ASEM Eco-Innovation Index (ASEI) 2013

Measuring Sustainable Future for Asia and Europe

ASEM SMEs Eco-Innovation Center

ESG Information, Analytics & Investment
SUSTINVEST

SMBA
Small & Medium Business Administration

SBC
Small & medium Business Corporation

The Second ASEM Eco-Innovation Index: 2013 ASEI 2013

Measuring Eco-Innovation for Sustainable Development in Asia & Europe

Full Report
November 2013

Sustinvest

Project Implementing Organization
Writer & Editor

About Sustinvest

Sustinvest is the first and leading SRI research and consulting institution established in Korea in 2006. Sustinvest is a think tank that provides actionable information and critical insight on extra-financial risks and opportunities of companies to enhance the decision-making process of the investor community. Sustinvest evaluates the ESG performance of companies and provides ESG analysis and advisory services to approximately 3.3 billion USD worth of SRI funds based on this evaluation system, as of June 2013.

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ASEIC

Ordering Organization

About ASEIC (ASEM SMEs Eco-Innovation Centre)

The ASEM SMEs Eco-Innovation Center (ASEIC) aims to promote eco-innovation for Small and Medium-sized Enterprises (SMEs) in Asia and Europe. Its establishment was endorsed by the leaders of ASEM member countries at the 8th ASEM Summit in Brussels, Belgium. ASEIC seeks to serve as an international platform where eco-innovation practices are shared and new green growth opportunities are created. ASEIC is currently funded by the Small and Medium Business Administration, the Republic of Korea. Its office is located in Seoul.

www.aseic.org

Disclaimer

The views expressed in this report are purely those of the authors and may not in any circumstances be regarded as stating an official position of the organisations involved.

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About ASEI

ASEI is a project for ASEM SMEs Eco-Innovation Center (ASEIC) to offer a measuring tool for eco-innovation and explore the examination of ASEM member countries using the developed tool.

Project website: *http://www.aseic.org/aeii/OverviewR.do*

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About the ASEM SMEs Eco-Innovation Center

The ASEIC was established in 2011 with the principal mandate of promoting Asia-Europe cooperation to create and enhance eco-innovation of small and medium sized enterprises (SMEs) in both regions. Having agreed upon the importance of SMEs as main engine of innovation and growth, ASEM member countries have joined together to create ASEIC as international platform where growing environmental regulations and eco-innovative technologies are shared and new business opportunities are created, and ultimately implementing the vision of green growth and sustainable development around the globe.

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Decoupling

The term decoupling refers to breaking the link between "environmental bads" and "economic goods" (OECD, 2011)

Eco-efficiency

Eco-efficiency is producing more goods and services with less energy and fewer natural resources (OECD, 2012)

Eco-industry

The core eco-industries are "those [identifiable] sectors within which the main – or a substantial part of – activities are undertaken with the primary purpose of the production of goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well
as problems related to waste, noise and eco-systems." (Ecorys, 2009)

Environmental Technology

Environmental Technology is a technology that advances sustainable development by reducing risk enhancing cost effectiveness, improving process efficiency and creating products and processes that are environmentally beneficial or benign. (EcoAP, 2012)

Energy efficiency

Encompasses changes that result in decreasing the amount of energy used to produce one unit of economic output (e.g., the energy used per unit of GDP) or to achieve a certain energy service (e.g., lighting, heating). Measures to increase energy efficiency include technological, organizational and behavioral changes. (UNIDO, 2010)

Environmental Research & Development

Research of environmental issues (air, soil, water, energy, waste, noise, etc.) and development of "end of pipe" pollution treatment and clean up solutions and "source prevention" solutions to prevent environmental impacts, through the development of "cleaner" technologies and the use of renewable raw materials, analyze environmental impacts (settlement of measurement and analysis instrumentation), clean up pollution (e.g. filtering or treatment processes). (Ernst & Young, 2006)

Green Business

Green business means innovative products to decrease environmental impacts and use fewer resources, as well as services that facilitate a better match between supply and demand of eco-innovative solutions and help eco-innovation into the market (European Union, 2011)

Green Competitiveness

Applying strategy to achieve productivity and overall performance of socio-economic development while reaching the goal of sustainable development (OECD, 2012)

Green Economy

In a green economy, growth in income and employment is driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services. (UNESC, 2011)

Green Growth

Green growth means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies. (OECD, 2011)

Green Technology

A general term used to for more environmentally friendly solutions. As such green technology for that matter can be used as environmental healing technology that reduces environmental damages created by the products and technologies for peoples conveniences. (A.N.Sarkar, 2013)

Indicator

A parameter or a value derived from parameters, which points to, provides information about, and describes the state of a phenomenon/area, with a significance extending beyond that directly associated with a parameter value. This definition points to two major functions of indicators (OECD, 1993)

Innovation

Innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations. (OECD, 2005)

Resource efficiency

Refers to the economic efficiency and the environmental effectiveness with which an economy or a production process is using natural resources. (OECD, 2011)

Resource Management

Comprises technologies and products to manage and/or conserve the stock of natural resources against depletion phenomena including both preventive and restoration activities as well as the monitoring and control of the levels and uses of natural resource stocks (OECD, 2011)

Resource Productivity

Measurement of how effectively resources are used i.e., how much product output is produced per unit of energy, water or material used (UNIDO-UNEP 2010b)

Recycled Materials

Production of equipment, technology or specific materials, or design, construction, installation, management or provision of other services for manufacturing new materials or products, separately identified as recycled, from recovered waste or scrap, or preparation of such materials or products for subsequent use. This category covers the production of secondary raw materials but not their subsequent use. (Ernst & Young, 2006)

Renewable Energy

Production of equipment, technology or specific materials, or design, construction, installation, management or provision of other services for the generation, collection or transmission of energy from renewable sources, including biomass, solar, wind, tidal, or geothermal sources. (Ernst & Young, 2006)

Sustainable Consumption & Production

Production and consumption of services and products that respond to basic needs and bring about a better quality of life, while minimizing use of natural resources and toxic materials as well as the generation of wastes and pollutants over the whole life-cycle of the product or service, as not to jeopardize the needs of future generations (UNEP 2002)

Sustainable Development

Sustainable development means integrating the economic, social and environmental objectives of society, in order to maximise human well-being in the present without compromising the ability of future generations to meet their needs. (OECD, 2001)

Waste Water Treatment

Production of equipment, technology or specific materials, or the design, operation of systems, plants and sites or provision of other services for the collection, treatment, handling, transport, reuse and management of waste water, cooling water and sewage. (Ernst & Young, 2006)

Acronyms and Abbreviation

CO_2	Carbon Dioxide
EC	European Commission
EcoAP	Eco-Innovation Action Plan
Eco-IS	Eco-Innovation Scoreboard
ETAP	Environmental Technologies Action Plan
EU	European Union
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GG	Green Growth
GGS	Green Growth Strategy
IEA	International Energy Agency
NGOs	Non-Governmental Organizations
R&D	Research and Development
SMEs	Small and Medium Sized Enterprises

Foreword by ASEIC

Both the global community and ensuing efforts towards sustainable development are gaining momentum daily. Likewise member countries of the Asia-Europe Meeting (ASEM) have been focusing on the role of small and medium sized enterprises in achieving sustainable development.

Korea's Small and Medium Business Administration(SMBA) established the ASEM SMEs Eco-Innovation Center (ASEIC) in 2011 with the endorsement of the ASEM member countries. Its establishment aimed to foster social and environmental transformation in tandem with the economic success of SMEs in the ASEM region through eco-innovation. Since its establishment, the ASEIC has been implementing field-oriented and forward-looking projects such as eco-innovation consulting for SMEs, appropriate technology transfers, eco-entrepreneurship training, international environment forums and the ASEM Eco-innovation Index, in cooperation with ASEM member countries.
The ASEM Eco-innovation Index(ASEI) was initiated to provide essential information for understanding the current status of eco-innovation, and for designing strategic eco-innovation development plans for ASEM member countries. Its first round of development started in 2012 analyzing the eco-innovation status of 15 ASEM member countries. ASEI is, therefore, a new and meaningful project which aims to reorient the dynamic potential of SMEs towards sustainable industry, of which the driving factor is eco-innovation.

Through eco-innovation, we can reduce the negative impact on the environment, preserve natural resources, and generate more jobs and income. We can also enhance organizational and institutional changes that will promote all of these changes.

This report is the result of the second round of ASEI development, which has tried to improve certain aspects in need of revision and supplement from the ASEI 2012. In the report, each ASEM member country shows a different eco-innovation status, reflecting their particular socio-cultural features. The ASEI gathers and provides extensive data, and interesting cases of eco-innovation, from across the ASEM region. This will help the member countries share the process towards sustainable development, as well as encourage mutual understanding and learning, and thus, mutual growth.

In the hope that the ASEM Eco-innovation Index becomes a global index that well supports our efforts in bringing the value of eco-innovation to the mainstream, I express my sincere appreciation to ASEIC's advisory committee for their contribution to the ASEI 2013.

Thank you.

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Foreword by Sustinvest

Since the introduction of the concept eco-innovation in 1996, eco-innovation has been emphasized as a way to meet current and future environmental challenges and promote future-orientated social and economic sustainability.

As a result, many Asian and European governments now regard eco-innovation as part of their long-term driver of sustainable development strategy. Yet, eco-innovation is a broad and evolving concept that requires continuous constructive research to capture and understand overall trends and prospective.

The ASEI project was launched as contribution to ASEIC, to monitor the national characteristics of eco-innovation overtime, the ASEM Eco-Innovation Index (ASEI) has been launched in 2012 for the first time. This year, it is the second attempt to quantitatively measure and qualitatively analyze the level of eco-innovation of the ASEM member countries. In comparison to the 1st ASEI, the 2013 second version of ASEI provides a clear explanation of the framework and methodology to enhance overall credibility of the project. It also had broadened the coverage of the ASEM member countries from fifteen to twenty-five countries. This measurement and analysis will offer various stakeholders how to better comprehend the evolving concept and design policy measures adequate for local contexts.

Sustinvest would like to thank our advisory board for accepting to be our advisors and for their active contribution. Acknowledging that there is room for improvement, Sustinvest will continue to put effort in positioning ASEI as a reliable international measurement for eco-innovation overtime.

Ryu, Young Jae

Chief Executive
Sustinvest

Highlights of ASEM Eco-Innovation Index 2013

This second ASEM Eco-Innovation Index (ASEI) report is in its second edition on the eco-innovation of ASEM member countries. The report recognizes the key role of eco-innovation as an accelerating driver of sustainable development of a country. It calls for the need to increase awareness on eco-innovation and for a multidimensional approach to understand eco-innovation in both developed and developing countries. This report looks at various aspects triggering eco-innovation, putting effort to keep track of the most current perceptive of the concept. Each government is aiming to gain sustainable competitiveness today and we see eco-innovation as a way to achieve this.

The ASEI 2013 examines 25 countries on 20 individual indicators. These individual indicators are aggregated into composite index to provide measurement with currently best available country data sources, to capture national status of eco-innovation. There is hope that quantitative study of eco-innovation would offer a snapshot of where we are: global and regional trends that policy makers can use as a foundation for making their decision that shape the future.

However, broad and not yet internationally agreed concepts of eco-innovation make it difficult to convert into simple measures. No consensus has been made on what eco-innovation is or how it can be measured, whether it is even measurable. In the midst of such continuous debate, ASEI hopes to be part of the broader imperative and practical studies in the field of eco-innovation.

With reference to quantitative metrics, qualitative research and analysis had been implemented in order to better capture the complex full eco-system of eco-innovation. This report tracks policy measures and national plan, involved national organizations and business best practices related.

Structure and Content of the ASEI Report

This report is presented in seven chapters. Chapter One summarizes the scope of the second ASEI project and clarifies its objectives. This chapter refines the concept understood and shows a snapshot of how the concept is evolving. Chapter Two presents how indicators had been selected and key literature reviews on eco-innovation and eco-innovation indicators, which we have referred to. In Chapter Three, a set of selected indicators for ASEI framework is introduced. It includes explanation on what is measured in each four criteria, underpinning theoretical background to support the grounds of the ASEI measuring framework. Chapter Four shows the overall result of all twenty five countries assessed and how missing data had been input. Chapter Five presents key analytical findings based on the ASEI result. Chapter Six analyzes ASEI result by country. For each countries measured, key national policies, programmes, strategies, networks and organizations on eco-innovation are illustrated. Overall analysis of each country is presented by integrating both qualitative and quantitative research considering each local context and condition. The last chapter, Chapter Seven aims to underline the imperative interconnection between eco-innovation and business actors. Role of business in eco-innovation is being increasingly emphasized. In particularly, the role of Small and Medium Enterprises (SMEs) is highlighted in this report. Finally, the report concludes with lessons learned and a way forward.

Chapter 1
Purpose of the ASEM Eco-innovation Index

The ASEI project was launched in 2012, as an integral part of a wider objective:

1) To increase awareness of eco-innovation paradigms and communicate the importance at the global stage;
2) To enhance quantitative data based eco-innovation analysis

The definition of eco-innovation used in this report is as follows;

"Eco-innovation is any form of innovation aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment or achieving a more efficient and responsible use of resources including both intended and unintended environmental effects from innovation as well as not only environmental technology but processes, systems and services."

European Commission, 2012

The ASEI is not meant to show the definitive ranking of countries with respect to eco-innovation. In other words it is not ASEI's purpose to define the laggards and frontrunners of eco-innovation by comparing ASEM member countries, or suggest a blueprint for successful eco-innovation policy measures and market instrument that can be replicable. Each country is at a different starting point for eco-innovation, and each country's capacity relies on its institutional settings, level of development, natural resource, human capacity, environmental conditions and other economic, social and environmental aspects.

Today, a variety of concepts has emerged such as green economy, green growth, and inclusive growth, to describe a way to combat current environmental challenges we face via changing from conventional economic pattern. Such similar and grand terminologies undervalue the eco-innovation concept. This report emphasizes the critical role of business and governments. Active development and wide diffusion of eco-innovation will bring a change in paradigm at national, regional and global levels.

The significant work done since the mid-1990s around eco-innovation has contributed to a broader understanding of the concept. Eco-innovation has evolved through five flows since it was first introduced in 1996. Each country can be at different stages of the following waves.

- *First Wave*: Understanding eco-innovation as environmental technology advancement
- *Second Wave*: Establishment of regional initiatives and programmes on eco-innovation
- *Third Wave*: Acknowledging eco-innovation as an engine for national sustainable development
- *Fourth Wave*: The role of business and understanding the non-technological side of eco-innovation
- *Fifth Wave*: Diffusion of eco-innovation in both developed and developing countries & Importance of SMEs

Chapter 2
ASEM Eco-Innovation Index Development Process

No agreement hitherto exists on a set of indicators that accurately measure eco-innovation. Thus, ASEI is an evolving project focusing on a handful of proposed indicators for eco-innovation which always carries room for improvement.

There have been few cases where a preliminary set of eco-innovation indicators was proposed but actual measuring procedure had been neglected. Much of these studies merely introduced important indicators for examining eco-innovation status at a company, industry or national level. Each of these sets is different depending on where the focus lies.

This chapter presents the development process of ASEI and how we have appropriately selected eco-innovation indicators considering conceptual coherence. We chose the indicators through a careful selection process that included the following: a review of eco-innovation literature, AHP process, consultation with experts and checking of available data sets.

Indicator Selection Process:

1) Research key indicators introduced via literatures and related indexes;
2) Engage expert group via Analytic Hierarchy Process (AHP) to find relevant indicators;
3) Check availability data sources for each indicators;
4) Consultation and confirmation by renowned global professionals

Chapter 3
ASEM Eco-Innovation Index Framework & Indicators

The ASEI model has evolved over for only two years and it only examines a partial picture of the complex "eco-innovation eco-system". This report provides a measurement framework storyline for greater analytical rigor of the index.

The ASEI measures eco-innovation using the following four criteria.

1) *Eco-innovation Capacity*: aims to capture the country's mental attitude towards eco-innovation by examining the potential each country carry to implement eco-innovation at the practical level.
2) *Eco-innovation Supporting Environment*: gears "eco-innovation capacity" to transform into practical tools that actually facilitate the implementation of eco-innovation activities as the market itself cannot trigger the diffusion or activation of eco-innovation.
3) *Eco-innovation Activities*: focuses on the firms' contribution towards eco-innovation such as green patents, level of environmental management and commercialization of green technology that can affect eco-innovation at industry and national economy levels.
4) *Eco-innovation Performance*: measures the overall

national economic, social and environmental competitiveness that eco-innovation can bring in the long term.

Each of the four criteria is composed of individual indicators (20 in total).

Storyline of ASEI Framework

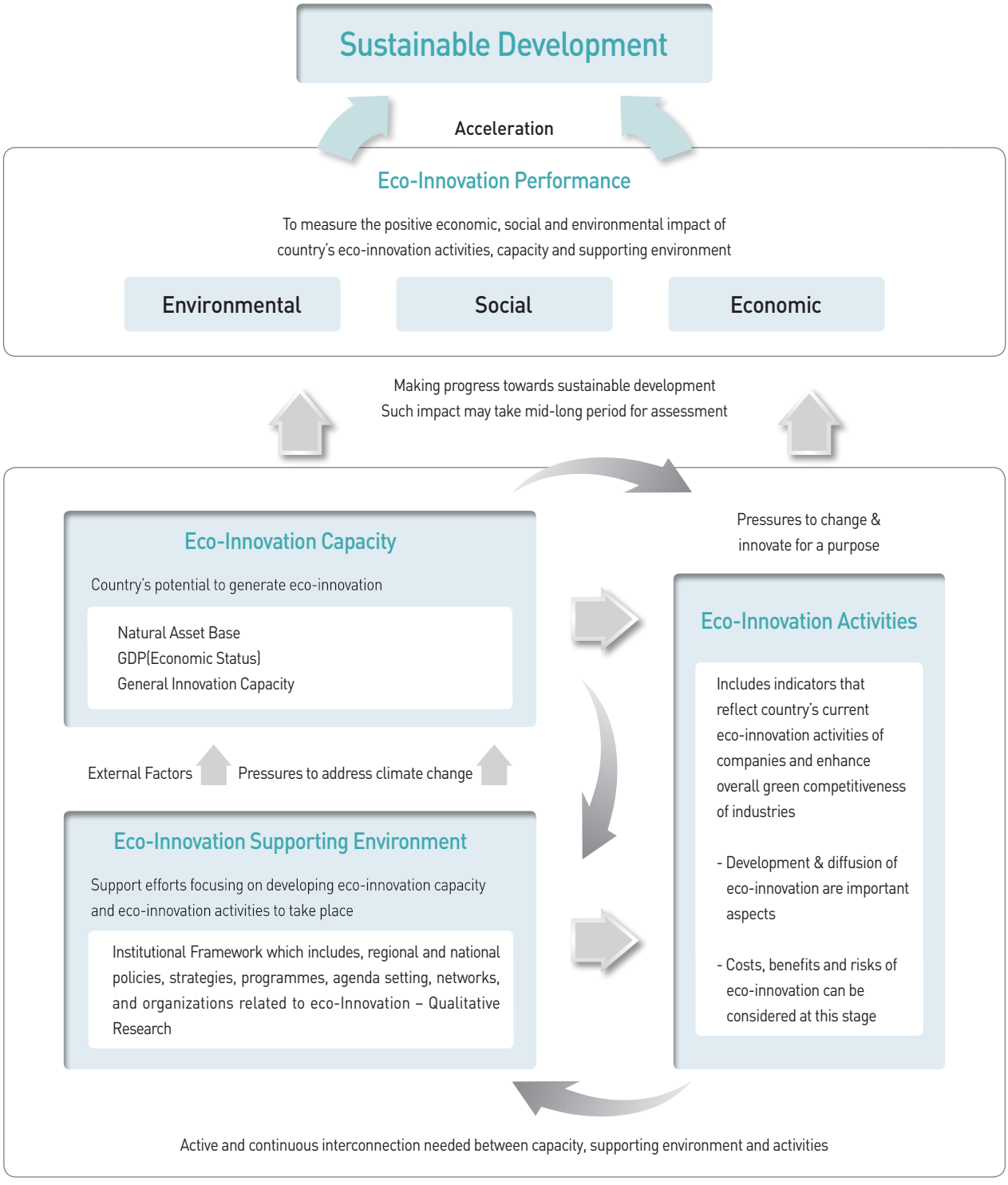


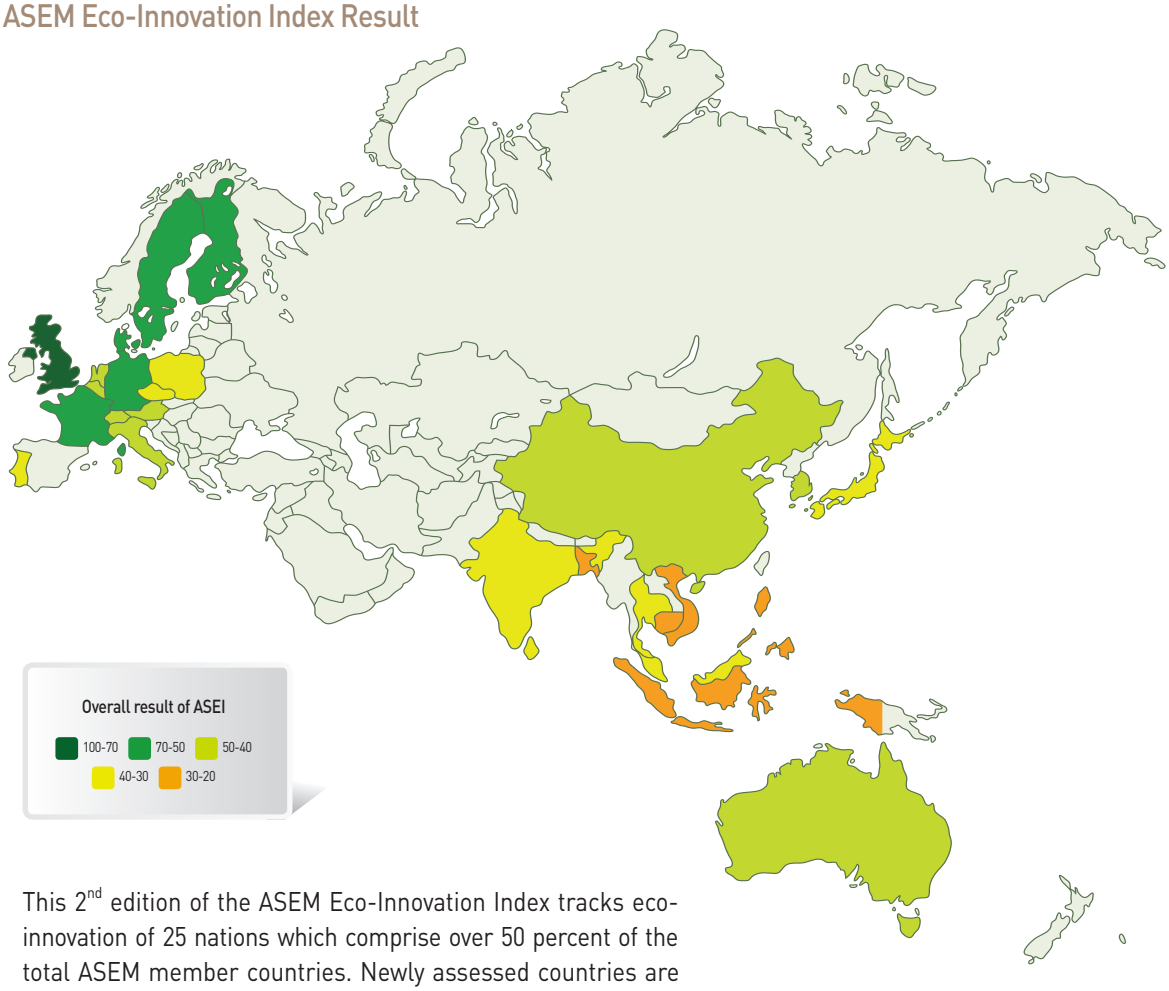
Fig 6. Storyline of ASEI framework

(Source: Own Elaboration)

While there is no widely accepted answer to appropriate set of an eco-innovation index, we believe that ASEI indicators cover a comprehensive yet manageable body of information on core eco-innovation issues. The ASEI framework incorporates all high priority issues including green technology, environmental R&D, green patents, green market and others. It aims to spell out some of the critical drivers of successful eco-innovation performance. The ASEI 2013 tried to go beyond the traditional measures of eco-innovation merely focusing on level of green technology in a country.

This year, ASEI framework had been updated and revised. Depending on the decision to use 'stock' and 'flow' measure for each indicator, the time series of data sources differ. In accordance to each individual indicators used, measuring factor, reference year and data source used have been shown clearly in the appendix of this report.

Chapter 4
ASEM Eco-Innovation Index Result



This 2nd edition of the ASEM Eco-Innovation Index tracks eco-innovation of 25 nations which comprise over 50 percent of the total ASEM member countries. Newly assessed countries are shown in bold below.

Australia	**Czech Republic**	Germany	Korea	**Portugal**
Austria	**Cambodia**	India	Malaysia	Sweden
Bangladesh	Denmark	Indonesia	**Netherlands**	Thailand
Belgium	France	Italy	**Philippines**	United Kingdom
China	**Finland**	Japan	**Poland**	**Vietnam**

ASEI Result Mapping

Chapter 5
Result Analysis

By extending the number of countries in the ASEI 2013, from fifteen to twenty-five countries, more in-depth regional comparative analysis between European and Asian countries had been possible compared to the 1st ASEI. Going beyond the traditional evaluation of regional analysis, this time, the ASEI data has been flexibly utilized in order to look the result through different perspective.

Criteria level Analysis

- The "eco-innovation capacity" criterion result of each country shows the strongest correlation with the each country's overall result. From our analyses, the capacity gap between European and Asian nations is relatively large.
- In "eco-innovation supporting environment" criteria, United Kingdom is placed as the top performer leading with a wide gap with other countries. It is noticeable that China and India's eco-innovation supporting environment reaches the level of the European countries. Qualitative analysis on China and India's institutional framework proves that they are preparing to form a firm foundation to support eco-innovation activities. Meanwhile, the rest of Asian nations fall behind.
- "Eco-innovation activity" and "eco-innovation performance" showed the narrowest disparity between top and bottom tier performers among the four criteria of ASEI. Top tier group of countries performing well in "eco-innovation performance" are likewise reflecting high score in overall score of ASEI.

Income Group Peer Analysis

To compare the results of similar peer groups by national income level, 25 member assessed countries were grouped into three income categories: 1) high income (16 countries), 2) middle income (7 countries) and 3) low income countries (2 countries). All countries' ASEI result were compared against the average of the group each country belongs to.

- In case of the high income group, United Kingdom, Sweden, France, Denmark and Germany showed above average scores in each four criteria.
- For the middle income group, China was the only country that showed an above average score.
- With regards to the low income group, there was a limitation in the comparison and analysis as there were only two countries that belonged to this group.

Income level correlates highly with ASEI scores: higher the income, higher the ASEI score. In particular, large gap difference between peer groups was shown in "eco-innovation capacity", "eco-innovation supporting environment", and "eco-innovation performance". The gap is wider in other three criteria, wider respectively: eco-innovation supporting environment, eco-innovation performance and eco-innovation capacity. "Eco-innovation activities" shows the lowest gap between the three peer groups. Disparity within eco-innovation capacity and performance was found to be larger because these two criteria reflect a nation's fundamentals which include economic infrastructure, education, scale of investment, R&D capacity, natural resource and environmental condition, which takes a long period to shape and organize. Meanwhile, eco-innovation supporting environment and activities showed the lowest gap between the peer groups. It is viewed that these two criteria includes indicators that shows short-term impact or force of eco-innovation.

The eco-innovation gap between the peer groups is difficult to reduce in a short period of time. However, there is potential for quicker growth by accelerating the development in eco-innovation activities and supporting environments where the gap between different income peer groups is small and impact period is shorter. It is expected that better policy and national strategies of low-income countries would demonstrate more direct impact to their economy, society and environment. International collaboration between peer groups can also narrow the gap.

Regional Analysis: Europe & Asia

Eco-Innovation in Asia

- Most of the Asian countries' ASEI results fall behind the European Countries
- Within the region, China, Japan and Korea score high while less developed emerging countries are catching up fast
- Eco-innovation activities criteria score varied the most between Asian countries
- Although European countries mark the top tier of the list, Asian countries have been identified to have high Eco-innovation Capacity scores. It is significant to note Malaysia and India's score high in this criteria
- Regional initiatives or policy schemes have not developed yet; however, bilateral or multilateral

national networks are being created.
- Additionally, more international events are taking place in Asia such as Sustainable Product Innovation in Vietnam, Korea-China Cooperation Forum for Green Industry and Conference for Green Business Malaysia-Europe Forum Roundtable Series on Sustainability.

Eco-Innovation in Europe

- Most of the European countries show high scores in ASEI, dominating the top tier of the list
- United Kingdom and Sweden rank top while Eastern European countries fall behind when compared within the region.
- European countries' Eco-Innovation Capacity and the Eco-Innovation Performance criteria scores show the strongest correlation with the overall ASEI results
- The European Commission understood that eco-innovation is a crucial aspect to improve economic, social and environmental competitiveness of Europe since the early days.
- The first regional initiative for eco-innovation was launched in 2004: the European Commission's the Environmental Technologies Action Plan (ETAP). In 2010, the ETAP was revised to the Eco-innovation Action Plan (EcoAP) and, together with the Europe Strategy 2020; eco-innovation became the European Commission's major development strategy.
- In Europe, which has the high level of Eco-innovation, R&D activities and innovative trials are strong that ■ In Europe, SMEs have been the main target of eco-innovation initiatives and programmes at the national and regional level.

Green Technology Analysis

ASEI used five indicators, using the Cleantech Database to capture green technology sector contribution to national eco-innovation.

Although, there are increasing discussions on stressing non-technological eco-innovation and of its impact, we acknowledge that green technology related indicators are a good source to capture partial pictures of current eco-innovation status. It is also true that the contribution of green technology towards eco-innovation is still dominant today.

United Kingdom scored high for all of the green technology related indicators. The indicators have shown France has vibrant investment environment for green technology while Finland, Sweden and Denmark show competitiveness in green technology firms. European countries are showing to be proactive in stimulating the green technology industry by via actively financing SMEs and networking between firms.

As Asian countries, China and India have scored high in green technology indicators in comparison to other Asian countries. China and India are known to invest heavily in R&D and commercialization of green technology, not falling too far behind the frontrunners of European countries. China and India's huge investment in green technology and related R&D, is prospected to trigger a strong eco-innovation drive within the next ten years. Other Asian countries including Korea and Japan, where green technology has been the key word in the national sustainable growth agenda, still fall behind in the scale of investment and infrastructure on green technology.

Prospective Analysis: Global Eco-innovation Capacity Trend

Each country has different eco-innovation capacity and resources to trigger eco-innovation. Capacity is a significant factor affecting mid to long term eco-innovation performance. In order to do so, capacity needs to be converted and processed to impact the overall eco-innovation status of a nation. "Capacity" is viewed as the fundamental in this report as well as in the ASEI measuring framework. It represents "absorptive capacity"[1] needed for wider diffusion of technology and knowledge as well as ability to integrate sustainable growth agenda into traditional development approach. From this perspective, we can attentively predict the potential growth of nations that score high in eco-innovation capacity, although this criterion only depicts partial picture of the wider and complex eco-system of eco-innovation capacity.

Most of the assessed twenty five countries received high scores in eco-innovation capacity criteria compared to other three criteria. Each four countries from Europe and Asia with high eco-innovation capacity compared to other three criteria had been selected from our prospective analysis. In Europe, the countries selected were Denmark, Netherlands, Austria and Poland and in case of Asia, Australia, India, Malaysia and Vietnam. These eight countries have not scored high overall eco-innovation national scores yet they are predicted to have great growth potential.

1) OECD (2012), Inclusive Green Growth for the Future We Want
OECD (2012), Greening Development Enhancing Capacity

For Denmark, Netherland, Poland and Austria, they are creating eco-innovative industries through new business opportunities. In particular, Denmark, Netherlands and Austria with already achieving high score in eco-innovation performance have developed its eco-innovation capacity by strengthening partnership and networks. Though Australia reveals low eco-innovation performance score compared to eco-innovation capacity, the government's current active role in promoting eco-innovation is worthy of attention from a mid to long term perspective. Economic development is an important issue for Poland and India and as part of their economic growth strategies, are seeking appropriate ways to develop sustainable economic growth. To do this, both countries are seeing eco-innovation as a way to achieve this; they are investing heavily on eco-innovation related R&D and infrastructure. Malaysia has put productivity innovation and environmental values as their long term development strategy and Vietnam is activating eco-innovation industries by attracting foreign investment. We attentively introduce these countries as countries with high potential to enhance their eco-innovation level in the future.

Chapter 6
Country Level Analysis

With acknowledgement of the importance of understanding each country's cultural, social, economic, environmental and political contexts in order to comprehend various driving force of eco-innovation in different local contexts, this report has integrated the quantitative results of ASEI 2013 and qualitative research on national measures and activities that promote eco-innovation.

ASEI's result analysis demonstrates that rate and patterns of development and diffusion of eco-innovation tend to vary from country to country. Yet it tends to be that the more determined a country's sustainable development targets and envisions, the higher that the country scores high in ASEI. Each country's level of eco-innovation capacity tends to differ nationally.

This chapter goes beyond the quantitative findings of ASEI and sees the local context, institutional framework and conditions that is promoting eco-innovation.

This chapter specifically:

- Analyzes relationship between quantitative and qualitative research and integrate both research to provide key feature analysis of a country's eco-innovation status.
- Identifies national policies, programmes, vision, strategy, network and partnerships promoting eco-innovation at local level.
- Highlights high priority issues in the field of eco-innovation.
- Identify whether each national government has particular industries they push and focus their efforts to generate eco-innovation of firms.
- Examine key instruments that trigger eco-innovation, sustainable development and eco-innovation of firms.
- Distinguish distinctiveness and similarities between the countries.

Research has shown that rarely does a country offer direct eco-innovation policy frameworks and programmes. Rather, eco-innovation is promoted under multifaceted concepts and combination of policy instruments.

Eco-innovation advanced countries are aiming to gain sustainable competitiveness today and are seeing eco-innovation as a way of achieving this. In such point in time, it is necessary to see where each country stands in terms of eco-innovation in comparison to other countries and regions. ASEI hopes to provide related stakeholders and key decision-makers extensive analytical information on different national approaches to eco-innovation.

This report hopes to push each government to create specific action plans and broader strategies on the basis of our analysis and evidence. This would be beneficial specifically to those countries that have not yet formed eco-innovation policy objectives or actions, which would be mostly developing countries.

ASEI projects hopes to stimulate flexible policy learning and positively influence regional and national policy making processes rather than generating a search for a set blueprint for successful eco-innovation. There is no blueprint or enough evidence on exactly what types of eco-innovation can trigger sustainable growth. No correct answer exists, but this report provides room for flexible and creative thinking at different local contexts.

Chapter 7
Business Perspective Towards Eco-innovation

This report emphasizes the critical role of business and governments, and looks at the linkage and impact between macro level (country) and micro-level (company) eco-innovations. The logic behind such emphasis comes from

the understanding of nature and practice of innovation today: the positive and grand impact business can bring to our environment and society in the future. This chapter aims to capture the degree of interconnectivity between business and national eco-innovation competitiveness, triggering acceleration in reaching sustainable development.

Eco-innovation can make firms more competitive in the near future. As mentioned frequently throughout this report, businesses are the key drivers and enablers of eco-innovation. Innovative firms today are quickly becoming as solution providers concerning environmental and social challenges and they will determine the success of eco-innovation at the country level. Corporations, SMEs and start-ups have the capacity to innovate, change and diffuse new concepts, products, processes and technologies and their activities can bring far greater impact and opportunities in the future than the present. The integration of both non-technical and technical approaches to eco-innovation will allow a specific industry to break away from resource intensive growth and towards sustainable development. It is vital that businesses find their unique strengths and understand local dimensions and efficiently use of local supporting environment.

Innovation today allows SMEs to be more flexible in integrating eco-innovation concepts into their operation, product and strategy, and thus can be more inventive than larger corporations with rigid eco-system in the long run. More SMEs are expected to challenge many existing eco-innovation related technologies, processes, products and solutions of bigger companies. In contrast to a few literature that underestimate the role of SMEs in implementing eco-innovation in practice due to limited resource capacity, capital and advanced technology, this report emphasizes the radical potential and greater opportunities SMEs possess in triggering eco-innovation. More recently, there has been an increase in the number of SMEs that develop and trade green technology solutions and products which comes under the paradigm of eco-innovation. Many national governments are building networking stages for SMEs to gear eco-innovation activities as eco-innovations can be developed and commercialized as a result of the interactions of firms themselves.

This report aims to emphasize the increasing role and potential of SMEs so that this chapter provides information to SMEs of what can be done within such size of business by offering business case studies.

Conclusion

International organizations have extended their research on eco-innovation. However, academic studies and statistical data sources on eco-innovation are still limited today. In line with the growing interests towards eco-innovation, advanced data and studies will be required in the future. Thus, ASEI calls for the need for further development of data sources, in-depth study and discussion on eco-innovation.

Yet, the 2nd edition of ASEI hopes to mark a forward stride in the development of the latest research on eco-innovation and its measurement, steering individual countries and deliver greater impact to the targeted users. The ASEI analysis can assist in monitoring the determinants of eco-innovation progress overtime and provide a snapshot of the evolving global trend of eco-innovation.

While the ASEI 2013 still faces barriers, we are stepping forward to overcome them one at a time. The biggest barrier that we currently face is the lack of available data for Asian ASEM member countries. Yet, ASEI has been more focused on improving the framework and extend deeper understanding of eco-innovation. As a way to make up for such limitations, we have applied qualitative research into our analysis. Overall the ASEI 2013 represents a work-in-progress.

Each country has a different level of understanding of eco-innovation and thus, different short, medium and long term approaches that should be taken to promote different dimensions of eco-innovation at the national level. Eco-innovation can provide a window of opportunities for both developing and developed countries in a variety of ways. Nations need to optimize the interplay of institutions and the interactive processes, application and diffusion of eco-innovation. Success in eco-innovation requires a holistic approach to progress.

The ASEI framework will be revised every year as new data sources become available, and as the concept evolve. The 3rd ASEI 2014 will expand the coverage of countries measured. We endeavor to constantly offer the most advanced research in the field of eco-innovation. We hope that this report has laid another foundation to this process.

Introduction

Today, a variety of related concepts such as green economy, green growth, inclusive growth are used by each national governments to describe their path to combating climate change through the change of conventional economic pattern. These grand terminologies underestimate the concept of eco-innovation itself as a key engine for innovative sustainable growth. Eco-innovation can accelerate the reaching of sustainable development targets set at national, regional and global levels. This report provides better understanding on how this notion works. The 2nd ASEI 2013 report hopes to mark a forward stride in the development of latest research on eco-innovation and its measurement.

The ASEM Eco-Innovation Index (ASEI) project was launched in 2012, to primarily discover an appropriate measurement framework that monitors the status of eco-innovation at the national level.

This was an integral part of a wider objective outlined below;
1) Increase the awareness of eco-innovation paradigms and discuss its importance at an international stage and;
2) Enhance quantitative data based eco-innovation analysis

The ASEI index aims to act as a main agent for eco-innovation future agenda setting, supporting and leading to policy formation, monitoring and evaluation, and facilitation of discussions among various stakeholders including businesses. This report is an extended study of the previous ASEI 2012. As highlighted in the first ASEI 2012 report, ASEI merely marks as a starting point in representing only a portion of the full picture of eco-innovation in quantitative dimensions. Since the first publication of the ASEI in November 2012, we extended our research methodology, scaling up our capacity for enhanced analysis. In the ASEI 2013, we have improved critical and logical reasoning behind the ASEI framework and selected sets of eco-innovation indicators. This year, we improved our ASEI framework by revising what we measure via individual indicators. This report explains how eco-innovation has evolved, and has spotted significant trends hitherto. The ASEI 2013 report received feedbacks from a wider range of experts made up of renowned experts in sustainability arena. We made an effort to be transparent as possible in illustrating the barriers and limitations that we faced in preparing this report. ASEI needs continuous improvement, as the concept evolves and related statistical data sources become more readily available.

This report is divided into seven chapters. Chapter One summarizes the scope and dimension of the second ASEI project and clarifies its objectives. This chapter in addition introduces how the concept is understood and how the concept and scope of analysis have evolved overtime. Chapter Two presents how the ASEI measurement framework has developed and improved since its launch. This chapter shows the key literatures and previous proposals of eco-innovation indicators. This chapter also includes explanation of current research gaps and ways to overcome such barriers in the future. In Chapter Three, a set of selected indicators for ASEI framework is introduced. It includes explanation on what is measured in each four criteria, underpinning theoretical background to support the grounds of the ASEI measuring framework. Chapter Four shows the overall result of all twenty five countries assessed using twenty selected indicators and how missing data had been inputted. The chapter includes simple mapping of the overall ASEI result. Chapter Five presents key analytical findings based on the ASEI result. We have sliced the overall ASEI data by criteria, income level and regional to better analyze the results. Country level quantitative and qualitative analysis of twenty five countries (12 European countries and 13 Asian countries) is included in Chapter Six. This chapter illustrates the key national policies, programmes, strategies, networks and organizations on eco-innovation referring to each local context. Such qualitative research hopes to provide additional information in order to understand the full picture of each country's eco-innovation activities and efforts. Acknowledging that eco-innovation is a rather complex concept which cannot be fully comprehended by quantitative data, we hope that the qualitative research may reduce the current quantitative research gap. The last chapter, aims to underline the imperative interconnection between eco-innovation and business actors. The role of businesses in eco-innovation is being increasingly emphasized. In particularly, the role of Small and Medium Enterprises (SMEs) is highlighted in this report. Selected case studies of SMEs which has so far implemented successful eco-innovation are presented, revealing a hopeful future for SMEs. In addition, it describes selected regional and country level initiatives and projects that support businesses to push eco-innovation. Finally, the report concludes with lessons learned and a way forward.

Chapter 1
Purpose of the ASEM Eco-Innovation Index

The definition of eco-innovation used in this report is as follows;

"Eco-innovation is any form of innovation aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment or achieving a more efficient and responsible use of resources including both intended and unintended environmental effects from innovation as well as not only environmental technology but processes, systems and services."

European Commission, 2012

Chapter 1

The 2nd ASEI 2013 report hopes to mark a forward stride in the development of the latest research on eco-innovation and its measurement. The ASEI 2013 project aimed to better capture the degree of interconnectivity between companies and national eco-innovation competitiveness, accelerating the reaching of sustainable development. The main objectives of ASEI and the measuring of eco-innovation include; 1) tracking evolving eco-innovation trend, 2) monitoring national progress towards sustainable development through eco-innovation, 3) providing better qualitative and quantitative advanced study on eco-innovation, 4) encouraging formation of eco-innovation policy and agenda setting based on in-depth research, 5) identifying drivers and barriers of eco-innovation at different local contexts and 6) capturing the close relationship between eco-innovation and sustainable development of a nation. This chapter explains the scope of the project, details of the project implementation process and our understanding of eco-innovation. Since the introduction of the eco-innovation concept, it has evolved in the last fifteen years; this development is summarized in this chapter.

Scope of the 2nd ASEI Project

The scope of this study includes examining eco-innovation level of ASEM member countries, improving current ASEM eco-innovation index (ASEI), spotting current trends of eco-innovation and exploring each examined country's future potentials of eco-innovation.

Objectives of measuring eco-innovation & ASEI

- Spread concept of eco-innovation a broad range of stakeholders
- Track evolving eco-innovation trends
- Promote eco-innovation activities on a firm level, as firms are the key drivers of eco-innovation
- Monitor national progress towards sustainable development through eco-innovation
- Provide better qualitative and quantitative advanced study on eco-innovation
- Encourage formation of eco-innovation policy and agenda setting based on in-depth research
- Spot overall global trends of eco-innovation
- Enhance international trade of eco-innovation products and services between developed and developing countries
- Identify drivers and barriers of eco-innovation at different local contexts
- See the close relationship between eco-innovation and sustainable development of a nation

Table 1. Objectives of ASEI project

While the ASEI 2012 aimed at laying emphasis on introducing the unfamiliar concept, and selecting an appropriate set of indicators measurable for both European and Asian countries, the ASEI 2013 hopes to go further ahead. The 2nd ASEI 2013 focused on enhancing the credibility of the ASEI methodology, framework logic and reasons for selecting individual indicators. It presents a wide range of findings on eco-innovation trends and strengths each country possesses in order to trigger prospective eco-innovation.

The second ASEI project involved the following steps.

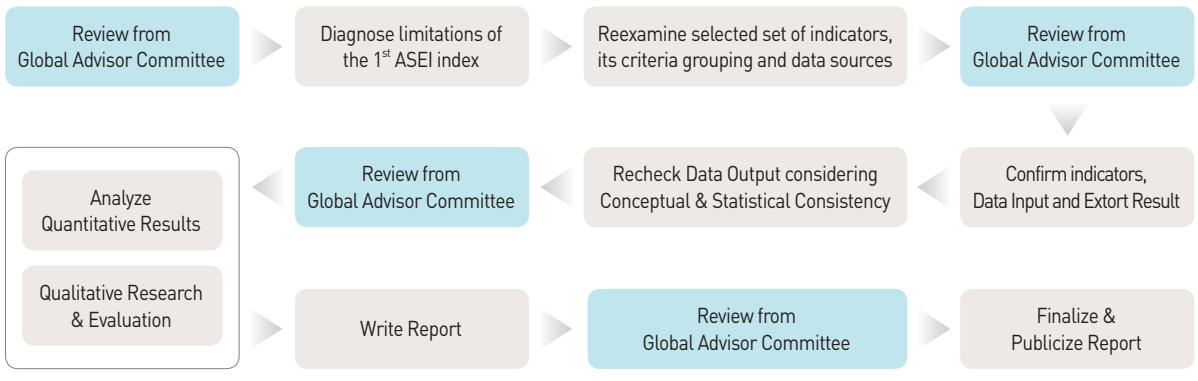


Fig 1. Steps involved in the 2nd ASEI Project

ASEI's Understanding of Eco-Innovation

The definition of eco-innovation used in this report is as follows;

"Eco-innovation is any form of innovation aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment or achieving a more efficient and responsible use of resources including both intended and unintended environmental effects from innovation as well as not only environmental technology but processes, systems and services."

European Commission, 2012

More frequent appearance of the term "eco-innovation" in reports published by key international organizations, in part proves how the role of eco-innovation increasingly discussed in sustainable and environmental facets of a nation's development. The term "eco-innovation" introduced in such reports retain a broader meaning than previously understood. In a recent UNIDO (2013) report, explains that "eco-innovation has a wider notion and includes the development of new products, new business models, new behavior of consumers and new policy instruments and frameworks." [2]

Innovation is more complex today and thus, so is eco-innovation. Innovation today involves more interactive procedure, radical breakthrough, and can give greater impact to our environment and society. Today's innovation may not always be based on science and technology. Likewise, eco-innovation does not merely stand for advanced development and utilization of environmental technology. In the future, the understanding of eco-innovation may be broadened even further or change in relation to evolving trends and society needs. It is uncertain how flexible or ground-breaking future innovation would be, and thus equally how eco-innovation would emerge on a firm, industry and/or country levels. As such, eco-innovation may have the enormous potential to resolve environmental challenges and other socio-environmental problems in both developed and developing countries. Broader developments of replicable and transferrable eco-innovation solutions from developed countries to developing countries, or vice versa, would bring "a change in paradigm" in tackling macro global challenges that all countries face.

The diagram below summarizes where ASEI puts its focus in evaluating countries' eco-innovation status.

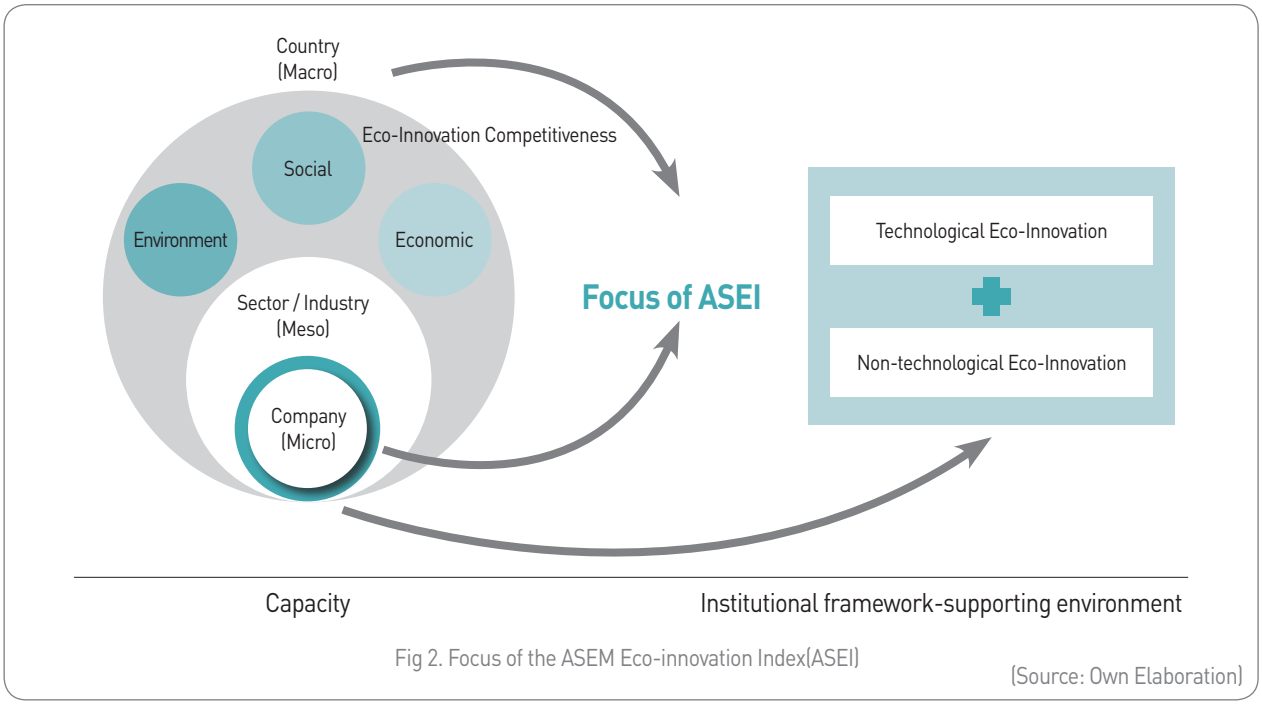


Fig 2. Focus of the ASEM Eco-innovation Index(ASEI)

(Source: Own Elaboration)

2) UNIDO (2013), Green Growth: From labour to resource productivity

History of Eco-Innovation

Since the first introduction of the concept, eco-innovation, it has evolved to become the key word for a new growth engine for decoupling economic growth with environmental loads. The concept was first introduced in 1996 via an academic literature written by Claude Fussler and Peter James. In their writing, the concept was described as "new products and processes which provide customer and business value but significantly decrease environmental impacts".[3]

The evolution of the concept contains five flows. Each of these flows are not consecutively aligned, nor does it come chronologically; rather each flow has become the groundwork for the other that follows. The five flows identified show the key features the concept has carried over fifteen years since it was launched. It is vital to recognize that different countries are at different steps in acknowledging the key features of eco-innovation seen in the diagram. Some eco-innovation frontrunners will acknowledge the importance of all five key features below but for some developing countries, understanding of eco-innovation can be neglected or very narrow, for example, merely understanding eco-innovation as environmental technology advancement.

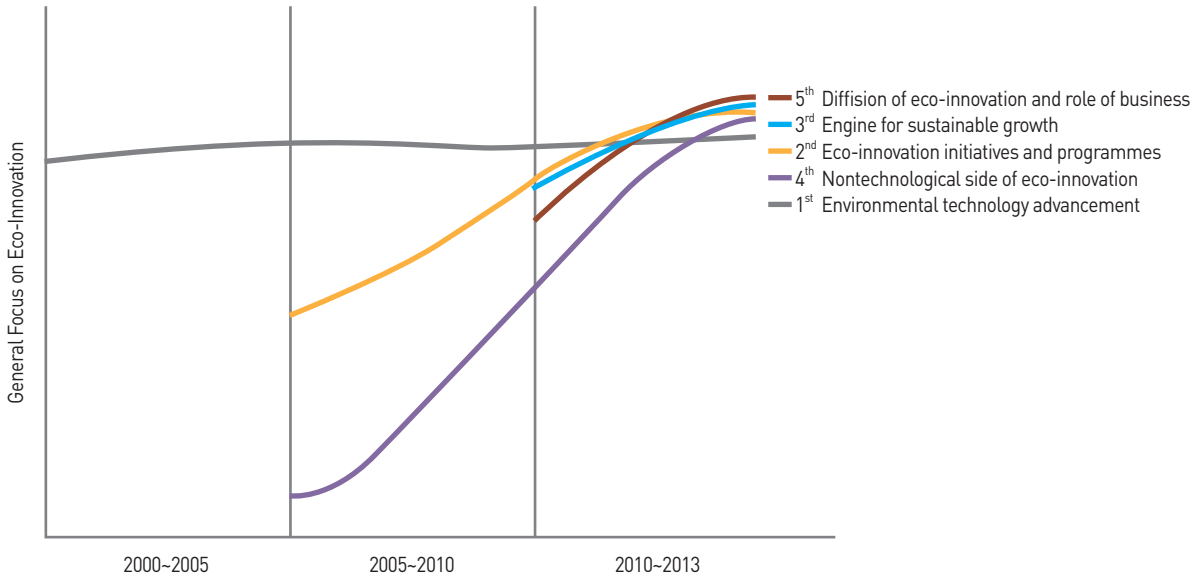


Fig 3. Key Five Flows of Eco-innovation

(Source: Own Elaboration)

First flow: Understanding eco-innovation as environmental technology advancement (Gray)

The first ten years after the concept, became realized, eco-innovation was understood as environmental technology advancement. As a demonstration, in 2004, the European Commission launched the Environmental Technologies Action Plan (ETAP) to promote eco-innovation and wider use of environmental technologies. This action plan emphasized the use and development of environmental technologies. However, in 2011, this action plan changed its name to Eco-innovation Action Plan (EcoAP), removing the word "environmental technology". The EU states that the "EcoAP is a significant step forward for eco-innovation, moving the EU beyond green technologies and fostering a comprehensive range of eco-innovative processes,

3) Fussler, C. & P. James, (1996), Driving Eco-Innovation: A Breakthrough Discipline for Innovation and Sustainability, Pitman Publishing: London

products and services."[4] Nevertheless, at the time of establishing ETAP, the EU's simple understanding of eco-innovation narrowed down to development and promoting the use of environmental technology. The shift represented the EU's step towards deeper and comprehensive understanding of eco-innovation.

Second flow: Establishment of regional initiatives and programmes on eco-innovation (Yellow)

To spread the concept of eco-innovation, various organizations, forums, initiatives and projects were established in the 2000s. As the frontrunners of eco-innovation, the European countries looked for opportunities to promote eco-innovation at the regional level. The EU published various research reports on eco-innovation and eco-industry. In 2007, the EU launched the "Measuring of Eco-innovation" project, which was published in collaboration with the UNU-MERIT[5] and in 2008 it launched the Eco-Innovation Observatory (EIO). The Eco-Innovation Observatory is a three year initiative financed by the European Commission's Directorate-General for the Environment from the Competitiveness and Innovation framework Programme (CIP)[6]. The EIO is known to directly confer with EcoAP (mentioned above) and Europe INNOVA[7]. The EIO was established to provide information source on eco-innovation for various stakeholders, so that the information can be used in the decision making process for policy development. One of the main projects of EIO is the Eco-IS (Eco-innovation Scoreboard), which measure eco-innovation of European countries. Asia took longer to acknowledge the importance of eco-innovation and, as such, much of the initiatives or projects related to eco-innovation started in 2010s. For example, ASEM SMEs Eco-innovation Center (ASEIC)[8] was established in 2011, to promote Asia-Europe cooperation to promote eco-innovation of small and medium sized enterprises.

Third flow: Acknowledging eco-innovation as an engine for national sustainable development (Blue)

Governments of developed countries started to acknowledge and discuss eco-innovation as part of the key resolution to the rise of environmental challenges. International organizations such as the OECD emphasized the importance of eco-innovation in national growth strategy. The OECD published reports to deliver such messages since late 2000s via the following reports, "Eco-innovation policies in the People's Republic of China" (2009), "Eco-innovation policies in Australia" (2008), "Eco-innovation in Japan" (2008), "Eco-innovation in Korea" (2008), "National Approaches for Promoting Eco-innovation, COUNTRY PROFILES of Eight Non EU OECD Countries" (2008), "Analyzing National Policies and Business Best Practices on Eco-Innovation" (2010), "Better Policies to Support Eco-Innovation, OECD Studies on Environmental Innovation" (2011), "Policies for the development and transfer of eco-innovation" (2009), urging the OECD countries to include eco-innovation in the policy making process as a way to enhance economic competitiveness. In case of Europe, in support of the European Commission's push for promoting eco-innovation, European countries have made eco-innovation key issue for national development.

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4) http://ec.europa.eu/environment/ecoap/about-action-plan/objectives-methodology/index_en.htm

5) UNU-MERIT is a research and training centre of United Nations University and works in close collaboration with the University of Maastricht

6) Competitiveness and Innovation Framework Programme (CIP): "With small and medium-sized enterprises (SMEs) as its main target, the Competitiveness and Innovation Framework Programme (CIP) supports innovation activities (including eco-innovation), provides better access to finance and delivers business support services in the regions. It promotes the increased use of renewable energies and energy efficiency. The CIP runs from 2007 to 2013 with an overall budget of 3621 million Euros.", CIP Website

7) Europe INNOVA: "Throughout 2006-2012, Europe INNOVA has been the laboratory for the development, testing and promotion of new tools and instruments in support of innovation, with a view to helping innovative enterprises to innovate faster and better. Thus, it has served as a pan-European platform for innovation professionals, enabling them to discuss, develop, test and exchange 'better practices' in support of innovative SMEs and to contribute to a better understanding of the innovation patterns in different sectors. Under each IP, public-private partnerships developed and tested new innovation support services for SMEs. Eco-IP has experimented with new forms of mediation between those companies that possess prototype eco-innovative solutions and those that could be willing to test these as first users with a view to help bridging the demand for, and supply, of environment-friendly solutions, in areas such as bio-based products, recycling and resource efficiency, water management and the food & drinks industry. The European Innovation Platforms have been supported by a number of actions providing innovation analysis (European Cluster Observatory, the Eco-Innovation Observatory (managed by DG Environment) and the Sectoral Innovation Watch), innovation management (IMP3rove) and the promotion of novel results, tools and services (KISPLATFORM, ECOLINK+ and TAKE IT UP." Europe INNOVA Website

8) ASEM SMEs Eco-innovation Center (ASEIC): The ASEIC was established in 2011 with the principal mandate of promoting Asia-Europe cooperation to create and enhance eco-innovation of small and medium sized enterprises (SMEs) in both regions.

Fourth flow: The role of business and understanding the non-technological side of eco-innovation (Purple)

As previously mentioned, the understanding of the eco-innovation concept has promulgated. In this process, the role of business in eco-innovation has been emphasized. Firms can perform eco-innovation in a variety of ways including creating new business models or through their organization process. They can also create their products and services that meet the demands and needs of our current and future society while enhancing the quality of our environment and positively affecting overall eco-system of industries. Today, green technology is not a must but an option to perform eco-innovation today. Thus, green technology itself cannot tell the full story of eco-innovation. The OECD workshop in 2012, "The Future of Eco-Innovation - The role of Business models in green transformation" put attention to the importance of transforming business model to create eco-innovation. In the workshop report, the role of business to implement different typology (radical, transformative and systemic) of eco-innovation has been put into notice hitherto. Going beyond environmental technology, non-technical eco-innovation including eco-innovation in service sector or business model has the potential to have powerful dimensions in the future.

Fifth flow: Diffusion of Eco-innovation in both developed and developing countries & Importance of SMEs (Maroon)

Opportunities of eco-innovation for both developed and developing countries can be grand and such message is continuously delivered and outwardly promoted to specifically encourage developing countries to adopt eco-innovation friendly national policies and strategy. For developing countries, proper enforcement and diffusion of eco-innovation tools can bring poverty eradication, food and water security, improved energy use, job creation and other positive social and economic dimensions along with the environmental benefits. Though this may be theoretically proper, such perspective may seem ideal to many of the developing countries as the cost for initiating eco-innovation such as developing green technologies and market mechanism at the national level may go beyond what these countries are capable of at the current stage. However, as OECD (2012) states developing countries have the "greatest opportunities for capitalizing on the synergies between environmental and economic sustainability"[9]. Small & Medium Enterprises are increasingly acknowledged as a key driver of eco-innovation. SMEs have radical potential to trigger eco-innovation and their impact may be far greater than one would expect. There have been recent reports and initiatives to emphasize the role of SMEs in the field of eco-innovation today and it is believed that this move will persist in the next years to come.

9) OECD (2012), Green Growth and Developing Countries

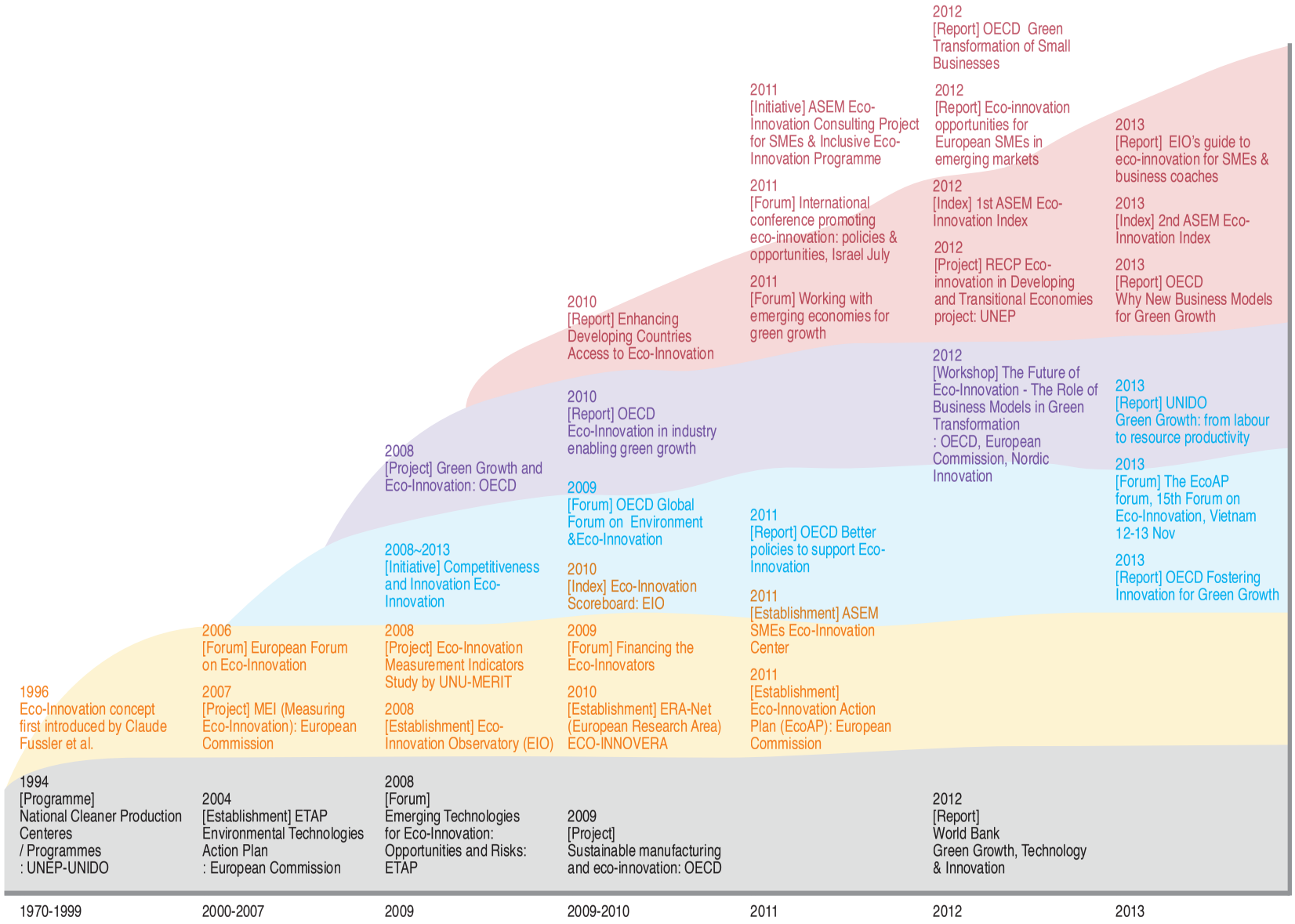


Fig 4. Key History Marks of Eco-Innovation

(Source: Own Elaboration)

Chapter 2
ASEM Eco-Innovation Index Development Process

"Further theoretical work and empirical validation specifically on eco-innovation indicators is needed to meet the growing national and European policy needs in this area."

MEI, 2009

Chapter 2

No agreement hitherto exists on a set of indicators that suitably measure eco-innovation. Thus, the sets of eco-innovation indicators identified till today can be regarded as a preliminary set of eco-innovation indicators. These sets of indicators have changed as the concept broadened and data source developed, and depend on where the measuring focus lies. This chapter presents the development process of ASEI and how we have appropriately selected eco-innovation indicators considering conceptual coherence. This chapter describes the process involved in selecting the twenty core indicators for ASEI and provides literature and empirical study review on eco-innovation measuring approaches. It also suggests ways for improvement.

ASEI Measurement Framework Development Process

No agreement hitherto exists on a set of indicators that can suitably measure eco-innovation. There have been few cases where a preliminary set of eco-innovation indicators was proposed but actual measuring procedures had been neglected. Much of these studies merely introduced important indicators for examining eco-innovation status at company, industry or national level and each set is different depending on where the focus lies. This ASEI report is an attempt to present a measuring approach for eco-innovation by proposing the best set of indicators to measure eco-innovation in both European and Asian countries today.

ASEI additionally presents its own conceptual coherence with the selected indicators and developed framework. OECD (2011) states, referring to its green growth indicators[10], the importance of using indicators based on internationally comparable data and that "these need to be embedded in a conceptual framework and selected according to well specified criteria" to deliver a clear message to the related stakeholders. Likewise, ASEI has elaborated a theoretical logic and reasons behind the framework, which is divided into four criteria and twenty selected indicators. Below illustrates the process of developing ASEI measurement framework via careful selection of twenty indicators.

Sixty candidate indicators for ASEI were first selected through in-depth research of indicators used for eco-innovation, innovation and environment indexes. These first screened sixty indicators were sent to the ASEI expert group consisting of thirty professionals in the related field, asking them to choose the most appropriate indicators via Analytic Hierarchy Process (AHP) for each four criteria. As a second screening process, the filtered candidate indicators had to be checked to see if data sources existed to practically measure eco-innovation. In the last step, renowned global experts in the related fields of eco-innovation studied and confirmed the filtered set of indicators for each criterion.

Indicator Screening Process

1) Research key indicators introduced via literatures and related indexes;
2) Engage expert group via Analytic Hierarchy Process (AHP) to find relevant indicators;
3) Check availability data sources for each indicators;
4) Consultation and confirmation by renowned global professionals

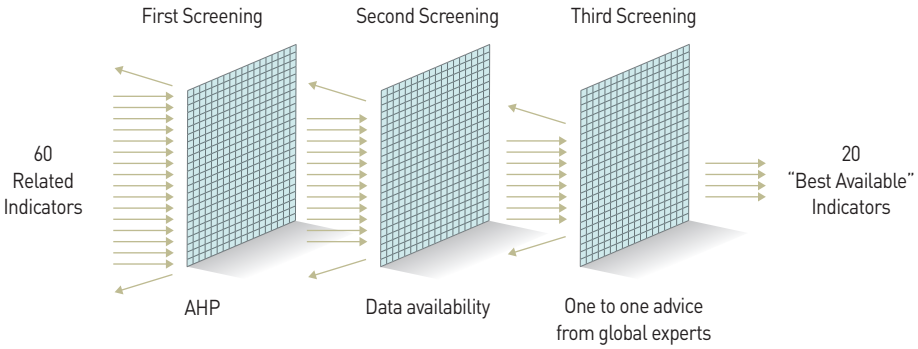


Fig 5. Indicator Screening Process

10) OECD (2011), Towards Green Growth: Monitoring Progress

Studying the sets of eco-innovation related indicators, introduced in academic papers and international organizations reports within the last ten years, enabled us to develop a more comprehensive understanding on measuring scope and approach for ASEI. Previously, due to limited data source available, limited attempts have been made to quantitatively measure eco-innovation because as the OECD states current global or nation's data collection and monitoring systems are not intended to be comprehensively measure eco-innovation.[11] As a result, it is inevitable that each set of eco-innovation indicators introduced till today have limitations in structuring, selecting and aggregating indicator sets.

Nevertheless, key eco-innovation indicators identified aimed to present soundness in their framework logics and mark its focus. With appropriate review of previous empirical studies of literature based on eco-innovation had led to development of appropriate eco-innovation indicators for ASEI.

Key Literatures and Proposals for a set of Eco-innovation Indicators

The following working papers and reports were referred to build a foundation on how to construct a composite measurement framework for eco-innovation particularly for ASEI:

United Nations University-Maastricht Economic and Social Research and Training Centre on Innovation and Technology (UNU-MERIT) (2008) by Anthony Arundel and Rene Kemp

- UNU-MERIT published a working paper in 2008 focusing on measuring eco-innovation. This research paper emphasized the importance of widening the scope of eco-innovation research and data collection in order to fully measure the impact of all products, processes or organizational innovations with environmental benefits. The authors mentioned that no single method or indicator is likely to be sufficient to measure eco-innovation which suggests that one should apply different methods for analysis depending on where the focus lies. The report presents a list of proposed eco-innovation indicators with a logical framework to as back-up. In addition, this study emphasizes the importance of analyzing the nature of eco-innovation and scale of use, drivers and barriers of eco-innovation when eco-innovation is measured at the national level.

Eco-Innovation Observatory (EIO), Eco-Innovation Scoreboard (Eco-IS) (2011~)

- Eco-IS launched in 2011 aims to measure eco-innovation of European countries and conducts country level analysis. Eco-IS framework logic and indicators are focused on measuring resource efficiency and materiality by analyzing resource input and the whole life cycle in terms of resource productivity. In EIO 2012 report, it states that "Eco-IS aims to reflect the definition of eco-innovation by looking at both the ongoing innovation activities and the macro-level outcomes". The number of Eco-IS indicators has been reduced each year and each indicator sources and structure have been changed since its launch. Most of the data sources used are regional statistical data such as Eurostats and Ecroys. This index is the only index that actually performs quantitative measurement of eco-innovation using national level indicators.

OECD (2009), Sustainable Manufacturing and Eco-innovation: Framework, Practices & Measurement

- OECD published a report entitled "Sustainable Manufacturing and Eco-Innovation: Framework, Practices & Measurement" in 2009. This report introduces different typology of eco-innovation, examples of sustainable manufacturing, methods for measuring eco-innovation at the macro level and analysis on conceptual relationship between sustainable manufacturing and eco-innovation. This report aims to introduce diversity and characteristics of eco-innovation activities, emphasizing the role of companies in each different industries.

11) OECD (2009), Sustainable Manufacturing and Eco-innovation: Framework, Practices and Measurement

OECD (2011), Towards Green Growth Monitoring Progress

- OECD's Green Growth Measurement introduces a set of indicators to capture both "green" and "growth" at the national level. The framework comprises of twenty-five indicators, which are not wholly measurable. The indicators are grouped into five categories: 1) environmental and resource productivity of the economy, 2) natural asset base, environmental dimension of quality of life, 3) economic opportunities and policy responses, 4) socio-economic context and 5) characteristics of growth. The report states that the proposed set of indicators aims to monitor "related use of environmental services (use of natural resources and materials, including energy, generation of pollutants and other residuals) in production to the output generated and by tracking decoupling in trends of production and environmental services". Not all proposed indicators introduced here are fit for measuring eco-innovation. However, in measuring eco-innovation performance of ASEI the green growth indicators had been a useful reference.

European Energy Agency (EEA) (2006), Eco-Innovation Indicators

- The European Energy Agency (EEA)'s Eco-innovation indicators (EI-indicators) report states that it focuses on measuring the eco-innovation development than the environmental state via response indicators that measure societal processes along with the innovation chain. It states that the eco-innovation indicators are fundamentally different from traditional environmental indicators and introduces key elements for building eco-innovation indicators. The EI-indicators seems to be focused on technological eco-innovation and of its innovation chain which includes technology push and market pull. The report purposes that EI-indicators should bring "new policy signals", "new incentives", and "new insights".

Analytic Hierarchy Process (AHP) Procedure

AHP survey was sent to thirty experts and received twenty eight responses. Sixty candidate indicators were sent to the experts, fifteen indicator options were paired up for each of the four criteria: "eco-innovation capacity", "eco-innovation activities", "eco-innovation supporting environment" and "eco-innovation performance". The list of candidate indicators can be seen in Appendix VI.

To appropriately coordinate and aggregate the selected indicators filtered via AHP, we developed a pool of exports in the field of eco-innovation, environment, innovation, Corporate Social Responsibility (CSR) and elicited advices from these experts to build a logical structured framework. Composing indicators together to form a storyline accordingly is an imperative part of developing a measuring framework. Final twenty indicators were selected on the "basis of their analytical soundness, measurability, country coverage, relevance to the phenomenon being measured and relationship to each other" [12]. The next chapter elaborates the framework storyline and what each criteria hopes to represent and measure.

12) OECD (2008), Handbook on Constructing Composite Indicators

Chapter 3
ASEM Eco-Innovation Index Framework & Indicators

"No existing measurement approach can capture the overall trends and characteristics of eco-innovation. Further progress in benchmarking and indicators might include the development of an "eco-innovation scoreboard" which combines different statistics or the design of a new dedicated survey."

OECD, 2009

Chapter 3

This chapter includes the list of proposed indicators and detailed explanation of the ASEI framework. The composite indicator set of ASEI can only examine a portion of the whole "eco-innovation eco-system" shown above. Each indicator assesses different and a few aspects of the complexity within in the overall "eco-innovation ecosystem". ASEI indicators measure the current state, potential and the result of eco-innovation. ASEI uses four specific criteria to analyze eco-innovation: 1) eco-innovation capacity, 2) eco-innovation activities, 3) eco-innovation supporting environment and 4) eco-innovation performance. To better understand the relationship between the four criteria, the basic storyline of the framework is shown in a diagram in this chapter. The importance of each four criteria is also explained in this chapter.

ASEM Eco-Innovation Indicators

The twenty generic indicators of ASEI represent a selected number of key indicators that represent central elements of the eco-innovation concept and issues. These indicators were selected that are measurable today.

Criteria	Indicators
1. Eco-innovation Capacity	1.1 Country's Economic Competitiveness
	1.2 Country's General Innovation Capacity
	1.3 Green Technology R&D Institution Capacity
	1.4 Green Technology possessed/acquired Firms
	1.5 Awareness of Sustainability Management
2. Eco-innovation Supporting Environment	2.1 Government's R&D expenditure in Green Industry
	2.2 Implementation of Environmental Regulations
	2.3 Maturity of Investment Setting for Green Technology Industry
	2.4 Investment Scale of Green Technology SMEs
3. Eco-innovation Activities	3.1 Commercialization Level of Green Technology
	3.2 Firms' Participation on Environmental Management System
	3.3 Economic Influence of Leading Environmentally Responsive Firms
	3.4 Green Patents
	3.5 Activeness of Renewable Energy Utilization
4. Eco-innovation Performance	4.1 Level of Environmental Impact on Society
	4.2 CO_2 Emission Intensity
	4.3 Country's Energy Sustainability Level
	4.4 Water Consumption Intensity
	4.5 Jobs in Green Technology Industry
	4.6 Green Industry Market Size

Table 2. ASEM Eco-Innovation Indicators

The following sources of data were utilized to build the above framework:

INSEAD, Global Innovation Index
WEF, Global Competitiveness Index
International Energy Agency, Renewable Energy Database
Cleantech Group Data, as of Aug 2013
World Intellectual Property Organization
UK Department for Business Innovation & Skills
ISO 14001, as of Aug 2013
United Nations Global Compact, as of Aug 2013
World Energy Council
Environmental Performance Index
WEF, Sustainable Competitiveness Index
Trucost, as of Aug 2013
IMD World Competitiveness Yearbook
OECD, Green Growth Indicators

Appendix V includes details on measuring factor, reference year and data source for each indicator above. It also provides supportive references to show the suitability of selecting each indicator for the ASEI measuring framework. Depending on the decision to use 'stock' and 'flow' measure for each indicator, the years of data source used for each indicator differs.

Theory behind the ASEI Framework

"Ideally, a composite indicator should be based on a theoretical framework or definition, which allows individual indicators or variables to be selected, combined and weighted in a manner which reflects the dimensions or structure of the phenomena being measured". (OECD and JRC, 2008)[13)]

Indicators measuring eco-innovation can vary depending on where the focus lies and how the concept is defined. The overall storyline of measuring frameworks can change accordingly to such variations. The composite indicator set can only examine a partial picture of overall eco-innovation eco-system and each indicator attempts to assess even smaller parts of the overall complex eco-system eco-innovation carries.

Common logic flow used for measuring innovation is recognized as the input-output analysis. The same applies to eco-innovation. As stated in EIO 2012 report, the input-output model allows "analysis of the effects of different aspects of eco-innovation have on the economy, society and environment for a particular nation". While, ASEI measuring framework does not refer to the precise term "input-output model", it follows the same simple logic. ASEI uses four specific criteria to analyze eco-innovation in terms of "input-output model": 1) eco-innovation capacity, 2) eco-innovation activities, 3) eco-innovation supporting environment and 4) eco-innovation performance.

Eco-innovation Capacity

ASEI views "eco-innovation capacity" as the core criterion of ASEI. This is due to an expectation to see the potential of developing countries which may not yet have adequate infrastructure to implement active eco-innovation activities. This criterion aims to capture the country's mental attitude towards eco-innovation, as well as examine the potential of each country including developing countries to implement eco-innovation at the practical level. Developing countries may have great eco-innovation capacity if their future nation's capacity development efforts focus on systematically integrating eco-innovation into their national agenda, processes and business activities.

Indicators in this criterion include five indicators that can be regarded as the foundation to initiate eco-innovation activities: "Country's Economic Competitiveness", "Country's General Innovation Capacity", "Green Technology possessed/acquired Firms", "Green Technology R&D Institution Capacity", and "Awareness of Sustainability Management". "Economic competitiveness" ensures firms and the overall market economy work towards eco-innovation and "General innovation capacity" forms a firm base to activate innovation activities to work against the environmental challenges. Firms (both SMEs and large corporations) and R&D institutions (universities, research centers, etc) are seen as the main doers and thinkers of eco-innovation in ASEI and this message is emphasized throughout the report. In particular, firms with green technology and advanced CSR (Corporate Social Responsibility) management systems are seen as the main actors of eco-innovations. "Green Technology possessed/acquired Firms", "Green Technology R&D Institution Capacity", and "Awareness of Sustainability Management" indicators allow capturing the potential of eco-innovation related R&D institutions, corporations with advanced CSR management system and green technology firms.

13) OECD (2008), OECD Glossary of Statistical Terms

Eco-innovation Supporting Environment

"Eco-innovation supporting environment" gears "eco-innovation capacity" to transform into practical tools that actually facilitate the implementation of eco-innovation activities as the market itself cannot trigger the diffusion or activation of eco-innovation. "Eco-innovation supporting environment" criteria include four currently measurable indicators that show a small picture of how government supports firms to eco-innovate: "Government's R&D expenditure in Green Industry", "Implementation of Environmental Regulations", "Maturity of Investment setting for Green Technology Industry" and "Investment Scale towards Green Technology SMEs". "Eco-innovation supporting environment" should represent the foundation of the institutional framework to promote eco-innovation which includes regional and national policies, national strategies and programmes. However, these institutional arrangements are hard to capture into single indicators. Such indicators can only offer a partial view of the overall country's institutional policy framework. Therefore, we took both quantitative and qualitative approach to our analysis. Each country's eco-innovation related institutional framework had been examined and analyzed for all twenty five countries and this is apparent in Chapter 6: Country Analysis.

Eco-innovation Activities

Different arrangements of "eco-innovation supporting environment" are drawn together to bring a synergetic effect to pressure and trigger firms to change and innovate for environmental purposes. "Eco-innovation activities" indicators focus on the contribution of firms towards eco-innovation such as green patenting, level of environmental management and commercialization of green technology that can affect eco-innovation of industries and economic activities at the national level. "Eco-innovation activities" focus on the contribution of firms, green patents and renewable energy activity towards eco-innovation performance.

Illustrated from various literatures and reports show that eco-innovation in business can be demonstrated via radical technological or incremental organizational change in production processes and development of products or services. As "MEI: Measuring eco-innovation"(2008) report states, "different tracking methods are needed for measuring incremental and radical eco-innovation output". Taking this into consideration, ASEI used different indicators to capture exploration of different firms' activities in the eco-innovation process: "Commercialization Level of Green Technology", "Firms' Participation on Environmental Management System", "Economic Influence of Leading Environmentally Responsive Firms", "Green Patents" and "Activeness of Renewable Energy Utilization".

Eco-innovation Performance

If "eco-innovation activities" includes indicators reflecting short mid-term "output measures" of eco-innovation, "eco-innovation performance" reflects the long term "outcome measures". "Eco-innovation Performance" measures the overall national economic, social and environmental competitiveness that eco-innovation can bring in the long term. Accordingly, six sets of data sources are selected for the measurement of this criterion: "Level of Environmental Impact on Society", "CO_2 emission Intensity", "Country's Energy Sustainability level", "Water Consumption Intensity", "Jobs in Green Technology Industry" and "Green Industry Market Size".

Eco-innovative performance is a value based concept which has room for open discussion. We surveyed experts on what they understood by "eco-innovation performance" and the answers have varied. Eco-innovation performance depends on the scope and value one defines. Thus not one set answer has been provided as of yet; and; further discussion is needed on this topic. ASEI views eco-innovation performance as eco-innovation outcomes that accelerate overall eco-system of sustainable development.

Below diagram show the basic storyline of the four criteria and of their relations.

Storyline of ASEI Framework

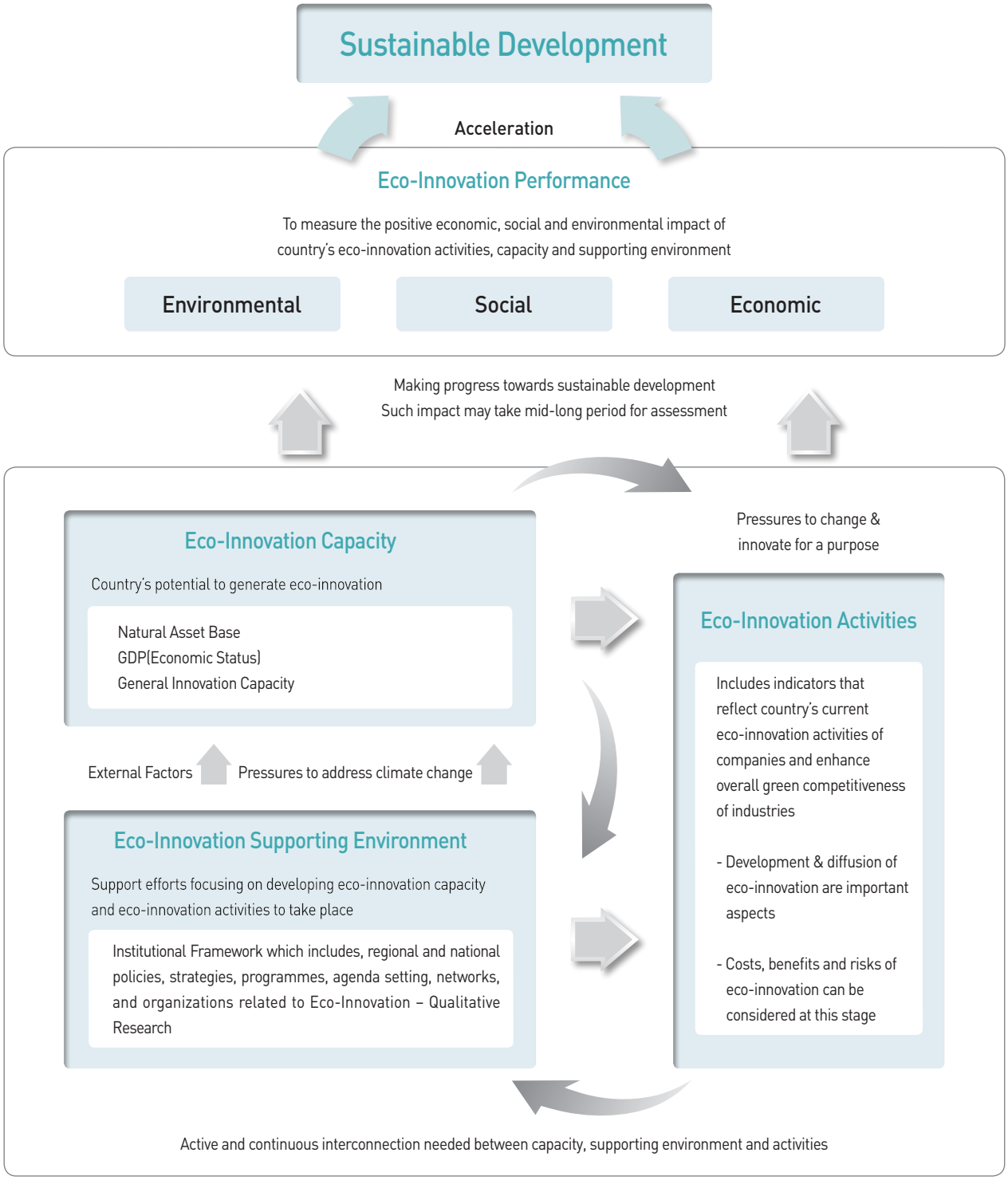


Fig 6. Storyline of ASEI framework

(Source: Own Elaboration)

Chapter 4
ASEM Eco-Innovation Index Result

ASEI Result: Data Table

Country	Eco-Innovation Capacity	Eco-Innovation Supporting Environment	Eco-Innovation Activities	Eco-Innovation Performance
Australia	57	67	27	39
Austria	46	37	34	52
Bangladesh	28	27	17	29
Belgium	49	55	31	55
Cambodia	25	27	17	26
China	41	49	45	33
Czech Republic	37	31	47	45
Denmark	88	51	42	70
Finland	68	47	47	68
France	75	60	51	70
Germany	57	59	46	65
India	44	47	29	27
Indonesia	29	26	24	29
Italy	40	43	39	53
Japan	43	31	32	46
Korea	47	30	34	53
Malaysia	44	28	30	30
Netherlands	62	40	32	57
Philippines	29	26	20	30
Poland	45	34	31	42
Portugal	46	36	28	45
Sweden	71	56	60	74
Thailand	34	26	32	34
United Kingdom	85	87	60	70
Vietnam	30	26	20	18

Table 3. ASEI Result Table by Criteria

This 2nd edition of the ASEM Eco-Innovation Index tracks 25 nations which comprise over 50 percent of the total ASEM member countries. Newly assessed countries are shown bold below.

Australia
Austria
Bangladesh
Belgium
Cambodia
China
Czech Republic
Denmark
France
Finland
Germany
India
Indonesia
Italy
Japan
Korea
Malaysia
Netherlands
Philippines
Poland
Portugal
Sweden
Thailand
United Kingdom
Vietnam

Mapping of Overall ASEI Result

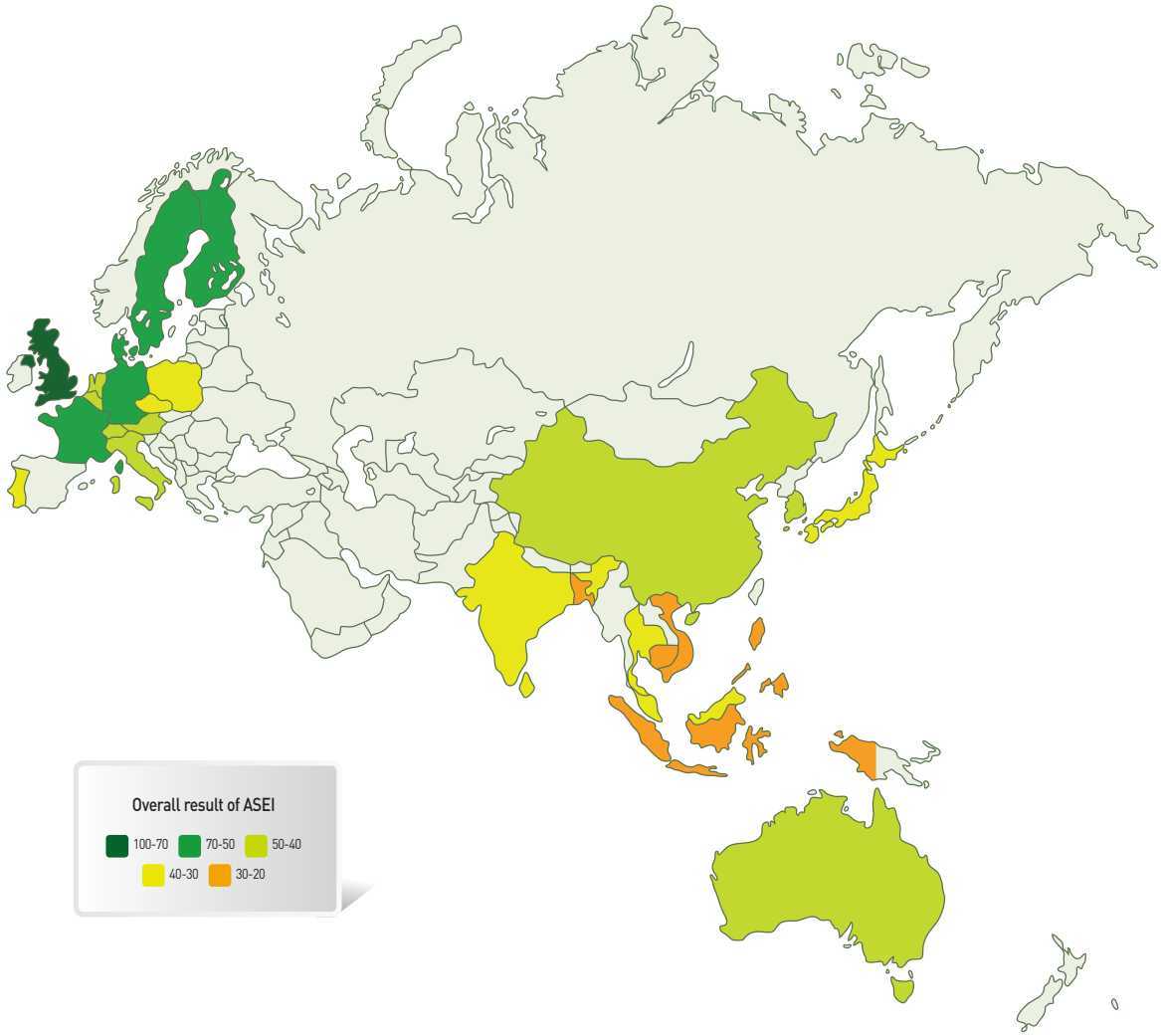


Fig 7. Mapping of Overall ASEI Result

The overall results of ASEI can be grouped into five categories divided into the following range: 100-70, 70-50, 50-40, 40-30 and 30-20. Mapping of the overall results of twenty five countries, shows a vague idea where each country stands when evaluated with ASEI. This report does not intend to show the definitive ranking of countries with respect to eco-innovation, or define the laggards and frontrunners. Rather this mapping allows readers to see the level of eco-innovation movement activated at the global level.

Statistical Methodology

Imputation by a sequential regression

The imputations of missing data points were done by fitting a sequence of regression models and predicting values based on the corresponding regression models: [14]

1. Fit a regression model with the variable having the fewest number of missing values as the dependent variable and with the other related variables completely observed as the predictors. Then the imputations are the predicted values given by fitted regression model.
2. Move to the next variable with the next fewest missing values and regress the variable on the predictors and the imputed variable in 1. Then impute the missing values with the predicted values by the fitted regression model.
3. Repeat the imputation process 2 in the above until all the variables have been imputed.

It was observed that, during the sequential regression procedure for the imputation, R-squares were consistently larger than 80% (mostly larger than 90%), which highly supports the validity of the imputation process.

14) Trivellore E. Raghunathan, James M. Lepkowski, John Van Hoewyk and Peter Solenberger (2001), A multivariate technique for multiply imputing missing values using a sequence of regression models, *Survey Methodology* 27(1), 85-95.

Chapter 5
Result Analysis

Chapter 5

By extending the number of countries in the ASEI 2013, from fifteen to twenty-five countries, more in-depth comparative result analysis has been performed. Going beyond the traditional evaluation of regional analysis, this time, the ASEI data has been flexibly utilized in order to look at the results through a different perspective. This chapter includes details on 1) criteria level analysis, 2) income group peer analysis, 3) regional analysis, 4) green technology sector analysis and 5) prospective analysis. This chapter has encouraged to spot patterns and trends by evaluating the ASEI result through variety of viewpoints.

Criteria Level Result Analysis

Eco-Innovation capacity

"Eco-innovation capacity" criterion result of each country shows a strongest correlation with the each country's overall result. From our analysis, the capacity gap between European and Asian nations is relatively large. Denmark and United Kingdom show the highest scores in this criteria followed by France and Sweden. The mid-tier countries include Korea, Austria and Portugal, presenting similar criteria score. India and Malaysia also fall into the mid-tier; however, from our qualitative analysis these two countries have been evaluated to have great potential to exploit eco-innovation in the near future.

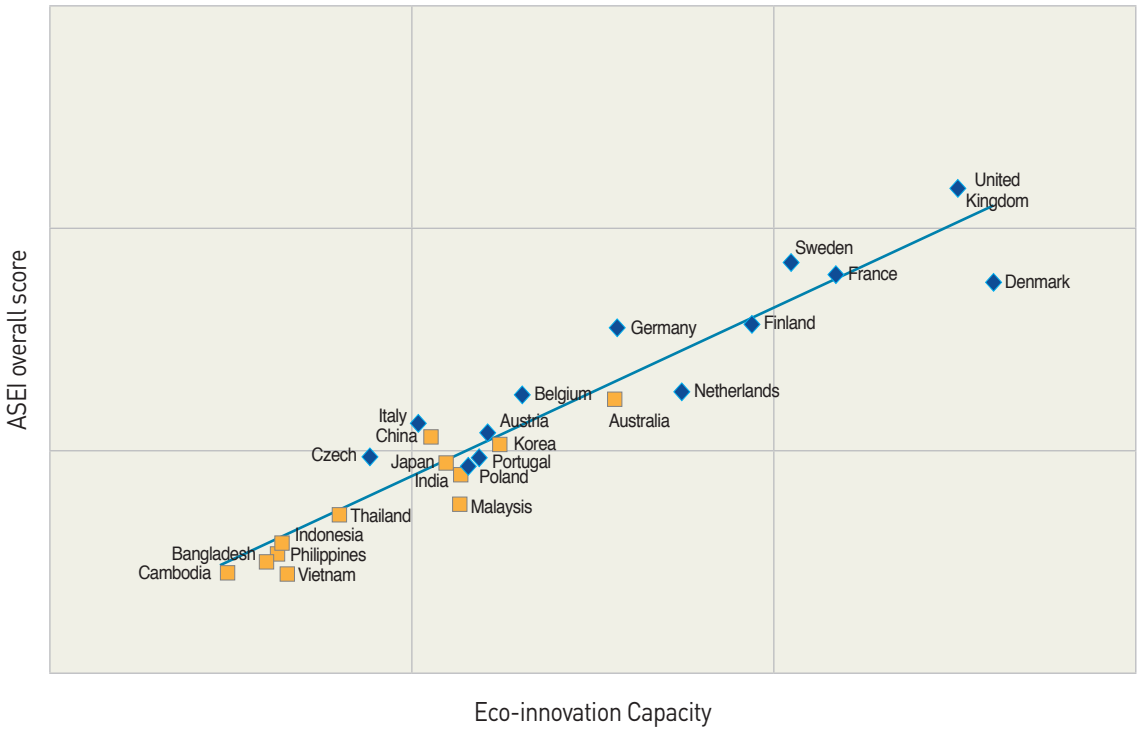


Fig 8. Correlation Map between Eco-Innovation Capacity Score & ASEI Overall Score

Eco-Innovation Supporting environment

In "Eco-innovation supporting environment" criteria, United Kingdom is placed as the top performer showing a wide gap with other countries. As shown below, China and India's eco-innovation supporting environment reaches the level of the European countries. Qualitative analysis on China and India's institutional framework shows that they are preparing to form a firm foundation to support eco-innovation activities. Meanwhile, the rest of Asian nations fall behind in supporting eco-innovation. In Australia, the eco-innovation supporting environment criterion shows high scores in relevance to the overall ASEI score. This represents how country's effort to form an eco-innovation supporting environment takes longer to positively impact the overall eco-innovation status of a country.

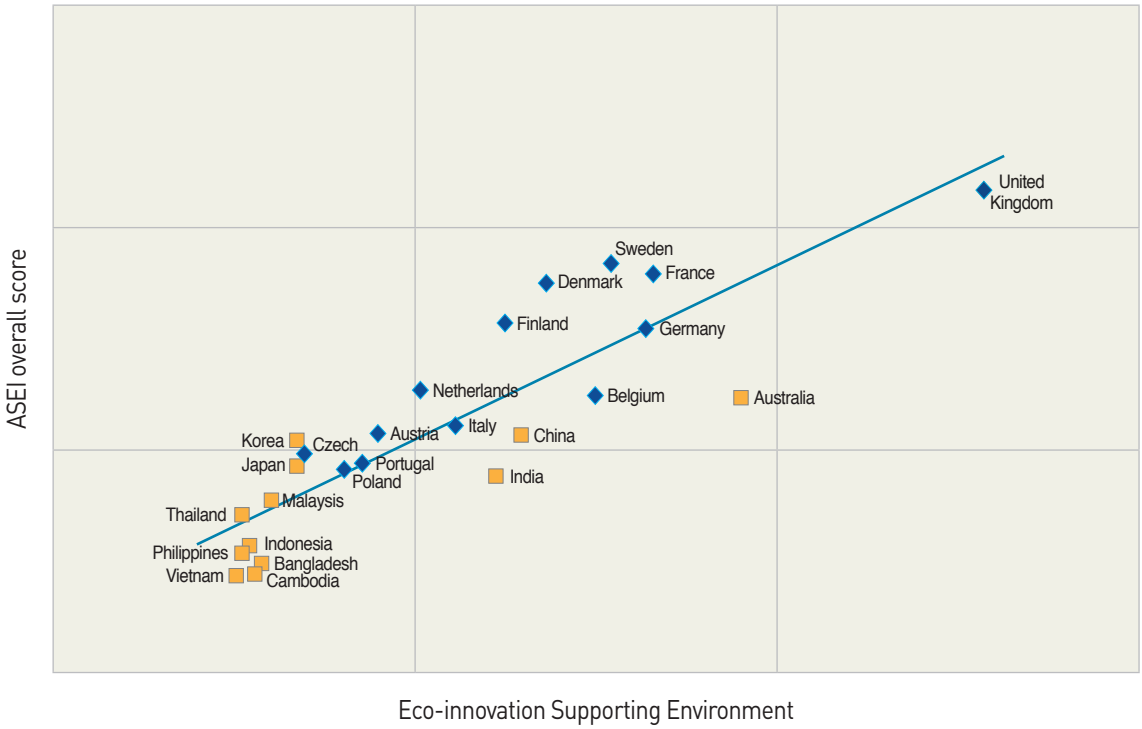


Fig 9. Correlation Map between Eco-Innovation Supporting Environment Score and ASEI Overall Score

Eco-Innovation Activity & Performance

"Eco-innovation activity" shows the narrowest disparity between top and bottom tier performers among the four ASEI criteria. Sweden, United Kingdom and France ranked the highest with Czech and China follow in the ranking. Countries with firms that are active in CSR and green technology have scored high in this criterion. The top ten performers in "eco-innovation performance" and overall eco-innovation score appear to be the same. Countries with high "eco-innovation performance" form a solid group as the top performers overall.

Peer Grouping Analysis: Income level

According to the World Bank's classification of countries' income level, sixteen countries are classified as high income countries, seven as middle income countries and two are considered to be low income countries. Referring to the World Bank's nation classification guideline, we worked out the average score of the three peer income groups and conducted an analysis on the significance of quantitative gaps between the peer groups.

Peer Grouping	Countries	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activities	Eco-innovation Performance	ASEI Overall
		Average Score per peer group				
High income countries	Poland	57	48	40	56	50
	Czech					
	Portugal					
	Korea					
	Italy					
	United Kingdom					
	France					
	Germany					
	Belgium					
	Finland					
	Japan					
	Austria					
	Netherlands					
	Sweden					
	Australia					
	Denmark					
Middle income countries	Thailand	36	33	28	29	32
	China					
	Malaysia					
	Vietnam					
	India					
	Philippines					
	Indonesia					
Low income countries	Bangladesh	27	27	17	28	24
	Cambodia					

Table 4. Result Table by Income Peer Group

- The high income countries, United Kingdom, Sweden, France, Denmark and Germany showed higher scores than average scores shown above when compared to its income peer group in each four criteria.
- In the middle income group, China was the only country that showed an above average score when compared to its income peer group in all four criteria.
- With regards to the low income group, there was a limitation in the comparison and analyses as there were only two countries that belonged to this group.

High income correlates highly with ASEI scores. In particular, strong association is shown with "eco-innovation capacity", "eco-innovation supporting environment", and "eco-innovation performance". "Eco-innovation activities" shows the lowest gap between the three peer groups. The gap is wider in other three criteria: eco-innovation supporting environment, eco-innovation performance and eco-innovation capacity. Disparity within eco-innovation capacity and performance is larger because these two criteria reflect a nation's basic fundamentals which include economic infrastructure, scale of investment, natural resource and environmental status, which takes long period to shape and structure.

The eco-innovation gap between the peer groups is difficult to reduce in a short period of time. However there is potentials for quicker growth if development in eco-innovation activities is accelerated and supporting environment where the gap between different income peer groups is narrower. Better policies and national strategies of low-income countries would demonstrate more direct impact to their economy, society and environment. Eco-innovation related policies should be divided into short and mid/long term strategies and the short term eco-innovation outcome monitored in order to see the alliance with mid to long term strategies to accelerate sustainable growth and competitiveness. International collaboration between the peer groups can also narrow the gap.

Regional Analysis: Europe & Asia

The ASEI 2013 result shows clear disparity between European and Asian countries. As mentioned earlier most European countries are in the top tier while Asian countries are in the bottom tier when evaluated with the ASEI. While, China, Korea and Australia seem to be catching up to the early adapators of eco-innovation in Europe, the eco-innovation gap shown between the two regions should go beyond a simple observation. This gap signifies more complex issues related to social and economic differences as well as geopolitical and environmental circumstances.

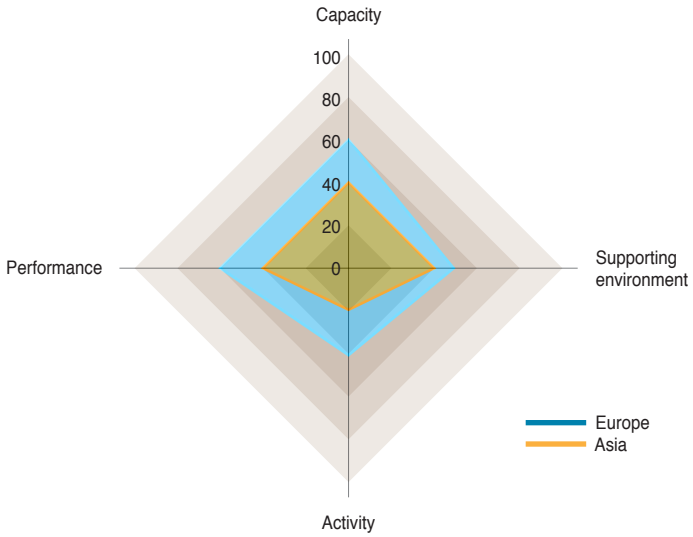


Fig 10. Regional Result Average: Europe and Asia

Europe

European countries generally show high in "eco-innovation capacity" and "eco-innovation performance". In regards to the overall score, United Kingdom and Sweden are at the top while Eastern European countries fall behind when compared within the region.

The first regional initiative for eco-innovation in 2004 was the European Commission's Environmental Technologies Action Plan (ETAP). In 2010, ETAP was regrouped into the Eco-innovation Action Plan (EcoAP) and, together with the Europe Strategy 2020, eco-innovation became the European Commission's major development strategy. Europe Strategy 2020 is a long-term development strategy to improve resource efficiency and low carbon economics. The European Commission understood that eco-innovation is a crucial aspect to improve economic, social and environmental competitiveness of Europe since the early days. In Europe, the high level performers of eco-innovation, R&D activities and innovative trials are strong when they are centered on clusters and activities of SMEs. Such facts are reflected in the quantitative result that shows certain gap when compared with Asian countries.

Asia

Asian countries including Australia generally show low scores in "eco-innovation supporting environment" and "eco-innovation capacity". Yet, Malaysia, India, China and Korea show high "eco-innovation capacity" scores. Most of the Asian countries show higher scores in "eco-innovation activity" and "supporting environment", where the disparity is small when compared to the European average.

As regional initiatives or schemes have not developed yet, the Asian countries instead have bilateral or multilateral national networks. Following the path of Europe, there are more regional activities and events related to eco-innovation being held in Asia today which includes: Sustainable Product Innovation in Vietnam, Cambodia and Laos, Asia Low Carbon Cooperation with UNESCAP, Korea-China Cooperation Forum for Green Industry and Conference for Green Business Malaysia-Europe Forum Roundtable Series on Sustainability. Understanding the regional difference, cooperation between Europe and Asia is one way to mobilize and accelerate the diffusion of appropriate eco-innovation solutions through international trade of eco-innovative products and services, sharing of knowledge, research and human resource, as well as supporting of financing mechanisms at the global level.

Green Technology Sector Analysis

ASEI used five indicators from Cleantech Database to capture green technology sector contribution to national eco-innovation. While it is apparent that there is a concentration of sources in terms of extracting data from solely Cleantech Database, it is currently inevitable to find appropriate alternative data source on green technology which covers all twenty five countries evaluated in ASEI 2013.

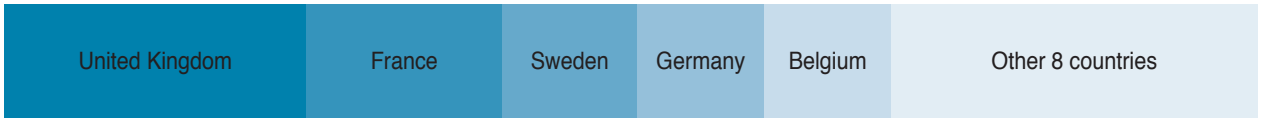
ASEI Criteria	ASEI Indicators
Eco-innovation Capacity	Green Technology R&D Institution Capacity
	Green Technology possessed/acquired Firms
Eco-innovation Supporting Environment	Maturity of Investment Setting for Green Technology Industry
	Investment Scale of Green Technology SMEs
Eco-innovation Activities	Commercialization Level of Green Technology

Table 5. Key Green Technology Indicators in ASEI

Although, there are increasing discussions on stressing non-technological eco-innovation and of its impact, we acknowledge that green technology related indicators are also a good source to capture partial pictures of current eco-innovation status. It is also true that the contribution of green technology towards eco-innovation is still dominant today. As A.N.Sarkar (2013) states "eco-innovation is closely related to the development and use of environmental technologies" and the diffusion of eco-innovation can be tracked by "environmental technology as a whole or for specific subsets".

Exclusively analyzing the indicators on green technology, United Kingdom shows high scores for all of the above five green technology related indicators. France has shown to have a vibrant investment environment for green technology while Finland, Sweden and Denmark have firms that show competitiveness in green technology firms. Since the early 2000s, the European Commission understood the prospect of firms with green technology and established Environmental Technology Action Plan (ETAP) to encourage the European countries to take measures in promoting green technology and create an appropriate market mechanism. European countries are stimulating green technology industry through active financing of green technology SMEs and networking between green technology firms.

Green Technology Investment: Europe



Green Technology Investment: Asia

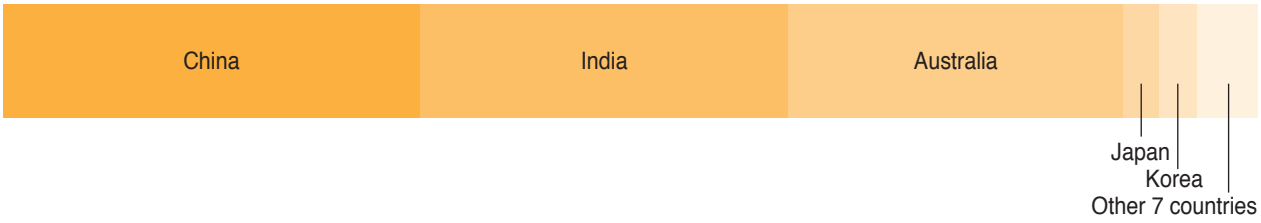


Fig 11. Green Technology Investment Status (Our own elaboration)

(Source: Cleantech data)

In Asia, China and India show high scores in green technology indicators relative to other Asian countries. China and India are well known to invest heavily in R&D and commercialization of green technology, and do not fall too far behind the frontrunners of European countries. China and India's huge investment in green technology and related R&D is expected to trigger a strong eco-innovation drive within the next ten years. Except for Korea and Japan, where green technology has been the key word in the national sustainable growth agenda, other Asian countries still lack the scale of investment and infrastructure on green technology. "Investment Scale of Green Technology SMEs" and "Green Technology possessed/acquired firms" are good indicators that can measure the eco-innovation potential one country carries. Policy measures are needed to foster continuous creation of green technology firms and matured investment environment for firms already possessing green technology. In addition, it is imperative to generate a mixture of diverse financing mechanism and entrepreneurship culture to activate new green technology start ups.

Prospective Analysis: Global Eco-Innovation Capacity Trend

Multidimensional approaches should be taken to measure a nation's level of eco-innovation capacity. It is necessary to take not only a static approach towards analysis but a flow approach in order to predict the eco-innovation capacity of a nation. Capacity is a significant factor affecting future eco-innovation performances and almost directly correlates with the overall eco-innovation status of a nation. "Capacity" is viewed as the fundamental in ASEI. "Capacity" allows us to see the mental attitude or infrastructure that a nation possesses which can be manipulated into eco-innovation activities and performance within the next ten years. It represents "absorptive capacity" [15] needed for wider diffusion of technology and knowledge as well as ability to integrate sustainable growth agenda into traditional development approach. One nation's policy, strategy and firm activities will affect how the nation transforms eco-innovation capacity to short and mid-long term eco-innovation performance. From this perspective, we can attentively predict the potential growth of nations that scores high in eco-innovation capacity, although this criterion only depicts a small picture of the wider and complex eco-system of eco-innovation capacity.

Clearly, it would be a difficult task to precisely identify, which aspect of eco-innovation capacity or integration of such parts have affected the overall eco-innovation performance due to various variables and long term period. Despite such limitations, it is still meaningful to provide a global prospective analysis based on the result of ASEI as there has been limited attempts to provide such prospective analysis in the field of eco-innovation.

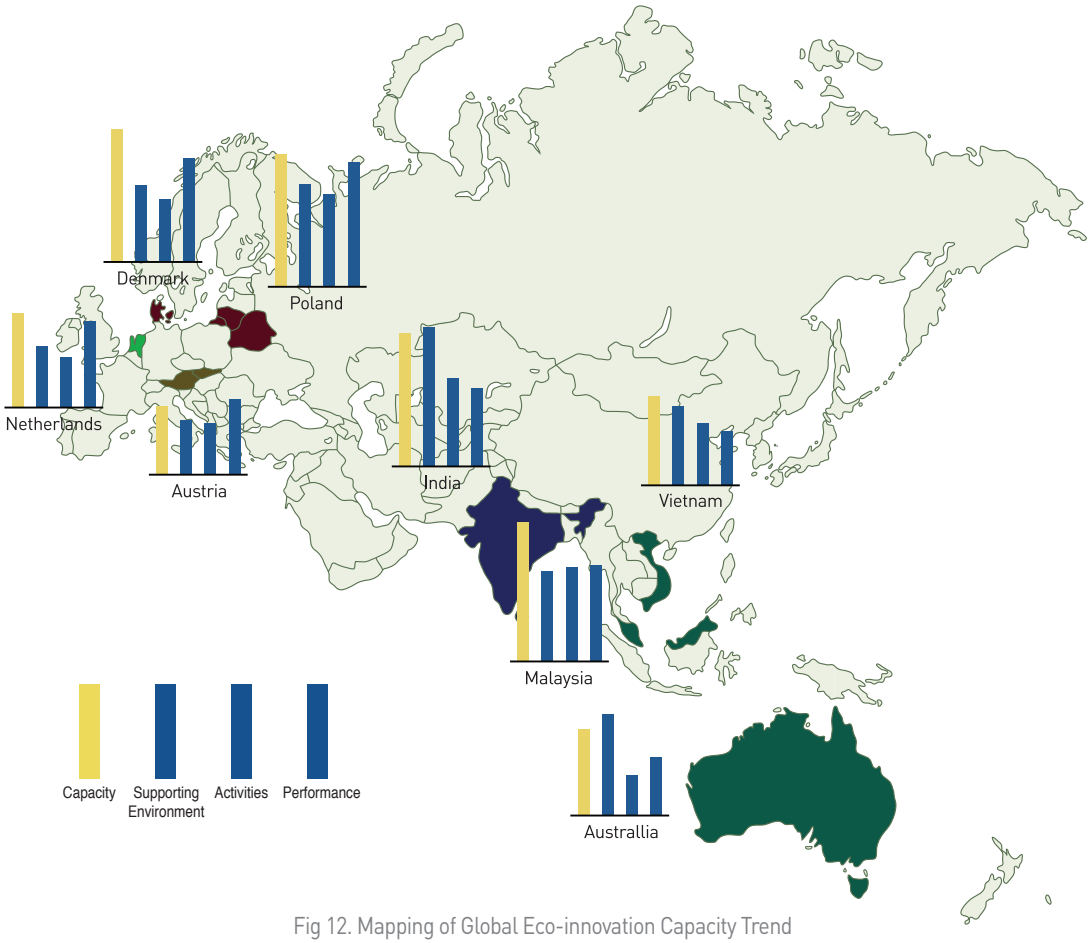


Fig 12. Mapping of Global Eco-innovation Capacity Trend

15) OECD (2012), Inclusive Green Growth for the Future We Want
OECD (2012), Greening Development Enhancing Capacity

Most of the twenty five countries evaluated in ASEI 2013 received high scores in eco-innovation capacity criteria compared to other three criteria. Furthermore, as mentioned previously, eco-innovation capacity score shows high correlation with overall eco-innovation score. Each four countries from Europe and Asia with high eco-innovation capacity compared to other three criteria had been selected from our analysis. European countries selected were Denmark, Netherlands, Austria and Poland and Asian countries selected were Australia, India, Malaysia and Vietnam. These eight countries do not demonstrate high overall eco-innovation scores yet they are viewed to possess great growth potential in the field of eco-innovation. Current ASEI score and eco-innovation growth potential represent different aspects. With a careful prospective and relying on both qualitative and quantitative ASEI research, the selected countries seem to have significant capacity that can manipulated into distinctive eco-innovation activities and performance.

For Denmark, Netherland, Poland and Austria, these four countries are creating eco-innovative industries via new business opportunities. In particular, Denmark, Netherlands and Austria already have high scores in eco-innovation performance and have developed its own eco-innovation capacity by strengthening partnerships and networks. Though Australia scored low in eco-innovation performance compared to eco-innovation capacity, the government's active role in promoting eco-innovation is worthy of attention from a mid to long term perspective. Economic development is an important issue for Poland and India and as part of their economic growth strategy, they are looking for an appropriate way to achieve sustainable economic growth. To do this, both countries are seeing eco-innovation as a way to achieve this by investing heavily on eco-innovation related R&D and infrastructure. On the other hand, Malaysia has put productivity innovation and environmental values as their long term development strategy while Vietnam is actively pursuing eco-innovation industries by attracting foreign investment which makes these countries have better potential to enhance eco-innovation levels in the future.

Chapter 6
Country Level Analysis

"Different national circumstances, capacities and levels of development add to the complexity of a common approach on indicators. And no single indicator will suffice to capture the many dimensions on which progress is needed... On selecting eco-innovation indicators is that as in most other domains of measurement, indicators are often proxies or tend to simplify the underlying reality."

(UNIDO, 2013)

Chapter 6

ASEI's result analysis illustrates that the rate and patterns of development and diffusion of eco-innovation tend to vary from country to country. For ASEI case, it is viewed that the more ambitious the sustainable development targets and vision, the more likely that eco-innovation is developed and adopted by the certain country. Each country's level of existing capacity tends to also differ nationally and regionally. In other words, ASEI's qualitative findings show that depending on the nature and conditions of each country, the strength and scope of eco-innovation capacity and the form of eco-innovation activities show a discrepancy. This chapter shows that all twenty five countries make different choices in their mix of instruments to support and trigger eco-innovation. Our qualitative analysis on country's institutional framework focused on the business environment that is essential to trigger eco-innovation focusing on the drivers of eco-innovation activities rather than the barriers.

Country Level Analysis

ASEI's results analysis demonstrates that rate and patterns of development and diffusion of eco-innovation tend to vary from country to country. Yet it tends to be that more determined a country's sustainable development targets and vision, the higher that the country scores high in ASEI. As analyzed in the previous chapter, each country's level of eco-innovation capacity tends to differ per country. The OECD report emphasizes that "countries may want to prioritize their development efforts in green innovation in areas where they have capabilities and a certain critical mass, and focus on technologies and innovations that are particularly relevant in their own national context".[16] Each government should focus their effort in finding the areas where it has strong capacity as there is no single blueprint. As OECD (2013) highlights markedly, "no single factor or policy drives eco-innovation rarely does a country offer direct eco-innovation policy frameworks and programmes. Rather, eco-innovation is promoted under multifaceted concepts and combination of policy instruments."

For this reason, this chapter goes beyond the quantitative findings of ASEI. This chapter includes qualitative findings that show the depending nature and conditions of each country and how these are affecting the capacity and activities of eco-innovation. Each national government has particular industries they push and focus their efforts to generate eco-innovation in firms. This report proves that this is the dominant pattern for the twenty five countries that have been monitored for the ASEI.

Empirical studies on eco-innovation demonstrated that success areas of policy instrument aimed at promoting eco-innovation are not solely dependent on specific or benchmark policy measures but through the integration of various pressures from their respective governments and domestic markets and correct implementation of detailed policy measures considering sensitive local contexts.

In previous studies, there have been attempts to discover possible policy measures to promote eco-innovation. Referring to the information including the one below, this chapter includes research and analyze on key national instruments including policies, programmes, strategies and networks that promote eco-innovation in each local context. The ASEI is that goes beyond the simple measure of quantitative data in order to evaluate the concept of eco-innovation.

Main features of a policy approach to promote eco-innovation

Environmental policy instruments

- CAC instruments (technology standards, performance standards)
- Market instruments (taxes, ETS, subsidies, deposit-refund schemes)
- Other (EMS, ecolabels, life-cycle analysis and producer product responsibility, voluntary agreements, information disclosure)

Technology policy instruments

- Government funding of R&D
- Technological assistance programs
- Training in new technologies
- Strategic Niche Management
- Technological foresight studies
- Environmental technology awards
- Innovation waivers
- Creation of a network of actors involved in environmental technological change (networking)

16) OECD (2011), Fostering Innovation for Green Growth, OECD Green Growth Studies

Other instruments

- Public procurement
- Instruments targeted at SMEs
- Establish long-term visions

Source: "Eco-Innovation: when Sustainability and Competitiveness Share hands" by Javier et al.

Table 6. Main Features of a Policy Approach to Promote Eco-innovation introduced by Javier et al.

Possible policies to foster green innovation introduced by OECD

Policy Challenge	Policy Options
Insufficient demand for green innovation	• Taxes and market- based instruments to price externalities and enhance incentives • Demand- side policies, such as public procurement, standards and regulations, in specific markets and circumstances
Lack of innovation capability	• Board- based policies to strengthen innovation
Technological roadblocks and lack of radical innovation	• Investment in relevant R&D, including thematic and mission orientated research • International co - operation
Research and investment bias to incumbent technology	• R&D support, tax incentives • Adoption incentives/subsidies • Technology prizes
Lack of finance	• Co - investment funds • Market development
Regulatory barriers to new firms	• Regulatory reform • Competition policy • Front - runner approaches
Lack of capabilities in SME to adopt green innovation	• Access to finance • Skills development • Linking SMEs to knowledge networks • Improving information supply • Reducing regulatory burdens
Non-technological innovation	• City and transport planning • Regulatory reform
International technology transfer	• Development of capabilities • Trade and investment policies • IPR protection and enforcement • Voluntary patent pools and collaborative mechanisms

Table 7. Possible Policies to Foster Green Innovation introduced by OECD (2009)

This chapter includes "qualitative tables" for the twenty five countries evaluated in this report. This "qualitative table" aims to show key instruments that trigger eco-innovation, sustainable development and eco-innovation of SMEs. Through the "qualitative table" it is our intention to overcome the limitations of the quantitative outcome and analysis.

As mentioned earlier in this chapter, country rarely offer direct eco-innovation institutional measures, rather it is promoted under broader concepts like sustainable development. In addition to eco-innovation, we have chosen sustainable development as a key research theme for qualitative analysis as such broader institutional measures are expected to promote eco-innovation eventually. In case of many countries, it is found that there is an overlap or a thin line between eco-innovation and sustainable development institutional measures.

In Chapter One, eco-innovation key waves had been explained. The fifth wave of eco-innovation illustrates the recent emphasis on diffusion of eco-innovation and the role of SMEs. In this report, it is viewed that the SMEs represent a large picture of nation's future eco-innovation capacity. Thus, we have included our research on each country's institutional measures to promote SMEs' eco-innovation. The imperative role of SMEs is elaborated in Chapter 7.

ASEI Qualitative Analysis

- **National Vision & Strategy:** National Mid/long-term vision, roadmap and designed tasks to achieve each nation's core values
- **National Policy & Programmes:** Policies and programs implemented and established for vision achievement including (including regional measures)
- **Network, Partnership and Organizations:** Major private-public institutions and organizations network, partnership including international and public-private cooperation, recent multinational forums and workshops

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Public mid/long-term vision and roadmap for the development of Eco-Innovation	■ Eco-Innovation specialized or promoting nation or regional law, policy and program ■ Financial aids program included	■ Major organizations of Eco-Innovation ■ Name of private partnership and network related to Eco-Innovation ■ Forum and workshop discussing Eco-Innovation as a major theme
Sustainable Development	■ Public comprehensive vision and roadmap for sustainable development	■ Environmental and sustainable development policy and program for responding climate change e.g. environment protection, biodiversity, etc	■ Major governmental organizations and private institutions for sustainable development ■ Multinational forum and workshop discussing Eco-Innovation as a major theme
SMEs	■ Vision and policy direction for promoting SMEs	■ Competitiveness reinforcement of SMEs' Eco-Innovation and core promoting policy and program ■ Innovation Policy in SMEs ■ Fund and investment program of SMEs	■ Major support organizations for SMEs' Eco-Innovation ■ Networks and institutions promoting exchange of eco-innovation knowledge and experience between SMEs

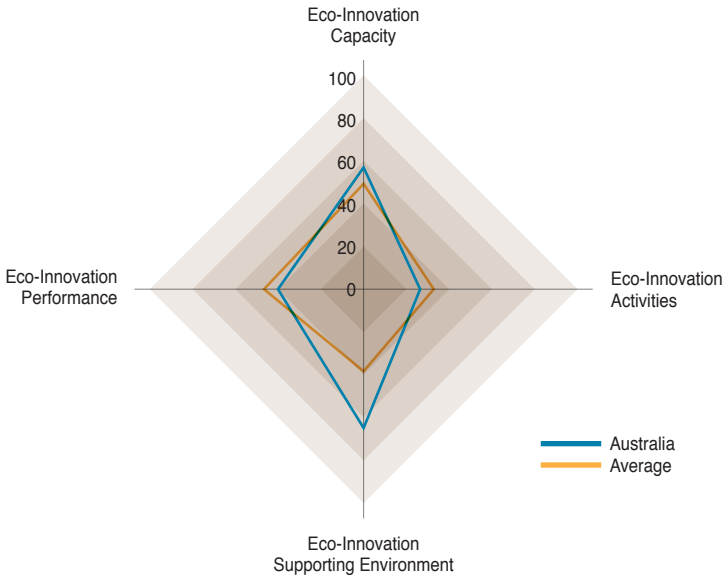
Major Policies or Organizations of Eco-Innovation

Fundamental policies and programs or organizations that push the country's eco-innovation drive

Overall Comments for a country (Qualitative & Quantitative Analysis)

Describe overall or significant finding for each country using both ASEI's quantitative and qualitative research

Australia



	Australia	Average
Capacity	57	49
Supporting Environment	67	42
Activities	27	35
Performance	39	46

Fig 13. ASEI Result: Australia

Australia's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Australia scores average on the scale (Australia: 47/100, Average: 43/100) when compared to other twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria score is above average:* it is significant to note that Green Technology R&D Institution Capacity indicator shows high score whilst Green Technology possessed/acquired Firms indicator shows a below average score.
- *"Eco-Innovation Supporting Environment" criteria score is above average:* The Government's R&D Expenditure in Green Industry indicator far outweighs the average score. Maturity of Investment Setting for Green Technology Industry and the Investment Scale towards Green Technology SMEs show slightly higher scores than the average.
- *"Eco-Innovation Activities" criteria score is below average:* indicates a Firms' Participation on Environmental Management System and Activity of Renewable Energy Utilization indicators are below average, and the rest including Commercialization Level of Green Technology and Green Patents are within the average level.
- *"Eco-Innovation Performance" criteria score falls below average:* Level of Environmental Impact on Society indicator scores high, but Jobs in Green Technology Industry, Green Industry Market Size and CO_2 emission intensity are considerably lower.

Australia's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Backing Australia's Ability (2004) ■ Renewable Energy Target (MRET)	■ Greenhouse Challenge Plus ■ Advanced Electricity Storage Technologies (AEST) ■ Low Emissions Technology Demonstration Fund ■ Local Greenhouse Action - Cities for Climate Protection (CCP) - Travel Demand Management - Cool Communities ■ Solar Cities (2004) ■ Solar Hot Water Rebates Programme ■ Green Power Scheme (1997) ■ Measures for a Better Environment (greenhouse gas reduction programmes) (2000) ■ Biofuel Capital Grants (2003) ■ Renewable Energy Development Initiative (REDI) (2004) ■ Low Emissions Technology and Abatement (LETA) (2005)	■ Commonwealth Scientific and Industrial Research Organisation (CSIRO) ■ Victorian Eco-Innovation Lab ■ Clean Energy Finance Corporation ■ Australian Renewable Energy Agency (ARENA)
Sustainable Development	■ National Average Fuel Consumption (NAFC) target ■ National Climate Change Adaptation Framework (2006) ■ The Australian National Research Priorities (2002) ■ Building Code Australia	■ Nation-wide House Energy Rating Scheme ■ National Plan for Water Security ■ Australian Government Water Fund ■ National Solar School Programme ■ Australia's Climate Change Policy (2007)	
SMEs		■ Renewable Energy Equity Fund (REEF) (1997)	

Table 8. Australia's Eco-innovation Supporting Environment Qualitative Research Table

Major Organizations of Eco-Innovation in Australia

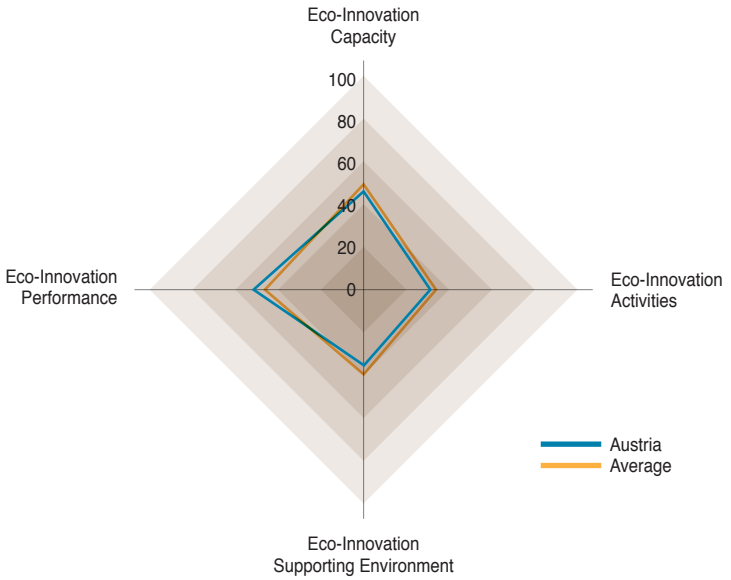
- Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- Clean Energy Finance Corporation

Overall Comments for Australia

- Australia mainly implements eco-innovation through its goals to convert to "Clean Energy Economy" in 2011. The Australian government is focusing on renewable energy development, establishing huge investment in R&D organizations in manufacturing industry and strengthening environmental regulations. As the major coal export country[17], the CCS (Carbon Capture and Storage) industry for the clean production of fossil fuels is an important part of eco-innovation. The country has established an organization for international CCS technology standard[18] research.
- To facilitate eco-innovation supporting environment, the government is expected to introduce carbon tax and ETS at the same time, increase incentive for investment in energy efficiency facilities and expand green technology consulting services. Such actions are expected to provide wider commercial opportunities for green products, services and technology. Presently, Australia is moving towards the right path as recent reports have indicated that the Australian government invested $13 billion to commercialize green technology.[19]

17) World's 2nd in Coal export volume. IEA, (2012), Key World Energy Statistics
18) Currently, companies, power plants and research institutes are participating in 20 projects
19) Clean Energy Finance Corporation, Australia Renewable Energy Agency(ARENA)

Austria



	Austria	Average
Capacity	46	49
Supporting Environment	37	42
Activities	34	35
Performance	52	46

Fig 14. ASEI Result: Austria

Austria's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Austria falls into the average (Austria: 42/100, Average: 43/100) group when compared to other twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria score is average:* average in the Country's Economic Competitiveness, Awareness of Sustainability Management and Green Technology possessed/acquired Firms.
- *"Eco-Innovation Supporting Environment" criteria score falls just below average:* Implementation of Environmental Regulations indicator exceeds the average score, but the Maturity of Investment Setting for Green Technology Industry and Investment Scale towards Green Technology SMEs indicator score is falls shorter than average.
- *"Eco-Innovation Activities" criteria score is aligned along the average line:* the Commercialization Level of Green Technology, Firms' Participation on Environmental Management System and Economic Influence of Leading Environmentally Responsive Firms indicators demonstrate a low score, Activeness of Renewable Energy Utilization indicator shows a high score.
- *"Eco-Innovation Performance" criteria score is above average:* specifically the Level of Environmental Impact on Society and CO_2 emission intensity indicators are considerably high. In contrast, Green Industry Market Size is lower than average.

Austria's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Growth in Transition ■ Master plan's strategies ■ The new Green Electricity Act 2012 ■ Resource Efficiency Action Plan (REAP) (2007) ■ Waste Prevention and Recycling Strategy (2006)	■ Master Plan Green Jobs ■ Master Plan Environmental Technologies(MUT) ■ Master plan Sustainable Energy ■ The programme on Technologies for Sustainable Development (2005) - Building of Tomorrow - Factory of Tomorrow - Energy systems of Tomorrow ■ Environmental technology export initiative (2005) ■ Green Public Procurement (2008-2013) ■ Green Brands seal (2011) ■ Smart Energy Demo (2011) ■ Waste Prevention Programme (2011)	■ Austrian Clean Technology (ACT) (2008) ■ COMET (Competence Centers for Excellent Technologies)
Sustainable Development	■ Austrian Strategy for SD (NSTRAT) (2002) ■ A new Austrian Sustainable Development Strategy (SDS) (2010) ■ Strategy 2020-Research, Technology and Innovation for Austria	■ The National Action Plan for Sustainable Public Procurement (2010) ■ The Climate and Energy Fund(KLIEN) ■ The Austrian Raw Materials Plan ■ Austrian Climate Strategy and the Energy Efficiency Action Plan (2007)	
SMEs		■ Mountain Cleantech Fund II ■ ERP SME Program ■ Austrian Research Promotion Agency (FFG)	■ Austria Wirtschaftsservice GmbH[20]

Table 9. Austria's Eco-innovation Supporting Environment Qualitative Research Table

Major Organizations of Eco-Innovation in Austria

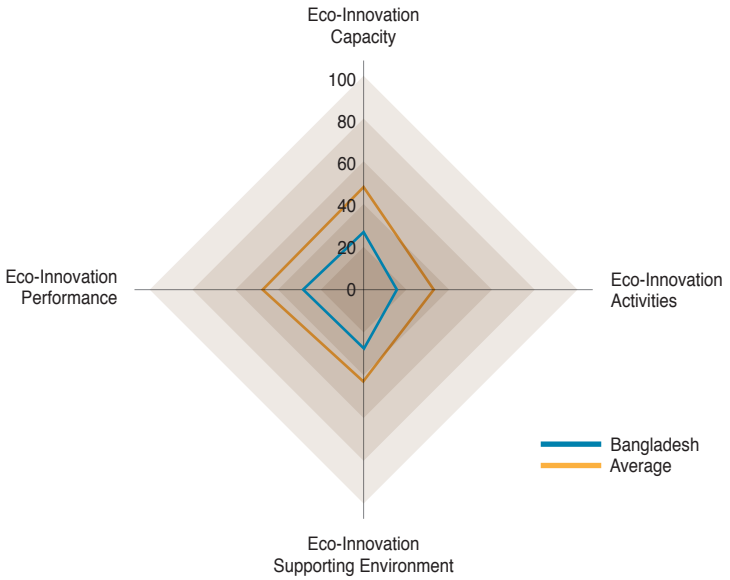
- Austrian Business Agency (ABA)
- Victorian Eco Innovation Lab (VEIL)

Overall Comments for Austria

- Austria's eco-innovation mainly focuses on enhancing competitiveness in green technology. The country included environmental industry driven economic development as a key theme in its national strategy plan.[21] The 'Master Plan Environmental Technology' (MUT) was established in order to enhance eco-innovation competitiveness through cooperation between the government, firms, research institutes and academic institutions.[22]
- Austria is rich in natural resources and, therefore, is advanced in the use of renewable energy such as green electricity, water power, biomass, and wind power. With a focusing on enhancing energy efficiency, the government is using such advanced skills as an opportunity to increase export scale.

20) *EIO (2011), Eco-innovation in Austria*
21) Aiming at creating new 10,000 jobs and making up 2.5% of the world trade volume. Federal Ministry of Agriculture, Forestry, Environment and Water Management, Eurofound
22) Austrian Business Agency(ABA)

Bangladesh



	Bangladesh	Average
Capacity	28	49
Supporting Environment	27	42
Activities	17	35
Performance	29	46

Fig 15. ASEI Result: Bangladesh

Bangladesh's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Bangladesh falls below the average national score (Bangladesh: 25/100, Average: 43/100) when compared to other twenty four ASEM member countries evaluated by the ASEI. Bangladesh also falls below average when it is compared to its regional peers.

- *"Eco-Innovation Capacity" criteria score falls below average:* the Country's Economic Competitiveness and Awareness of Sustainability Management indicators are at considerably low figures.
- *"Eco-Innovation Supporting Environment" criteria score is lower than average:* Implementation of Environmental Regulations, Investment Scale towards Green Technology SMEs and Maturity of Investment Setting for Green Technology Industry indicators show low scores but Government's R&D Expenditure in Green Industry illustrates a comparatively higher score.
- *"Eco-Innovation Activities" criteria score is lower than average:* Commercialization Level of Green Technology, Firms' Participation on Environmental Management System, Economic Influence of Leading Environmentally Responsive Firms and Green Patents indicators show low scores, the Activeness of Renewable Energy Utilization indicator is above average.
- *"Eco-Innovation Performance" criteria score falls below average:* Green Industry Market Size, Level of Environmental Impact on Society, Jobs in Green Technology Industry, CO_2 emission intensity, Country's Energy Sustainability level and Water consumption intensity indicators all show lower than average.

Bangladesh's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation		■ The Clean Technology Fund ■ Biomedical Waste Management Rules (2008) ■ Ship Breaking and Hazardous Waste Management Rules (2010) ■ Revised Renewable Energy Policy (2011)	■ Network of 34 'focal points'[23] ■ A seminar entitled "Opportunities for UK-Bangladesh Business Collaborations for Environmental Sustainability and Resource Efficiency" - To help to support Bangladeshi businesses interested in collaborating with UK institutions to move towards more environmentally-sustainable products and services
Sustainable Development	■ Vision 2012 ■ The National Strategy for Accelerated Poverty Reduction (NSAPR) ■ National Sustainable Development Strategy (2009) ■ Bangladesh Climate Change Strategy & Action Plan (BCCSAP) (2009)	■ Sixth Five Year Plan (2011-2015)[24] ■ Perspective Plan of Bangladesh 2010-2021 ■ National Climate Change Fund ■ The Strategic Climate Fund ■ National Environment Management Action Plan (NEMAP) (1995) ■ National Energy Policy(draft) (2006) ■ National Water Policy (1999) ■ National Water Management Plan (2004, revised) ■ The National Adaptation Programme of Action(NAPA) (published in 2005, updated 2009)[25] ■ Bangladesh Climate Change Trust Fund Act (2010) ■ Draft National Solid Waste Management Rules (2010)	■ Sustainable agribusiness supply chain workshop(2013) - Jointly arranged to broker supply-chain partnerships between companies and NGOs who are directly involved in agribusiness value chains
SMEs			

Table 10. Bangladesh's Eco-innovation Supporting Environment Qualitative Research Table

23) *Government of the People's Republic of Bangladesh, (2008), Bangladesh Climate Change Strategy and Action Plan*
The Climate Change Cell in DoE under the Ministry of Environment and Forests supports the mainstreaming of climate change into national development planning and has developed a network of 34 'focal points' in different government agencies, research and other organisations.

24) *GED Bangladesh Planning Commission , Sixth Five Year Plan (2011-15) as the tool of accelerating growth and reducing poverty*
The five year plan is cast in the context of a long-term development vision defined by the Government's Vision 2021 and the Perspective Plan (2010-2021). the Sixth Five Year Plan includes the objectives such as to achieve sustained growth with equity and social justice and to revitalize the rural economy by higher farm productivity and stimulating SMEs

25) *Ministry of Environment and Forests,(2009), Climate Change Strategy and Action Plan*
In 2005, we developed the National Adaptation Programme of Action (NAPA) after extensive consultations with communities across the country, professional groups; and other members of civil society. We have since taken this process forward, including through the adoption of the Bangladesh Climate Change Strategy and Action Plan (BCCSAP), which will be the main basis of our efforts to combat climate change over the next ten years.

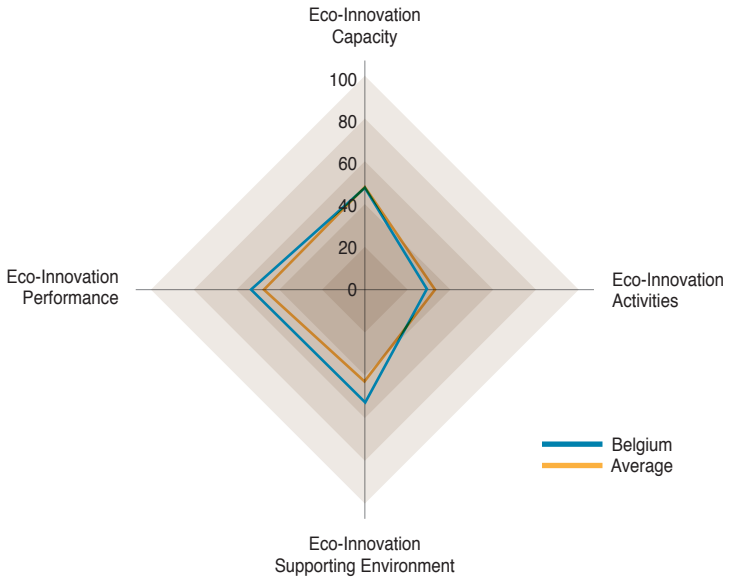
Major Policies of Eco-Innovation in Bangladesh

- Vision 2012
- Perspective Plan of Bangladesh, 6th Five Year Plan

Overall Comments for Bangladesh

- Bangladesh's eco-innovation plan had been introduced in Rio +20 as part of its green development plan which takes "economic growth, poverty reduction, social emancipation, sustainable development" in as factors for development. Bangladesh is vulnerable to climate change, poverty, corruption, high-density population and heavily focused on primary industry economic structure. Thus, Bangladesh needs to implement eco-innovation and align it with overall sustainable economic development strategy to tackle broad issues that it is currently facing. Yet, Bangladesh's eco-innovation supporting policies are primarily focused on tackling climate change and natural resource management rather than integrated measures of both environmental and economic growth. Eco-innovation is active in bio-energy and photovoltaic industry and there is indication that the government is willing to support and invest in such eco-innovation industry and firms.

Belgium



	Belgium	Average
Capacity	49	49
Supporting Environment	55	42
Activities	31	35
Performance	55	46

Fig 16. ASEI Result: Belgium

Belgium's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Belgium scores slightly above the average scale (Belgium: 48/100, Average: 43/100) when compared to the other twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria score is average:* Country's Economic Competitiveness and Green Technology possessed/acquired Firms indicators are higher than average, but Green Technology R&D Institution Capacity and Awareness of Sustainability Management indicators show lower than average scores.
- *"Eco-Innovation Supporting Environment" criteria is above average:* Government's R&D Expenditure in Green Industry and Maturity of Investment Setting for Green Technology Industry Implementation of Environmental Regulations indicators represent average-level scores and Investment Scale towards Green Technology SMEs indicator far outweighs the average.
- *"Eco-Innovation Activities" criteria falls slightly below average:* Commercialization Level of Green Technology and Green Patents indicators are above average while, Firms' Participation on Environmental Management System and Activeness of Renewable Energy Utilization indicators demonstrate low scores.
- *"Eco-Innovation Performance" criteria is higher than average:* Country's Energy Sustainability level and Jobs in Green Technology Industry indicators gained high scores, but Green Industry Market Size indicator shows lower than average score.

Belgium's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ National Energy Efficiency Action Plan 2008-2016 (NEEAP) ■ Eco Management and Audit Scheme (EMAS) (2005) ■ Strategic Policy Plan 2010 – 2015 on Waste, Materials and Soil Management (2009) ■ The Federal Products Plan (2009-2012) ■ Walloon Waste Plan 2020 ■ Flanders In Action pact 2020	■ PRODEM [26] ■ Ecocheque ■ Eco-dynamic enterprise label ■ Decree on waste & materials management ■ Energy Renovation Programme 2020 ■ Waste-water treatment plan ■ Cluster policy, a sixth pole 'GreenWin'(green chemistry and eco-industries) (2011) ■ Flanders's Sustainable Materials Management Programme (2011) ■ Walloon's Marshall Plan2.Green ■ Walloon's Voluntary Agreements on Energy Efficiency ■ Flemish Reform Programme (2010)	■ Grants by Flanders: MIP, Environmental and Energy Technology Innovation Platform for university-company collaborative projects ■ Clusters Walloon (2011) ■ Ghent Bio-Energy Valley ■ TWEED ■ Public Waste Agency of Flanders(OVAM) (2010) ■ IMIEU (Institute for Infrastructure, Environment and Innovation) ■ The 9th European forum on eco-innovation- Finance the eco-innovation (Nov 2010)
Sustainable Development	■ Sustainable Materials Management Strategy ■ National Climate Plan 2009-2012 ■ Flemish Climate Policy Plan 2013-20 ■ Energy Efficiency Action Plan 2011-16	■ Federal research programme - Science for a Sustainable Development ■ The National Strategy for Sustainable Public Procurement (2004-2008) ■ Regional policy statement (2009-2014) ■ 4th Environmental Policy Plan (MINA-4) (2011-2015)	■ Sustainable Technology Development (STD) facility (in Flanders) ■ DuWoBo (a Flemish Transition Network for Sustainable Construction)
SMEs		■ Brussels - Funding for pre-competitive development ■ Eco-efficiency Scan programme	■ Brussels Enterprise Agency (BEA) ■ Business Angels Network (BAN) ■ Wallonia/Brussels-Capital ■ Brussels-Capital - BRUSTART ■ Wallonia - FIRST Enterprise spin-out

Table 11. Belgium's Eco-innovation Supporting Environment Qualitative Research Table

Major Policies of Eco-Innovation in Belgium

- Brussels Enterprise Agency
- Flemish Public Waste Agency Federal

Overall Comments for Belgium

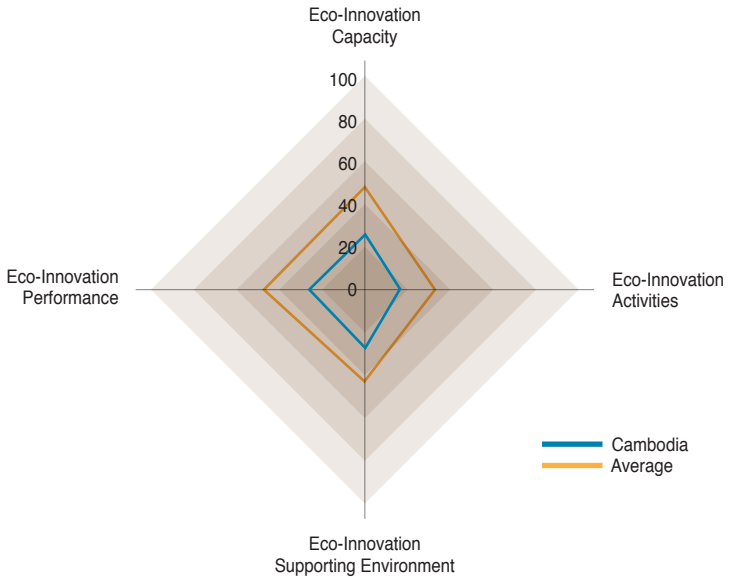
- Belgium's eco-innovation activities are considerable at the regional level, and are one of the distinctive features that promote eco-innovation in the country. Each local government takes its own initiative to facilitate eco-innovation activities for firms located in the area.[27] This strategy generated more interest among firms and raised the level of participation towards environmental management.
- Belgium has successfully developed a cluster system for specific industries. Clusters in Belgium are playing a major role in activating eco-innovation activities through partnership between various stakeholders.[28] Such synergetic effects count lead to increasingly activate commercialization of eco-innovative products and technology. Also, continuous research is being implemented in the area of renewable energy.

26) *EIO, (2011), Eco-innovation in Belgium*
Promotion and Demonstration of Environmental Technologies The project encourages SMEs to introduce environmentally friendly process technologies, by setting up demonstration tests and pilots to investigate the feasibility of selected technologies since this was found crucial for SMEs to guide them to do the right investments in cleaner technologies.

27) Wallonia: since 2000's voluntary agreement aiming at improvement of energy efficiency expanded its coverage into 13 industries. Flandre: have contracted voluntary agreement for energy consumption reduction with 180 companies by now. With spontaneous efforts from each local government, since 2000's energy consumption has been decreased annually by average 3% which is faster rate than the reduced amount of the total energy consumption

28) Representative examples are Ghent Bio-Energy Valley, TWEED, etc

Cambodia



	Cambodia	Average
Capacity	25	49
Supporting Environment	27	42
Activities	17	35
Performance	26	46

Fig 17. ASEI Result: Cambodia

Cambodia's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Cambodia falls below the average national score (Cambodia: 24/100, Average: 43/100) when compared to other twenty four ASEM member countries evaluated by the ASEI. Cambodia also falls into below average when it is compared to its regional peers.

- *"Eco-Innovation Capacity" criteria score is relatively lower than average:* Country's Economic Competitiveness, Country's General Innovation Capacity and Green Technology possessed/acquired Firms indicators represent considerably low figures.
- *"Eco-Innovation Supporting Environment" criteria score is lower than average:* Implementation of Environmental Regulations, Maturity of Investment Setting for Green Technology Industry and Investment Scale towards Green Technology SMEs indicators score significantly low among other indicators that falls below average.
- *"Eco-Innovation Activities" criteria score indicates lower level than average:* Commercialization Level of Green Technology and Firms' Participation on Environmental Management System indicators gained low grades
- *"Eco-Innovation Performance" criteria score is lower than average:* Level of Environmental Impact on Society, Jobs in Green Technology Industry and Green Industry Market Size indicators illustrate significantly low scores.

Cambodia's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Renewable Electricity Action Plan (2002–2012) ■ Master Plan Study on Rural Electrification by Renewable Energy (2008) ■ Cambodia power sector strategy (1999)	■ Reducing Greenhouse Gas Emissions through Improved Energy Efficiency in the Industrial Sector ■ Rural Electrification by Renewable Energy Policy (2006)	■ Community Based Natural Resource Management (CBNRM)- Emerging Trends, Challenges and Innovations (2009)
Sustainable Development	■ The National Strategic Development Plan (NDSP 2009 to 2013 update) [29] ■ The National Green Growth Roadmap (2009) - the aim of contributing an emphasis on 'green' dimensions to the implementation of Cambodia's national policy platform ■ National Environmental Action Plan (1998-2002)	■ Green Growth Mater Plan - Development of a national Green Growth Master Plan (GGMP) includes the institutional establishment of a high-level coordinative National Council on Green Growth (NCGG) as well as practical capacity-building initiatives ■ The 3rd Socio-Economic Development Plan (2006- 2010) [30] ■ Programme of Action for Adaptation to Climate Change CAM ■ TT-Pilot (GEF-4): Climate Change Related Technology Transfer for Cambodia: Using Agricultural Residue Biomass for Sustainable Energy Solutions ■ Promoting Climate-Resilient Water Management and Agricultural Practices ■ National Policy on Water Resources Management and the Strategic Plan on Water Resources Management and Development (2005-2008) ■ Strategic National Action Plan for Disaster Risk Reduction (DRR) (2008-2013)	■ The 1st National Consultative workshop on drafting the National Policy on Science and Technology (NPSTI) organized by The Cambodian National Committee on Science and Technology (NCOST) and UNESCO - Fostering policies and capacity-building in science, technology and innovation for sustainable development
SMEs			■ Sustainable Product Innovation in Vietnam, Cambodia and Laos - Strengthens the innovative power of industry to improve environmental and societal quality of products made in Vietnam, Laos and Cambodia - Activities include among others capacity building on project branding and marketing skill trainings for SMEs ■ Green Eco-preneurship Accelerated Program 2013 in Cambodia - Developed by ASEIC in cooperation with Global Green Growth Institute(GGGI) to provide appropriate entrepreneurship training program including application of eco-innovation concept and a holistic range of services to encourage trainees to build a practical start-up business model

Table 12. Cambodia's Eco-innovation Supporting Environment Qualitative Research Table

Major Policies of Eco-Innovation in Cambodia

- National Strategic Development Plan (NDSP)

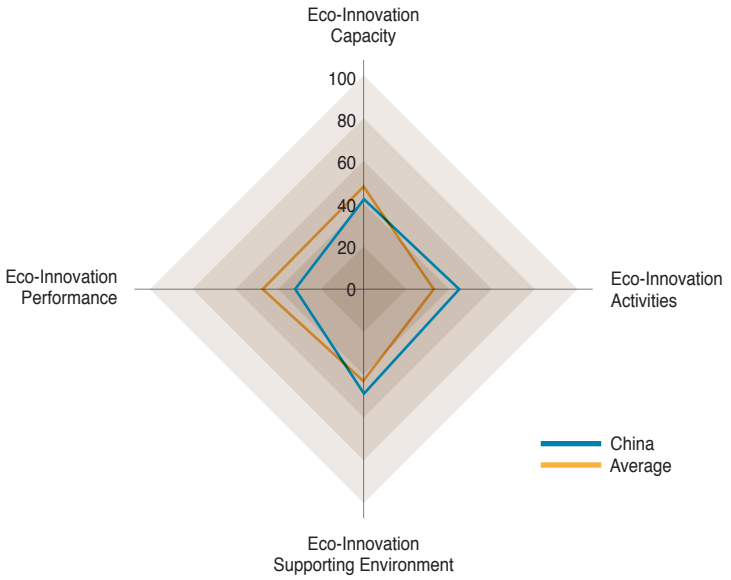
Overall Comments for Cambodia

- Cambodia's awareness of eco-innovation is low. The country's main concern is on their climate change, poverty and regional development. However, Cambodia is slowly starting to realize the importance of sustainable economic growth. Recent "Green Eco-entrepreneurship Acceleration Program" established in 2013 shows government's effort to increase SMEs' activities towards eco-innovation.
- Cambodia possesses eco-innovation capacity to facilitate regional energy supply by increasing its resource efficiency through appropriate utilization of renewable energy.

29) *National Report for Rio+20 United Nations Conference on Sustainable Development, (2012), The National Strategic Development Plan*
The current national strategy is the Rectangular Strategy Phase II3 which represents the Government's long-term development vision and economic policy agenda for the Fourth Legislature(2008-2013) of its National Assembly (parliament). The National Strategic Development Plan (NDSP 2009 to 2013 update) is the national development plan and the roadmap for the implementation of the Rectangular Strategy. The NSDP fully integrates the Cambodia Millennium Development Goals (CMDGs)
National Report for Rio+20 United Nations Conference on Sustainable Development, (2012), Millennium Development Goals
Sustainable development goals are reflected throughout all CMDGs, especially CMDG 1 (poverty and hunger), CMDG 2 (education), CMDG 3 (gender equality), CMDG 4 (child mortality), CMDG 5 (maternal health), CMDG 6 (HIV/AIDS, malaria and other diseases), CMDG 7 (environmental sustainability) and CMDG 9 (demining)

30) *NATIONAL STRATEGIC DEVELOPMENT PLAN UPDATE 2009-2013, (2009), The 3rd Socio-Economic Development Plan*
The 3rd five year development Plan for 2006-2010 was formulated to be the single, overarching, guiding, and reference national policy document for pursuing prioritized goals, targets and actions for the next five years. The new Plan was renamed to be the National Strategic Development Plan (NSDP) 2006-2010

China



	China	Average
Capacity	41	49
Supporting Environment	49	42
Activities	45	35
Performance	33	46

Fig 18. ASEI Result: China

China's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, China falls below the average national score (China: 42/100, Average: 43/100) when compared to other twenty four ASEM member countries evaluated by the ASEI. However, China scores above average when compared to its regional peers.

- *"Eco-Innovation Capacity" criteria score is just below average:* Country's General Innovation Capacity indicators are significantly below average and Green Technology R&D Institution Capacity and Green Technology possessed/acquired Firms indicators score fall into the average level.

- *"Eco-Innovation Supporting Environment" criteria score is above average:* Implementation of Environmental Regulations indicator represents somewhat poor figure, Maturity of Investment Setting for Green Technology Industry and Investment Scale towards Green Technology SMEs indicator score far surpass the average level.

- *"Eco-Innovation Activities" criteria score is above average:* Commercialization Level of Green Technology and Firms' Participation on Environmental Management System indicators gained considerably high marks while Economic Influence of Leading Environmentally Responsive Firms and Firms' Participation on Environmental Management System indicators demonstrate average level scores.

- *"Eco-Innovation Performance" criteria score is below average:* most indicators including Level of Environmental Impact on Society and CO_2 emission intensity indicators score far below average. However, Green Industry Market Size ranked in the top-tier compared to its peer countries.

China's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Energy Saving and New Energy Vehicle Development Plan (2011-2020)	■ Renewable Energy Law (NPC) ■ Energy Conservation Law ■ The government energy efficiency programs in 2006: (i) large substitutes for small (LSS), and (ii) energy conservation power generation scheduling ■ Major progress on transportation air emissions - China IV emission standard in 2011 - China V emission standards in 2012 ■ New and renewable energy development program (1996-2010) ■ Thousand Enterprises program (2006) [31] ■ 2009-2020 Strong and Smart Grid Plan	■ China Builds Capacity in Energy Efficiency through Linkage with Japan (2009)
Sustainable Development	■ National Plan for Science and Technology Development (2006-2020): prioritized field of research includes energy, water, environment etc. ■ The 12th five-year plan (2011-2016) [32]	■ Renewable Energy Power Pricing and Costs Sharing for Trial Implementation (NDRC) ■ Circular Economy Promotion Law ■ National High-tech R&D program: "863 program" ■ Natural Science Foundation of China-Public investment in environmental R&D (NSFC) ■ National Program on Key Basic Research Projects: "973program" [33] - Public investment in environmental R&D ■ Hundred Scholars Chinese Academy of Sciences(CAS) ■ National Key Laboratories Programmes-Public investment in environmental R&D ■ Mobilizing financing from National new products program & National key technologies R&D program ■ China Greentech Partner Program	■ The Regional Inclusive Innovation Policy Forum (2012) ■ China-Japan-US Forum on ■ Sustainable Built Environment ("CJUFSBE")
SMEs		■ Technical Innovation Fund for Small and Medium-sized S & T Firms	■ China SME Global Development Forum ■ The 30th Meeting of APEC SMEWG (Small and Medium Enterprises Working Group) (June 2010)

Table 13. China's Eco-innovation Supporting Environment Qualitative Research Table

31) *OECD, (2009), eco innovation policies in the people's republic of china*
The Program recognized industry as the largest energy user, selected 1,008 top firms that together consume one-third of all China's primary energy, and instructed them to formulate individual energy efficiency improvement plans in cooperation with local officials

32) *KPMG, (2011), China's 12th Five-Year Plan: Sustainability*
Government figures show that by the end of China's 11th Five-Year Plan in 2010, the country achieved a 19.1 percent energy consumption reduction, narrowly missing the 20 percent target. To meet further reduction targets, the 12th Five-Year Plan (5YP) is investing heavily in the low-carbon economy and sustainable development

33) *OECD, (2009), eco innovation policies in the people's republic of china*
The 973 Programme contains eight key areas: agriculture, energy, information technology, natural resources and environment, population and health, material sciences, multi-disciplinary research, and important frontiers of sciences. From 2002 to 2007, there were a total of 274 research projects funded, of which 30 were on energy and 32 were on natural resources and environment.

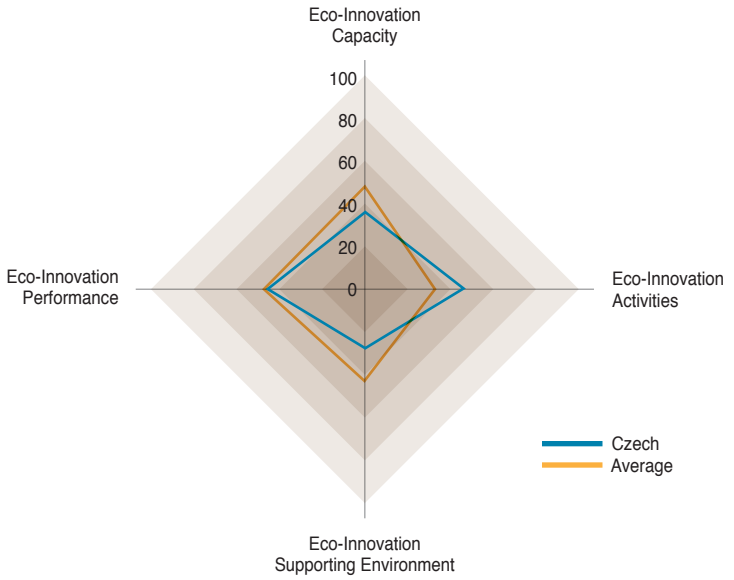
Major Organizations of Eco-Innovation in China

- Ministry of Science and Technology (MOST), Ministry of Commerce, Ministry of Finance
- The State Council Steering Group for Science, Technology and Education
- National Development and Reform Commission, National Leadership Committee on Climate Change, National Development and Reform Commission (NDRC), National Natural Science Foundation of China
- Local governments

Overall Comments for China

- China's eco-innovation plan is included as part of the state-run major development plan.
- China has contributed to the photovoltaic industry which is a major part of eco-innovation investment. However due to global economic recession and oversupply of photovoltaic facilities, the renewable energy market in China is slowing down its growth rate. However, the country's R&D long term national programmes such as the 863 programme and 973 programme continuously provides a firm foundation to build up eco-innovation capacity in other various areas.
- Due to fast economic growth, environmental quality of life in China has weakened and the high rate of CO_2 emission is a deepening concern for the country. In comparison to the previous national plan, the 12^{th} five-year national plan focuses on sustainable development and improvement of environmental standard rather than rapid economic growth and energy intensive industry development plans. Accordingly, there is an expectation that more eco-innovation activities will be introduced in China and eco-innovation capacity will be built over time due to such active institutional measures at the national level.

Czech Republic



	Czech	Average
Capacity	37	49
Supporting Environment	31	42
Activities	47	35
Performance	45	46

Fig 19. ASEI Result: Czech Republic

Czech's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Czech scores below the average level (Czech: 40/100, Average: 43/100) when compared to other twenty four ASEM member countries evaluated by the ASEI. Czech falls below average when compared to its regional peers.

- *"Eco-Innovation Capacity" criteria score falls below average:* Country's Economic Competitiveness and Country's General Innovation Capacity indicator scores average, yet Green Technology R&D Institution Capacity and Green Technology possessed/acquired Firms indicators falls below average.
- *"Eco-Innovation Supporting Environment" criteria score is lower than average:* Government's R&D Expenditure in Green Industry and Implementation of Environmental Regulations indicators are on the average level while the scores for the Maturity of Investment Setting for Green Technology Industry indicator are considerably lower.
- *"Eco-Innovation Activities" criteria score is higher than average:* Commercialization Level of Green Technology, Economic Influence of Leading Environmentally Responsive Firms and Activeness of Renewable Energy Utilization indicator shows low scores yet it ranked high in the level of Firms' Participation on Environmental Management System and Green Patents.
- *"Eco-Innovation Performance" criteria score falls into average:* Level of Environmental Impact on Society and Green Industry Market Size indicators were both indicate average. Yet, CO_2 emission intensity and Jobs in Green Technology Industry indicator scores show lower than average scores.

Czech's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Waste Management Plan of the Czech Republic (2003–2013)	■ Operational Program for Environment ■ Program on Environmental Technology Support (2006) ■ Updated Programme of Support of Environmental Technologies (2009) ■ Act no. 185/2001 on waste prevention and waste management ■ Subsidy programmes of the State Environment Fund ■ The Green Investment Scheme (2009) - New programme supporting renewable energy sources and energy savings in residential buildings ■ Raw Material Policy in the Field of Mineral Materials and Their Resources (1999) ■ State Energy Policy of the Czech Republic (2004) ■ State environmental policy (2004-2010)	■ Czech Environmental Information Agency (CENIA) ■ 14th European forum on eco-innovation-Delivering innovative solutions for mobility, energy and ICT in cities (May 2013)
Sustainable Development	■ National Action Plan for Renewable Energy Sources ■ The National Energy Efficiency Action Plan ■ Sustainable Spatial Development ■ the Framework of Programmes on Sustainable Consumption and Production (SCP Framework) (2005) ■ National Cluster Strategy (2005) ■ Strategic Framework for Sustainable Development (2010)	■ Local Agenda 21 ■ National Program of Labelling Environment-friendly Products ■ National programme for the energy management and the use of renewable sources of energy for (2006–2009) ■ Czech National Biomass Action Plan for the period (2009–2011)	■ The Government Council for Sustainable Development (GCSD) ■ National Network of Science and Technology Parks
SMEs			■ Operational programme enterprise and innovation (2007-2013)

Table 14. Czech's Eco-innovation Supporting Environment Qualitative Research Table

Major Organizations of Eco-Innovation in Czech

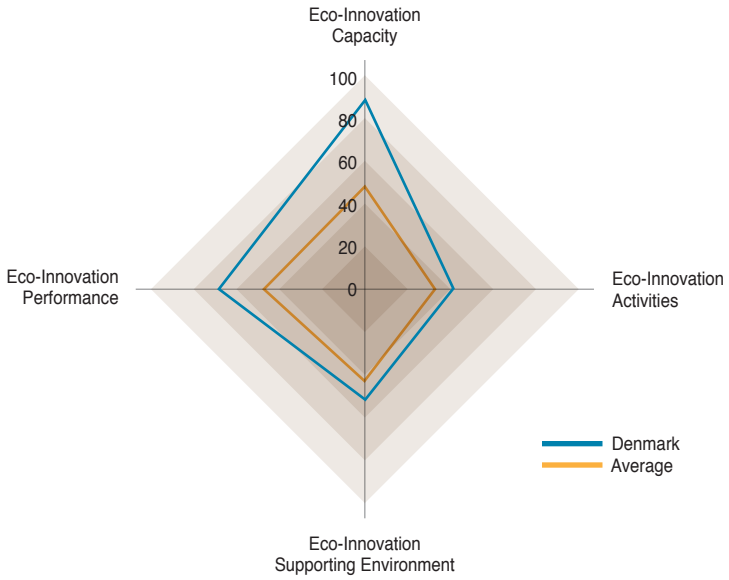
- The Government Council for Sustainable Development (GCSD)
- Czech Environmental Information Agency (CENIA)

Overall Comments for Czech

- Czech economic structure heavily depends on SMEs as SMEs make up over 99% of the country economy and over 60% of the total employment.[34] The Strategic Framework for Sustainable Development places importance in supporting start up firms, SMEs and intellectual property protection. Such understanding is well reflected in the result of eco-innovation activities criteria of ASEI.
- Czech's eco-innovation activities are mainly related to enhancing the utilization of renewable energy and developing green smart grid, focusing on environmentally friendly shipping. The Czech government has facilitated environmental tax benefit for vehicles and, as a result, local car makers are putting their effort in developing electric cars.
- Czech's eco-innovation capacity lies on well-equipped infrastructures to create green technology innovation, through R&D clusters, innovation parks, etc.

34) In 2008, SMEs accounted for 61.52% of employment and 54.57% of book value added, the proportion of SMEs in the total number of active businesses was 99.83%. *Government Council for Sustainable Development, (2010), The Strategic Framework for Sustainable Development in the Czech Republic*

Denmark



	Denmark	Average
Capacity	88	49
Supporting Environment	51	42
Activities	42	35
Performance	70	46

Fig 20. ASEI Result: Denmark

Denmark's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Denmark scores quite higher (Denmark: 63/100, Average: 43/100) when compared to other twenty four ASEM member countries evaluated by the ASEI. As such, Denmark falls into the top tier group compared to its regional peers.

- *"Eco-Innovation Capacity" criteria score is much higher than average:* every indicator included in this criterion represents higher scores than the average, particularly Green Technology R&D Institution Capacity, Green Technology possessed/acquired Firms and Awareness of Sustainability Management indicators far outweigh the average.
- *"Eco-Innovation Supporting Environment" criteria is relatively higher than average:* Implementation of Environmental Regulations indicator has been evaluated to be outstanding.
- *"Eco-Innovation Activities" criteria is just above average:* Firms' Participation on Environmental Management System and Economic Influence of Leading Environmentally Responsive Firms indicators are around average, yet Activeness of Renewable Energy Utilization indicator score exceeds the average.
- *"Eco-Innovation Performance" criteria appears go beyond the average level:* CO_2 emission intensity, Country's Energy Sustainability level and Water consumption intensity indicators demonstrate high scores yet Green Industry Market Size shows a relatively low score.

Denmark's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Environmental technological action plan 2010-2011 ■ Energy Strategy 2050	■ New Ecoinnovation Programme ■ The Energy Technology Development and Demonstration Programme (EUDP) ■ The Green Development and Demonstration Programme ■ The Fund for Green Conversion and Commercial Renewal ■ Eco-label Denmark ■ The Raw Materials Act ■ Four largest water research programmes - Grant Scheme for Environmental Technologies within Water - The Foundation for the Development of Technology in the Danish Water Sector - The Business Innovation Fund - The Danish National Advanced Technology Foundation	■ The 7th European Forum on Eco-Innovation- Adapting to Climate Change through Eco-Innovation (Nov 2009)
Sustainable Development	■ The National Energy Agreement (2008 – 2011) ■ Danish Strategy for Sustainable Development(Vækst med Omtanke) (2009) ■ Green Growth (2009) ■ The Waste Strategy (2009-2012) ■ Green Growth agreement (2009) & Green Growth agreement 2.0 (2010)	■ Vaekstfonden[35] ■ An enhanced effort for green procurement (2008-2009) ■ A visionary Danish Energy Policy 2025 (2008)	■ Business climate strategy (2009)
SMEs		■ Research voucher for SMEs[36]	■ Regional Innovation Agents[37]

Table 15. Denmark's Eco-innovation Supporting Environment Qualitative Research Table

Major Organizations of Eco-Innovation in Denmark

■ Secretariat for Ecoinnovation (Danish Environmental Protection Agency)

Overall Comments for Denmark

■ In 2012, the Danish Ministry of the Environment announced the importance of eco-innovation and introduced nine action plans to promote eco-innovation: partnership for innovation, international cooperation, R&D development, Consulting service and gathering of advanced knowledge and information, eco-efficient technology development and utilization etc. These specific plans are expected to build a firm ground to create new businesses and national opportunities overtime.

■ Denmark's eco-innovation capacity is closely related to the close partnership between various stakeholders. The government understands the importance of close interaction between firms, research institutes, academic institutions and, is working towards creating new partnerships[38] and providing financial support to generate synergy in the field of eco-innovation.

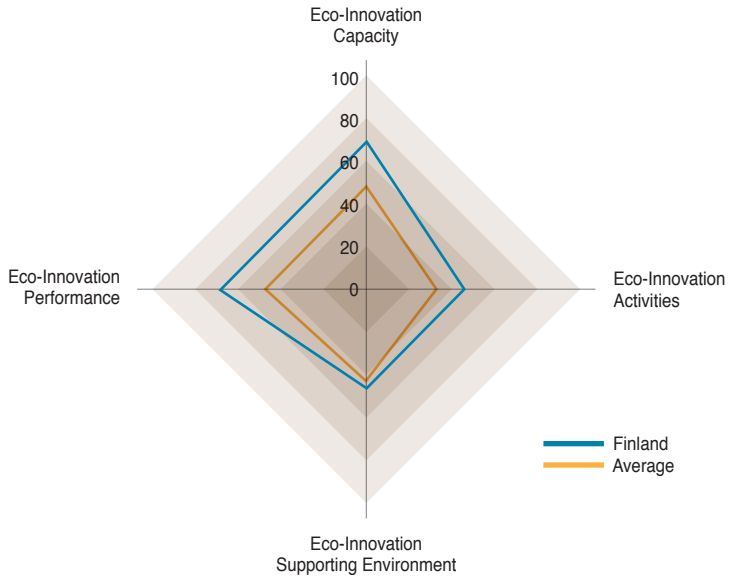
35) *EIO, (2011), Eco-innovation in Denmark*
The policy measure aims at an increased R&D intensity of SMEs by fostering collaboration with public research institutions, improving knowledge transfer and by strengthening quality and relevance of public R&D

36) *EIO, (2011), Eco-innovation in Denmark*
Experts from 9 regional centres offer innovation checks to smes of the regions in question

37) *EIO, (2011), Eco-innovation in Denmark*
National funding scheme named that has a high focus on investing in companies, who put innovation and environment high on their agenda

38) Water Partnership, Partnership for Environmental Technology to groundwater area in Shandong Province, Partnership for wastewater in Chongqing Province

Finland



	Finland	Average
Capacity	68	49
Supporting Environment	47	42
Activities	47	35
Performance	68	46

Fig 21. ASEI Result: Finland

Finland's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Finland scores higher (Finland: 57/100, Average: 43/100) than the average group when compared to other twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria score exceeds the average:* indicators included exceed the average score. Green Technology possessed/acquired Firms indicator is the only indicator below the average.
- *"Eco-Innovation Supporting Environment" criteria score is just above average:* Implementation of Environmental Regulations indicator ranked highest amongst its regional peers and Maturity of Investment Setting for Green Technology Industry and Investment Scale towards Green Technology SMEs indicator scores indicate higher level than the average.
- *"Eco-Innovation Activities" criteria score demonstrates higher than average:* Commercialization Level of Green Technology and Activeness of Renewable Energy Utilization indicators show high scores, but low score for Green Patents.
- *"Eco-Innovation Performance" criteria score shows significantly higher level than average:* Level of Environmental Impact on Society, Country's Energy Sustainability level and Jobs in Green Technology Industry indicators shows outstanding figures yet Green Industry Market Size is relatively small.

Finland's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation		■ Energy and eco-efficiency standards for new buildings ■ Energy efficiency label scheme ■ Acquisition law: energy efficiency requirement in public investment ■ Proposals for Finland's national programme to promote sustainable consumption and production (2005) ■ The Programme for the Built Environment (2010) ■ Towards a Smart Resource Economy – Government Report to Parliament on Natural Resources (2010) ■ The ERA17 programme for an energy-smart built environment 2017 (2010)	■ Green Net Finland ■ Cleantech Finland Business Forum ■ The Finnish Cleantech Cluster ■ Wood energy advisors network ■ Motiva Ltd: Equipment procurements, Energy procurements and Material efficiency ■ The Energy Efficiency committee (2008) ■ The 11th European Forum on Eco-Innovation working with emerging economies for green growth (Oct 2011)
Sustainable Development	■ National waste plan until 2016 (2008) ■ Climate Change and Energy Strategy (2008) ■ The National Resources Strategy (2009) ■ A Natural Resource Strategy for Finland: Using natural resources intelligently (2009) ■ The National Innovation Strategy (2009) ■ The Climate and Energy Strategy (2009) ■ Bioeconomy Strategy (2010)[39] ■ Finland's Mineral Strategy (2010)	■ The Finnish Innovation Fund(Sitra) ■ Resolution on Sustainable public procurement (2009) ■ The Strategic Programme for Cleantech Business (2012) ■ Tekes [40] - Finnish Funding Agency for Technology and Innovation, funded by Ministry of Transport and Communications	■ SHOK (Strategic Centres for Science, Technology and Innovation) [41] ■ The Finnish National Environmental Innovation Panel
SMEs		■ Finnvera - Environmental loan	

Table 16. Finland's Eco-innovation Supporting Environment Qualitative Research Table

Major Organizations of Eco-Innovation in Finland

- The Finnish National Environmental Innovation Panel
- The Energy Efficiency committee

Overall Comments for Finland

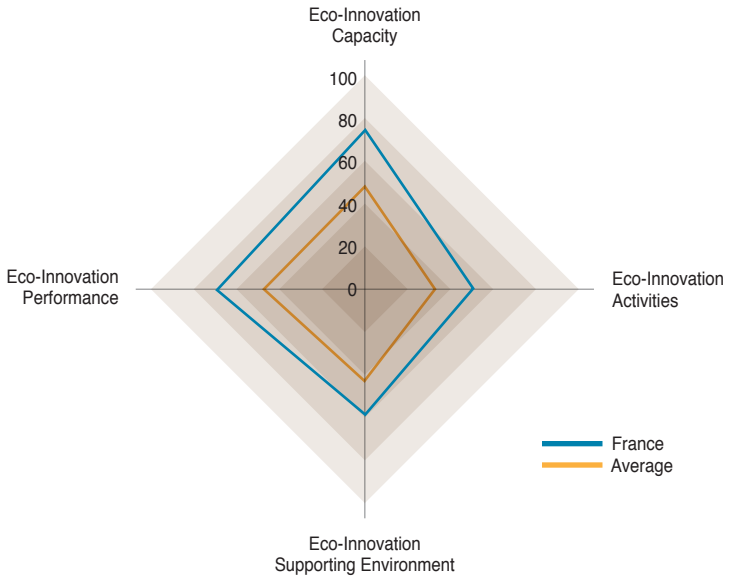
- Finland has well-equipped with environmental professions and infrastructure. It can be noticed from ASEI result that it scores high in the following indicators: Implementation of Environmental Regulations, Jobs in Green Technology Industry and Level of Environmental Impact on Society. Current eco-innovation activities are concentrated on energy efficiency and renewable energy.
- Finland industry development policy measures have been focused on cluster development, and the country is known to possess one of the world's top three Cleantech clusters, thus it is expected more these clusters will generate more eco-innovation activities overtime.

39) *European Environmental Agency, (2011), Finland resource efficiency policies*
To support national resource strategy, the Ministry of Employment and the Economy set a working group (WG) on bioeconomy. The WG released its final report in September 2010. The WG proposed 15 action points with several sub-points in each action to promote bioeconomy in Finland. One action point is that a National Biostrategy is to be prepared to concretise how bioeconomy can be utilised to promote new economic development and welfare.

40) *EIO, (2011), Eco-innovation in Finland*
Programmes: Biorefine, Sustainable community, Green growth

41) *EIO, (2011), Eco-innovation in Finland*
SHOKs related to eco-innovations: CLEEN Ltd/ Energy and environment, Forest cluster, Built environment

France



	France	Average
Capacity	75	49
Supporting Environment	60	42
Activities	51	35
Performance	70	46

Fig 22. ASEI Result: France

France's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, France scores higher (France: 64/100, Average: 43/100) than the average national score when compared to other twenty four ASEM member countries evaluated by the ASEI. France falls into the top tier group when compared to its regional peers.

- *"Eco-Innovation Capacity" criteria score is above average:* Green Technology R&D Institution Capacity and Awareness of Sustainability Management indicators represent high scores.
- *"Eco-Innovation Supporting Environment" criteria score is higher than average:* Maturity of Investment Setting for Green Technology Industry indicator is well above the average score.
- *"Eco-Innovation Activities" criteria score is above average:* Commercialization Level of Green Technology, Economic Influence of Leading Environmentally Responsive Firms and Green Patents indicators show higher scores than average yet Activeness of Renewable Energy Utilization indicator demonstrates low figure.
- *"Eco-Innovation Performance" criteria score shows significantly higher level than average:* CO_2 emission intensity, Country's Energy Sustainability level and Jobs in Green Technology Industry indicators score go beyond the average level while Green Industry Market Size indicator reveals lower figure than the average.

France's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Systemic approach to addressing environmental issues ■ Water framework directive in 2000 ■ A Waste Action Plan (2009-2012)	■ Ecotech 2012 (2012) ■ Eco-industry call (2009) ■ The Ecophyto Plan 2018 (2008 - 2018) ■ Fuel cell research programme H-PAC	■ ADEME (French Environment and Energy Management Agency) ■ The Club ADEME International ■ Cluster of Axelera in Rhone Alpes ■ Eco-technology clusters
Sustainable Development	■ National Strategy for Sustainable Development(NSSD) (2010-2013) ■ The national climate change adaption plan ■ Development plan for renewable energy (2008)	■ Excellence Institutes in the field of carbon-free energies (IEED) (Instituts d'excellence sur les énergies décarbonnées) [42] ■ Sustainable Energy programme	■ The Strategic Investment Fund (FSI)
SMEs		■ DEMETER Common Fund for Risk Placement [43]	■ OSEO [44] ■ CDC Enterprises [45] ■ Tenerrdis [46]

Table 17. France's Eco-innovation Supporting Environment Qualitative Research Table

Major Organizations of Eco-Innovation in France

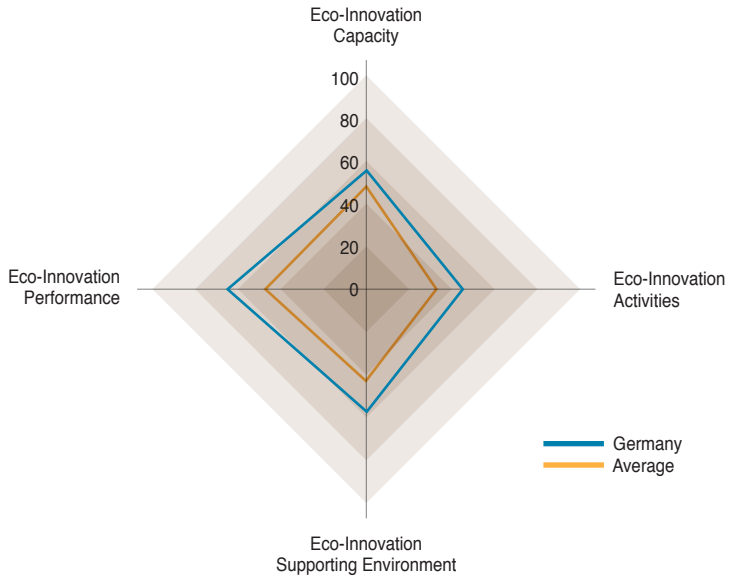
- ADEME (French Environment and Energy Management Agency)
- ANR (National Agency for Research)

Overall Comments for France

- France's eco-innovation is core part of its sustainable development plan, thus France has high level of awareness on eco-innovation. Governmental investment and support policies towards eco-industry in general are active and strong.
- To grow the eco-industry, the government has introduced 87 specific action plans under three core goals: 1) promote eco-innovation, 2) expand export of clean technology and 3) support SMEs. Support for SMEs includes expanding financial aid via ADEME in order to facilitate R&D activities and innovative green technology development.[47]
- The government has built joint partnership and network with the private sector in order to support developing countries to achieve decoupling economic-environmental growth by utilizing and commercializing green technology.[48]

42) Part of the 'Investments for the Future' programme. It funds projects with high potential for the economy and focuses on higher education and training, research, innovation and sustainable development *http://www.eurofound.europa.eu/eiro/studies/tn0908019s/at0908019q.htm*
43) Mutual Fund at Risk (RPF) in SMEs services and technologies in the fields of sustainable development
44) A fund for small and medium-sized enterprises development and innovation set up in 2005
45) French Government (French treasury) owned, 150 million fund of funds, that encourages more early-stage co-funds
46) Renewable energy cluster
47) Besides, there are ANR, Public investment bank, etc
48) Representatively, 120 of eco-companies related to environment and energy belong to 'Club ADEME International', a network organized by ADEME

Germany



	Germany	Average
Capacity	57	49
Supporting Environment	59	42
Activities	46	35
Performance	65	46

Fig 23. ASEI Result: Germany

Germany's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Germany scores higher (Germany: 57/100, Average: 43/100) than the national average score when compared to other twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria reveals higher score than average:* in particular, Country's Economic Competitiveness, Country's General Innovation Capacity and Green Technology possessed/acquired Firms indicators appear considerably high.
- *"Eco-Innovation Supporting Environment" criteria shows higher score than average:* especially Implementation of Environmental Regulations and Maturity of Investment Setting for Green Technology Industry indicators illustrate significantly higher scores than the average.
- *"Eco-Innovation Activities" criteria score is above average:* Commercialization Level of Green Technology and Economic Influence of Leading Environmentally Responsive Firms indicators far outweighs the average yet Firms' Participation on Environmental Management System and Activeness of Renewable Energy Utilization indicators show lower figures than the average.
- *"Eco-Innovation Performance" criteria score is above average:* Level of Environmental Impact on Society and Jobs in Green Technology Industry indicators show figures that are far above the average.

Germany's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ High-Tech Strategy(2006) (renewed in 2010)	■ Eco-Innovation Programme (former, Environmental Technology Programme) ■ The Master plan on environmental Technology (2008) ■ ProgRess programme promoting the understanding of resource efficiency as a competitive advantage ■ Research programme on Material Efficiency and Resource Conservation (MaRess) ■ Integration of the closed-cycle and waste management into a sustainable resource-conserving substance management (2004) ■ Identification of Relevant Substances and Materials for a Substance Flow-Oriented, Resource-Conserving Waste Management (2006) ■ Act for Promoting Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal (1994, latest update 2006; now under revision) ■ 5th Federal government energy research programme	■ NeMAT (Netzwerken zur Materialeffizienz) programme ■ Solar Valley-grid parity for solar power in Germany ■ Cool silicon-climate friendly communications ■ The Centre for Resource Efficiency(VDI ZRE) (2009)
Sustainable Development	■ The Framework Research Programme for Sustainable Development (FONA) ■ National ICT Strategy "Germany Digital 2015" and Action Plan "Germany: Green IT Pioneer" ■ National Research Strategy for BioEconomy 2030 ■ The German Federal Sustainable Development Strategy (2002) ■ The High-Tech Strategy 2020 for Germany (2010) ■ National Raw Material Strategy (2010)	■ The "Saarländisches Umweltmanagement-Förderprogramm" - Goal is an increase of EMAS-certified enterprises in order to tackle the sustainable resource-management issue ■ The project WING (Materials innovation for industry and society) ■ The Research for Sustainable Development Programme of the Federal Ministry of Education and Research (2010) ■ The national eco-label scheme "Blue Angel" ■ The federal government runs three subsidy programs - A subsidy program for renewable energy (MAP) - An energy advice program - A program for remodeling federal government buildings ■ The Integrated Energy and Climate Package (2007) ■ The National Energy Efficiency Plan (2008) ■ National Biomass Action Plan (2009) and Action Plan for the Industrial use of Biomass (2009) ■ National Resource Efficiency Programme (2011)	■ International partnerships for sustainable climate protection and environmental technologies and services(CLIENT) ■ The national "Resource Efficiency Network"
SMEs		■ The KfW bank programme "Energy efficiency advice for SMEs" ■ BMU-Umweltinnovationsprogramm supports primarily SME investing in processes for the abatement of any environmental damage ■ DEMEA - Consultative programmes on material efficiency - Material Efficiency Award Scheme ■ The Mikrokreditfonds Deutschland -a guarantee fund and sponsors mainly SME (2009)	■ PROINNO(innovation partnerships for small and medium enterprises) ■ ZUTECH(future technologies for SMEs) ■ Innonet(support of innovative networks) (2008)

Table 18. Germany's Eco-innovation Supporting Environment Qualitative Research Table

Major Organizations of Eco-Innovation in Germany

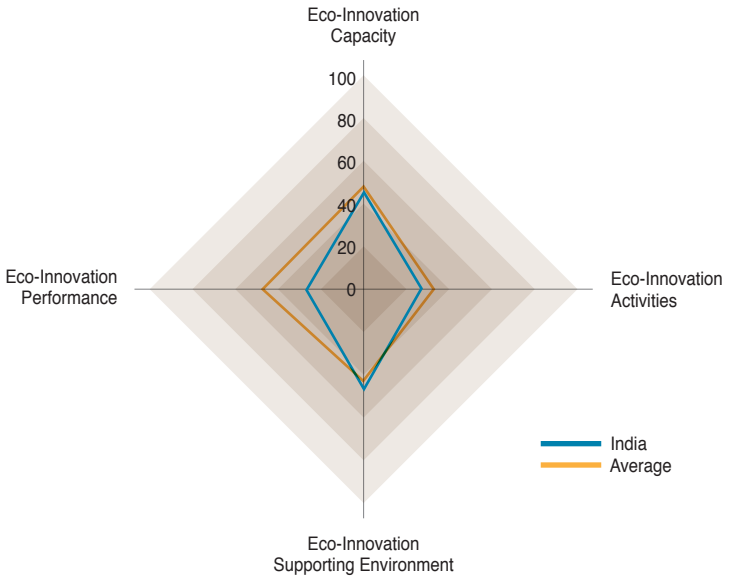
- Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
- German Material Efficiency Agency(DEMEA)
- Federal Environment Agency, German Mineral Resources Agency

Overall Comments for Germany

- Germany's eco-innovation is facilitated by policy measures focused on resource efficiency such as Sustainable Development Strategy, Waste Policy and Resource Efficiency Strategy for Innovation, and Economic Growth and Competitiveness (EEA, 2011) [49].
- Based on high standard of the national general competitiveness and innovation capacity, investment in eco-industry and environmental regulation is activating the eco-innovation of the private sector as a consequence creating green jobs and activating commercialization of green technologies.
- Germany is known to be advanced in manufacturing and technology industry and its economic structure consists of a large proportion of SMEs. As a result, the country has various policy measures to promote and support SMEs' innovation and technology advancement. This is seen as eco-innovation growth potential for Germany.

49) EEA, (2011), Survey of resource efficiency policies in EEA member and cooperating countries Country Profile: Germany

India



	India	Average
Capacity	44	49
Supporting Environment	47	42
Activities	29	35
Performance	27	46

Fig 24. ASEI Result: India

India's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, India falls below the average national score (India: 37/100, Average: 43/100) when compared to other twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria score is lower than the average line:* India obtained relatively low figures in Country's Economic Competitiveness and Awareness of Sustainability Management.
- *"Eco-Innovation Supporting Environment" criteria score is just above average:* Investment Scale towards Green Technology SMEs indicator far outweighs the average, but rather lower score in Implementation of Environmental Regulations indicator.
- *"Eco-Innovation Activities" criteria score below average:* Commercialization Level of Green Technology and Activeness of Renewable Energy Utilization indicators are above average, yet Firms' Participation on Environmental Management System shows lower figure.
- *"Eco-Innovation Performance" criteria score is below average:* Level of Environmental Impact on Society, Country's Energy Sustainability level and Water consumption intensity indicators show lower level than average scores.

India's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ National Solar Mission ■ National Energy Map for India: Technology Vision 2030 ■ Science, Technology and Innovation Policy 2013	■ Environmental Information System (ENVIS) ■ National biofuel policy (2008) ■ Strategic plan for new and renewable energy sector (2011-2017) ■ Performance Related Incentive Scheme	■ India Innovation Initiative (I3) ■ Water Treatment Plant (2008)
Sustainable Development	■ National Action Plan for Climate Change(NAPCC) (2008) ■ National Green Tribunal Act (NGT)	■ An Environmental compliance program ■ National Environment Policy (2006)	■ The Grassroots innovation augmentation network ■ National Green Corps (NGC) (2001)
SMEs		■ Techno-entrepreneurs promotion programme ■ Home grown technology programme	■ Technology Business Incubators(TBIs) ■ Public-Private Partnership

Table 19. India's Eco-innovation Supporting Environment Qualitative Research Table

Major Organizations of Eco-Innovation in India

- Bureau of Energy Efficiency
- National Innovation Council

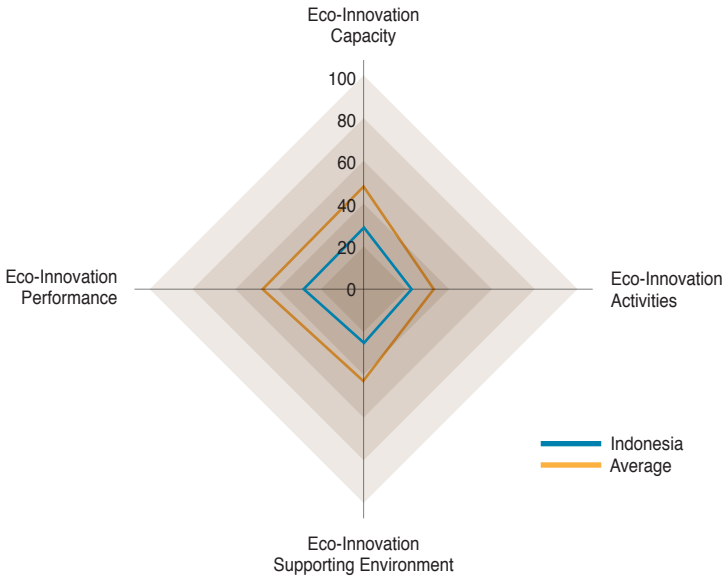
Overall Comments for India

- The decoupling of economic growth and environment overload is a major issue for India.[50] Yet India's awareness level of eco-innovation is low.
- India has emphasized the "Innovation for Comprehensive Growth" as a solution to environmental and social challenges that the country current face. This slogan of the government aims to build a world-class R&D infrastructure and develop competitiveness of advanced technology firms through partnership between various stakeholders and establishment of appropriate investment structure. India selected ten most promising sectors including energy, water management, environment and climate change response sectors.
- To enhance the environmental management level of firms, India is transforming existing industrial complex into Eco-industrial Parks (EIP)[51], and through this aims to generate clean production and resource efficiency to ultimately achieve sustainable growth.

50) World Bank, (2013), Diagnostic Assessment of Select Environmental Challenges in India
The report estimates the total cost of environmental degradation in India at about Rs. 3.75 trillion (US$80 billion) annually, equivalent to 5.7 percent of GDP in 2009, which is the reference year for most of the damage estimates

51) Representative examples are GUJARAT, Naroda, etc

Indonesia



	Indonesia	Average
Capacity	29	49
Supporting Environment	26	42
Activities	24	35
Performance	29	46

Fig 25. ASEI Result: Indonesia

Indonesia's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Indonesia scores lower (Indonesia: 27/100, Average: 43/100) than most of the other ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria is below average:* especially Country's General Innovation Capacity and Awareness of Sustainability Management indicators represent considerably low figures.
- *"Eco-Innovation Supporting Environment" criteria score is below average:* Implementation of Environmental Regulations, and Maturity of Investment Setting for Green Technology Industry show lower figures than the average scores.
- *"Eco-Innovation Activities" criteria score is below average:* most of the indicators included in this criterion show lower figures than the average.
- *"Eco-Innovation Performance" criteria score records relatively low level:* Green Industry Market Size indicator shows higher figure relative to other indicators. Country's Energy Sustainability level, Water consumption intensity, and Jobs in Green Technology Industry Market Size indicators show considerably lower score compared to that of the average.

Indonesia's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Wind Hybrid Power Generation (WHyPGen) Marketing Development Initiatives ■ Desa Mandiri Energi [52] ■ Vision 25/25 [53]	■ Energy Mix Policy ■ Eco-industry program ■ Green Investment Program ■ Reducing Emissions from Deforestation and Forest Degradation Plus (REDD+) program ■ low cost green car (LCGC) program ■ Integrated Microhydro Development and Application Program (IMIDAP), Part I ■ CF: Promoting Energy Efficiency in the Industries through System Optimization and Energy ■ Geothermal Power Generation Development Program ■ Crash Program Phase II	■ BAPEDAL (2003) [54] ■ Water Treatment Plant (WTP) (2008) ■ The APEC Policy Partnership on Science, Technology and Innovation (PPSTI) [55]
Sustainable Development	■ Reduce environment impact and implement climate action ■ Practicing green productivity with a focus on low-carbon green growth ■ The 2005–2025 National Energy Policy Blueprint (implemented in 2006) ■ Indonesia National Climate Change Commission (2010)	■ Indonesia's National Energy Policy (2006) ■ PROPER [56]	■ Indonesia-Singapore Environmental Partnership (ISEP) (2002) ■ Green Investment, Innovation, and Productivity Program (by National Council on Climate Change (NCCC/ DNPI)
SMEs		■ Environmental Soft Loans	■ Workshop on Development of APEC Green Technology Network to Support SME Development (2013)

Table 20. Indonesia's Eco-innovation Supporting Environment Qualitative Research Table

Major Policies of Eco-Innovation in Indonesia

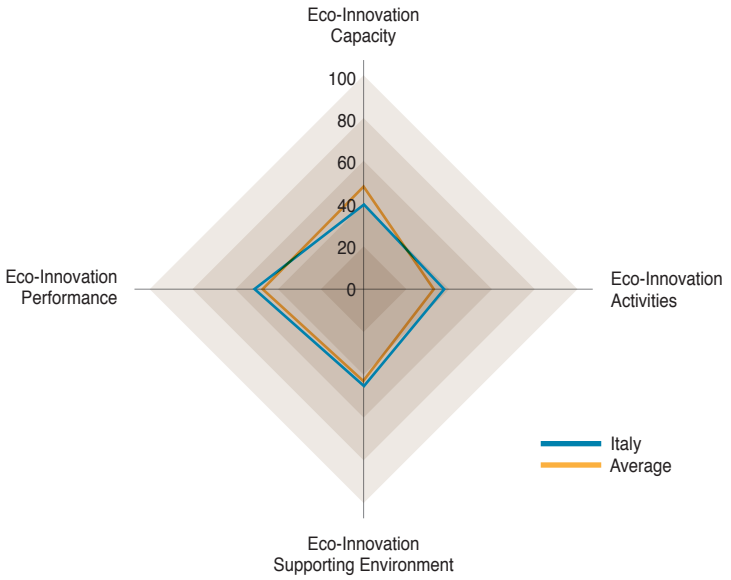
- Energy Mix Policy
- Eco-industry program

Overall Comments for Indonesia

- No specific green policy is being discussed at the national level, yet it should be noted that the government is in the middle of preparing one. This move indicates government's slow but there is noticeable effort towards eco-innovation.
- There is a movement to enhance the level of sustainability management level and of its awareness by strengthening environmental regulations and proceeding related programs. This expects to generate more eco-innovation activities at firm level.[57]
- International supports such as World Bank's Green Innovation Pilot Program and International Labor Organization's ecotourism industry are also fostering to develop eco-industry in India.

52) Strategic Support for the Autonomous Village Energy Programme
53) National energy agency proposed to enhance the share of renewable energy to 25% in 2025) (still discussion)
54) Indonesia Environmental Impact Management Agency
55) One of the PPSTI's activities is fostering an enabling environment for innovation (2013)
56) Programme for Pollution Control Evaluation and Rating
57) *Friedrich Ebert Stiftung, (2012), Green Jobs in Indonesia: Potentials and Prospects for National Strategy*
Aiming at improvement of corporate environment recognition level, in 2007 it enabled to claim on native impacts from environmental and social aspects. It required government-owned companies to assign 2% of profits to environment program and another 2% to partnership program. Other companies implement PROPER, a voluntary environment information disclosure program

Italy



	Italy	Average
Capacity	40	49
Supporting Environment	43	42
Activities	39	35
Performance	53	46

Fig 26. ASEI Result: Italy

Italy's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Italy's overall score falls into the average level (Italy: 44/100, Average: 43/100) when compared to other twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria score is below average:* Country's Economic Competitiveness, Green Technology R&D Institution Capacity, and Green Technology possessed/acquired Firms are significantly below the average.
- *"Eco-Innovation Supporting Environment" criteria indicates an average figure:* Government's R&D Expenditure in Green Industry and Investment Scale towards Green Technology SMEs indicators show high score yet, Implementation of Environmental Regulations and Maturity of Investment Setting for Green Technology Industry indicator scores demonstrate low scores.
- *"Eco-Innovation Activities" criteria score is above average:* Commercialization Level of Green Technology, Green Patents, and Activeness of Renewable Energy Utilization indicators show lower scores, yet Firms' Participation on Environmental Management System and Economic Influence of Leading Environmentally Responsive Firms indicator scores represent higher than the average.
- *"Eco-Innovation Performance" criteria show above average score:* Level of Environmental Impact on Society and CO_2 Emission Intensity indicator shows similar score to the top-tier group.

Italy's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation		■ Italia degli Innovatori - an initiative sponsored by the Agency for Innovation for the diffusion of technology innovation, in collaboration with the Department of digitization and technological innovation, which aims to bring out the best examples of innovation and Italian technological excellence ■ The Zero Energy House in Friuli Venezia-Giulia Region ■ Leadership in Energy and Environmental Design scheme(LEED) ■ Programme "Industria 2015" ■ Italian National Energy Efficiency Action Plan (2007) - approximately 9.6% energy savings target by 2016 ■ Italian National Renewable Energy Action Plan (2010) ■ The National Plan for the Integrated Management of Water Resources(2012)	■ The national network of scientific and technological parks (PSTs); a number of PSTs have areas that are focused on eco-innovation ■ Prato[58]
Sustainable Development	■ Environmental Action Strategy for Sustainable Development(EASSD) (2002)	■ ROP (Regional Operational Programme) [59] ■ Italian National Action Plan on Green Public Procurement (2008)	■ The Italian National Agency for New Technologies, Energy and Sustainable Economic Development(ENEA)
SMEs		■ Toscana Innovazione [60]	■ eLCA project(EcoSMEs) - a European project that has involved 45 experts from the United Kingdom, Germany, Italy, Spain and Greece who have combined their knowledge of IPP, Information & Communication Technologies, Management & Marketing and Training ■ The Pratese Industrial Union ■ Network contracts (NET) (2009)

Table 21. Italy's Eco-innovation Supporting Environment Qualitative Research Table

58) *Greenovate, (2011), Eco-innovation in cluster organizations in the chemical and textile-clothing-leather sectors*
Confartigianato Prato is a public organisation set up to promote regional industry through support services to SMEs. Though the Confartigianato Prato does not identify environmental challenges or eco-innovative practices within its objectives or targets, the organisation is aware of its Growing significance. At this point, no fundamental plans to tackle these issues have been developed but the organisation hopes to implement more solid plans in the future.

59) *ERDF, DISTRICT+_Component 3_Good Practice description_"Fondo Toscana Innovazione"*
"Fondo Toscana Innovazione", active from the 1st June 2008 with a budget of 44.4 million Euro, aims to invest in small and medium enterprises that have identified a business idea or have been recently started and that are in the so-called early stage phase (from seed to start-up), but it also aims to invest in already existing firms that want to grow up and to set up new industrial developments (expansion). Fund main activity sectors are: renewable energy, robotics, ICT, biotechnology and life sciences.

60) *ERDF, 2007-2013 Emilia-romagna ERDF Rop Networking Resources*
The 2007-2013 Regional Operational Programme of the European Regional Development Fund, approved by the European Commission on 7th August 2007, has allocated 347 million euro funds. These financial resources are mainly intended to support the Emilia-Romagna Region to reach the outstanding Lisbon and Göteborg objectives of growth in research and development expenditure, creation of the knowledge society and dissemination of sustainable development.

Major Organizations of Eco-Innovation in Italy

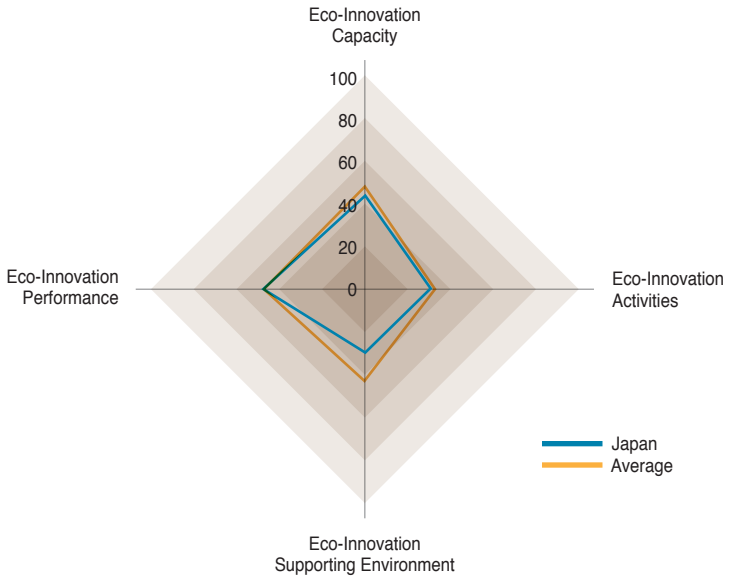
- Italian National Agency for New Technologies, Energy and Sustainable Economic Development(ENEA)
- Inter-ministerial Committee for Economic Planning (CIPE)

Overall Comments for Italy

- Italy's eco-innovation activities mainly focused on renewable energy, yet due to the recent European financial crisis, the renewable energy industry in Italy is in a period of stagnation. For example, solar energy industry[61], which is the second largest after Germany, is facing a slow move in the market.
- Italy is known to have strong SMEs, clusters and cooperatives, like other European countries, this is seen as eco-innovation potential that Italy and other European countries possess.

61) *EPIA, Global Market Outlook For Photovoltaics 2013-2017*

Japan



	Japan	Average
Capacity	43	49
Supporting Environment	31	42
Activities	32	35
Performance	46	46

Fig 27. ASEI Result: Japan

Japan's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Japan's overall score falls below the average level (Japan: 38/100, Average: 43/100) when compared to other twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria score is below average:* However, most of the indicators included show average scores.
- *"Eco-Innovation Supporting Environment" criteria score is below average:* particularly, Government's R&D Expenditure in Green Industry and Maturity of Investment Setting for Green Technology Industry indicators represent low score.
- *"Eco-Innovation Activities" criteria score is aligned along the average line:* Firms' Participation on the Environmental Management System and Economic Influence of Leading Environmentally Responsive Firms indicators show considerably high scores while Commercialization Level of Green Technology represent lower figure compared to the average.
- *"Eco-Innovation Performance" criteria score is average:* However Level of Environmental Impact on Society and Country's Energy Sustainability level indicators demonstrates high scores.

Japan's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Green Innovation Strategy (2010) ■ Strategic Energy Plan (2010) ■ The Cool Earth ■ New Action Plan towards a Global Zero Waste Society ■ RCCJ Fuel cell roadmap ■ Innovation 25 (June, 2007) ■ 21st Century Environment Strategy (2007)	■ Top runner program [62] ■ The Japan Environmental Technology Verification Programme (J-ETV) (2003) ■ Eco Leaf Program ■ Eco-Action 21 ■ Carbon Footprint Program ■ The Cool Earth Innovative Energy Technology Programme (2008) ■ Environment research and technology development fund ■ Green IT Project ■ Eco-Town project ■ The Eco-Point Programme (2009) ■ 3Rs(Reduce, Reuse, Recycle) Programme	■ Green purchasing network ■ Water Environment Partnership in Asia (2003) ■ Asia-Pacific Regional Inception Workshop on the Environmentally Sound Management of Electronic and Electrical Wastes (2005)
Sustainable Development	■ Fukuda vision [63] ■ The Basic Environment Plan ■ Japan's Strategy for a Sustainable Society (2007) ■ New growth strategy (2009-2010) [64]	■ Third Science and Technology Basic Plan (2006-2010) [65]	■ The Eco Mark Program & Global Eco-labeling Network ■ The Regional Innovation Cluster Programme ■ Keidanren voluntary action plan [66]
SMEs		■ The New Competitive Cluster Project (2010)	

Table 22. Japan's Eco-innovation Supporting Environment Qualitative Research Table

Major Policies of Eco-Innovation in Japan

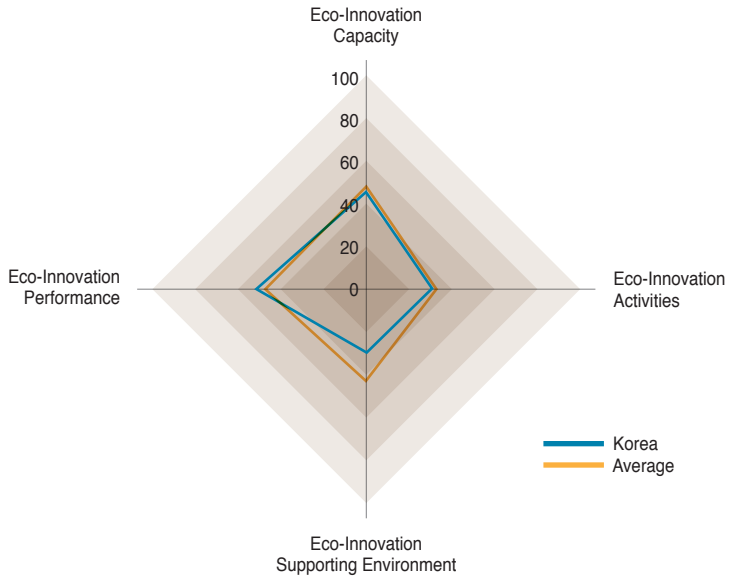
- 21st Century Environment Strategy (2007)
- Top runner program

Overall Comments for Japan

- Japan's eco-innovation is largely implemented by firms with green technology and advanced environmental management systems. Since 1990s, eco-innovation activities of firms have focused on systemic eco-innovation this is due to limited land for industrial waste management and lack of resource. With the introduction of 3R (Reduction, Reuse, Recycling) policy which aims for 'closed loop cycle' [67], Japanese firms have focused their eco-innovation effort towards waste management, eco-design and green technology.
- Japan acknowledges the importance of disclosing environmental data at the firm and industry level, thus the country has introduced national Environmental Reporting Guidelines. In 2012, 35 percent of the firms were reporting their environmental actions. Eco-action 21 provides environmental reporting guidelines for Japanese SMEs and provides incentives for best practice SMEs [68].

62) *OECD, (2011), Greening Growth in Japan*
Top Runner Programme targets (Section 6.3) on lighting, electric appliances and cars agreed in the late 1990s might have contributed to spur innovation in energy efficiency in buildings and lighting and in electric and hybrid vehicles
63) As a long-term goal by 2050, aims to reduce by 60~80% of the current greenhouse gas emission
64) UN Sustainable Development Knowledge Platform, This strategy states that "green innovation" indicates innovation in the fields of environment and energy http://sustainabledevelopment.un.org/about.html
65) OECD, (2008), Eco-Innovation Policies in Japanll
This is the third in a series of science and technology (S&T) plans. Objective: Maximize National Potential, to create a competitive nation for achieving sustainable growth
66) On December 17, 1996, Keidanren presented the Industry-Wise Voluntary Action Plans for 29 industries (represented by 131 organizations), which were drafted in response to Keidanren's Appeal on the Environment. http://www.asiaeec-col.eccj.or.jp/eng/e3104keidanren_outline.html
67) In 2007, as one of strategies for the sustainable society, 'sound Material-Cycle Society' was announced
68) Environmental Reporting Guidelines: with the enact of 'Law Concerning Promotion of Environmental Consideration in Business Activities', companies are mandatory to write and announce the environment report. Eco-Action21: certification and registration system of environment reporting certification for SMEs

Korea



	Korea	Average
Capacity	47	49
Supporting Environment	30	42
Activities	34	35
Performance	53	46

Fig 28. ASEI Result: Korea

Korea's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Korea's overall score falls into the average level (Korea: 41/100, Average: 43/100) when compared to other twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria score is average:* Specifically, Country's General Innovation Capacity and Green Technology possessed/acquired Firms indicator scores show above average figures.
- *"Eco-Innovation Supporting Environment" criteria score is below average:* most of the indicators included in this criterion score fall into the average level or just below.
- *"Eco-Innovation Activities" criteria score is average:* Firms' Participation on Environmental Management System, Economic Influence of Leading Environmentally Responsive Firms, and Green Patents indicators show considerably high scores.
- *"Eco-Innovation Performance" criteria scores above average:* Level of Environmental Impact on Society, CO_2 emission intensity, Country's Energy Sustainability level, Water consumption intensity, and Jobs in Green Technology Industry indicators score outstand the average figure.

Korea's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ The "Key Green Technology Development and Commercialization Strategies" (2009)	■ Mandatory energy-efficiency standards and labeling (1992) ■ The high-efficiency appliance certification (1996) ■ Standby electricity reduction programme (1999) ■ Ten-year Basic Plan for the Development and Dissemination of New and Renewable Technologies (released in 2003) ■ GHG&Energy target management system (2010) ■ Carbon point scheme	■ Signed cooperation of resources MOU between Korea and Greenland ■ The "Seoul Initiative Network on Green Growth" (2005) ■ The Korean Green Industry Complex cluster ■ Local Green Networks ■ The Green Technology Network (GTNET) (2009)
Sustainable Development	■ The Green New Deal (2009-2012) ■ The Five-Year Plan for Green Growth (2009-2013) ■ Green growth strategy (2009-2050) ■ The Long-term Vision for Science and Technological Development to 2025 (1999) ■ National Energy Master Plan (2008) ■ Technologies in the Korean green growth strategy - 17 New Growth Engines(PCFV, 2009) - Green Technologies(27)(NSTC, 2009) - Green Energy(15)(MKE, 2009)	■ The Greening Cities project ■ The EcoRich City Competition ■ Climate Change Adaptation Model City project ■ The Eco-city project and the Low-carbon, Green Village project ■ The National Climate Change Adaptation Master Plan ■ Korea Certified Emissions Reductions (KCERs), 287 projects had generated 5.6 million KCERs (2005)	■ Asia Low Carbon Cooperation with UNESCAP (Korea Environmental Industry and Technology Institute) ■ East Asia Climate Partnership (2008)
SMEs	■ Foster 1000 green SMEs by the year 2013 ■ SMEs green growth support project by Small and medium Business Corporation(SBC)	■ Environmental venture funds ■ Eco-Technopia 21	■ Environmental Technology Business Incubator (ETBI) ■ Green partnership among big companies and SMEs (2012) ■ Korea-China Green Cooperation Forum for Green Industry and Conference for Green Business (2012)

Table 23. Korea's Eco-innovation Supporting Environment Qualitative Research Table

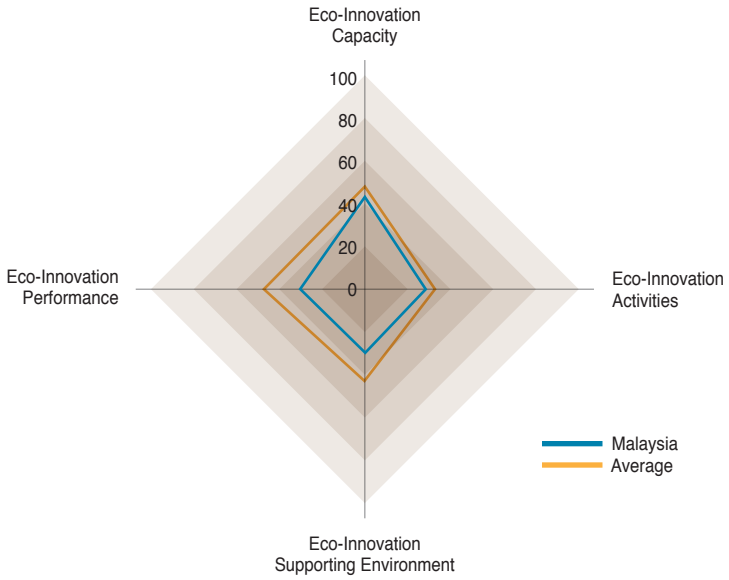
Major Organizations of Eco-Innovation in Korea

- Committee on Green Growth
- Korea Energy Management Corporation (KEMCO)
- Small and medium Business Corporation(SBC)
- Korea Environment Corporation(KECO)

Overall Country Analysis: Key Features of Eco-Innovation in Korea

- National green growth strategy and roadmap have pushed various eco-innovation activities at firm level and has built a firm foundation for various active eco-innovations to be implemented at national level in the future. The initiation of the GHG emission reduction market mechanism expects to trigger a positive move towards the low carbon economy.
- Rapid economic growth since the 1970s based on technology development allowed technology innovation centered policies to take place forming a firm foundation to build capacity focused on technological eco-innovation.
- Korea aims to foster green SMEs and this project is centrally implemented by the Small and medium Business Corporation (SBC).

Malaysia



	Malaysia	Average
Capacity	44	49
Supporting Environment	28	42
Activities	30	35
Performance	30	46

Fig 29. ASEI Result: Malaysia

Malaysia's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Malaysia falls below the average national score (Malaysia: 33/100, Average: 43/100) when compared to other twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria score is below average:* each indicators included in this criterion score average level, particularly Green Technology possessed/acquired Firms indicator is higher than the average.
- *"Eco-Innovation Supporting Environment" criteria score is below average:* Government's R&D Expenditure in Green Industry and Investment Scale towards Green Technology SMEs indicator scores record relatively low level yet Implementation of Environmental Regulations indicator score is above average.
- *"Eco-Innovation Activities" criteria falls below average:* Commercialization Level of Green Technology and Economic Influence of Leading Environmentally Responsive Firms indicators show lower scores than average yet Green Patents indicator illustrates a rather high score.
- *"Eco-Innovation Performance" criteria is falls below average:* particularly, CO_2 Emission Intensity and Jobs in Green Technology Industry indicators show far below the average.

Malaysia's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Green technology financing scheme ■ National automotive policy (2009 revised in 2013)[69]	■ GreenTAG Endorse program ■ Small Renewable Energy Programme (SREP)	■ Malaysian Technical Cooperation Programme (MTCP) ■ EiMAS(Environment Institute of Malaysia)
Sustainable Development	■ The 10th Malaysia Plan[70]	■ Economic transformation program[71]	■ The Malaysia-New Zealand Environmental Cooperation Agreement ■ The Malaysia-Europe Forum (MEF) Roundtable Series on Sustainability: 'Future Cities – Urban Mobility'
SMEs			■ Cleaner Technology (1996) ■ The EU–ASEAN SME Forum 2012: ASEAN Economic Community 2015 on "Challenges and Opportunities for EUROPEAN and ASEAN SMEs in the Services Sectors" (Nov 2012) ■ South East Asian SME Forum (2011)

Table 24. Malaysia's Eco-innovation Supporting Environment Qualitative Research

Major Organizations of Eco-Innovation in Malaysia

- 10th Malaysia Plan
- Economic transformation program

Overall Country Analysis: Key Features of Eco-Innovation in Korea

- Malaysia's tenth development plan (the 10th Malaysia Plan), Economic Transformation Program, and Government Transformation Program are pushing the potential growth of eco-innovation focused on 'unleashing productivity-led growth and innovation' and 'valuing environment endowments'.
- Malaysian SMEs takes more than 99% in Malaysia's total number of business firms and 56% in the total employment[72]. Thus, Malaysia has set a strategy to develop SMEs as an engine for growth and innovation and this move is prospected to push SMEs to be main actors of eco-innovation in the future.

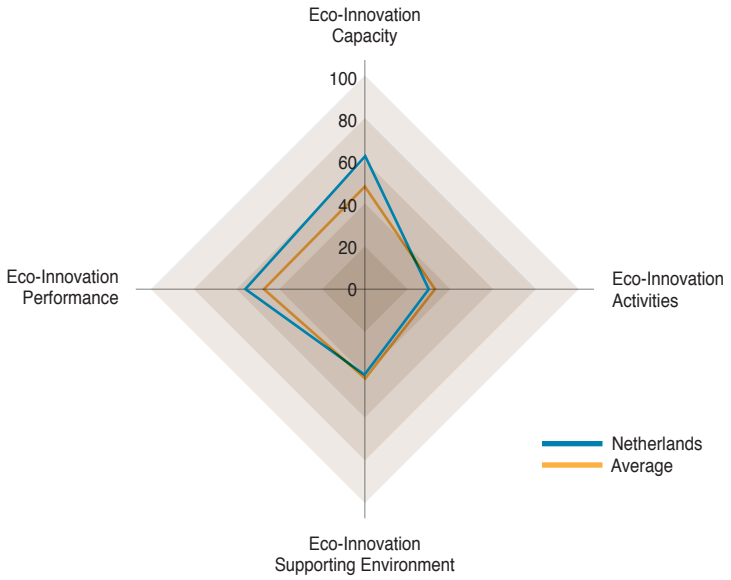
69) *The National Automotive Policy (NAP) http://www.miti.gov.my*
The National Automotive Policy (NAP) was introduced on 22 March 2006 to facilitate the required transformation and optimal integration of the local automotive industry into regional and global industry networks within the increasingly liberalised and competitive global environment. The NAP is the main thrust for the formulation of the strategic directions of the industry under the Third Industrial Master Plan (IMP3), 2006-2020.

70) *The economic planning unit prime minister's department putrajaya, (2010), the 10th malaysia plan 2011-2015*
The Tenth Malaysia Plan houses the aspirations of both the Government Transformation Programme and the New Economic Model, premised on high income, inclusiveness and sustainability. It charts the development of the nation for the next five years, anchored on delivering the desired outcomes for all Malaysians.

71) *Economic transformation program ETP Handbook Chapter 6*
"We will strengthen other value creating activities in the oil and gas value chain and ensure that we have a sustainable energy platform for the future. ···At the same time we will ensure that we develop an energy efficient, diversified and sustainable energy mix to power our future"

72) *The Economic Planning Unit Prime Minister's Department Putrajaya, (2010), 10th Malaysia Plan 2011-2015*

Netherlands



	Netherlands	Average
Capacity	62	49
Supporting Environment	40	42
Activities	32	35
Performance	57	46

Fig 30. ASEI Result: Netherlands

Netherlands's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Netherland shows higher score than the average group (Netherland: 48/100, Average: 43/100) when compared to other twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria score is above average:* Country's Economic Competitiveness, Country's General Innovation Capacity, Green Technology R&D Institution Capacity and Green Technology possessed/acquired Firms indicators far outweigh the average scores.
- *"Eco-Innovation Supporting Environment" criteria score is average:* However Implementation of Environmental Regulations and Maturity of Investment Setting for Green Technology Industry indicators show high scores.
- *"Eco-Innovation Activities" criteria score falls into the average level:* However Commercialization Level of Green Technology and Economic Influence of Leading Environmentally Responsive Firms indicator scores show higher level than the average. In contrast, Firms' Participation on Environmental Management System and Activeness of Renewable Energy Utilization indicators score lower than the average figures.
- *"Eco-Innovation Performance" criteria score is above average:* every indicator including Level of Environmental Impact on Society, Country's Energy Sustainability Level and Jobs in Green Technology Industry indicators except for Green Industry Market Size indicator is above average.

Netherland's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Dutch ETAP roadmap (2006) (EU ETAP roadmap)	■ Renewable energy incentive scheme (SDE+) ■ Green fund scheme ■ Green deal programme ■ Programme Environment & Technology ■ MEP subsidy ■ VAMIL/MIA[73] ■ EIA: fiscal support for purchasing innovative energy investment goods ■ Tax incentive for low CO_2 cars ■ Groen Beleggen[74]	■ Energy valley ■ Netherlands Water Partnership (NWP) ■ Natuurenmilieu (renewable energy, sustainable mobility and healthy food) ■ The 12th European Forum on Eco-Innovation- Scaling up sustainable construction through value chain innovation (April 2012)
Sustainable Development	■ Sustainability Agenda (2011) [75] ■ Green deal		
SMEs		■ Dutch SBIR (Small Business Innovation Programme) ■ Syntens: training and awareness centre for improving entrepreneurship ■ Doe Mee: raising awareness and competences in a group of 200 SMEs which are interested in sustainability	

Table 25. Netherlands's Eco-innovation Supporting Environment Qualitative Research Table

Major Organizations of Eco-Innovation in Netherlands

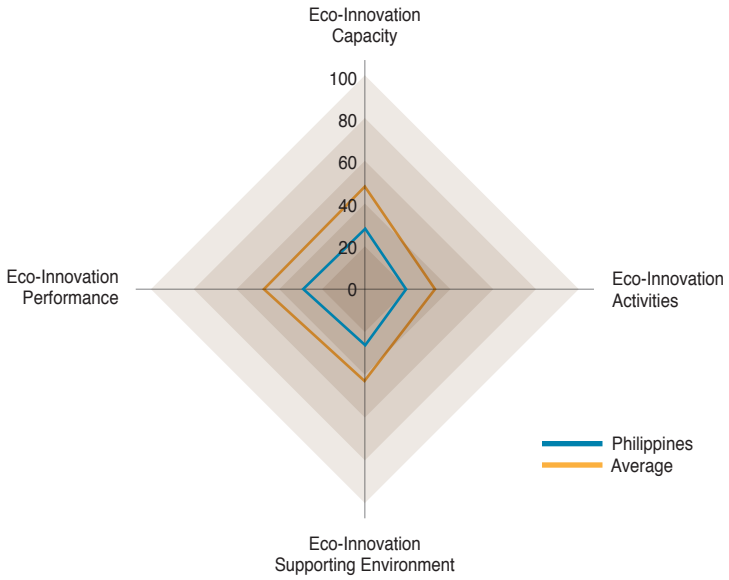
- National Science Technology and Innovation Policy Office

Overall Country Analysis: Key Features of Eco-Innovation in Netherlands

- Netherland's high score in the Eco-Innovation Supporting Environment criteria is supported by advanced green investment policies and strict environmental regulations. In line with the strict environmental regulations, there has been great advancement in creating green investment policies.
- Netherland has a high rate of tax regards to heavy environmental load[76] and the country has created funds to support the private sector eco-innovation activities such as the Green Fund Scheme (GFS), SDE+ and MEP. This has increased the rate of green job creation in the eco-industry, higher than the average total employment growth rate per year.
- Strict environmental regulations have created a variety of eco-innovation related demand-side policies such as VAMIL, MIA and EIA. These policies are regarded as the main agenda in Netherlands, contributing to the activation of eco-innovation activities.

73) Fiscal support for purchasing environmental innovative investment goods
74) Green investment tax reduction e.g. eco-innovative or green business activities
75) *EIO, (2011), Eco-innovation in Netherlands*
Sustainability Agenda (Sustainability Agenda, 2011) does promote 'green growth' and focuses on 'resources and product chains', 'sustainable water and land use', 'food', 'climate and energy' and 'mobility'
76) Statistics Netherlands (2011), Green growth in the Netherlands
Revenues from environmental taxes in the Netherlands amounted to over 19 billion euro in 2009, accounting for 14 percent of total tax revenues

Philippines



	Philippines	Average
Capacity	29	49
Supporting Environment	26	42
Activities	20	35
Performance	30	46

Fig 31. ASEI Result: Philippines

Philippines's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Philippines's overall score is lower than (Philippines: 26/100, Average: 43/100) the average national score when compared to other twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria score falls below average:* all indicators included in this criterion show lower scores than average figures. Specifically Country's General Innovation Capacity and Green Technology possessed/acquired Firms indicators represent considerably low figures.
- *"Eco-Innovation Supporting Environment" criteria score is below average:* Implementation of Environmental Regulations and Maturity of Investment Setting for Green Technology Industry indicators score lower than the average.
- *"Eco-Innovation Activities" criteria score is below average:* Commercialization Level of Green Technology and Economic Influence of Leading Environmentally Responsive Firms indicators score significantly low.
- *"Eco-Innovation Performance" criteria score falls below average:* Country's Energy Sustainability level, Water consumption intensity and Jobs in Green Technology Industry indicators show significantly low scores.

Philippines's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Energy Efficiency and Conservation Plan of Action ■ Biofuels Act (2006) ■ Renewable Energy Act (2008)	■ Chiller Energy Efficiency Project ■ Credit Programme for Energy Efficiency PHI ■ The Mindanao Energy Plan (MEP) ■ Natural Gas Vehicle Program for Public Transport (NGVPPT) ■ Auto Liquefied Petroleum Gas (LPG) Repowering Program ■ Energy Efficient Electric Vehicle Project -Electric Vehicle Program	■ Sub-regional Conference on Wastewater Management: Promoting Innovations and Sustainable Investments (Jan 2013) ■ Clean Technology Fund Investment Plan for the Philippines[77]
Sustainable Development	■ The Philippine Agenda 21[78] ■ AO254: National Environmentally Sustainable Transport Strategy (NESTS)[79]	■ Climate Change Adaptation Project, Phase I ■ Philippines Sustainable Energy Finance Program ■ Credit Programme for Climate-Friendly Refrigeration Equipment ■ National Energy Efficiency and Conservation Program (NEECP) ■ The Philippine Industrial Energy Efficiency Project (PIEEP)	■ The Asia Low Emission Development Strategies (LEDS) Forum (Oct 2013) ■ Philippines sustainable development network (PSDN)
SMEs			■ The Philippine SME Business EXPO 2013 - Philippines's biggest business expo dedicated to empowering the Small and Medium Enterprises (SMEs) and Entrepreneurs ■ The 2013 APEC Green Business Forum - To take a look at expanding global green supply chains in various ways and discuss how SMEs may adapt to the global phenomenon

Table 26. Philippines's Eco-innovation Supporting Environment Qualitative Research Table

77) One of the Climate Investment Funds (CIF), the $5.2 billion Clean Technology Fund (CTF) provides middle income countries with resources to explore options to scale up the demonstration, deployment, and transfer of low-carbon, clean technologies. Each CTF investment plan is tailored by the country to be integrated into national development objectives and to serve as a programmatic organizing framework for the activities of actors across institutions, stakeholder groups, and sectors.

78) Agenda 21 is a program of action into the 21st century for bringing the Earth into a sustainable future. It was adopted by the participating governments of the world in the United Nations Conference on Environment and Development (UNCED), otherwise known as the Earth Summit, in Rio de Janeiro, Brazil in June 1992.

79) *Philippines Department of Energy, (2007), CTF Investment Plan Philippines final*
NESTS will promote, among others, the development of Bus Rapid Transit (BRT) systems, expansion of the urban rail network in Metro Manila, deployment of hybrid vehicles in the public transport fleet, and acceleration of fuel-switching in certain public transport modes.

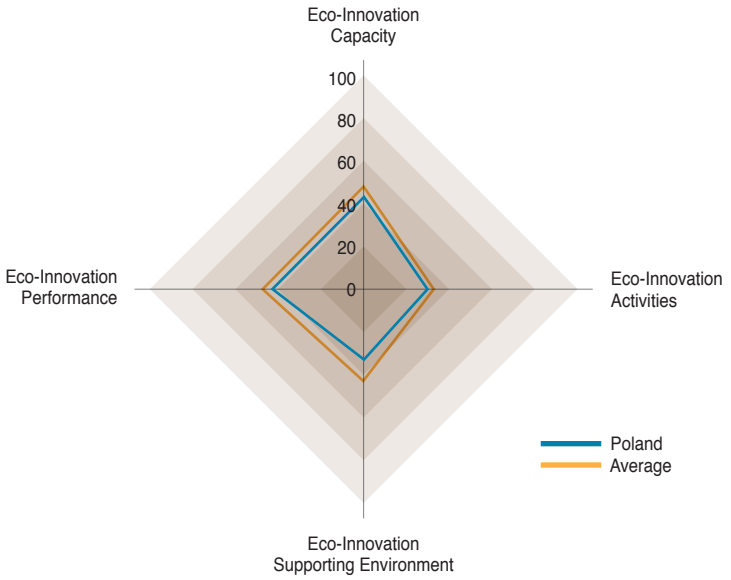
Major Policies of Eco-Innovation in Philippines

- The Philippine Agenda 21
- National Environmentally Sustainable Transport Strategy (NESTS)

Overall Country Analysis: Key Features of Eco-Innovation in Philippines

- Philippines is in the need to overcome the challenges of urbanization and energy shortage, eco-innovation can be a key solution to accelerate sustainable development and pursue balanced economic growth.
- Current private sector lacks activities on eco-innovation as examined with ASEI indicators however, in order to activate private sector activities Philippines is holding various international forums such as SME business EXPO and 2013 APEC Green Business Forum to engage international stakeholders.
- Eco-innovation supportive measures mainly focus on public transportation and automobile policy which have taken up a large part of the current environmental pollution. Cooperation effort between Department of Energy, Electrical Vehicle Association of Philippines and Asian Development Bank has enforced the promotion of eco-friendly public transportation such as e-trikes, e-bus and electric cars triggering industry specific eco-innovation activities.

Poland



	Poland	Average
Capacity	45	49
Supporting Environment	34	42
Activities	31	35
Performance	42	46

Fig 32. ASEI Result: Poland

Poland's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Poland is lower than average (Poland: 38/100, Average: 43/100) group when compared to other twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria score shows lower level than average:* Country's General Innovation Capacity and Green Technology possessed/acquired Firms indicators are shown to be around the average, while Green Technology R&D Institution Capacity indicator indicates high score than the average figure.
- *"Eco-Innovation Supporting Environment" criteria score is below average:* Maturity of Investment Setting for Green Technology Industry and Investment Scale towards Green Technology SMEs indicators are below the average while Government's R&D Expenditure in Green Industry indicator demonstrates comparatively high score.
- *"Eco-Innovation Activities" criteria score is below average:* while most of the indicators show average scores Green Patents indicator far outweighs the average score.
- *"Eco-Innovation Performance" criteria score is lower than average:* while most of the indicators show average or lower scores than average figures Green Industry Market Size indicator scores higher than average.

Poland's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ The Strategy-Energy Security and Environment 2020 outlook ■ Transport Development Strategy[80]	■ Green Investments Scheme ■ Renewable Energy Source(RES) development ■ Operational Programme Infrastructure and Environment ■ Bank Gospodarstwa Krajowego Energy Efficiency Programme ■ 16 Regional Operational Programmes ■ Energy Policy of Poland until 2030 ■ Long-term program for the promotion of biofuels in 2008-2014 (2007)	■ 15 clusters 8 technology platforms functioning in Poland strongly involved in developing environmentally-friendly solutions, including eco-innovations
Sustainable Development	■ Poland 2020 ■ Strategy for Changing Production and Consumption Patterns to Support Durable and Sustainable Development ■ Sustainable Development of Rural Areas, Agriculture and Fishery Strategy ■ The National Development Strategy (2007-2015) [81] ■ Innovativeness and Efficiency of the Economy Strategy (2012-2020)	■ GEKON programme - To gather various initiatives that support Polish research institutions and companies in developing environmentally-friendly technologies ■ Sustainable Production through Innovation in Small and Medium-sized Enterprises in the Baltic Sea Region,SPIN. ■ A new three-year National Action Plan on sustainable public procurement for 2010-2012 (2010) ■ National Environmental Policy (2009-2012) and its 2016 Outlook ■ National Fund for Environmental Protection and Water Management ■ The 2014 National Waste Management Plan ■ Assumptions to the National Development Programme for Low-carbon Economy ■ National Renewable Energy Action Plan ■ Second National Energy Efficiency Action Plan for Poland ■ National Programme for the Development of Low-Emission Economy ■ National Progr amme for Municipal Waste Water Treatment (2009) ■ Poland 2030: Development Challenges (2009) ■ National Strategy for Management of Water Resources 2030 (2010) ■ The Enterprise Development Programme (PRP) (2011-2020)	■ Swiss-Polish Cooperation Programme
SMEs		■ Polish Sustainable Energy Financing Facility - provides SMEs with loans for energy efficiency improvement and RES utilisation ■ Greenevo programme – to support Polish eco-innovators, mostly SMEs	■ Eight networks of Business Angels in Poland - More than 86% focus in the activities on ecology, environmental protection and biotechnologies

Table 27. Poland's Eco-innovation Supporting Environment Qualitative Research Table

Major Policies of Eco-Innovation in Poland

- the Council of Ministers
- Polish National Energy Conservation Agency

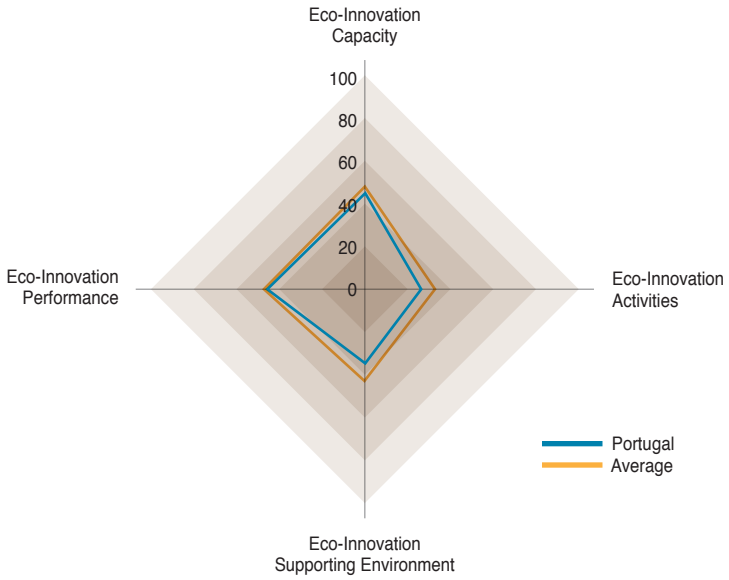
Overall Country Analysis: Key Features of Eco-Innovation in Poland

- In the process of opening of the economy and changes in the industrial structure through economic transition, no significant national measures have been created to support eco-innovation. However, the country is implementing eco-innovation related researches via technology platforms and various clusters.
- Compared to the total number of patent, the proportion of green patent is high and the Government's R&D Expenditure in Green Industry is higher than its regional peers thus, these will be partial features that will develop nation's eco-innovation capacity in the near future.

80) *European Environmental Agency, (2011), Poland resource efficiency policies*
The Transport Development Strategy, which is nearing completion, includes the development of the road, rail, air, marine and inland-water transport in order to modernize it, make it more efficient and more environment-friendly. The strategy includes provisions for economic effectiveness and infrastructure organization improvement through novel technical solutions, ICT, intermodal transport and training professional staff.

81) *National Development Strategy Ministry of regional development*
The National Development Strategy, which draft was prepared by the Ministry of Regional Development, was adopted by the Council of Ministers on 29 November 2006. It is a principal strategic document which provides guidelines for other Government and local government strategies and programmes. The NDS determines the goals and identifies major areas that will be the focus of the state's activities. It also sets out priorities of Poland's social and economic development and the conditions that should sustain this development.

Portugal



	Portugal	Average
Capacity	46	49
Supporting Environment	36	42
Activities	28	35
Performance	45	46

Fig 33. ASEI Result: Portugal

Portugal's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Portugal's overall score falls below the average national score (Portugal: 39/100, Average: 43/100) when compared to other twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria score is aligned along the average line:* Most of the indicators included in this criterion show average scores.
- *"Eco-Innovation Supporting Environment" criteria score is below average:* while most of the indicators show average or low scores Government's R&D Expenditure in Green Industry indicator shows relatively high score comparatively.
- *"Eco-Innovation Activities" criteria score is below average:* Most of the indicators included in this criterion show average or lower level compared with average scores for each indicator.
- *"Eco-Innovation Performance" criteria score falls into the average level:* Most of the indicators included in this criterion show average or lower level compared with average scores.

Portugal's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Strategic Plan for Municipal Waste (PERSU II) ■ The Strategic Plan for water supply and Wastewater Treatment (PEAASAR 2007-2013)	■ The Environmental Technologies Action Plan ■ The Energy Efficiency Fund ■ Strategic Plan for Industrial Waste Management (PESGRI) ■ Thematic operational programme for territory valuing (2007-2013) ■ Integrated pollution prevention and control (IPPC) (2008) ■ Ecodesign for energy related products (Decree-Law No.12/2011)	■ The Innovation Support Fund ■ Partnership agreement for the Eco-Innovation - signed between APA, Portuguese Environment Agency and the AdI, Agency for Innovation, in order to promote initiatives integrating innovation and the environment. ■ Info-day eco-innovation ■ The Call on 2011 Projects Eco-Innovation ■ Ecopolis Project ■ MOR(the Organized Waste Market) [82] ■ Brigantia EcoPark - A partnership. Renewable energy and the environment science and technology park ■ Relvão Eco Park [83] ■ The 13th European Forum on Eco-Innovation- Developing new markets for eco-innovation (Nov 2012)
Sustainable Development	■ National Sustainable Development Strategy (ends 2015) ■ General framework on environment ■ National Energy Strategy(ENE 2020)	■ The MIT Portugal Programme – to aim to enhance the sustainability of social activity as well as the natural and built environments ■ The national Green public procurement action plan (NAP) ■ The Portuguese Carbon Fund ■ The Waste Management National Plan ■ National renewable energy action plan (PNAER) ■ National Plan for Industrial Waste Prevention (PNAPRI) ■ The Portuguese National Programme for the Efficient Use of Water - Set the targets to be achieved in ten years' time (until 2015) ■ The National Climate Change Programme (2006) ■ New National Energy Efficiency Action Plan (2008)	■ LNEG(National Laboratory for Energy and Geology, Portugal)
SMEs		■ The Institute for Small and Medium-Sized Firms and Investment (IAPMEI)	

Table 28. Portugal's Eco-innovation Supporting Environment Qualitative Research Table

82) *MOR [2011]Portugal_EIO_Eco-innovation in Portugal*
An important step in promoting reuse of waste or recovered material as a secondary raw material within the Portuguese economy was taken in 2006 with the creation of the organised waste market (MOR). The MOR is a voluntary system, which promotes exchange of information about waste materials available on the market and facilitates trading of these materials between economic entities. It is envisaged that all categories of waste can be traded on the MOR after being sent for recovery operations

83) Relvão Eco Park *[2011]Portugal_EIO_Eco-innovation in Portugal*
Relvão Eco Park (in Chamusca, Santarém): with an area of 1800 hectares, hosts several treatment and reuse of waste facilities, as well as companies that use waste as raw material.

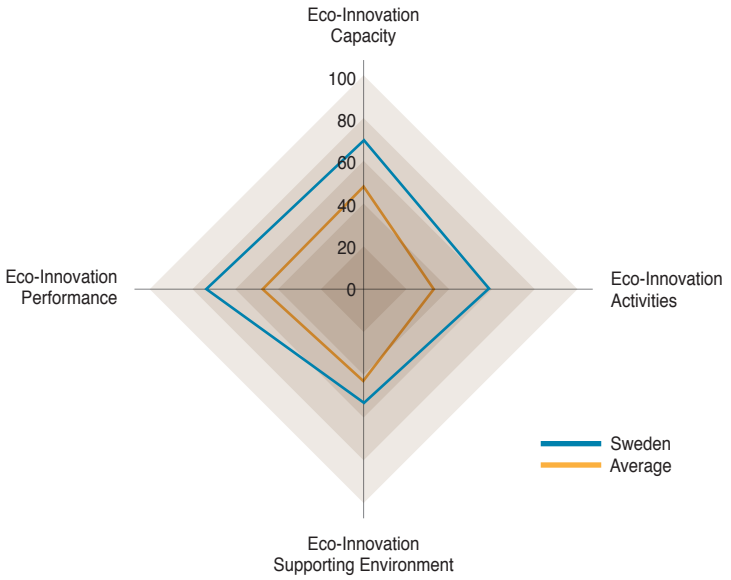
Major Policies of Eco-Innovation in Portugal

- the Council of Ministers
- The Portuguese Innovation Agency(ADI)
- The Portuguese Environment Agency(APA)
- The Portuguese Investment and Trade Promotion Agency(AICEP)

Overall Country Analysis: Key Features of Eco-Innovation in Portugal

- Portugal appears to have lower level of eco-innovation status compared to its regional peers; however, there have been efforts to raise awareness of eco-innovation. The 13th European Forum on Eco-Innovation was held in Portugal, and during this process, it is expected that the country would have enhanced their understanding of the eco-innovation concept in the recent years.
- Eco-innovation activities are occurring in the renewable energy especially in the electricity and waste management sectors. It is noticeable that there are number of specific policy measures regard to resource efficiency and renewable energy. The country has an innovative waste management trading system, MOR, trying to create a market mechanism for eco-innovation.

Sweden



	Sweden	Average
Capacity	71	49
Supporting Environment	56	42
Activities	60	35
Performance	74	46

Fig 34. ASEI Result: Sweden

Sweden's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Sweden score is higher than the average national score (Sweden: 65/100, Average: 43/100) when compared to twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria score is higher than average:* most of the indicators in this criterion shows comparatively high scores than average figures, yet Green Technology R&D Institution Capacity indicator score is similar to the average.

- *"Eco-Innovation Supporting Environment" criteria score is above average:* most of the indicators such as Implementation of Environmental Regulations, Maturity of Investment Setting for Green Technology Industry, Government's R&D Expenditure in Green Industry and Investment Scale towards Green Technology SMEs indicator scores are above the average.

- *"Eco-Innovation Activities" criteria score is exceeds the average level:* Commercialization Level of Green Technology, Firms' Participation on Environmental Management System and Activeness of Renewable Energy Utilization show higher scores relative to other included indicator scores.

- *"Eco-Innovation Performance" criteria is far above the average level:* most of the indicators show comparatively high scores yet Green Industry Market Size indicator score demonstrates a relatively lower figure.

Sweden's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ The Environmental Technology Strategy (2011)	■ Environmental technology Action Plan ■ The research and innovation bill (Bill 2008/9:50) - the government's support for eco-innovation research programmes ■ five-year energy efficiency programme for 2010-2014	■ The International Cooperation for Eco-Innovations Programme (2012) ■ VINNOVA[84]
Sustainable Development	■ Integrated climate and energy policy (2009) ■ The Strategy for Development and Export of Environmental Technology (2011-2014) ■ National Innovation Strategy for 2020 [85]	■ Sustainable Technologies Fund ■ Delegation for Sustainable Cities (2008) ■ Innovationsbron AB – providing business incubation support for Swedish enterprises focusing on environmental technology ■ Nordic Cleantech ■ Action Plan for Swedish Cleantech (2009) ■ National system for Green certificates in electricity production ■ Swedish Environmental Code (1998) ■ 16 Swedish Environmental Quality Objectives (1999) ■ National Waste Plan (2005) ■ A National Program for Waste Prevention (2013)	■ Swedish American Green Alliance (SAGA) ■ SEMCo - the Swedish government's expert body on environmental and other sustainable procurement ■ The Swedish Environmental Technology Council(SWENTEC) ■ Swedish energy agency
SMEs		■ The Environment-Driven Business Development program(2003) ■ MISTRA(The foundation for strategic environmental research) Innovation - to give small and medium-sized enterprises (SMEs) a chance to develop innovative ideas ■ Almi(Almi FöretagspartnerAB) is owned by the state with the task to promote the development of competitive small and medium-sized businesses as well as to stimulate new enterprises with the aim of creating growth and innovation in Swedish business life	■ Cleantech Inn Sweden - A nation-wide business support organization that coaches new and established companies in the promotion and adoption of cleantech innovations

Table 29. Sweden's Eco-innovation Supporting Environment Qualitative Research Table

84) *VINNOVA http://www.vinnova.se/en/About-VINNOVA/*
VINNOVA - Swedish Governmental Agency for Innovation Systems - is Sweden's innovation agency. Mission is to promote sustainable growth by improving the conditions for innovations, as well as funding needs-driven research. VINNOVA's vision is for Sweden to be a world-leading country in research and innovation, an attractive place in which to invest and conduct business. VINNOVA is a Swedish government agency working under the Ministry of Enterprise, Energy and Communications and acts as the national contact agency for the EU Framework Programme for R&D

85) *The Swedish Innovation Strategy , National Innovation Strategy for 2020 Government Offices of Sweden*
A good innovation climate lays the foundations for more jobs, a more sustainable society with better quality of life for all inhabitants and growth throughout the country

Major Policies of Eco-Innovation in Sweden

- VINNOVA
- The Swedish Energy Agency(SEA)
- Swedish Environmental Protection Agency
- the Swedish Agency for Economic and Regional Growth
- The Swedish Environmental Technology Council (SWENTEC)

Overall Country Analysis: Key Features of Eco-Innovation in Sweden

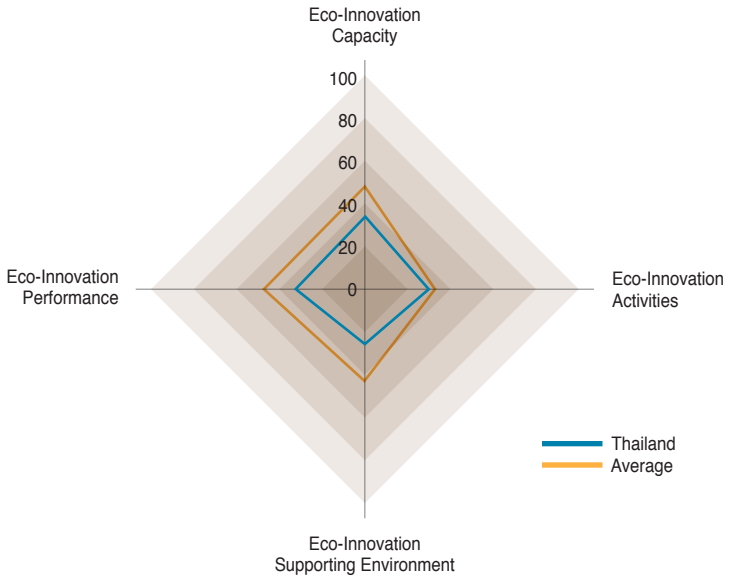
- Based on the abundant natural resources and the high level of competency in manufacturing industries such as engineering, pharmacy and wood processing, Sweden has a high standard of national eco-innovation competency in Europe. In all four criteria of ASEI evaluation Sweden ranks in the top tier of the list.
- Sweden, already producing the lowest CO_2 emissions per person in Europe, has an ambitious environmental policy objective 'to hand over to the next generation a society in which the major environmental problems in Sweden have been solved'. [86] The Integrated Climate and Energy Policy allows Sweden to implement mid-long term practical strategy to challenge climate change and enhance energy efficiency, to create provision of energy with zero CO_2 emissions. Such policy measure has allowed creation of eco-innovation activities to in insulation and automobile sectors.
- Sweden has relatively high overall R&D expenditure (3.4% of GDP)[87] and policies that support SMEs which takes over 64% in the total employment [88] which is mainly delivered via VINNOVA will further expand its potential towards eco-innovation. VINNOVA supports advancement of technology and more recently actively supports companies with eco-innovative technological solutions, so that they can transfer such solution to the emerging market.
- Sweden's four focused areas of eco-innovation: ICT, Space technology, Biotechnology, Nanotechnology (EIO, 2011)

86) *European Environmental Agency, (2011), Sweden resource efficiency policies*
In Environmental Objectives Bill in March 2010, the Swedish Government stated that the overall goal of environmental policy was to hand over to the next generation a society in which the major environmental problems in Sweden have been solved, and that this should be done without increasing environmental and health problems outside Sweden's borders. The Bill was approved by the Riksdag in June of the same year.

87) *2010 research and development expenditure (% of GDP), World Bank*

88) *SBA Fact Sheet 2012 Sweden, European Commission*

Thailand



	Thailand	Average
Capacity	34	49
Supporting Environment	26	42
Activities	32	35
Performance	34	46

Fig 35. ASEI Result: Thailand

Thailand's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Thailand falls below the average national score (Thailand: 31/100, Average: 43/100) when compared to other twenty four ASEM member countries evaluated by the ASEI.

- *"Eco-Innovation Capacity" criteria score falls below the average level:* in particular, Green Technology R&D Institution Capacity, Green Technology possessed/acquired Firms and Awareness of Sustainability Management indicators represent considerably low figures than the average.
- *"Eco-Innovation Supporting Environment" criteria score is below average:* most of the indicators scores demonstrate lower than average.
- *"Eco-Innovation Activities" criteria score is relatively closer to the average level, yet falls short:* Firms' Participation on Environmental Management System and Economic Influence of Leading Environmentally Responsive Firms indicator scores represent the average level. Commercialization Level of Green Technology and Green Patents indicator scores are far below the average.
- *"Eco-Innovation Performance" criteria score falls below average:* most of the indicators scores demonstrate lower level than the average.

Thailand's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Thailand's green and inclusive innovation policy ■ Thai Energy Efficiency Development plan (EEDP) (2011-2013) ■ 15-year renewable energy development (2008-2022) ■ The philosophy of Sufficiency Economy	■ Carbon Reduction Labeling and Carbon Footprint Program ■ Environmental Quality Management Plan (1999-2006) ■ Thailand 20-Year Energy Efficiency Development Plan (2011 - 2030) - Mandatory labeling - the Energy Conservation Promotion Act , B.E. 2550 (2007) - Energy Conservation Promotion Fund - Enforce the Ministerial Regulation on Building Design for Energy Conservation, B.E. 2552 (2009)	■ Pilot project on waste exchange programs ■ The 9th Sustainable Energy and Environment Forum (SEE Forum) (2012)
Sustainable Development	■ Plan and the National Policy and Prospective Plan for the Enhancement and Conservation of National Environmental Quality (1997-2016) ■ 11th National Economic and Social Development Plan ■ Thailand's Industrial Development Plan ■ The country strategy 2014	■ The Tenth National Economic and Social Development Plan (2007-2010) [89]	■ Thailand country development partnership-environment (2004) ■ Science and Innovation for Sustainable Development Forum ■ A Quest for Sustainable Development: Goals for Asia and Europe (Asia-Pacific Ministerial Dialogue) (Aug 2013) ■ The Fifth Regional Environmentally Sustainable Transport (EST) Forum in Asia (2010)
SMEs		■ Good innovation projects ■ Green Labor program and Green leaf program (2008) - Standard Offer Program (SOP) - Energy Efficiency Resource Standards	

Table 30. Thailand's Eco-innovation Supporting Environment Qualitative Research Table

Major Policies of Eco-Innovation in Thailand

■ National Science Technology and Innovation Policy Office

Key Features of Eco-Innovation in Thailand

■ Thailand has focused its national agenda to overcome environmental challenges; in this process the government has provided measures to enhance R&D innovation capacity and environment management system of companies. Thailand showed high number of local companies with ISO14001 following the top performers, Japan, China, and Korea.

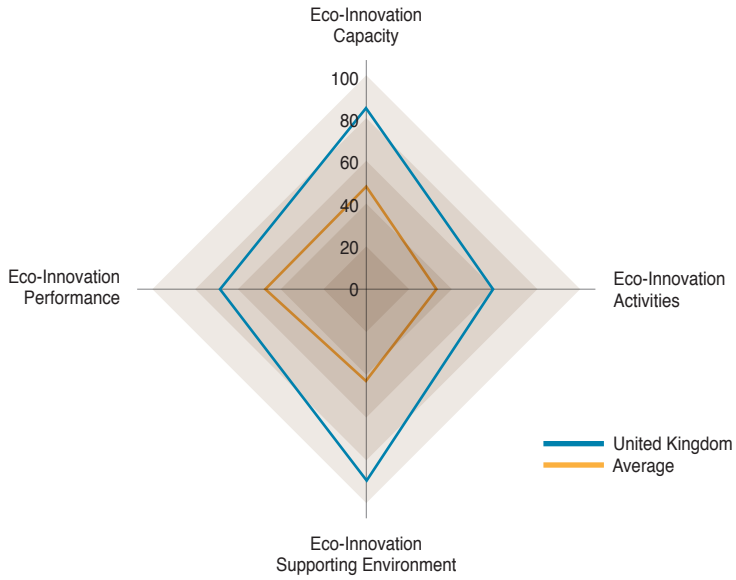
■ With relatively high percentage of manufacturing sector in its economy,[90] Thailand has executed a variety of initiatives in regards to eco-innovation. As an example, Thailand has implemented Green Industry Initiative to promote sustainable business in manufacturing industry until 2014.[91]

89) *The national economic and social development board, UNEP, Thailand Environment Institute, (2008), National Sustainable Development Strategy (NSDS)*
It focuses on holistic development within the framework of sustainable development and uses the Sufficiency Economy Philosophy as a guideline for balanced development, by stressing stability, transparency, accountability, equal development distribution, sustainable natural resources and environmental management, and enhancement of national competitiveness.

90) *CIA The World Factbook https://www.cia.gov/library/publications/the-world-factbook/geos/th.html*

91) *Friedrich Ebert Stiftung, (2012), Green Growth and Green Jobs in Thailand: Comparative Analysis, Potentials, Perspectives*
The nation has promoted expanding companies' environmental products production. As the representative support systems, $23 million has been invested from 2007 to 2010 for the purpose of expanding carbon footprints-labeled product. And the goal of 2011 was to give carbon footprint label over 700 products from 30 industries. Also five stages of Green Industry Development program have supported improvement of green management development. Other examples are DEE+Net program, support for Eco-town development, etc.

United Kingdom



	UK	Average
Capacity	85	49
Supporting Environment	87	42
Activities	60	35
Performance	70	46

Fig 36. ASEI Result: United Kingdom

United Kingdom Eco-Innovation Quantitative Analysis

According to the ASEI 2013, United Kingdom scores higher than the average national score (UK: 75/100, Average: 43/100) when compared to other twenty four ASEM member countries assessed with the ASEI.

- *"Eco-Innovation Capacity" criteria score far exceeds the average level:* Country's Economic Competitiveness, Green Technology R&D Institution Capacity and Awareness of Sustainability Management indicator scores showed the highest amongst the evaluated countries.
- *"Eco-Innovation Supporting Environment" criteria score is above average:* Maturity of Investment Setting for Green Technology Industry and Investment Scale towards Green Technology SMEs indicators show considerably high score whereas Implementation of Environmental Regulations indicator falls into the average level relative to its regional peers.
- *"Eco-Innovation Activities" criteria score exceeds the average level:* while Commercialization Level of Green Technology, Firms' Participation on Environmental Management System and Economic Influence of Leading Environmentally Responsive Firms indicators in particularly demonstrate high scores compared to the average level.
- *"Eco-Innovation Performance" criteria shows higher level than the average:* In particular, CO_2 emission intensity, Water consumption intensity and Green Industry Market Size indicator scores far outweigh the average level.

United Kingdom's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ Waste Prevention & Waste Management – DEFRA[92] ■ Carbon Reduction Commitment Energy Efficiency Scheme ■ the Microgeneration Strategy ■ UK Bioenergy Strategy 2011 ■ Anaerobic Digestion Strategy in 2011 ■ Combined Heat and Power schemes	■ The northwest eco-innovation programme ■ WRAP (Waste & Resources Action Programme) ■ Resource Security Action Plan ■ Renewable Transport Fuel Obligation (RTFO) (2008) ■ Community Energy Saving Programme (CESP) (2009) ■ The Energy Act (2011) ■ Green Investment Bank (GIB) (2012) ■ Green Deal: The Energy Bill (2012) ■ Environmental Transformation Fund (ETF) ■ Technical Advice Note 8 Renewable Energy (TAN8)	■ UK-Japan Symposium on Green Manufacturing and Eco-innovation (2010) ■ The 10th European Forum on Eco-Innovation 'Towards a Resource-Efficient Economy – from Policy to Action' (March 2011) ■ Scotland & Northern Ireland Forum for Environmental Research (SNIFFER)
Sustainable Development	■ UK Sustainable Development Strategy (2005) ■ Securing the future-sustainable development strategy (2006) ■ A Roadmap to a Green Economy (2011) ■ 'The Greenest Government Ever' campaign ■ The 'Building a low carbon economy: unlocking innovation and skills' strategy (2008) ■ National Low Carbon Strategy ■ The Low Carbon Industrial Strategy, and the Low Carbon Transition Plan (2009) ■ Planning Policy Wales (PPW) - Guidance on renewable and low carbon energy projects ■ Overarching National Policy Statement for Energy, DECC (2011)	■ National Sustainable Procurement Training Programme ■ Ultra Low Carbon Vehicle Demonstrator Programme ■ The Low Carbon Vehicle Integrated Delivery Programme ■ Securing the future-sustainable development strategy (2006) ■ Carbon Emission Reduction Target (CERT) (2008) ■ Climate Change Act (2008) ■ Carbon Reduction Commitment Energy Efficiency Scheme (CRC EES) (2010) ■ Carbon Plan (2011) ■ the Central Government Low Carbon Technology Programme	■ Environmental Sustainability Knowledge Transfer Network (ES KTN) (2009)
SMEs		■ National Contact Point for eco-innovation (2011) - provide advice and individual assistance to support UK SMEs	■ Local Enterprise Partnerships (LEPs) - The DEFRA Network

Table 31. United Kingdom's Eco-innovation Supporting Environment Qualitative Research Table

92) *The UK Department for Environment, Food and Rural Affairs website*

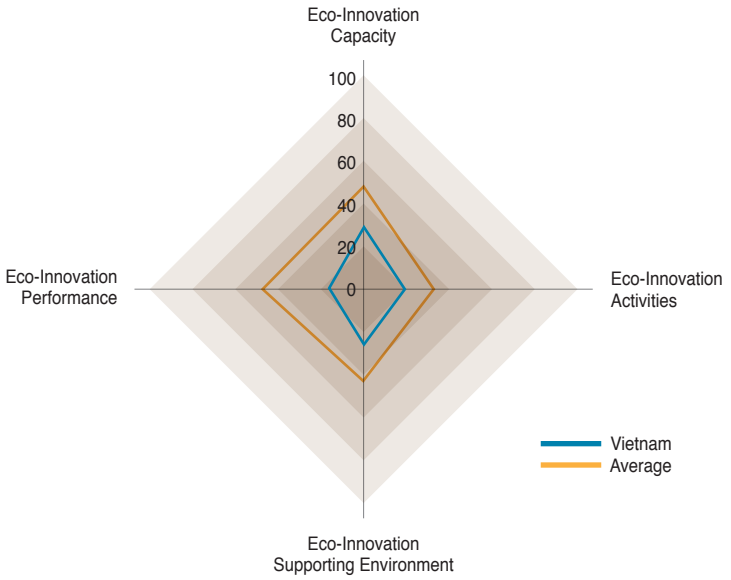
Major Policies of Eco-Innovation in UK

- DEFRA
- the Environment Agency
- the UK Committee on Climate Change (CCC)
- UK Green Investment Bank (GIB)

Key Features of Eco-Innovation in UK

- UK still heavily depends on burning fossil fuels and this is partly reflected in Activeness of Renewable Energy Utilization indicator score, which showed lower score when compared to higher scores for other indicators.
- For such reason, the country is pushing eco-innovation in a variety of areas in energy sector such as renewable energy and energy efficiency and many of these activities are financed through UK Green Investments project.
- Together with the governmental measures, the private sector in UK also shows comparatively outstanding performance. This is shown in high scores in number of indicators that capture green technology development, commercialization of green technologies and participation of environmental management system.
- Service sector takes a large part of the UK economy, contributing around 70 percent of the GDP. Reflecting this, UK has various eco-innovation initiating programs that are based on consulting and evaluating services. For instance, Carbon Trust is a private company financed by the UK government which provides consulting services regarding business' sustainability and environmental management. Carbon Trust Standard is also a certification program for companies with excellent energy management. It is significant to note that such programs are leading the companies to meet the international standards for reducing CO_2 emissions.

Vietnam



	Vietnam	Average
Capacity	30	49
Supporting Environment	26	42
Activities	20	35
Performance	18	46

Fig 37. ASEI Result: Vietnam

Vietnam's Eco-Innovation Quantitative Analysis

According to the ASEI 2013, Vietnam scores lower (Vietnam: 24/100, Average: 43/100) than the average of other twenty four ASEM member countries assessed with ASEI.

- *"Eco-Innovation Capacity" criteria score falls below average:* Most of the indicators in this criterion show low scores compared to the average. In particular, Green Technology R&D Institution Capacity and Awareness of Sustainability Management indicators show the lowest scores relative to other indicators.
- *"Eco*-Innovation Supporting Environment" criteria score is below average: Most of the indicators in this criterion show low or average scores compared to other countries.
- *"Eco*-Innovation Activities" criteria score falls below average: Most of the indicators in this criterion show low or average scores compared to other countries. Commercialization Level of Green Technology and Economic Influence of Leading Environmentally Responsive Firms indicators particularly show scores that are far below the average level.
- *"Eco-Innovation Performance" criteria scores far below the average level*: Most of the indicators in this criterion show relatively low scores compared to the average figures.

Vietnam's Eco-Innovation Supporting Environment: Qualitative Research

	National Vision & Strategy	National Policy & Programmes	Network, Partnership & Organizations
Eco-Innovation	■ A Guideline for Energy Efficiency Standard and Labeling (2006) ■ The Study on Master Plan on Energy Conservation and Effective Use in Vietnam (EE&CMP) (2008)	■ Enforcement in Minimum Energy Performance Standards (MEPS) and Labeling ■ Hanoi Urban Transport Development ■ Development of a Strategy for the Deployment of Mini-Biogas Systems in Pig Production for a Distributed Energy Supply ■ Improving the Energy Policy Setting for Renewable Energies and Grid-Connected Pilot Wind Energy Project ■ Energy Conservation and Efficiency Program for Vietnam (EE&CP) (1995) ■ Pilot Commercial Energy Efficiency Program (CEEP) (2004) ■ Fluorescent Thin Tube Lamp (FTL) & Compact Fluorescent Lamp (CFL) Promotion Campaign (2004) ■ Electricity Saving Program for the period (2006-2010)	■ 15th Forum on Eco-innovation: EC-UNEP Roundtable on Eco-innovation (Nov 2013) ■ Green Innovation Forum – Energy Efficiency and Renewable Energy (2011) - The opening event in a series of four programs of Green Innovation Forum 2011, organized by GreennoCom and 350Vietnam to introduce practical environmental solutions to the public in Vietnam. The program is sponsored by British Council and FPT Technology Research Institute
Sustainable Development	■ The National Strategy on Environmental Protection towards 2010 and Orientations towards 2020 (2003) ■ Science and Technology Development Strategy (2003-2010) ■ National Energy Master Plan, Vietnam (2008)	■ Vietnam Clean Production and Energy Efficiency Project ■ Vietnam Demand Side Management and Energy Efficiency (DSM) – Phase 1&2 (2000) ■ Vietnam Energy Efficiency Program(VNEEP) (2006)	
SMEs		■ Promoting Energy Conservation in Small and Medium Enterprises (PECSME) (2006)	■ European Green Business Solutions for Vietnam (Sep 2013) ■ Sustainable Product Innovation in Vietnam, Cambodia and Laos - Strengthens the innovative power of industry to improve environmental and societal quality of products made in Vietnam, Laos and Cambodia - Activities include among others capacity building on project branding and marketing skill trainings for SMEs

Table 32. Vietnam's Eco-innovation Supporting Environment Qualitative Research Table

Major Policies of Eco-Innovation in Vietnam

- Vietnam's Environmental Protection Agency (VEPA)
- Energy Efficiency and Conservation Office
- The State Agency for Technology Innovation (SATI)
- The Committee on Science, Technology and Environment of the National Assembly

Key Features of Eco-Innovation in Vietnam

- Vietnam is an oil producing country yet due to lack of national infrastructure; Vietnam only recently started its oil refining businesses. As such, the eco-innovation activities in the energy sector remains to be weak. However, Vietnam is putting effort to accept the eco-innovation concept slowly, this is partially reflected in the move to promote, 15th Forum on Eco-innovation, Green Innovation Forum this year. This also shows how Vietnam is trying to attract foreign investment in developing eco-industry including renewable energy and waste recycling sector. In various ways, Vietnam shows signs that will elevate eco-innovation capacity as well as introduction of more practical eco-innovation activities.

Chapter 7
Business Perspective Towards Eco-Innovation

"Without innovation, it will be very difficult and very costly to achieve a transformation to a greener economy. Business is the driver of innovation, including green innovation."

(UNIDO, 2013)

Chapter 7

This chapter aims to lay emphasis on the role of corporations, SMEs and start-ups in promoting and implementing eco-innovation. They have the capacity to innovate, change and diffuse new concepts, products, processes and technologies and their activities can bring far greater impact and opportunities in the future than today. Firms are the key actors that can manage and enhance resource and material efficiency. They are important for a transitional improvement needed to grow an eco-innovative economy and accelerating sustainable development. This report aims to emphasize the increasing role and potential of SMEs so it informs SMEs of what can be done within its scope of business. This chapter presents a set of detailed case studies of SMEs that have successfully introduced eco-innovation products, systems and services to the domestic market. We have selected cases that offer a diverse view on the different methods SMEs have taken to adopt eco-innovation practice, hoping that it would ultimately validate our perspective on the important role of SMEs.

Role of Business in Eco-Innovation

"Eco-innovation is about creating business models that are both competitive and respect the environment by reducing the resource intensity of products and services. Eco-innovation takes the full life-cycle perspective into account, rather than just focusing on environmental aspects of individual life-cycle stages. It does not just mean inventing new products and delivering new services, but it also encompasses reducing environmental impacts in the way products are designed, produced, used, reused and recycled"

Eco-Innovation Observatory: A guide to eco-innovation for SMEs and business coaches, 2013

Eco-innovation can develop a firm's competitiveness. This chapter aims to emphasize the importance of business in promoting and implementing eco-innovation. As mentioned frequently throughout the report, businesses are the key drivers and enablers of eco-innovation. Firms have the capacity to innovate, change and diffuse new concepts, products, processes and technologies bringing far greater impact and opportunities in the future than today. They can manage and enhance resource and material efficiency, important transitional improvement needed for eco-innovative economy and accelerating sustainable development. It can be extrapolated that their impact will be far superior and larger in the future as their innovation activities today is more radical and complex affecting larger parts of the global community. Innovative firms today are accelerating as solution providers of environmental and social challenges and they will determine the success of eco-innovation at the country level in the future.

As emphasized in the previous chapter, various national and regional governmental support elevate and ensure businesses to successfully create, diffuse and deliver eco-innovation solutions. Governmental support towards eco-innovation is indispensible and is a major impetus to the domestic firms. Businesses in diverse national contexts may choose different eco-innovation approaches to utilize and maximize a range of beneficial support and opportunities provided by the governments and business environment. The more exploited to government supported policies businesses are, the most likely businesses will find local strengths and understand local dimensions and make most use of local supporting environments. However, regardless of a government's willingness to promote eco-innovation to firms, it will be subject to the firm's appropriate awareness and resources to implement eco-innovation at a practical level.

Early runners of eco-innovation like Sweden and United Kingdom have continuously made efforts to encourage firms to proactively participate in their respective nation's eco-innovation activity. Denmark and France, they have provided comprehensive eco-innovation support friendly policy in the areas of R&D and international trade. Belgium and Finland is known to establish clusters and partnerships to provide a ground to facilitate synergy between various stakeholders in order to create eco-innovation activities. The ProgRess program in Germany provides financial support and advisory services to SMEs with eco-innovative technology solutions. Thousand Enterprises Programme in China and GHG & Energy Target Management Programme in Korea request firms to participate in national set environmental goals. Denmark, France and Sweden support oversees exports of eco-innovative products and solutions by facilitating partnership with developing countries. Policy direction and strategy focuses vary by country and region, yet there is a general movement that developing countries follow, usually in the footsteps of more developed countries to urge firms to participate in eco-innovation.

Importance of Small and Medium Sized Enterprises (SMEs)

"New and young firms are prone to exploiting technological or commercial opportunities which have been neglected by more established companies often because radical innovations challenge the business models of existing firms... Policy may need to create the room for such new firms by enabling their entry, exit and growth, ensuring fair competition and improving access to finance which remains a major constraint for the entry and growth of young firms." [93] (OECD, 2012)

93) OECD Green Growth Studies Fostering Innovation for Green Growth Report

The OECD explains there are different levels of innovation. Technological and non-technological innovation leads to incremental, disruptive and radical innovation[94] and then to systemic and transformative eco-innovation. Technological approaches and its applications are known to present more positive and forceful breakthroughs from existing systems and patterns than non-technological approaches. This is why incremental innovation generally refers to non-technological eco-innovation approaches while transformative innovation refers to technological eco-innovation approaches. Synergetic integration of both non-technological and technological approaches to eco-innovation will allow a specific industry to break away from resource intensive growth and towards sustainable development.

The OECD states that radical transformative eco-innovations tend to be pioneered by SMEs and, systemic eco-innovation are performed by larger firms. The changing definition of innovation today also implies that small and medium business have equal or more potential to implement eco-innovation compared to large corporations with sufficient resources, sector professionals and strong infrastructure. SMEs are often more flexible to integrate eco-innovation concept into their operation, product development and strategy, thus can be more creative overtime than larger corporations with rigid eco-systems. Many businesses in green technology are small and medium enterprises (SMEs) which can bring radical influence to society and environment. It is expected that more SMEs will challenge many existing eco-innovation related technologies, processes, products and solutions of bigger companies. More recently, there has been an increase in number of SMEs that develop and trade green technology solutions and products which comes under the paradigm of eco-innovation. Many national governments are building networking stages for SMEs to stimulate eco-innovation activities as eco-innovations become more developed and commercialized as a result of interactions between innovative firms.

More than 99 percent of European Union companies are SMEs and are responsible for over 60 percent of the EU's GDP.[95] In Asia, SMEs account for about 90 percent of businesses and employ about 60 percent of the workforce.[96] Yet, the definition of SMEs varies from country to country which make it hard to define. In both Asia and Europe, SMEs are extensively recognized as key drivers of eco-innovation growth and a key instrument for environmental and social development efforts. SMEs around the world are growing at a faster pace than ever before and are bringing greater impact to domestic markets, affecting wider global society. As a result, SMEs in Europe have been the main target of eco-innovation initiatives and programmes at the national and regional level.[97] SMEs unlike large corporate or MNEs, lack the effort and activities towards developing eco-innovation. Organizations like the OECD, the EU and the ASEIC are working towards promoting opportunities of eco-innovation which can bring global, national and industry levels of participation in developing countries and SMEs. In a recent report by the CIP showed that SMEs implementing eco-innovation create twenty times more profit than normal SMEs and those eco-innovation SMEs are more likely to receive investment, and contribute to job creation and higher profit. More analytical research on the benefits of eco-innovation for developing countries and SMEs is expected to be available in the near future.

Belgium's Business Angel Network (BAN), China's Technical Innovation Fund for SMEs and China SME Global Development Forum, France's OSEO and CDC Enterprises, Germany's BMU and the Mikrokreditfonds Deutschland, the Netherland's Dutch SBIR and Doe Mee are representative examples of governmental support given to SMEs to facilitate eco-innovation. Networking stages vary by region. In Europe, which has the high level of eco-innovation, R&D activities and innovative trials are strong when centered on clusters and parks. For example, Italy has a tradition of industrial clusters and regional cooperation unions and countries such as Belgium, Czech and Finland each has its own numerous R&D cluster and technology parks where SMEs' innovation and R&D capacity are expanding. Additionally, a variety of networks such as each European country's Cleantech Cluster, France's Club ADEME International and Britain's Carbon Trust are going on to transfer Europe's aggregated eco-innovation capacity to other regions. In case of Asia, many countries are now moving towards promoting technology transfer and financial support from developed countries. Vietnam, Bangladesh, Cambodia, Malaysia, and Philippines are increasingly hosting various kinds of forums and events to increase cooperation with European countries in the area of eco-innovations.

94) The OECD states that incremental changes refer to "gradual and continuous competence enhancing modifications that preserve existing production systems and sustain the existing networks, creating added value in which innovations are rooted", radical changes, in contrast, refer to "competence-destroying, discontinuous changes that most often seek the replacement of existing components-or entire systems and the creation of new networks, creating added value", and disruptive innovation refers to "changes how things are down or specific functions are fulfilled without necessarily changing the underlying technological regime itself".

95) EIO (2012), Emerging Markets

96) Small and Medium Enterprises, Asia-Pacific Economic Cooperation

97) EIO (2012), Emerging Markets

Chapter 7

Business Perspective Towards Eco-Innovation

This report introduces the best business case studies that can be categorized more towards radical or transformative eco-innovation. This report does not underestimate the role of large corporations. Rather, this report aims to emphasize the increasing role and potential of SMEs so that this report provides information to SMEs on ways to develop eco-innovation within their scope of business. SMEs face various barriers such as lack of financial support, training and information on eco-innovation or environmental regulation, co-operational groups and human resource to implement eco-innovation. This report calls for governmental support to help SMEs overcome such barriers.

The next sub-chapter presents a set of detailed case studies of SMEs that have successfully introduced eco-innovative products, systems and services. We have tried to select cases that can offer a diverse view of different methods SMEs have taken to adopt eco-innovation practice, hoping that it would ultimately validate our view of the importance of SMEs. The next second sub-chapter presents eco-innovation practices that have been implemented by other stakeholders than firms. This should give a brief introduction on how various stakeholders can participate in eco-innovation at local contexts.

Case Studies of Eco-innovative Small and Medium Sized Enterprises (SMEs)

Business Case Study 1

Company Name: **Renewable Recyclers**
Contribution Area: **Environment & Society**
Key Eco-innovation Words: **Resource Efficiency, Recycling, Green Jobs**
Product / Organizational Change & Process / Service / **Whole Life Cycle** / Supply Chain / Design / R&D / Waste Management / Emission Management/ **Material Productivity** / **Energy Productivity**

Country: Australia	Recycling electronic wastes & Jobs opportunities for those with disabilities

Renewable Recyclers is a social enterprise of Richmond PRA. Richmond PRA is a not-for-profit organization that works with people diagnosed with mental health issues or psychosocial disability and their families in order to provide recovery orientated support and resources. Specifically, Renewable Recyclers simultaneously seeks to reduce electronic wastes (e-wastes) that end up in landfills, and provide sustainable jobs and training opportunities for the disabled through project collaboration and partnerships. For example, training and development opportunities are provided to the staff, and all permanent staffs are currently enrolled in relevant courses. In regards to e-wastes, Renewable Recyclers seek to reduce, reuse and recycles e-wastes; e-waste management solutions include collection, de-manufacture, recycling and refurbishment. Renewable Recyclers' ability to deal with the growing problem of e-waste while creating employment opportunities for the disabled is an exemplary case of contributing both to the environment and society.

Sources:
- http://www.renewablerecyclers.com.au/
- http://www.environment.nsw.gov.au/greenglobes/2013/region.htm
- https://www.richmondpra.org.au/

Business Case Study 2

Company Name: **The 'Re-Define' Sofa & Armchair**
Contribution Area: **Environment & Economy**
Key Eco-innovation Words: **Resource Efficiency, Green Product**
Product / Organizational Change & Process / Service / **Whole Life Cycle** / Supply Chain / **Design** / **R&D** / Waste Management / Emission Management/ **Material Productivity** / Energy Productivity

Country: Australia	Sustainable furniture

The 'Re-Define' sofa and armchair, launched in Australia at the end of 2000, is the result of a project seeking to develop high-quality, sustainable furniture. As a project in collaboration between Wharington International, The Centre for Design at Royal Melbourne Institute of Technology (RMIT), and MID Commercial Furniture, the goal was in developing a range of furniture whose environmental impacts are minimized across the entire life-cycle. The guidelines in developing the furniture include minimization of the quantity of material used, avoidance of toxic or hazardous substances, using metals with low 'embodied energy', minimization of the number of components and assemblies, replacement of glue and screws with simple 'push, hook, and clip' assembly, avoidance of solvent-based adhesives, possibility of minor repairs to be carried out, and avoidance of colors or designs that will go out of fashion quickly. In regards to the materials, forest products have

been avoided, and no toxic or hazardous materials are used at any stage of the manufacturing process. Moreover, in order to prolong its life-span, it has been designed to be easily maintained and repaired. Only the design phase incurred extra expenditure in comparison to conventional furniture and the manufacturing process did not entail cost premium.

Source:
- http://www.iisd.org/business/viewcasestudy.aspx?id=93

Business Case Study 3

Company Name: **Grameen Danone Food Ltd.**
Contribution Area: **Economy, Environment & Society**
Key Eco-innovation Words: **Social and Environmentally Conscious Business Model**
Product / **Organizational Change & Process** / **Service** / Whole Life Cycle / Supply Chain / Design / R&D / Waste Management / Emission Management/ Material Productivity / Energy Productivity

Country: Bangladesh	Empowerment of community through novel business model

Grameen Bank and Groupe Danone have partnered in Bogra, Bangladesh to develop a self-sustaining enterprise business in the local community. It is an eco-friendly, mini factory for fortified yogurt, which uses only sustainable local resources and a novel business model. The goal is to empower the local community and to address the problems of malnourishment and poverty. It employs a novel business model by using door-to-door sales by "Grameen Ladies", who are micro-entrepreneurs selling yogurt from the mini-factory to Bogra and surrounding villages. This business model overcomes the challenges coming from the lack of infrastructure of transporting and supplying refrigerated items.

The factory and the new business model that it used have shown success as the factory produces 22,000 pounds daily (i.e., equivalent of breakfast for 130,000 children). Moreover, Grameen Danone has launched new products and has doubled its annual sales during its first three years. Grameen Danone has increased employment opportunities in the local community, as the door-to-door selling model employs approximately 500 women and 50 factory workers. Also, it has improved the nutrition of local members as one container of the yogurt provides 30% of a child's daily requirement of vitamins, iron, zinc, and iodine. Moreover, it is affordable to the poorest people as a yogurt is priced as low as $0.09 per 2.1 ounce serving. With such success, Grameen Danone plans to build 50 mini-factories by 2020. Each factory will have an annual production capacity of 3,000 tons, which is expected to meet the needs of 150 million people.

Sources:
- http://www.danone.com/en/what-s-new/focus-4.html
- http://www.innovationexcellence.com/blog/2013/01/31/greenovate-grameen-danone-eco-friendly-mini-factory/
- http://www.grameencreativelab.com/live-examples/grameen-danone-foods-ltd.html
- http://www.danonecommunities.com/en/project/grameen-danone-foods-ltd

Business Case Study 4

Company Name: **Manufacturers of CNG Bus includes Tedom s.r.o., SOR Libchavy spol. S r.o., Iveco Czech Republic, a. s., and Ekobus a.s**
Contribution Area: **Economy & Environment**
Key Eco-innovation Words: **Emission Reduction Technology**
Product / Organizational Change & Process / Service / Whole Life Cycle / Supply Chain / Design / **R&D** / Waste Management / **Emission Management** / Material Productivity / Energy Productivity

Country: Czech Republic	CNG bus

Using CNG technology for vehicles has several environmental benefits, and in the Czech Republic there are several manufacturers of CNG buses, including Tedom s.r.o., SOR Libchavy spol. S r.o., Iveco Czech Republic, a. s., and Ekobus a.s.. CNG for vehicles means almost zero emissions of solid pollutants of PM and SO_2, CO_2. Moreover, emissions lower by 10 to 15% compared to diesel engines and by 20 to 25% in comparison to petrol engines. CNG also reduces NOx emissions by up to 60% compared to diesel engines. Also, CNG engines contribute to the reduction of ground-level ozone production, and it runs more silently than classical engines. CNG vehicles also have a longer traveling distance, lower operating costs and there is virtually no risk of fuel tank explosion in the event of a fire. However, disadvantages include higher purchase costs and insufficient infrastructure. Although the rate of use of CNG technology in the Czech Republic is relatively low in comparison to other countries (e.g., Switzerland), the potential of usage is high, and depends on several factors including legislation, supply of vehicles, and infrastructure.

Sources:
- http://www.cenia.cz/web/www/web-pub2.nsf/$pid/CENMSFVKXSCW/$FILE/environmental_technologies_and_eco-innovation_in_the_cr.pdf

Business Case Study 5

Company Name: **SME Renewable Energy Ltd. (RE) & E+Co**
Contribution Area: **Economy & Environment**
Key Eco-innovation Words: **Environmentally Friendly Electricity System**
Product / Organizational Change & Process / Service / Whole Life Cycle / Supply Chain / Design / **R&D** / Waste Management / Emission Management/ Material Productivity / **Energy Productivity**

Country: Cambodia	Generating green energy through conversion of waste products

SME RE sells bio-mass gasifer systems that provides reliable, affordable and environmentally friendly electricity to Cambodia's critical industries (i.e., rice, brick, textile, and ice industries). The bio-mass gasidiers convert widely available waste products, such as rice husks, into a source of affordable, reliable energy. The 32 gasifiers that have been installed by SME RE have shown substantial environmental benefits as they have eliminated the need to over 3 million liters of diesel fuel, thereby reducing carbon emissions by over 9,000 tons each year.

In addition to environmental benefits, the economic benefits are considerable as electricity generated by a gasifier can cost as little as half of that of grid electricity. Moreover, business continuity has improved as operators now have control of the bulk of their energy supply and are not forced to shut down during frequent blackouts. This is critical given that Cambodia lacks a robust and stable electric grid. Although installing a gasifier requires an initial investment of $70,000,

the substantial savings coming from the independence from the grid can result in a payback period as short as two years. Moreover, SME's partner, E+Co, an American non-profit investing in renewable energy companies across the developing world, finances 80 % of the capital required for installing a gasifier. Not only has this dramatically increased SME RE's customer pool, but it also brought additional benefits of earning 10 % of interest on the loans.

Sources:
- http://www.smerenewables.com/
- http://www.greenbiz.com/blog/2010/04/08/turning-rice-husks-cheap-green-energy-cambodia

Business Case Study 6

Company Name: **Endomines**
Contribution Area: **Economy, Society & Environment**
Key Eco-innovation Words: **Environmentally Friendly Operations**
Product / **Organizational Change & Process** / Service / **Whole Life Cycle** / Supply Chain / Design / R&D / Waste Management / Emission Management/ **Material Productivity** / Energy Productivity

Country: Finland	Environmentally friendly gold mining

Endomines is operating a clean and environmentally friendly gold mining operation in Pampalo, near the easternmost point in Finland. Pampalo's operation is green and responsible, and at the same time profitable. Endomines' Pampalo mine is a participant of the Green Mining project conducted by the Finnish Funding Agency for Technology and Innovation. The project has two main themes; the handing of arsenics in minerals processing, and developing of sustainable and responsible means of gold processing. In lines with this, Pampalo have 100% recirculation of process waters and also use environment-friendly emulsion explosives, thereby minimizing the nitrogen load. Moreover, the gold mining operation avoids acid mine drainages. The Pampalo started with an investment of 20 million EUR, and currently produces 800 to 900kg of pure gold annually. Expansions are on-going and it is expected that the mine's capacity will increase by 30-50% in 2014.

Sources:
- http://www.endomines.com/
- http://www.bulk-solids-handling.com/processing/crushing_grinding_milling/articles/394667/
- General information regarding "green" mining in Finland: http://www.tekes.fi/en/gateway/PTARGS_0_200_403_991_2092_43/http%3B/tekes-ali2%3B7087/publishedcontent/publish/programmes/greenmining/documents/greenmining_esittelydiat_en_01062012.pdf

Business Case Study 7

Company Name: **Kent RO Systems Ltd**
Contribution Area: **Economy & Environment**
Key Eco-innovation Words: **Resource Efficiency**
Product / Organizational Change & Process / Service / Whole Life Cycle / Supply Chain / Design / R&D / Waste Management / Emission Management/ **Material Productivity** / Energy Productivity

Country: India	Water purifier with 0% water wastage

Kent RO Systems Ltd in India launched a water purifier with 0% water wastage reverse osmosis (RO) technology. Most water purifiers available in the Indian market employ RO purification process that loses 80% of water in producing drinkable water; that is, almost 40 liter of raw water is used to produce 10 liter of drinkable water. Kent's new patented technology in domestic RO water purifier recovers 40 liter of water out of 40 liter of raw water ensuring 0% water wastage. The product features a computer controlled process where the membrane is washed automatically, thereby recovering more than 50% of purified water. The rejected water is stored in a separate 'Reject Water Tank', which can then be utilized by consumers for washing utensils, moping floor or gardening. Hence, the net result is 0% water wastage.

Sources:
- http://articles.timesofindia.indiatimes.com/2013-04-05/india-business/38305477_1_water-purifier-market-raw-water-water-tank
- http://www.kent.co.in/

Business Case Study 8

Company Name: **Hanjer Biotech Energies**
Contribution Area: **Environment & Society**
Key Eco-innovation Words: **Recycling, Citizen Engagement**
Product / Organizational Change & Process / Service / Whole Life Cycle / **Supply Chain** / Design / R&D / **Waste Management** / Emission Management/ **Material Productivity** / Energy Productivity

Country: India	Eco-friendly technology in the management and recycling of municipal solid waste

Hanjer Biotech Energies is an innovative waste recycling and resource recovery company. It provides a unique way of processing and treating municipal solid wastes, and subsequent conversion into bio-compost, green fuel, sand and plastic. Driven by the singular objective to effectively 'Recycle, Reuse, and Reduce,' Hanjer has helped municipalities minimize landfills by up to 80% and reduce environmental impact, with no additional cost to the city bodies. Moreover, Hanjer has created products and services that have massively lowered resource intensity than conventional alternatives and displaying a quantum jump in utilizing existing technology to achieve maximum customer satisfaction at minimum cost. The company has been awarded the prestigious Golden Peacock Award 2012 for Eco-Innovation in Waste Management and Recycling.

Hanjer has 24 operational plants having ISO9001:2008, ISO 14001:2004 and OSHAS 18001:2007 certifications. The 24 plants are dispersed in 19 cities in India, and 6 more plants in 4 cities are in implementation stage. In regards to engaging with the community, Hanjer created "Trash Bash", which is a community awareness program to engage with citizens through events hosted in Hanjer cities and celebrate waste as positive resources. The "Trash Bash" seeks to increase awareness on better handling of waste and to educate audiences of the long-term benefits of disposing wastes in the right manner.

Sources:
- http://www.hanjer.com/
- http://www.indiaprwire.com/pressrelease/biotechnology/20120718125436.htm

Business Case Study 9

Company Name: **Gas Companies & Appliance Manufacturers in Tokyo and Osaka**
Contribution Area: **Economy & Environment**
Key Eco-innovation Words: **Resource Efficiency**
Product / Organizational Change & Process / Service / Whole Life Cycle / **Supply Chain** / Design / R&D / Waste Management / Emission Management/ Material Productivity / **Energy Productivity**

Country: Japan	Energy efficient home power generation system

Developed by gas companies in Tokyo and Osaka and home appliance manufacturers, Japan became the first country in the world to begin selling *Ene-Farm* in 2008. Ene-Farm is a home power generation system using gas co-generation. It consists of a fuel cell unit and a hot water storage unit. The fuel cell unit generates power by allowing hydrogen to react chemically with oxygen from the atmosphere. Such fuel cell can produce 750 W to 1,000 W of electricity, which can be used throughout the house after conversion to home AC current. Additionally, a heat-recovery device, known as a recuperator, efficiently recovers heat generated as a byproduct, and uses it to heat water for supply to the bathroom and kitchen. It is even used to heat the house through piping beneath room floors. According to gas utilities, Ene-Farm has proven to increase energy utilization efficiency to as much as 81%. This is a significant improvement from 37% in comparison to conventional power, or electricity provided through the grid, where a great deal of energy is lost in transmission and as unused exhaust. A single Ene-Farm system can supply 40% to 60% of the electricity consumed by a household.

Sources:
- http://www.fuelcelltoday.com/news-events/news-archive/2012/january/japanese-ene-farm-production-ramping-up-as-customer-demand-grows
- http://web-japan.org/trends/11_tech-life/tec120806.html

Business Case Study 10

Company Name: **Alphascan**
Contribution Area: **Environment**
Key Eco-innovation Words: **Environmentally Friendly Product**
Product / Organizational Change & Process / Service / Whole Life Cycle / Supply Chain / Design / **R&D** / Waste Management / Emission Management/ Material Productivity / **Energy Productivity**

Country: Korea	Energy efficient monitor

Alphascan display released an environment friendly LED backlight. The company gained remarkable results from objective evaluation through Bench Marking Test(BMT) and have steadily supplied displays for CCTV to security companies. 'Alphascan A1903 LED', the company's brand-new 19 inch monitor with 4:3 ratio is an energy high efficiency product with the company's latest technology applied which has gained more economic feasibility making a drastic cut in power consumption. As a power-saving and the 1st grade power consumption(18W) product, the newly released product with LED backlight has decreased around 50% of power consumption compared to the monitor with CCFL backlight. With regards to standby power as well, the product is excellent product in standby power reduction and features 90% of decrease, 0.1W out of governmental regulation 1.0W. In addition, this is an environmental friendly product with LED backlight which doesn't contain harmful materials to the human body.

Sources:
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- http://www.brainbox.co.kr/news/view.asp?id=27850
- http://www.etnews.com/news/home_mobile/living/2790494_1482.html

Business Case Study 11

Company Name: **Kyoto Cooling**
Contribution Area: **Environment**
Key Eco-innovation Words: **Reduction of Energy Use**
Product / Organizational Change & Process / Service / Whole Life Cycle / Supply Chain / Design / R&D / Waste Management / Emission Management/ Material Productivity / **Energy Productivity**

Country: Netherlands	**Technology for reducing energy used in data centers**

To reduce the amount of energy needed for cooling data storage, Kyoto Cooling systems developed a new technology, the 'heat wheel' that reduces energy use by up to 80%, resulting in large economic and environmental savings. In regards to economic impact, as expenditures on energy for cooling are a major part of total expenditure in the industry, reducing energy required for cooling can result in large savings. This is especially so given the relatively small additional investment for the installation of this technology in comparison to conventional methods. In regards to environmental impact, by reducing cooling energy demand, the total energy demand of the industry could decrease significantly. Additionally, the technology used by Kyoto Cooling does not require cooling water, thereby improving its environmental impact even more.

The company faced a difficult market after developing the technology and securing patents due to the market's extreme sensitivity about reliability in its service; the market was not willing to consider a risky new technology. However, it was able to overcome such challenges and build a test-site due to subsidies and other support from the Dutch government through its Energy Research Subsidy (EOS) program, and cooperation with KPN, a large Dutch telecom firm. Due to KPN's commitment and the proven functionality and the test-site, other firms were willing to switch to this new technology. Kyoto Cooling is now selling its technology worldwide.

Sources:
- http://www.eco-innovation.eu/index.php?option=com_content&view=article&id=439%3Akyoto-cooling&catid=68%3Anetherlands&Itemid=68
- http://www.kyotocooling.com/en/index.html

Business Case Study 12

Company Name: **Carbon8**
Contribution Area: **Environment**
Key Eco-innovation Words: **Environmentally Friendly Waste Management**
Product / Organizational Change & Process / Service / **Whole Life Cycle** / Supply Chain / Design / **R&D** / **Waste Management** / Emission Management/ Material Productivity / Energy Productivity

Country: United Kingdom	Treatment and recycle of industrial wastes and contaminated soils

Carbon8 provides Accelerated Carbonation Technology (ACT) for the treatment of industrial wastes and contaminated soils. Carbon8 is a spin-out company from the University of Greenwich, which was formed in 2006 in order to commercialize accelerated carbonation as a treatment for industrial wastes and contaminated soils. Landfill gas (mostly methane CH_4) is a very potent greenhouse gas. It is normally "flared" to produce H_2O and CO_2, however this process still releases CO_2 into the atmosphere. ACT offers a unique combination of benefits that uses carbon dioxide in the process to produce materials that can be re-used or disposed of more cheaply, and with significantly shorter treatment times than traditional methods. The compelling environmental feature of the process is the ability to capture significant volumes of CO_2, a major contributor to global warming. Carbon8 benefited from the Environmental Sustainability KTN (ESKTN) funding, and is ready to offer waste treatment services to industry, saving landfill tax and creating new products from waste.

Sources:
- http://www.c8s.co.uk/
- http://www.eco-innovation.eu/index.php?option=com_content&view=article&id=207:accelerated-carbonation-as-a-treatment-for-industrial-wastes&catid=76:united-kingdom

Country or Regional specific eco-innovative practices

Practice 1.

Country: **Poland**
Organization Name: **Polish Sustainable Energy Financing Facility (PolSEFF)**
Involved Organizations: **European Bank for Reconstruction and Development (EBRD)**
Area: **Financing**

Financing

The PolSEFF was created by the European Bank for Reconstruction and Development (EBRD) in order to facilitate investments in new, energy-efficient technologies and use of energy from renewable sources. It is a credit line of EUR 150 million, and is addressed to small and medium-size enterprises interested in investment in new technologies and equipment decreasing energy consumption or generating energy from renewable sources.

Sources:
- http://www.eco-innovation.eu/index.php?option=com_content&view=article&id=441:polseff-polish-sustainable-energy-financing-facility&catid=69:poland
- http://www.polseff.org/en

Practice 2.

Country: **India**
Organization Name: **India Institute of Technology (IIT)**
Area: **Water Purification**

Affordable and effective method of water purification

Researchers at the Indian Institute of Technology Madras in Chennai, India have devised a cheap and effective method to produce clean drinking water. A water purification system that uses nanotechnology to remove bacteria, viruses and other containments may be able to deliver clean drinking water to rural communities for less than $3 a year per family. The purification device filters water through a specially crafted mixture of nanoparticles to remove harmful contaminants. The study was published in the journal Proceedings of the National Academy of Sciences in May, 2013. The device, which is currently being tested in communities in India could afford an affordable way to provide small families with at least 10 liters (2.6 gallons) of safe drinking water per day.

Sources:
- http://www.thehindu.com/sci-tech/technology/affordable-water-purification-using-silver-nanoparticles/article4690096.ece
- http://www.livescience.com/29349-water-purification-system-nanotechnology.html

Practice 3.

Region: **Europe**
Project Name: **Ecobim**
Involved Organizations: **VTT Technical Research Centre & Three SMEs from Finland, Germany, and France, and CSTB**
Area: **R&D**

Development of a sustainable construction business model

Ecobim's main aim is to develop a sustainable construction business model to support paradigm change in eco-innovation. It is coordinated by VTT Technical Research Centre. Also, the consortium includes 3 SMEs from Finland, Germany, and France, and CSTB. The main expected output is to develop a set of guidelines based on indicators for sustainable eco-innovative construction business models.

Establishing a networking platform with SMEs enables the identification of new innovation fields within the construction sector and the development of the required methodologies and tools to serve the whole value chain. Selecting the right kind of SMEs is important in terms of them being representative enough of the variety and complexity of the construction process. The selection of SMEs for the consortium takes such issue into consideration, and the result is selection of an architectural firm from Finland, an eco-consultant from Germany, and an ICT consultant from France.

Several case studies in north, central and south Europe will link Ecobim's sustainable construction business model to SMEs daily practice, thus covering the European dimension and providing business opportunities for the common marketplace. The case studies are national but interactive information exchange ensures covering the whole value chain even considering local special features. This process will also provide a roadmap for enterprises, particularly SMEs, and easy-to-understand recommendations for policy makers covering the whole value chain.

Sources:
- http://www.vtt.fi/sites/ecobim/ecobim_background.jsp?lang=en
- http://www.eco-innovera.eu/1st-call-projects-ECOBIM

Practice 4.

Country: **Australia**
Project Name: **The Bondi Stromwater Project**
Involved Organizations: **NSW Government's Climate Change Fund**
Area: **Water Management**

Recycled Water

The Bondi Stormwater was built in 2012 with the funding support from NSW (New South Wales) Government's Climate change fund. It is a program designed to harvest and re-use storm-water previously discharged into the ocean at the southern end of Bondi Beach. The Project will treat and supply over 50 million litres of storm-water per year, delivering recycled water for irrigation, toilets and public cleaning at Bondi Beach. Key benefits of the project include over 50 million litres of drinking water saved each year, storm-water filtration for improved water quality, improved park surface and quality for recreational use, the maintenance of open space through underground system operation, insurance of water for irrigation in times of drought, and carbon neutral operation. Moreover, in regards to

sustainability, a 10 kW photovoltaic solar system is installed on the roof of Bondi Pavilion, which provides energy for the carbon neutral operation of the scheme.

Sources:
- http://www.waverley.nsw.gov.au/environment/water/bondi_stormwater_project

Practice 5.

Country: **Bangladesh**
Organization & Project Name: **Shidhulai Swanirvar Sangstha**
Area: **Education**

Provision of uninterrupted education amidst weather challenges.

Shidhulai Swanirvar Sangstha is a non-profit organization founded in 2002 with the goal of providing uninterrupted education year round to students in Bangladesh. During the monsoon season in Bangladesh, hundreds of schools frequently shut down as a result. In order to overcome this problem, the organization builds solar-powered floating schools in order to allow Bangladeshi kids to learn during monsoon season. Education: Solar-powered floating schools

The floating structures are made of locally-sourced natural materials, and each boat is equipped with rooftop solar panels, and small library with electronic resources, and a laptop with internet connectivity. The boats have a capacity of approximately 30 students, and they pick up students from the mainland and float during the school day. In the evenings, the solar power accommodates classes for parents and seniors, such as classes in agriculture, finance, and health. Thus, this program is not only overcoming environmental challenges, but also, it is using such challenges as a way to enhance educational opportunities and quality of life. In 2007, the UN Environment Programme awarded Shidhulai Swanirvar Sangstha the Sasajawa Prize 2007 in regards to the theme of Climate Change.

Sources:
- http://www.shidhulai.org/
- http://inhabitat.com/solar-powered-floating-schools-allow-bangladeshi-kids-to-learn-during-monsoon-season/
- http://www.ecohearth.com/eco-op-ed/449-bangladesh-confronts-climate-change-with-eco-innovation-and-floating-communities.html

Practice 6.

Country: **Bangladesh**
Organization Name: **Rahimafrooz Renewable Energy**
Project Name: **Rural Electrification and Renewable Energy Development Project (REREDP)**
Area: **Energy**

Provision of solar home systems in rural households.

Rahimafrooze Renewable Energy played a leading role in the Rural Electrification and Renewable Energy Development Project (REREDP), which is a major program providing photovoltaic solar home systems to rural households in Bangladesh. This has brought the benefits of electric lighting, phone charging and radio to homes. The company, which was formerly Rahimafrooze Batteries, applied its expertise in battery manufacture to the production of batteries specifically for solar-home-systems, as well as designing and manufacturing charge controllers and fluorescent lamps. They received the Ashden Award in 2006, during which they had supplied 25,000 solar home systems for the project.

Sources:
- http://www.ashden.org/winners/rahimafrooz
- http://www.rahimafrooz.com/Default.aspx

Practice 7.

Country: **Czech Republic**
Project Name: **Innovation vouchers**
Involved Organizations: **Regional authority, R&D Institutions, and Regional Councils**
Area: **Finance**

Finance program promoting eco-innovations.

The Czech *Innovation voucher* is a supply side eco-innovation tool that has been designed to support cooperation between industry and university R&D. This is to allow for industry to purchase services from R&D players to allow them to improve innovation potential. Administration is carried out in at three levels: the regional authority, R&D institutions, and regional councils.

The voucher program operates in each region of the Czech Republic. Each region has a budget of around 4m Czech kournal; 3m is financed by the European Regional Development Fund and 1m is financed by the region. Entrepreneurs producing new or innovative products or services can receive 75% of eligible costs for purchasing outside expertise up to a maximum of 149,000 CZK. Interest in this tool has been high, with demand 40% higher than funding has allowed.

Sources:
- http://www.greenovate-europe.eu/sites/default/files/publications/RECOMMEND_Greenovate!%20Europe%20screening%20of%20good%20practices%20(2012)_0.pdf

ASEM Eco-Innovation Index 2013
Conclusion

Conclusion

Eco-innovation can be implemented through different actors via various causes and effects. This project makes a clear call for appropriate institutional framework which is local context specific. Each country has a different level of understanding of eco-innovation and thus, different short, medium and long term approaches should be taken to promote different dimensions of eco-innovation at the national level. Eco-innovation can provide a window of opportunities for both developing and developed countries in a variety of ways. Global partnership and trade between developed (mostly European countries) and developing countries (mostly Asian countries) can bring international enabling environments for eco-innovation to facilitate international exchange of knowledge, proficiency, and experience. Each country has different potentials and opportunities towards demand and supply side of eco-innovative products and services. It is important for each country to develop and seek their own way to play the role within the global market mechanism based on their institutional settings.

Chapter 7 provides the reader insight on how eco-innovation processes occur at the micro (firm) level. Case studies show clear evidence on how firms in particularly SMEs can implement eco-innovation in different ways and evaluate their crucial impact on the country. There is no set answer or benchmark case on how companies should eco-innovate as a way to solve environmental problems today as the nature and scale of the problem varies. Yet, the message is clear that the nature and scale of present day environmental-socio problems call for eco-innovation in businesses of any size and require their active participation.

We project that eco-innovation will become a key word in sustainable growth overtime and as more discussion and evidence of its positive impact become available, eco-innovation will become a much more familiar word to various stakeholders. We also believe that future eco-innovation activities will be more difficult to classify into set typologies such as non-technological or technological, incremental or transformative[98]. Non-technological eco-innovation can be as radical as the technological eco-innovation, and technological eco-innovation can lead to incremental outcome. The impact of technological and non-technological eco-innovation is determined more on the rate of adaptation and diffusion into the society and the scale of this impact may be larger and more global than one could predict today.

The 2nd ASEM Eco-innovation Index (ASEI) provides a step forward from last year's first attempt to offer theoretical basis and an empirical tool for measuring eco-innovation. In the first ASEI report, fifteen countries were examined while simultaneously introducing ASEI with an explanation of the complex concept of eco-innovation. If the first ASEI project was a "learning by doing" phrase, the 2nd ASEI project aimed to provide more valuable insight and significant evidence in the process of measuring twenty five ASEM member countries.

The ASEI still lacks available comparable data for Asian countries in eco-innovation. Being aware of several limitations that ASEI face, efforts had been made to enhance the following: 1) theory and principle behind the measurement framework, 2) appropriate allocation of individual indicators into four criteria of the measuring framework, 3) statistical methodology, and last but not least, 4) analytical qualitative research to support the quantitative results. In comparison to the first ASEI framework, there were some revisions in terms of indicators: change of data source and coverage. Each indicator was also checked against whether it is in the correct categorized criteria.

There are various conceptual and operational challenges in measuring eco-innovation from agreeing on selected key eco-innovation indicators to fully understanding and analyzing the impact and benefits of eco-innovation at different levels (firm, industry and country). The "MEI: Measuring eco-innovation" project report states that "the characteristics of the innovation and the way in which it is used thus change." Multi-dimensional nature and ongoing evolvement of eco-innovation concept will continuously require ASEI to make improvements in its analysis. In addition, ongoing development of concept and data sources in the field of eco-innovation will allow indicators with more reliable data source to be replaced in the near future. There is plenty of room for improvement and feasibility to measure approach through own efforts and as more information becomes available. As most limitations lie on the lack of data availability, there is a need to collect data based on the needed information on eco-innovation measurement.

98) Incremental and transformative eco-innovation

Despite the limitations, the basis behind the continuous work of ASEI is to make it a supportive analytical study that fosters the creation of adequate eco-innovation measures at the national level. As the concept matures and awareness of the concept grows, ASEI will keep track of trends and movements of eco-innovation, in order to offer insightful and pertinent analyses in the field of eco-innovation. This is to ultimately encourage various stakeholders to take action. We hope that ASEI will also be a practical tool that will partially monitor a country's progress towards sustainable development.

A Way Forward

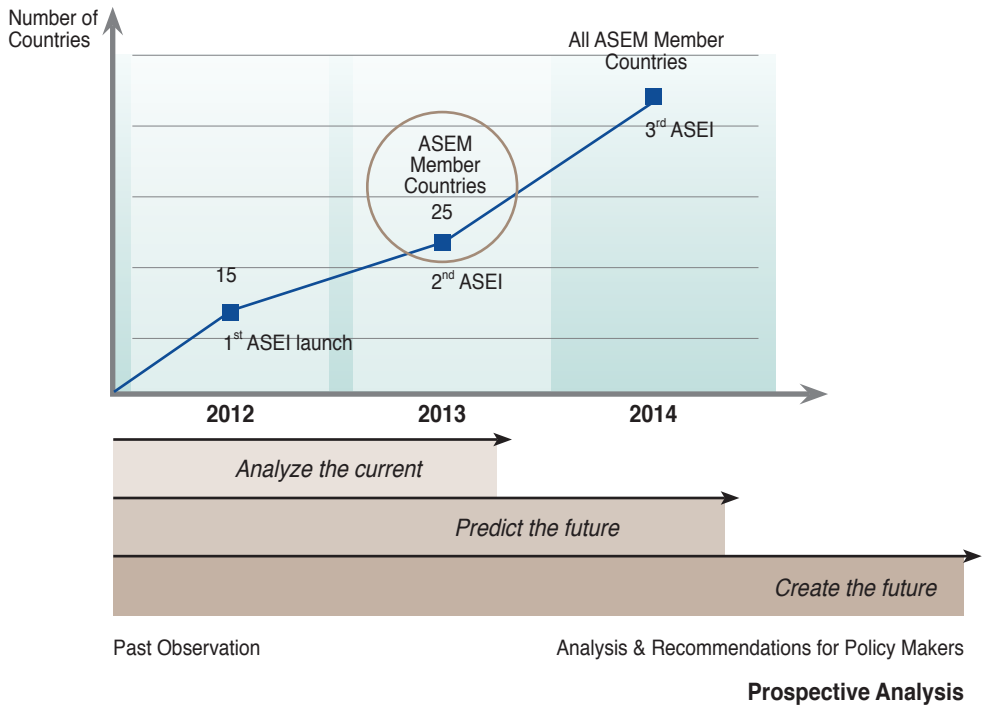

Fig 38. ASEI Development Plan

The 3rd ASEI 2014 will further enhance the creditability of ASEI framework and continuously update indicators, data sources and both statistical and analytical methodology. ASEI will also increase the coverage of countries measured overtime. ASEI study will continuously improve comprehensive understanding of drivers and barriers triggering eco-innovation. We wish to involve various stakeholders for deeper consultation and provide open discussion during the implementation of ASEI project in the future.

We anticipate to constantly offering the most advanced research in the field of eco-innovation. We hope that this report has laid another foundation to this process. As ASEI project develops overtime, we hope the outcome report becomes a key reference in the growing field of eco-innovation, while leaving room for policy makers and other eco-innovation enablers to exploit and utilize for this generation and the next.

ASEM Eco-Innovation Index 2013

APPENDIX

Appendix I: Definitions of Eco-Innovation

Different kinds of definitions of Eco-Innovation

- "New products and processes which provide customer and business value but significantly decrease environmental impacts"
  Fussler, C. & P. James (1996), Driving Eco-Innovation: A Breakthrough Discipline for Innovation and Sustainability, Pitman Publishing: London, 364 p.

- "The production, assimilation or exploitation of a product, production process, service or management or business method that is novel to the organization (developing or adopting it) and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives"
  MEI Project, Final Draft: "Measuring Eco-Innovation", March 2008, 114 p.

- "The creation of novel and competitively priced goods, processes, systems, services, and procedures designed to satisfy human needs and provide a better quality of life for everyone with a whole-life-cycle minimal use of natural resources (materials including energy and surface area) per unit output, and a minimal release of toxic substances".
  Technopolis Group (2008), SYSTEMATIC Eco-Innovation Report

- "Any form of innovative aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment or achieving a more efficient and responsible use of natural resources, including energy."
  Competitiveness and Innovation Framework Programme (2007 to 2013) European Commission

- "Introduction of any new or significantly improved product (good or service), process, organisational change or marketing solution that reduces the use of natural resources (including materials, energy, water and land) and decreases the release of harmful substances across the whole life-cycle."
  Eco-IS(Eco-Innovation Scoreboard) Homepage

- "Eco-innovation refers to all forms of innovation–technological and non-technological – that create business opportunities and benefit the environment by preventing or reducing their impact, or by optimizing the use of resources. Eco-innovation is closely linked to the way we use our natural resources, to how we produce and consume and also to the concepts of eco-efficiency and eco-industries.
  European Commission, Eco Innovation the key to Europe's future competitiveness

- "The creation of new, or significantly improved, products (goods and services), processes, marketing methods, organizational structures and institutional arrangements which-with or without intent-lead to environmental improvements compared to relevant alternatives"
  OECD, 2008

Appendix II: Result Methodology Using Composite Indicator

Composite indicator is agreed to be the most appropriate methodology to explain the differences in national eco-innovation status and capacity. This project used the checklist below for building a composite indicator, which is introduced in Handbook on Constructing Composite Indicators: Methodology and User Guide by OECD & JRC European Commission.

	Steps	Details
1	**Create Theoretical Measurement Framework** Provides a foundation for the selection and combination of indicators	- Understand the trends and multi- dimensional issues of eco- innovation - To compile a list of selection criteria for the underlying indicators - Identify the flow and determinants of eco- innovation
2	**Data Source/Indicator Selection** Selection is made based on analytical soundness, measurability, country coverage, and relevance between indicators	- Check quality of the available data source that can be used as individual indicator - Understand the advantage and limitations for using the selected indicator - Define data characteristics, e.g., availability across country and timeframe, source, criteria type - Check if proxy variables are needed due to scarcity of data - Check relevance between indicators and overall arrangement
3	**Imputation of Missing Data** Provide a complete dataset (e.g. by means of single or multiple imputation)	- Identify groups of indicators or groups of countries that are statistically "similar" and provide an estimate - Estimate missing values or use proxy variables - Measure of the reliability of each imputed value, so as to assess the impact of the imputation on the composite indicator results - Check and solve the presence of outliers in the dataset
4	**Multivariate analysis & Normalization** Study overall structure of the dataset, assess its suitability, and guide subsequent methodological choices (e.g., weighting, aggregation)	- Identify the relationship between individual indicators and framework criteria - Relate the statistically determined structure of the data set to the theoretical framework - Check presence of outliers in the dataset and make scale adjustment if necessary
5	**Weighting & aggregation** Set weighting for each indicators in line with underlying theoretical framework	- Select appropriate weighting and aggregation procedure(s) that respect both the theoretical framework and the data properties - Discuss whether correlation issues and compensability among indicators should be accounted for weighting consideration
6	**Uncertainty & sensitivity analysis** Assess the robustness of the composite indicator in terms of e.g., the mechanism for including or excluding an indicator, the normalization scheme, the imputation of missing data, the choice of weights, aggregation method	- Identify all possible sources of uncertainty in the development of the composite indicator and accompany the composite scores and ranks with uncertainty bounds - Conduct sensitivity analysis of the inference (assumptions) and determine what sources of uncertainty are more influential in the scores and/or ranks
7	**Result Analysis** Determine main drivers for an overall good or bad performance of each indicators	- Profile country performance at the indicator level so as to reveal what is driving the composite indicator results - Check if the composite indicator results are overly dominated by few indicators and explain the relative importance of the sub- components of the composite indicators - Develop data- driven narratives based on the results.
8	**Visualization of results & Interpretation**	- Create a coherent set of presentational tools for the targeted audience. - Select the visualization technique which communicates the most information - Present the composite indicator results in a clear and accurate manner

(Source: OECD)

Appendix III: AHP candidate indicators

(The order of the list does not imply the ranking of importance)

"Eco-Innovation Capacity"

- Companies' Green Innovation Capacity
- Country's Green Technology R&D Researchers
- Research Institutions' Green Technology Research Capacity
- Level of Country's Green Infrastructure
- Level of Government's Understanding of Eco-innovation
- Company Awareness Level on Sustainability Management
- Society's Awareness on Climate Change
- Country's Economic Competitiveness
- Country's Environmental State and Risk
- Country's General Innovation Capacity
- Attitudes towards eco-innovation
- Literature & Media
- Number of environmental graduate, MSc or PhDs
- Country's sustainable development competitiveness index

"Eco-Innovation Supporting Environment"

- Country's Response Effort towards Climate Change
- Government's Green Procurement
- Country's Commitment to International Environmental Agreement
- Country's Target on Environmental Performance
- Innovation friendly environmental policies
- Government's R&D expenditure in Green Industry
- Government's PAC(Pollution Abatement and Control) Expenditure
- Total investment in eco-innovation activity
- Government's Research and development (R&D) expenditures
- Green Tax as a percentage of government budget
- Financial support for eco-innovation from public programmes
- Uptake of environmental subsidies for eco-innovative activity
- Demand for eco-innovative products
- Environmental expenditure in college and university research
- Environmental industry supporting organization
- Implementation and level of new & renewable energy activation policy

"Eco-Innovation Activities"

- Energy Sustainability Level
- Renewable Energy Utilization Level
- Level of Green SCM
- Value of Innovation Investment in Green Technology SMEs (% of turnover)
- Number of eco-innovation projects executed
- Number of Commercialized Green Technology SMEs
- Turnover of Environmentally Friendly Companies
- % of firms with EMAS or ISO14001
- Organizational development (companies): EMS, CSR
- Value of green funds made available by financial institutions for innovating companies
- Seed and start up venture capital for eco-innovative firms
- Investment Maturity of Green Technology Industry
- Number of Green Patents
- Green Funds
- Ratio of eco-start ups to incumbents in the market
- Share of eco-innovative firms as a percentage of all firms
- Number of eco-enterprises
- Frequency of eco-innovation workshops/conferences and number of people attending

"Eco-Innovation Performance"

- Share of employment in Green Technology Industry as a percentage of all employment
- Level of Environmental Impact on Society
- Material Productivity
- Resource Productivity
- Energy Intensity
- CO_2 Emission Intensity
- Water Consumption Intensity
- Changes in resource efficiency and productivity
- Change in the amount of natural resource residual
- Green Industry Market Size
- Export scale of eco-industries
- Profit growth arised from green innovation

Appendix IV: Details & References of the Indicators

Eco-Innovation Capacity Indicators

1.1 Country's Economic Competitiveness

Measuring Factor: "Efficiency Enhancers" sub-index measures factors that enhance countries in the efficiency-driven stage which includes pillars such as "Higher education and training, Goods market efficiency, Labor market efficiency, Financial market development, Technological readiness, Market size".

Source: Global Competitiveness Index, World Economic Forum

Reference Year: 2012-2013

References to Support:

a. "Eco-innovation performance is correlated with GDP and competitiveness. There is a positive correlation between eco-innovation and GDP and eco-innovation and competitiveness."
- EIO (2010), Eco-Innovation Challenge

b. "Efficiency enhancers are the key for efficiency-driven economies. Countries will then move into the efficiency-driven stage of development, when they must begin to develop more efficient production processes and increase product quality because wages have risen and they cannot increase prices. At this point, competitiveness is increasingly driven by higher education and training, efficient goods markets, well-functioning labour markets, developed financial markets, the ability to harness the benefits of existing technologies, and a large domestic or foreign market."
- WEF (2008), Global Competitiveness Report 2008-2009

c. "The general situation of the economy is potential influential variable in this context. A weak economic climate may be a barrier to the uptake of eco-innovations."
- Javier Carrillo Hermosilla et al. (2009), Eco-Innovation when Sustainability and Competitiveness Shakehands

1.2 Country's General Innovation Capacity

Measuring Factor: Factors that facilitate country's level of general innovation capacity including institutions, human capital & research, infrastructure, market sophistication, business sophistication, knowledge and technology outputs and creative outputs.

Reference Year: 2013

Source: Global Innovation Index, INSEAD

References to Support:

a. "Innovation is essential today. It is a critical factor for enhancing economic growth and competitiveness. At the same time, innovation is crucial for social cohesion, equality, and poverty alleviation.
- INSEAD (2012), The Global Innovation Index

b. "Since some of the barriers to eco-innovation are also general barriers to normal innovations, some measures to promote eco-innovation are likely to be similar to those which would promote innovation in general. For example, creating an appropriate environment for innovation is as important for innovations in general as for environmental innovations (eco-innovations)."
- Javier Carrillo Hermosilla et al. (2009), Eco-Innovation when Sustainability and Competitiveness Shakehands

c. "Innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations."
- OECD's Definition of Innovation

1.3 Green Technology R&D Institutions Capacity

Measuring Factor: Number of Green (Clean) Technology R&D Institutions, Centers and University

Reference Year: Latest (- as of Aug 2013)

Source: Cleantech Group

References to Support:

a. "The relationship between research centers and firms may contribute to the development and diffusion of eco-innovations. The technological knowledge of research centers may be very useful for the development of eco-innovations. However it is the joint development of eco-innovations which is likely to be more successful, because firms are in the best position to know their market needs and demand behavior."
- Javier Carrillo Hermosilla et al. (2009), Eco-Innovation when Sustainability and Competitiveness Shakehands

b. "Given the uncertainty about outcomes and need for alignment of various activities, the innovation process is viewed as a search, development and learning process, where knowledge is gathered and used in new ways in the development of process technologies, products or services."
- MEI, Measuring Eco-Innovation by Rene Kemp & Peter Pearson (2009)

1.4 Green Technology possessed/acquired Firms

Measuring Factor: Number of Green (Clean) Technology possessed firms (Include firms in all development stages: concept, product development, shipping product/pilot, wide commercial availability)

Reference Year: Latest (- as of Aug 2013)

Source: Cleantech Group

References to Support:

a. "More important, corporations are viewing cleantech investments as a way to be more competitive not only through operational efficiency but also through generating new revenues and creating new markets as industries change, incumbents are displaced and governments provide cleantech incentives to develop national industries."

- Ernst & Young (2011), Cleantech Matters: Seizing transformational opportunities

b. "Eco-innovation is closely related to the development and use of environmental technologies and also to the concepts of eco-efficiency and eco-industries."
- A.N.Sarkar, (2013) Promoting Eco-Innovations to Leverage Sustainable Development of Eco-Industry and Green Growth, European Journal of Sustainable Development, 2, 1, 171-224

c. "It is clear that technological development and institutional consideration play an important role in the transition of economic system towards sustainability. Technological change is probably a necessary condition for achieving sustainability."
- Javier Carrillo Hermosilla et al. (2009), Eco-Innovation when Sustainability and Competitiveness Shakehands

1.5 Awareness Level of Sustainability Management

Measuring Factor: Number of United Nations Global Compact Participant Firms. The UN Global Compact is the world's largest corporate citizenship and sustainability initiative, which its networks include a number of important business associations representing leading companies from around the world.

Reference Year: Latest (- as of Aug 2013)

Source: United Nations Global Compact

References to Support:

a. CSR can be defined as the overall contribution of business towards achieving sustainable development goals. *-UN (2007)*

b. "The consideration of corporate social responsibility (CSR) in the firm's management and strategies is highlighted in the literature as another important factor for driving eco-innovation (Louche et al., 2010; Carillo-Hermosilla, 2008). Many firms have started engaging CSR as a core aspect of their innovation strategy and, as a result, including social and environmental concerns in their core business models."
- OECD (2012), The Future of Eco-innovation: The Role of Business Models in Green Transformation

c. "The Global Compact provides engagement opportunities for companies to contribute to the mission of the United Nations. Participating companies are encouraged to undertake partnerships with United Nations Agencies, other companies, governments and NGOs in order to help address significant global issues. The Global Compact has adopted a three-pronged model for describing the types of partnerships that companies can undertake They include: Core business partnerships in which companies seek to use their own business operations, Strategic Social Investment/Philanthropy in which companies provide funds or in kind donations to support United Nations projects, Advocacy partnerships in which companies collaborate with the United Nations to develop principles or guidelines in support of broad United Nations goals."
- Javier Carrillo Hermosilla et al. (2009), Eco-Innovation when Sustainability and Competitiveness Shakehands

d. "CSR holds many direct benefits for businesses and society as a whole. In the case of promoting the greening of industries, businesses benefit from reductions in energy and waste bills and lower input costs. Employees also benefit from safer working conditions and increased training and capacity building."
- UNIDO (2010), UNIDO Green Industry: A policy framework for supporting the greening of industries

Appendix

Eco-Innovation Supporting Environment Indicators

2.1 Government's R&D expenditure in Green Industry

Measuring Factor: Public spending in environmentally related RD, % total public spending

Reference Year: 2010-2011

Reference to Support: OECD Green Growth Indicators

a. "Science and technology are central to transforming manufacturing industries towards sustainable patterns of production and economic growth. Enterprises and industries are becoming increasingly aware of the prospects that environmental technologies hold – not just in terms of improved environmental outcomes, but also the potential to reap economic rewards from increased efficiencies and new business opportunities."
- UNIDO (2010), UNIDO Green Industry: A policy framework for supporting the greening of industries

b. "Governmental support has long been central in moving forward next-generation technologies and in promoting radical innovation and systemic changes."
- OECD (2011), Fostering Innovation For Green Growth: The Role of Business Models in Green Transformation

2.2 Implementation of Environmental Regulations

Measuring Factor: Stringency and enforcement of environmental regulation

Reference Year: 2011-2012

Source: Sustainable Competitiveness Index, World Economic Forum

References to Support:

a. "Governmental support has long been central in moving forward next-generation technologies and in promoting radical innovation and systemic changes (Scrase et al., 2009; OECD, 2011b)."

b. "The economic opportunity for eco-innovative solutions and practices can only be unleashed with a sufficient level of regulatory certainty."
- OECD (2012), The Future of Eco-innovation: The Role of Business Models in Green Transformation

c. "Public policy has traditionally been signaled as the major driver and barrier for eco-innovation. This has signaled as the major driver and barrier for eco-innovation. This has often been related to environmental policy, albeit innovation policy might also provide a significant stimulus. Eco-innovative behavior (of companies) is generally and usually related to the level of ambition of environmental policy."
- Javier Carrillo Hermosilla et al. (2009), Eco-Innovation when Sustainability and Competitiveness Shakehands

2.3 Maturity of Investment Setting for Green Technology Industry

Measuring Factor: Value of Investment towards Green Technology Firms

Reference Year: Latest (- as of Aug 2013)

Source: Cleantech Group

References to Support:

a. "The innovativeness of a particular sector depends on factors such as the maturity of the sector, the maturity of the dominant technology scale, capital intensity, R&D intensity of the industry and competitiveness."

b. "Initially high capital investments in the new technology act as a powerful deterrent for eco-innovation, especially for SMEs."
- Javier Carrillo Hermosilla et al. (2009), Eco-Innovation when Sustainability and Competitiveness Shakehands

2.4 Investment Scale towards Green Technology SMEs

Measuring Factor: Number of venture capitals & deals made towards green technology SMEs

Reference Year: Latest (- as of Aug 2013)

Source: Cleantech Group

References to Support:

a. "Entrepreneurial activity often involves high commercial and financial risks that cannot always be addressed by market mechanisms alone. Access to finance is often cited as the main constraint for firms to innovate and public policy has long aimed at easing firms' access to finance. Venture capital funds form one of the major ways to share risks of companies through various means like loans, equity injection or taking part in management. Another common form of equity support to business is guarantee funds, which guarantee loans directly or indirectly to companies."
- OECD (2010), Analyzing national policies and business best practices on eco-innovation

b. "Access to finance is a crucial variable to invest in eco-innovation practices, either for those developed in house or for those purchased from equipment suppliers but especially for highly capital intensive eco-innovations. The EU Environmental Technology Action Plan (ETAP) states that difficult access to finance in the form of a lack of adequate venture capital, in particular for SMEs and start-ups, represents on of the most relevant barriers to the rapid market development of environmental technologies... Insufficient availability of the venture capital required to move from the drawing board to the production line is particularly problematic for SMEs to engage in eco-innovation."

c. "In order to promote eco-innovation in SMEs instruments which increase their technological competency should be used."
- Javier Carrillo Hermosilla et al. (2009), Eco-Innovation when Sustainability and Competitiveness Shakehands

Appendix

Eco-Innovation Activities Indicators

3.1 Commercialization Level of Green Technology Firms

Measuring Factor: Number of companies with green technology widely commercialized

Reference Year: Latest (- as of Aug 2013)

Source: Cleantech Group

References to Support:

a. "Diffusion may be tracked for environmental technology as a whole or for specific subsets. It thus allows for diffusion analysis at a highly aggregated level. It does not measure diffusion directly but only indirectly."
- René Kemp & Peter Pearson (2007), Final report MEI project about measuring eco-innovation

3.2 Firms' Participation on Environmental Management System

Measuring Factor: Number of firms with ISO14001 certification (per billion GDP in PPP$)

Reference Year: 2008-2010

Source: ISO14001

References to Support:

a. "An increase in EMS and ISO certified firms might signal that firms understand environmental issues as integrated aspects in their businesses, and that eco-innovations can enhance their competitiveness. Environmental management tools and general organizational changes and improvements are relevant triggers for eco-innovation."
- Technopolis Group (2008), Eco-Innovation Final Report for Sectoral Innovation Watch

b. "A number of empirical studies from the innovation literature have found that implementation of EMS has a positive impact upon eco-innovation (Horbach, 2008; Wagner, 2007)."
- Effie Kesidou & Pelin Demirel (2010), Imperial College London Business School, On the Drivers of Eco-Innovations: Empirical Evidence from the UK

c. "Environmental Management Systems (EMS) which can be regarded as an environmental policy instrument or an (organizational) eco-innovation in its own right, and involve a set of internal practices which allow firms to be more aware and control the potential environmental impacts of their production activities. EMS allows the identification of cost-savings, positively affecting environmental innovations. In addition, adopting an EMS could improve the environmental visibility of the firm which, in turn, could positively influence the adoption of eco-innovations... the established EMS may lead to excessive focus on incremental improvements rather than radically different eco-innovations."
- Javier Carrillo Hermosilla et al. (2009), Eco-Innovation when Sustainability and Competitiveness Shakehands

3.3 Economic Influence of Leading Environmentally Responsive Firms

Measuring Factor: Revenue of firms included in Newsweek Green Ranking. The Newsweek Green Rankings cut through the green chatter and compare the actual environmental footprints, management (policies, programs, initiatives, controversies), and reporting practices of big companies. This score is derived from three component scores: an Environmental Impact Score, an Environmental Management Score, and an Environmental Disclosure Score

Reference Year: 2012

Source: Trucost

References to Support:

a. "In particular, Horbach (2008) shows that demand, namely expectations of increases in the turnover of the firm, is an important determinant of eco-innovations in the case of German manufacturing firms."
- Effie Kesidou & Pelin Demirel, Imperial College London Business School (2010), On the Drivers of Eco-innovations: Empirical evidence from the UK

3.4 Green Patents

Measuring Factor: Environmental technology patent (Patent grants by technology) / Total patent grants (direct and PCT national phase entries)

Reference Year: 2005 - 2011

Source: World Intellectual Property Organization

References to Support:

a. "Relatively limited evidence is currently available on patterns of green innovation. The available indicators of green patenting, an indicator of the rate of invention, show that renewable energy and air pollution control are the most dynamic groups of environmental technologies among patent applications filed under the Patent Cooperation Treaty."
- OECD (2011), Towards green growth monitoring progress

b. "Patents are useful indicators for what, how much, and where commercially useful technological innovation takes place. While they do not provide insight into their potential economic value, they do indicate the orientation and application of technical innovations. Together with R&D expenditures, patents have emerged as an important indicator in measuring innovation."
- Javier Carrillo Hermosilla et al. (2009), Eco-Innovation when Sustainability and Competitiveness Shakehands

c. "Eco-innovation activities may also be analyzed through patent analysis... Patent data are available from many different countries and so can be used to track patterns of diffusion".
- René Kemp & Peter Pearson (2007), Final report MEI project about measuring eco-innovation

3.5 Activeness of Renewable Energy Utilization

Measuring Factor: Measures the contribution of renewable to total primary energy supply (TPES): Renewables include the primary energy equivalent of hydro (excluding pumped storage), geothermal, solar, wind, tide and wave. It also includes energy derived from solid biofuels, biogasoline, biodiesels, other liquid biofuels, biogases, and the renewable fraction of municipal waste.

Reference Year: 2011

Source: International Energy Agency

References to Support:

a. "The use of renewable energy sources, and of low-carbon and clean fuel technologies plays an important role in addressing climate change, as well as other challenges such as energy security".
- OECD (2011), Towards green growth monitoring progress

Eco-Innovation Performance Indicators

4.1 Level of Environmental Impact on Society

Measuring Factor: Measures Environmental Health includes Air pollution (effects on human health): Indoor air pollution / Particulate matter, Water (effects on human health): Access to drinking water/ Access to sanitation and Environmental burden of disease(child mortality)

Reference Year: 2011

Source: Environmental Performance Index

References to Support:

a. "...base the definition of eco-innovation on environmental performance instead of on environmental aim because it is not the aim that is of interest but whether there are positive environmental effects related to its use"

b. "Innovation occurs within a wider context that shapes innovation processes, innovation output and economic and environmental outcomes".
- René Kemp & Peter Pearson (2007), Final report MEI project about measuring eco-innovation

4.2 CO_2 Emission Intensity

Measuring Factor: CO_2 emissions / GDP using exchange rates

Reference Year: 2010

Source: International Energy Agency

References to Support:

a. "Progress towards green growth can be assessed against the emission productivity of production and consumption and the level of decoupling achieved between CO_2 and other GHG emissions and economic growth."
- OECD (2011), Towards green growth monitoring progress

4.3 Country's Energy Sustainability Level

Measuring Factor: The Energy Sustainability Index ranks their likely ability to provide sustainable energy policies through the 3 dimensions of the energy trilemma: Energy security, social equity and environmental impact mitigation

Reference Year: 2012

Source: Energy Sustainability Index, World Energy Council

Appendix

References to Support:

a. "Energy is a major component of the economy, both as a sector in itself and as a factor input to all other economic activities. The structure of a country's energy supply and the intensity of its energy use, along with changes over time, are key determinants of the environmental performance and the sustainability of economic development, and hence of green growth."

b. "Variations in energy productivity and intensity among OCED countries are wide and depend on national economic structure, geography, energy policies and prices and countries' endowment in different types of energy sources.
- OECD (2011), Towards Green Growth - Monitoring Progress

4.4 Water Consumption Intensity

Measuring Factor: Water withdrawal for each 1000 US$ of GDP in cubic meters

Reference Year: 2008

Source: IMD World Competitiveness Yearbook

References to Support:

a. "Most importantly from the viewpoint of eco-innovation the basket of indicators must explicitly cover a spectrum from incremental eco-efficiency improvements within the current prevailing sociotechnical regimes through a radical transformative innovations with the potential to enable transitions to new sociotechnical regimes".
- René Kemp & Peter Pearson (2007), Final report MEI project about measuring eco-innovation

b. "Water quality, closely linked to water quantity, is of economic, environmental and social importance. It has many aspects and can be defined in terms of a water body's suitability for various uses such as public water supply, swimming or protection of aquatic life. If pressure from human activities becomes so intense that water quality is impaired to the point that drinking water requires ever more advanced and costly treatment or that aquatic plant and animal species in rivers and lakes are greatly reduced, then the sustainability of water resource use is in question".
- OECD (2011), Towards Green Growth: Monitoring Progress

4.5 Jobs in Green Technology Industry

Measuring Factor: # of Employees

Reference Year: Latest (- as of Aug 2013)

Source: Cleantech Group

References to Support:

a. "There are strong links between the economy and the environment. This can for example be seen from the fact that the eco-industry has become one of the biggest industrial sectors in Europe. The eco-industry not only leads to a cleaner environment, but also contributes to economic growth and employment."

- ECORYS (2008), Environment and labour force skills

b. "The global market for green goods and services is vast and growing gast, offering countries the dual benefit of prosperity and job creation"
- A.N.Sarkar, (2013) Promoting Eco-Innovations to Leverage Sustainable Development of Eco-Industry and Green Growth, European Journal of Sustainable Development, 2, 1, 171-224

4.6 Green Industry Market Size

Measuring Factor: BIS (then BERR) commissioned Innovas/K-matrix to undertake a market assessment of the size of the UK low carbon and environmental goods and services (LCEGS) sector in 2008. The sector has been defined using 24 sub sectors (Level 2 markets). These are sub- divided into three broad categories- Environmental, Renewable Energy and Low Carbon- the addition of each broadly mapping the evolution of the current LCEGS sector definition from its Environmental roots

Reference Year: 2011

Source: UK Department for Business Innovation & Skills

References to Support:

a. "As demand for environmental services, equipment and technologies has been increasing, mainly pushed by regulatory demands in developed countries, the environmental industry has become a dynamic growth pole in OECD countries. Sustainable lifestyles and consumption patterns are key agenda items addressed by United Nations agencies such as WHO, UNEP, UNDP, the World Food Programme, ITU and UN-HABITAT insofar as they are closely related both to trends in health and quality of life as well as to human and sustainable development overall."
- UN (2011), Working towards a Balanced and Inclusive Green Economy: A United Nations System-wide Perspective

b. "The competitiveness of eco-innovations may be measured on the basis of exports data, sales data, and the world market shares of those eco-innovations that are sold as goods or services. Here the market performance is used as a measure".
- René Kemp & Peter Pearson (2007), Final report MEI project about measuring eco-innovation

c. "While the clean tech concept also has a market orientation and is a concept very close to the eco-innovation concept, the eco-innovation concept has the advantage that it encompasses the entire innovation process from idea generation to value creation on the market. This also means that the concept can be linked to the wider "sustainable consumption and production" concept (SCP), though the two concept areas have been little linked so gar".
- A.N.Sarkar, (2013) Promoting Eco-Innovations to Leverage Sustainable Development of Eco-industry and Green Growth

Appendix V

List of Eco-innovation business case in chapter 7

Country	Company Name
Australia	Renewable Recyclers
	The 'Re-Define' Sofa & Armchair
Bangladesh	Grameen Danone Food Ltd.
Czech Republic	Manufacturers of CNG Bus includes Tedom s.r.o., SOR Libchavy spol. S r.o., Iveco Czech Republic, a. s., and Ekobus a.s
Cambodia	SME Renewable Energy Ltd. (RE) & E+Co
Finland	Endomines
India	Kent RO Systems Ltd
	Hanjer Biotech Energies
Japan	Gas Companies & Appliance Manufacturers in Tokyo and Osaka
Korea	Alphascan
Netherlands	Kyoto Cooling
United Kingdom	Carbon8

List of Eco-innovation initiatives mentioned in chapter 7

Country/Region	Organization Name/Project Name
Poland	Polish Sustainable Energy Financing Facility (PolSEFF)
India	India Institute of Technology (IIT)
Europe	Ecobim
Australia	The Bondi Stromwater Project
Bangladesh	Shidhulai Swanirvar Sangstha
Bangladesh	Rahimafrooz Renewable Energy
Czech Republic	Innovation vouchers

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ASEAN - Association of Southeast Asian Nations www.aseansec.org

EEA - European Environment Agency www.eea.europa.eu

EIO - Eco-innovation Observatory www.eco-innovation.eu

EPO - European Patent Office www.epo.org

European commission ec.europa.eu

ICTSD - International Centre for Trade and Sustainable Development ictsd.org

IEA - International Energy Agency www.iea.org

ILO - International Labor Organization www.ilo.org

IMF - International Monetary Fund www.imf.org

IPCC - Intergovernmental Panel on Climate Change www.ipcc.ch

OECD - Organization for Economic Co-operation and Development www.oecd.org

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SERI- Sustainable Europe Research Institute seri.at

UN - United Nations unstats.un.org

UN ESCAP - Economic and Social Commission for Asia and the Pacific www.unescap.org

UNEP -United Nations Environment Programme www.unep.org

WBCSD - World Business Council for Sustainable Development www.wbcsd.org

World Bank www.worldbank.org

WEF - World Economic Forum www.weforum.org

World Energy Council www.worldenergy.org

WWF - World Wide Fund for Nature wwf.panda.org

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