

## THE WORLD'S LEADING **ECO INNOVATION** MARKETPLACE



### Pre-Launch - August 2014

#### A Call for Eco Innovators and Experts

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#### Smarter ECO Marketing

The ECE's [Multi Media Marketing System \(MMMS\)](#) links those seeking to learn, those seeking to sell, to those seeking to buy, those seeking to invest, and those seeking to donate.

#### Participants

Participants represent over two million executive-level decision makers (as of August 2014) from industry, authorities, institutions and researchers. Targeted audience includes private and public enterprises and organisations, and individuals.

#### Results

The ECE enables and accelerates transfer of Eco Innovation, makes introductions between motivated sellers, buyers, investors, and donors, and removes barriers to motivated customers and qualified funding sources.

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[USA: Climate Resilience Partnership](#)

The ECE aims to remove barriers to market entry for business; expand opportunities for all size enterprises and organisations; facilitate the Collaborative Learning and Development needs of business and professionals; link complementary assets that are needed to fulfil client requirements concerning, technology, financial capacity, know-how, consultancy and system integration; and strengthen the Eco Innovation brand, through a common marketing and branding approach. The ECE is managed by [Chamber of Eco Commerce \(ECE\)](#), Atlanta, Georgia.

## Eco Innovation in the European Context

The environmental images of the EU countries are among the strongest in the world and the EU rank on various index lists on the top. Their high ESI scores are attributed to substantial natural resource endowments, low population density, and successful management of environment and development issues. On the [2014 Environmental Performance Index \(EPI\)](#) the EU countries rank at the top. The EPI provides benchmarks for current national pollution control and natural resource management results. The issue-by-issue and aggregate rankings facilitate cross-country comparisons both globally and within relevant peer groups. Many of the EU companies are dealing with the same challenges concerning entering a market or closing a deal with customers or investors. These challenges include: Competing and winning contracts in international projects where individual companies and countries are too small for large projects; Having references and showing essential capacity and cash flow for large projects; Having a fragmented approach to markets - individual countries network are too small; Financial capacity to assist the clients in implementing new technology.

## Eco Innovation in the USA Context

As one of world's largest economy the USA might have a unique opportunity to invest in Eco Innovation. In that light it may not be surprising that in 2008 USA recorded almost 20 % of all patents in this area. In 2003 the Congress directed the Environmental Protection Agency to develop a onestop shop office (Office of Research and Development - ORD) to coordinate similar programmes which foster private and public sector development of new, cost-effective environmental technologies. Other programmes of relevance for Eco Innovation will be managed within other departments such as the Department of Agriculture and the Department of Energy. It must also be assumed that a lot of activities will be conducted at the level of each state – some of them by themselves representing major economic powers.

New, more business-oriented programmes have emerged. One of these is the ARPA which combines new high yield/high-risk concepts with strict rules and obligations for innovative ideas to prove valid. Programs within the EPA and ORD cover the whole continuum from research through development to diffusion. The programmes may be divided into three types: Programs that offer financial support; programs that offer test and verification of commercial-ready technologies; in-kind support working with private companies or other government laboratories. A program typically covers several activities within the R & D continuum and almost all include information, diffusion and in that sense market uptake aspects.

The EPA is part of a special funding programme (SBIR) addressing technology development etc. in Small and Medium Sized Enterprises (SMEs) and has a special funding programme (STAR) providing grants to Universities and nonprofits. Both cover a wider range of environmental concerns (water, air, hazardous waste etc.). Some programmes address specific environmental challenges or concerns such as waste, water, air pollution or chemicals. These can be both informational or with some technology development or research. Some programmes are designed to foster cooperation at the state level and some programmes are designed as partnerships between public and private actors. Other programmes may be generally informational, or provide encouragement for voluntary actions to use innovative technologies for environmental improvements.

## Eco Innovation in International Context

Many countries worldwide apply a broad range of programs and activities that on the one hand fund and foster R&D in Eco Innovation related areas and on the other promote the commercialization and dissemination of Eco Innovation. The explicit concept of “Eco Innovation” is applied differently in the countries: Japan, for example, has adopted the concept and term in its strategy documents and defines it as a broad concept that includes techno-social innovations in industry, infrastructures and the areas of consumers and lifestyles. In other countries, the programmes, activities and strategy documents rather refer to “environmental technologies” or “cleantech” (US).

In particular Japan and USA are major players in the field of Eco Innovation. Due to Korea's high investments in this area, it is catching up fast. With regard to innovation potential in the area of clean tech start-ups, USA and South Korea rank rather high compared with other countries. China and India have a strong potential for growth in this area, as policy to promote Eco Innovation and green growth becomes more and more important. While Japan is a major player, the innovation potential for clean-tech start-ups ranks not very high compared to other countries, as it seems to lack capacity to commercialize new technology through innovative entrepreneurial start-ups. This could be connected to a rather rigid, formal and risk-averse cultural environment.

Independent of the wording, strategies on growth, innovation, and R&D – as well as stimulus packages in reaction to the economic crisis – stress the importance of R&D for innovation in the environmental area to address both ecologic and economic challenges, particularly in the US, Korea and Japan, but also in China. These strategies therefore foresee an increase of the share of Gross Expenditure on Research & Development (GERD) for environmental issues to foster green innovation. Korea is a particularly striking example with 80% of its Stimulus package reserved for green growth. China has recently adopted ambitious environmental objectives in its 12th Five-Year-Plan that expresses the goal of moving from a resource intensive and low value-added economic model towards knowledge based and high value-added green growth.

R&D funding programs with relevance for Eco Innovation:

The percentage of Government budget for R&D in environmental issues is particularly high in Korea (around 4 %), while in US and Japan it is around 1% (for India and China, no data was available). In general, most R&D funding programs of relevance for Eco Innovation in the investigated countries do not explicitly focus on Eco Innovation per se. Instead, some R&D programs listed in this report fund environmental research and environmental technology development without a specific focus on transfer of results and implementation, while other programs and activities put their focus on promoting implementation and commercialization of results without a specific environmental focus. However, there are also programs that combine both.

In the US, there are multiple actors involved in fostering Eco Innovation, like government agencies, industries, academia, non-profit organizations, and states. A strong focus of public programs for Eco Innovation is on dissemination and commercialization. The strategy of the US Environmental Protection Agency (EPA) is to anchor innovation in the environmental programs and to use the limited resources of the EPA as leverage by supporting collaboration with other actors. A number of EPA programs focus not only on the funding of research and development, but also on demonstration, verification, diffusion and utilization/commercialization activities. EPA has been designed as a one-stop-shop to coordinate all programs in the context of Eco Innovation. Support is provided in the form of research grants, but also of EPA in-kind services (provision of information, use of facilities).

One of these programs is the US Small Business and Innovation Research Programme (SBIR) that funds demonstration and commercialization activities of SMEs. The program includes a specific EPA-funded program line for environmental protection. The successful approach of the SBIR program, which was established in the 1980s, has served as a model for similar programs in other countries, e.g. the KOSBIR program of Korea, but also in Japan and a number of European countries. India has launched an SBIR Initiative for the biotechnology sector. The SBIR programme has been identified as a “Good Practice Example”. The US “Advanced Research Projects Agency – Energy (ARPA-E)” programme can be named as a good practice example for a program that promotes high-risk transformative innovations. ARPA-E

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funds projects at the intersection of fundamental and applied clean energy research and aims to overcome long-term and high-risk technological barriers. The program's design foresees to sustain for long periods of time those projects whose promise remains real, while phasing out programs that do not prove to be as promising as anticipated.

Public support to R&D is a major instrument to promote Eco Innovation in Japan. This is illustrated by the exceptionally high Gross Expenditure on R&D (GERD) and the fact that environmental issues form a priority area within the R&D strategy. Japanese public R&D programs put a major focus on fostering cooperation between academia and industry to contribute to economic development and competitiveness. A main Japanese R&D program with regard to Eco Innovation is the "Environment Research and Technology Development Fund (ERDF) that contains a strong orientation towards research that contributes to formulation of policies.

In Korea, recent strategic documents on green growth and on R&D strategy have given priority to the area of environmental research and Eco Innovation. However, the linkages between business, university and government research institutes are still weak in Korea and should be improved to support innovation. A specific approach to generate Eco Innovations by R&D projects that bring together a critical mass of academia and industry and cover technology development as well as commercialization was the program "Eco-Technopia 21 Project". While it did not reach all its goals, it was successful in increasing the level of technologies in all environmental sectors and in providing business opportunities. The need to strengthen basic research to promote innovation is an issue for both Korea and Japan.

China has seen a big increase in R&D expenditure in recent years. The highly centralized Chinese research system funds R&D projects through a number of different programmes, many of them directed towards international cooperation. The programs are characterized by Chinese long-term plans and usually address several science and technology areas. When it comes to the development of Eco Innovation, particularly the "863 R&D program", which targets cutting edge technologies, and the "National Key Technologies R&D Program", which has a specific focus on industry needs, should be mentioned. Both programs cover different areas, among them environmental protection, rational utilization of resources and sustainable agriculture. In terms of business participation in public funded R&D, large companies are rather addressed than SMEs. But the ASTSC program, introduced in 2009, aims at strengthening SME research. It encourages researchers to join the research and design work of SMEs. With regard to innovation, China's strategy is to evolve into a more innovation-driven society in the coming years. Though innovation linkages are still weak, China has made considerable progress in this area. It can be said that the academic sector in China has strongly picked up the need for Eco Innovations but transfer to application must be strengthened.

India has seen a massive budgetary increase in general R&D funding and a general trend toward fostering innovation. However, it has to be stressed that the overall level of R&D expenditure is still extremely low in India in comparison with the other investigated countries. The term and concept "Eco Innovation" is not that common in India yet; instead the term "environmental and bio-technology" is used in science and economy. Therefore the funding programs mainly reflect topics of natural and environmental sciences related innovations. In the area of biotechnology, there is the specific program "SBIRI" to support pre-proof-of-concept research as well as late stage development for SMEs. A particular program that is described in the annex as a "Good Practice Example" is the Research, Development and Demonstration Program of the Ministry of New and Renewable Energy. This programme provides good and successful examples for the specific context of Indian rural areas - new technologies that are easy to handle and accepted by rural people. While India has still weak general innovation inputs and no strong entrepreneurial culture, it provides an attractive infrastructure for renewables and there is a large amount of investment raised in clean tech funds with focus on India.

Concerning priority research fields, it is noteworthy that the US and Japan are very strong supporters for public funding of R&D in energy. Both hold very high patent applications in climate change mitigation technologies. The role of ICT for efficiency improvements in resource use is another priority in Japan. In India, high thematic priorities with relevance for Eco Innovation are in the areas of biotechnology, water, food, agriculture, and renewable energy – environmental research is also a priority. Korea's priority fields as defined in the strategy documents are energy sources and efficiency, climate change, and water and waste management. In China the fields of photovoltaic and hydropower, buildings and energy efficiency,



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agriculture, and water resources should be mentioned. China and India are also heavily involved in waste management.

### Other activities to foster Eco Innovation

Many countries apply a number of different market-based policy instruments for the promotion of Eco Innovation like tax incentives, emission trading schemes, green public procurement or environmental verification (ETV) and eco-labeling. It can be emphasized that these main instruments of environmental policy and particularly policy to stimulate Eco Innovation are almost universally used. Application of different policy instruments to foster Eco Innovation include: Environmental; Taxes; Regulation; Targets; Green; Public Procurement; ETV Program; Emission; Trading Scheme; Venture Investment support.

Many countries apply Emission Trading Schemes (ETS). In the US, these are established on state level – a number of states share a mandatory ETS. In Korea and Japan voluntary ETS exist – plans to implement an ambitious mandatory ETS in Japan have been postponed due to the economic crisis. India and China both have announced to introduce pilot ETS on regional level.

Environmental technology verification programs are in place in the US (since the mid 1990s), Japan (J-ETV, since 2003) and Korea. India and China both expressed interest in developing ETV programs in the near future. In the US, which was among the ETV pioneers, a number of programs which support the development and diffusion of environmental technologies also include verification activities. The introduction of different voluntary or mandatory eco-labels to inform users and promote specific environmental-friendly products is common in all investigated countries.

While most countries established laws on Green Public Procurement (Japan, Korea, some US states, China), there are also non-mandatory initiatives (e.g. the activities of the Green Purchasing Network in India). The Indian government just introduced a green public procurement initiative in Nov. 2011.

In many countries Eco Innovations are promoted through tax incentives for investments in energy efficiency technology (e.g. US, Korea), fuel efficient, hybrid or electrical vehicles (Japan, US) or renewable energy (e.g. US but also China). One of the elements of Korea's Green Growth Strategy is to "green" the tax system. The contribution of environmental taxes to revenues is also particularly high in Korea. Among the applied instruments to mobilize financing for Eco Innovation are tax incentives for R&D in general (US, China, Japan, India) and the provision of funds for specific loans. These instruments are often targeted to increase private R&D investment in general and are not specifically focused on Eco Innovation. In the US there is a specific focus on supporting R&D in SMEs with loans. There are also activities that aim at the further promotion of US venture capital investment in Eco Innovations. Korea is an example where a specific environmental venture fund exists, established by the Ministry of Environment to support venture companies. Further activities include funds for promoting industry-academia networks and clusters (e.g. Japan) and funds for supporting the establishment of Eco-Towns (Japan, China). In India, the Innovation foundation provides institutional support for green innovations on grassroots level.

*In the US, a large number of environmental regulations and performance targets on federal and state level support Eco Innovation. The same can be said for Japan and Korea. Initiatives to foster voluntary over-performance are in place in the US and in Japan. In the US, the Californian Zero Emission Vehicle Program (ZEV) presents a promising and ambitious new approach to reduce vehicle emissions by combining the control of vehicle emissions in a single coordinated package of standards with other measures to increase the number of hybrid and zero-emission vehicles. In Japan the Top Runner program is a specific highlight that defines dynamic targets by setting the most energy-efficient products as a benchmark. The Top Runner Program is described as a "Good Practice Example" in more detail in the Annex. The OECD Environmental Performance Review of China (2007) states that although China has a set of modern and comprehensive environmental laws their implementation lacks effectiveness and efficiency. India faces similar problems.*

International initiatives range from industry roundtables with a focus on Eco Innovation, collaboration on intellectual property rights (Japan), R&D cooperation, strategic cooperation, Clean Development Mechanism projects under the Kyoto frame to specific initiatives to actively promote a country's Eco

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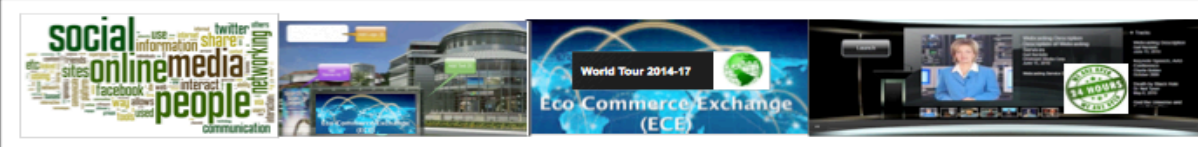
Innovation abroad. It can be observed that the Asian-Pacific space as a frame for cooperation is very important to all the investigated countries. The US is involved in a number of international initiatives that aim at promoting Eco Innovation in different areas (e.g. cleaner energy technologies, energy efficiency, carbon sequestration) and exporting US products. China received strong support from the international community, particularly the US, in the area of renewable energy.

The investigated countries feature a number of initiatives to raise demand for environmentally friendly products such as awards (e.g. for outstanding companies in the area of eco-efficiency in Japan), eco-labels, and education or awareness raising campaigns.

### **Recommendations**

- In terms of research collaboration, US, Japan and Korea are particular interesting partners in the area of climate change mitigation technologies, energy and resource efficiency.
- In addition, Japan is a particularly interesting partner for research in alternative fuel vehicle technologies.
- India is an interesting research partner particularly in the area of biotechnology, water, renewable energy and agriculture
- China is an interesting research partner particularly in buildings and energy efficiency, agriculture, and water resources
- Programs that address different stages of the R&D process and include promotion of verification, utilization, commercialization and dissemination can be found in the portfolio of the US Environmental Protection Agency and could serve as examples for designing such cross-cutting programs.
- The US venture capital market for eco-innovation can serve as a model for an active venture capital community.
- The US SBIR program is a successful good practice example for fostering R&D and innovation in small companies. When adapting the program, the experiences made by numerous other countries, where it already was adapted, should be taken into account.
- The US APRA-E program stands out as a unique good practice example for a program that promotes high-risk transformative innovations. It should be considered when designing a program along these lines.
- The Japanese Top-Runner program has proven to be a successful strategy to promote Eco Innovation and serves as a good practice example. Initiatives to implement similar programs in Europe should profit from these experiences.
- The Californian Zero Emission Vehicle Program (ZEV) presents a promising and ambitious new approach to reduce vehicle emissions. It should be considered when designing a program along these lines.

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## Technology Showcase

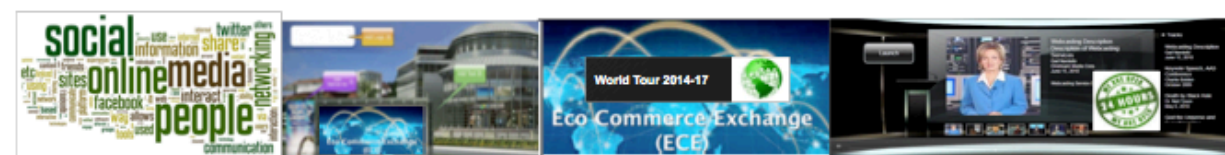
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