DENMARK



Fig. 9 Result analysis of Denmark

Country Result & Analysis

With an overall score of 68/100, Denmark ranks high in ASEI. Denmark's high score on "eco-innovation capacity" is backed with high "general innovation capacity" level, strong country's overall "economic competitiveness", high awareness "level on sustainability management" and a relatively large amount of investment capital flow in green technology industry. In regards to "eco-innovation activities", the country scores high in "number of green patents", "number of commercialized green technology related SMEs" and "number of green technology SMEs at early stage". It is significant to note that the number of green patent in Denmark is three times the average of the EU based on the findings of ASEI. With 1,100 Danish cleantech companies, 60,000 employees and a 12 billion Euro export value³⁸, Denmark is strong in the green technology sector. In the area of "eco-innovation supporting environment", the country scores high in the "level of systematic environmental laws" and "country's commitment to international environmental agreements". Yet, the country scores low in the "level of investment maturity of green technology industry" and "government's R&D expenditure in green industry". As an early starter of eco-innovation, there is significant evidence of high performance in "eco-innovation performance" with the support of high score in "water consumption intensity", "CO2 emission intensity" and "level of environmental impact on society". Overall, Denmark ranks well above the average in ASEI.

Denmark's Key Eco-Innovation Environment

In 2012, the Danish Minister for the Environment has announced the focus areas for its activities to promote environmentally sustainable future: water and climate mitigation, resources and waste, air pollution and noise, chemicals and industrial enterprises. With this announcement, a new program called the Environmental Technology Development and Demonstration Program was launched. This recent program aims to support Danish enterprises to develop green technology solutions and products. Denmark is imposing an integrated push to shape the necessary enabling conditions for eco-innovation activities to emerge.

³⁸ http://um.dk/en/tradecouncil/investindk/

Development of Technologies to Overcome National Environmental Challenge

Denmark is one of the water-scarce countries with highest water price, yet the country managed to position itself as a leader of water management technology solutions. Denmark demonstrates the top class technical knowhow in water supply, transportation and treatment. Denmark is amongst the largest global investee in R&D in water sector in proportion to the market size. Around 13 percent of Danish companies in water management sector allocate more than 25 percent of their market revenue in R&D activities.³⁹ A good amount of public spending has also gone to developing water management technology solutions: 8.6 million Euros in 2010 and 9.5 million Euros in 2011, through schemes such as Grant Scheme for Environmental Technologies, Foundation for the Development of Technology in the Danish Water Sector, Danish National Advanced Technology Foundation, and Business Innovation Fund.⁴⁰

Biomass is another strong technology sector in Denmark. Denmark produces a large amount of agricultural waste from approximately 60 percent of its land use for agricultural purposes, and the country saw this as an opportunity to advance its biomass technologies. Since 1993, the Danish government stimulated the growth of biomass technologies and the use of biomass through investment and the "Biomass Agreement". As a result, biomass in Denmark accounts for approximately 70 percent of renewable energy consumption. This consumption of biomass for energy production has more than quadrupled between 1980 and 2005. Continuous promotion of biomass technologies and biomass-based products, biomass has become one of the most advanced energy solutions in Denmark. Denmark is successfully addressing climate change and other environmental challenges faced by the country through the development of technologies that provide environmental solutions.

Importance of Partnerships & Collaboration in Eco-innovation Implementation

In 2006, Denmark announced its first roadmap for promoting green technology, "Danish Solutions to Global Environmental Challenges", which emphasizes the promotion of nine specific areas including innovation, research, climate and energy technology and a clean and unspoiled aquatic environment. In 2010, the renewed version of this plan was established with the name of "Environmental technology– for improvement of the environment and growth". In this new plan, the government emphasizes the importance of partnership and collaboration in stimulating growth through green technology. The government states that partnership is needed in the area of water, industrial biotechnology, mega wind turbines, biofuels, hydrogen/fuel calls, cleaner shipping, technology transfer, groundwater co-operation with China, ballast water, shredder waste and managing on-site rainwater. The Danish government is putting further effort to establish partnerships to implement bilateral co-operation agreements that would allow development and testing of pilot projects abroad in the field of the environment, climate and energy. Better partnership will provide better enabling infrastructure for Danish actors to perform eco-innovation activities.

Public Effort to Commercialize Eco-innovation Products and Services

The Danish Government uses Green Public Procurement (GPP) as an effective means to increase commercialization of eco-innovative products and services. Denmark has for years been one of the global frontrunners in GPP practice. Denmark established the framework of the Action Plan for a Sustainable Public Procurement Strategy in 1994 publishing a GPP guideline for 46 products and service. Since then, a majority of Danish authorities have applied this GPP guideline in their procurement process. The government also established the funding programmes such as Business Innovation Fund to mature the green market. The Business Innovation Fund not only grants financial supports but also helps pre-commercialized eco-

³⁹ National Environmental Research Institute, Cleaner water in Denmark

⁴⁰ Copenhagen Cleantech Cluster (2012), Denmark: Where water matters

innovative products and services to be readily launched in the market. In Denmark, public effort is made to project the green market by creating a better market mechanism for eco-innovation products and services.

Eco-innovation Case Studies

CASE STUDY 1

TEGnology

TEGnology, a Danish research based SME, is a young enterprise founded in 2010. In collaboration with the Center for Energy Materials at Aarhus University, the company brought Thermoelectric Generation (TEG) Technology to hybrid cars helping it run 10 percent further per liter. The new technology power supplies convert waste heat to electricity. TEGnology's eco-innovative product offers economic and environmental benefits such as better fuel economy, less CO2 emissions,

cheaper operation and more energy-efficient and environmentally friendly vehicles. The company believes that its invention holds high potential not only in the automotive industry but also in maritime, biofuel, combined heat & power and sensor industry. The company has won an international innovation award from Network of Automotive Excellence in 2012 for the invention.

Source: http://tegnology.dk/



CASE STUDY 2

The Water Partnership

The Water Partnership was established in the autumn of 2006 with a wide circle of manufacturers, civil engineering contractors, consultants, consumers and authorities. It is a co-operation between the Danish Ministry of the Environment, Danish Water Forum (DWF), the Royal Danish Embassy in Delhi and 6 Danish companies: COWI, Danfoss, DHI, Grundfos, VCS Denmark and Siemens Turbo Machinery. The Water Partnership was signed as part of the implementation of the Government Environmental Technology Action Plan (2007-2009), under the initiative on export promotion and partnerships. In 2009 India exhibition, Danish companies found a great capability for process improvement with cost-saving and India also expressed interest in Danish water treatment technology. The partnership is a strategic collaboration to confirm at least one demonstration project in India within the wastewater area, focusing on energy savings and process optimization. It aims for facilitating Danish water treatment system in India.

Source: http://www.ecoinnovation.dk

CASE STUDY 3

Aquaporin

Aquaporin is a startup company dedicated to developing biomimetic water purification technology. 'Aquaporin' refers to protein channels for water in organism membrane. When water goes through this membrane, purification or desalination occurs. The company's target is to develop, produce and commercialize Aquaporin Inside[™] membranes for industrial water treatment purposes and desalination of seawater. It is not yet commercialized however, is recognized as a promising eco-innovation solution that is getting attention from partners in Europe, US and Asia.



Source: http://www.aquaporin.dk