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SCIENCE · ECONOMY · COHESION

EUROPEAN UNION

Creating the Future of Lithuania

Eco-innovations

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Essence of eco-innovation

Eco-innovation is the development of products and processes that contribute to sustainable development, applying the commercial application of knowledge to elicit direct or indirect ecological improvements.

Essence of eco-innovation

Eco-innovation includes a range of related ideas, from environmentally friendly technological advances to socially acceptable innovative paths towards sustainability.

Essence of eco-innovation

The idea of eco-innovation is fairly recent. One of the first appearances of the concept of eco-innovation in the literature is in the book by Claude Fussler and Peter James

Essence of eco-innovation

Peter James defines eco-innovation as "new products and processes which provide customer and business value but significantly decrease environmental impacts

Terminology

Eco-innovation is closely linked to a variety of related concepts. It is often used interchangeably with "environmental innovation", and is also often linked with environmental technology, eco-efficiency, eco-design, environmental design, sustainable design, or sustainable innovation.

Terminology

The term "environmental innovation" is used in similar contexts to "eco-innovation", the other terms are mostly used when referring to product or process design, and therefore focus more on the technological aspects of eco-innovation rather than the societal or political aspects.

Terminology

The most common usage of the term "eco-innovation" is to refer to innovative products and processes that reduce environmental impacts. This is often used in conjunction with eco-efficiency and eco-design.

Terminology

Leaders in many industries have been developing innovative technologies in order to work towards sustainability. However, these are not always practical, or enforced by policy and legislation.

Terminology

Another position held (for example, by the organisation Eco Innovation) is that this definition should be complemented: eco-innovations should also bring greater social and cultural acceptance. In this view, this "social pillar" added to James's definition is necessary because it determines learning and the effectiveness of eco-innovations.

Terminology

This approach gives eco-innovations a social component, a status that is more than a new type of commodity, or a new sector, even though environmental technology and eco-innovation are associated with the emergence of new economic activities or even branches (e.g., waste treatment, recycling, etc.).

Terminology

This approach considers eco-innovation in terms of usage rather than merely in terms of product. The social pillar associated with eco-innovation introduces a governance component that makes eco-innovation a more integrated tool for sustainable development.

Terminology

Ecovation is the process by which responsible capitalism aligns with ecological innovation to construct products which have a generative nature and are recyclable back into the environment for usage in other industries.

Terminology

Shripad Vaidya's name figures in the 26th edition of the famous American publication 'Who's Who In The World' as the first record holder in the field of development of eco-innovation.

Eco-efficiency

Over the years, as countries and regions around the world began to develop, it slowly became evident that industrialization and economic growth come hand in hand with environmental degradation

Eco-efficiency

Eco-Efficiency has been proposed as one of the main tools to promote a transformation from unsustainable development to one of sustainable development

Eco-efficiency

It is based on the concept of creating more goods and services while using fewer resources and creating less waste and pollution.

Eco-efficiency

"It is measured as the ratio between the (added) value of what has been produced (eg. GDP) and the (added) environment impacts of the product or service (eg. S02 emissions)."

Eco-efficiency

The term was coined by the World Business Council for Sustainable Development (WBCSD) in its 1992 publication “Changing Course,” and at the 1992 Earth Summit, eco-efficiency was endorsed as a new business concept and means for companies to implement Agenda 21 in the private sector

Eco-efficiency

Ergo the term has become synonymous with a management philosophy geared towards sustainability, combing ecological and economic efficiency

Eco-efficiency

Although eco-efficiency is a rather new method, the idea is not. In the early 1970s Paul R. Ehrlich and John Holdren developed the lettering formula I = PAT to describe the impact of human activity on the environment

Eco-efficiency

Furthermore the concept of eco-efficiency was first described by Schaltegger and Sturm in 1989, but it wasn't until 1992, when the term was formally coined and widely publicized by Schmidheiny in ''Changing Course''.

Eco-efficiency

Stephan Schhmidheiny set out “to change the perception of industry as being part of the problem of environmental degradation to the reality of its becoming part—a key part—of the solution for sustainability and global development.”

Eco-efficiency

The major drivers in the early phase of eco-efficiency's development were the "forward-looking managers and thinkers in 3M and Dow."[

Eco-efficiency

It was their involvement which catapulted eco-efficiency from a brilliant idea to a workable concept. The results of the WBCSD's work creating the "linkage between environmental performance and the bottom line was published in 1997 in its report Environmental Performance and Shareholder Value."

Eco-efficiency

According to the WBCSD definition, eco-efficiency is achieved through the delivery of "competitively priced goods and services that satisfy human needs and bring quality of life while progressively reducing environmental impacts of goods and resource intensity throughout the entire life-cycle to a level at least in line with the Earth's estimated carrying capacity.

Eco-efficiency

It works by implementing 4 main types of ratios:

The first two are environmental productivity and its inverse, environmental intensity of production, referring to the realm of production.

Eco-efficiency

The second pair, environmental improvement cost and its inverse, environmental cost-effectiveness, are defined from an environmental improvements measures point-of-view.”

Eco-efficiency

The ratios may be applied to any unit comprising economic activities because such activities always relate to cost and value, “and having some physical substrate, always influence the environment.”

Eco-efficiency

Furthermore, there are two different levels upon which to orchestrate the ratios: ‘’micro’’ and ‘’macro’’. There are three different methods to determine eco-efficiency at the micro-level.

Eco-efficiency

First, ‘’incremental eco-efficiency’’, which “specifies the effects of the total value of a product system or sector and its total concomitant environmental effects.”[

Eco-efficiency

Second, an analysis method nicknamed ‘’win-win’’, which “gives a comparison between a historical reference situation and potentially new situations based on the use of new technologies.”

Eco-efficiency

It should be noted that the win-win micro-method is limited because it cannot give a concrete answer on the question of whether it improves overall environmental performance.

Eco-efficiency

And the third is ‘’difference eco-efficiency’’, which is similar to the win-win variant, but removes all irrelevant alternatives to heighten potential for optimal technologies while comparing two alternatives.

Eco-efficiency

Now the macro-level is much less defined and has shown less accurate results. However, “the ultimate aim of eco-efficiency analysis is to help move micro-level decision making into macro-level optimality

Eco-efficiency

The main goal in years to come is to create headline indicators to carry out macro-level analysis at a country/world scale.

Eco-efficiency

There are two LCA-based calculation systems on eco-efficiency: the Analysis Method of BASF, and the method of the Eco-costs value ratio of the Delft University of Technology

Examples

Furthermore, eco-efficiency is also a very useful tool because it can adapt and flex to be fit different sizes of companies, while also maintaining relevance with the larger scale of government and national policies

Examples

Larger national players such as the Organisation for Economic Co-operation and Development (OECD 2002), European Commission (EU 2005), European Environment Agency (EEA) and the National Round Table on the Environment and the Economy (NRTEE) have all recognized that eco-efficiency is a practical approach that businesses should adopt in setting and achieving their environmental performance objectives.

Examples

It has be proven to heighten market values for firms, serve as an effective management tool for governments, benefit civil society, and increase quality of life. “It does this by changing industrial processes, creating new products and changing and influencing markets with new ideas and with new rules

Examples

More people aim to get more value for their money in the market, while also enjoying a better environment.

Examples

Recently, there has also been use of eco-efficiency in more non-traditional ways, such as a use in banks to integrate environmental criteria into their credit-approval process; looking at “eco-integrated economic risks of a customer.”

Examples

And is also being implemented as marketing advantages where, “eco-efficient choices are always preferred,” especially in service sectors such as tourism

The EU's Eco-Innovation Action Plan

Rising demand for a better environment has led to an expanding supply of environmentally friendly techniques, products and services in both the industrialised and developing countries.

The EU's Eco-Innovation Action Plan

Europe's first major drive to boost eco-innovation came with the Environmental Technologies Action Plan (ETAP).

The EU's Eco-Innovation Action Plan

Adopted in 2004, this Action Plan focused on the further development and use of environmental technologies. Its goal was to tackle the financial, economic and institutional barriers hindering growth of these technologies, as well as to encourage their adoption by the market.

The EU's Eco-Innovation Action Plan

Under ETAP, Europe's eco-industries have flourished. This sector today has an estimated annual turnover of €227 billion or around 2.2% of the EU's gross domestic product – outperforming the European aerospace or pharmaceutical industries – and directly employs 3.4 million people.

The EU's Eco-Innovation Action Plan

The Eco-innovation Action Plan (EcoAP) is a logical successor to the ETAP. Launched by the European Commission in December 2011, the new Action Plan will build on the valuable experience gained to date – especially in promoting eco-innovation's development and uptake across Europe.

The EU's Eco-Innovation Action Plan

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, products and services. The ambitious plan will also focus on developing stronger and broader eco-innovation actions across and beyond Europe.

The EU's Eco-Innovation Action Plan

The Europe 2020 strategy will set the course for the EU's economy for at least the next decade. Focused on smart, sustainable and inclusive growth, this strategy aims to support the transition to a resource-efficient, low-carbon economy. Among its Flagship Initiatives is Innovation Union (IU), designed to turn innovative ideas into products and services that generate growth and jobs.

The EU's Eco-Innovation Action Plan

The EcoAP will build on the IU in three ways. Firstly it will expand the focus of innovation policies towards green technologies and eco-innovation. It will also target specific eco-innovation barriers and opportunities – especially those not covered by more general innovation policies.

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The EU's Eco-Innovation Action Plan

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The EU's Eco-Innovation Action Plan

EcoAP also complements three other Flagship Initiatives: Resource efficient Europe, Industrial policy for a globalised era, and Agenda for new skills and jobs. Taken together, these will help to put eco-innovation at the forefront of EU action to reduce pressure on the environment, bridge the gap between innovation and the market, and increase opportunities for the creation of green jobs.

The EU's Eco-Innovation Action Plan

The EcoAP is a broad policy framework. It provides directions for eco-innovation policy and funding. Until 2013, the eco-innovative projects will be funded under the EU's Seventh Framework Programme for Research and Technological Development

The EU's Eco-Innovation Action Plan

From 2014 to 2020, the main source of support will be Horizon 2020. This new research and innovation programme will strengthen the role of eco-innovation. It will also provide the financial means for implementing the EcoAP.

The EU's Eco-Innovation Action Plan

It has for example set aside €3 160 million for climate action and resource efficiency initiatives, which include eco-innovation. To support eco-innovative businesses, the Commission will develop new financial instruments offering them targeted debt and equity facilities.

The EU's Eco-Innovation Action Plan

Eco-innovation in companies leads to reduced costs, improves capacity to capture new growth opportunities and enhances their reputation among customers. In recent years, eco-industries have emerged as an important segment of the European economy. This sector has an estimated turnover of around €227 billion, corresponding to 2.2% of EU GDP, and employs 3.4 million people directly.

The EU's Eco-Innovation Action Plan

EcoAP also complements three other Flagship Initiatives: Resource efficient Europe, Industrial policy for a globalised era, and Agenda for new skills and jobs. Taken together, these will help to put eco-innovation at the forefront of EU action to reduce pressure on the environment, bridge the gap between innovation and the market, and increase opportunities for the creation of green jobs.

The EU's Eco-Innovation Action Plan

The Eco-innovation Action Plan (EcoAP) is a comprehensive set of initiatives to improve the market's uptake of eco-innovation. Adopted by the Commission in 2011, the plan expands the EU's focus from green technologies to every aspect of eco-innovation – including products and services.

The EU's Eco-Innovation Action Plan

The EcoAP builds on EU eco-innovation activities and experience gained over the last decade, especially under the Environmental Technologies Action Plan (ETAP). These encompass everything from recycled materials to wastewater treatment, and from green business and smart purchasing schemes to environmental labelling.

The EU's Eco-Innovation Action Plan

Eco-innovation supports innovative products, services and technologies that make better use of resources, while reducing Europe's ecological footprint. With the exception of renewable energy however, eco-innovation has a limited access to markets.

The EU's Eco-Innovation Action Plan

So the EcoAP will target eco-innovation's biggest barriers, such as market uncertainty and worries about return on investment. It will also address eco-innovation's main drivers, among them high energy prices, targeted regulations and standards, and access to knowledge.

ASEM ecoinnovation 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.

ASEM ecoinnovation center

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 around the globe.

ASEM ecoinnovation center

The ASEIC encourages governments in ASEM member countries to actively provide concrete and practical projects for SMEs in Asia and Europe for the benefit of accelerating SMEs green innovation and green management practices, and disseminating the effectiveness of such measures worldwide.

ASEM ecoinnovation center

The ASEIC office endeavors to facilitate constructive discussion among governments, businesses, and individuals in ASEM member countries. Your genuine participation and contribution will be essential in turning this vision into a reality.

Green technology and ecotechnology

Green technology (greentech) is the application of one or more of environmental science, green chemistry, environmental monitoring and electronic devices to monitor, model and conserve the natural environment and resources, and to curb the negative impacts of human involvement.

Green technology and ecotechnology

The field of "green technology" encompasses a continuously evolving group of methods and materials, from techniques for generating energy to non-toxic cleaning products.

Green technology and ecotechnology

The present expectation is that this field will bring innovation and changes in daily life of similar magnitude to the "information technology" explosion over the last two decades. In these early stages, it is impossible to predict what "green technology" may eventually encompass.

Green technology and ecotechnology

The goals that inform developments in this rapidly growing field include:

Green technology and ecotechnology

Sustainability - meeting the needs of society in ways that can continue indefinitely into the future without damaging or depleting natural resources. In short, meeting present needs without compromising the ability of future generations to meet their own needs.

Green technology and ecotechnology

"Cradle to cradle" design - ending the "cradle to grave" cycle of manufactured products, by creating products that can be fully reclaimed or re-used

Green technology and ecotechnology

Source reduction - reducing waste and pollution by changing patterns of production and consumption.

Green technology and ecotechnology

Innovation - developing alternatives to technologies - whether fossil fuel or chemical intensive agriculture - that have been demonstrated to damage health and the environment.

Green technology and ecotechnology

Viability - creating a center of economic activity around technologies and products that benefit the environment, speeding their implementation and creating new careers that truly protect the planet.

Green technology and ecotechnology

Examples of green technology subject areas:

Green technology and ecotechnology

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Energy

Perhaps the most urgent issue for green technology, this includes the development of alternative fuels, new means of generating energy and energy efficiency.

Green technology and ecotechnology

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Green building

Green building encompasses everything from the choice of building materials to where a building is located.

Green technology and ecotechnology

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Environmentally preferred purchasing

This government innovation involves the search for products whose contents and methods of production have the smallest possible impact on the environment, and mandates that these be the preferred products for government purchasing.

Green technology and ecotechnology

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Green chemistry

The invention, design and application of chemical products and processes to reduce or to eliminate the use and generation of hazardous substances.

Green technology and ecotechnology

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Green nanotechnology

Nanotechnology involves the manipulation of materials at the scale of the nanometer, one billionth of a meter. Some scientists believe that mastery of this subject is forthcoming that will transform the way that everything in the world is manufactured. "Green nanotechnology" is the application of green chemistry and green engineering principles to this field.

Industrial ecology

Industrial ecology (IE) is the study of material and energy flows through industrial systems. The global industrial economy can be modeled as a network of industrial processes that extract resources from the Earth and transform those resources into commodities which can be bought and sold to meet the needs of humanity.

Industrial ecology

Industrial ecology seeks to quantify the material flows and document the industrial processes that make modern society function. Industrial ecologists are often concerned with the impacts that industrial activities have on the environment, with use of the planet's supply of natural resources, and with problems of waste disposal.

Industrial ecology

Industrial ecology is a young but growing multidisciplinary field of research which combines aspects of engineering, economics, sociology, toxicology and the natural sciences

Industrial ecology

Industrial ecology has been defined as a "systems-based, multidisciplinary discourse that seeks to understand emergent behaviour of complex integrated human/natural systems".

Industrial ecology

The field approaches issues of sustainability by examining problems from multiple perspectives, usually involving aspects of sociology, the environment, economy and technology. The name comes from the idea that the analogy of natural systems should be used as an aid in understanding how to design sustainable industrial systems

Industrial ecology

Industrial ecology is concerned with the shifting of industrial process from linear (open loop) systems, in which resource and capital investments move through the system to become waste, to a closed loop system where wastes can become inputs for new processes

Industrial ecology

Much of the research focuses on the following areas

- material and energy flow studies ("industrial metabolism")
- dematerialization and decarbonization
- technological change and the environment
- life-cycle planning, design and assessment

Industrial ecology

Much of the research focuses on the following areas

- design for the environment ("eco-design")
- extended producer responsibility ("product stewardship")
- eco-industrial parks ("industrial symbiosis")
- product-oriented environmental policy
- eco-efficiency

Industrial ecology

Industrial ecology seeks to understand the way in which industrial systems (for example a factory, an ecoregion, or national or global economy) interact with the biosphere. Natural ecosystems provide a metaphor for understanding how different parts of industrial systems interact with one another, in an "ecosystem" based on resources and infrastructural capital rather than on natural capital.

Industrial ecology

Along with more general energy conservation and material conservation goals, and redefining commodity markets and product stewardship relations strictly as a service economy, industrial ecology is one of the four objectives of Natural Capitalism.

Industrial ecology

This strategy discourages forms of amoral purchasing arising from ignorance of what goes on at a distance and implies a political economy that values natural capital highly and relies on more instructional capital to design and maintain each unique industrial ecology.

Industrial ecology

One of the central principles of Industrial Ecology is the view that societal and technological systems are bounded within the biosphere, and do not exist outside of it.

Industrial ecology

Ecology is used as a metaphor due to the observation that natural systems reuse materials and have a largely closed loop cycling of nutrients. Industrial Ecology approaches problems with the hypothesis that by using similar principles as natural systems, industrial systems can be improved to reduce their impact on the natural environment as well.

Industrial ecology

The discipline of industrial ecology is to a large part based on the implicit assumption that if "we just get our technologies right", the problems of environmental pollution and unsustainability will be solved.

Industrial ecology

This is the reason why most current research in industrial ecology is focused on technological innovation (i.e., the T in the IPAT equation), such as improvements in eco-efficiency, design for environment, material flow analysis, etc.

Industrial ecology

The ecosystem metaphor popularized by Frosch and Gallopoulos has been a valuable creative tool for helping researchers look for novel solutions to difficult problems.

Industrial ecology

Recently, it has been pointed out that this metaphor is based largely on a model of classical ecology, and that advancements in understanding ecology based on complexity science have been made by researchers such as C. S. Holling, James J. Kay, and others.

Industrial ecology

For industrial ecology, this may mean a shift from a more mechanistic view of systems, to one where sustainability is viewed as an emergent property of a complex system

Industrial ecology

To explore this further, several researchers are working with agent based modeling techniques.