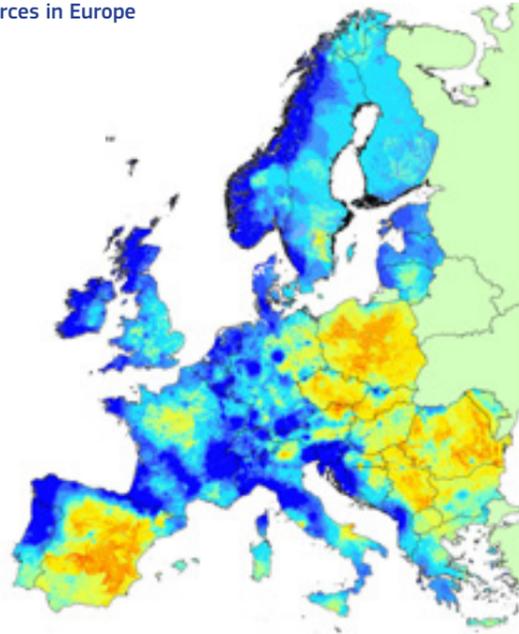


The JRC conducts sampling exercises to assess water quality throughout the EU. By assessing and monitoring the impact of pollutants and chemicals in aquatic ecosystems, the JRC helps develop common Environmental Quality Standards (EQS). In addition, the aforementioned Integrated Pollution Prevention and Control bureau is currently reviewing a reference document of best available techniques that will set the permit conditions for wastewater discharges from the chemical industry. Together with modelling-based scenario analyses of the impacts of policy options in controlling pollutant emissions, the JRC helps decision makers prepare for a more sustainable management of water resources.

Resources:

- *FATE and impact of pollutants* – <http://fate.jrc.ec.europa.eu/>
- *European Flood Forecast System (EFAS)* – <http://efas-is.jrc.ec.europa.eu/>
- *JRC science at the core of water solutions* – http://ec.europa.eu/dgs/jrc/downloads/jrc_2012_water_leaflet.pdf
- *European Integrated Pollution Prevention and Control bureau (IPPC)* – <http://eippcb.jrc.es/>
- *Current water resources in Europe and Africa – Matching water supply and water demand* – http://ies.jrc.ec.europa.eu/uploads/EUR_25247_EN_ONLINE.PDF

Water resources in Europe



Annual freshwater availability in mm/year (average 1990—2010).



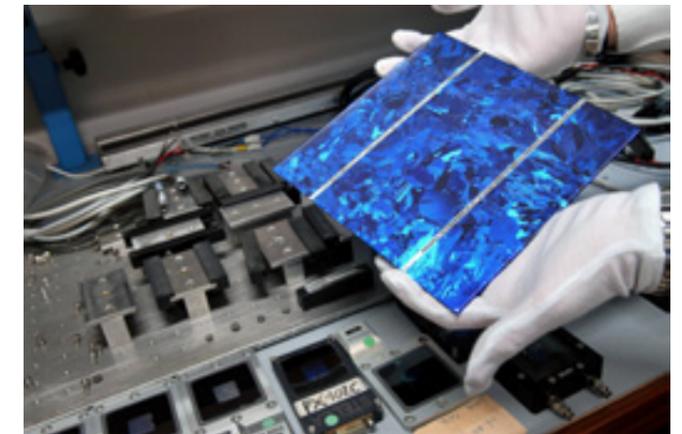
Science at the core of eco-industry

Some JRC examples

Eco-industries is a rapidly growing industrial sector producing goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air, soil and ecosystems, as well as addressing problems related to waste and noise. Already today, eco-industries create more than 3.4 million direct jobs. By 2020, their market share is projected to reach €2,200 billion.

is given to the security of energy supply and to more sustainable, safer and cleaner energy production and use for the future. The JRC's Renewable Energy Snapshots 2011 publication showed that the share of renewable energy sources in final energy consumption in the EU-27 was 19.4% in 2010 (up from 11.7% in 2000) and set to continue rising. The highest contribution overall was from hydropower plants (10.2%), followed by wind turbines (5 %), biomass (3.5%) and solar power (0.6%).

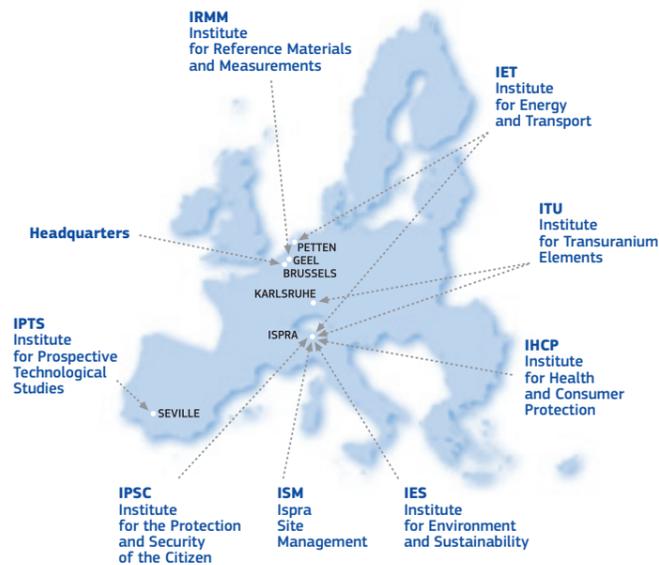
The European Commission's in-house science service, the Joint Research Centre (JRC), provides scientific and technical support to EU policy-making. Many of its services are directly relevant to eco-industries, such as its ongoing development of cleaner energy technologies, its assessment of the most environmentally-sound waste management techniques for a range of industries, and its development of measures to increase the energy efficiency of buildings. The JRC has specialised units and teams working with air, soil and water quality as well as climate change mitigation and adaptation. It participates actively in networks that assess the best available techniques for improving industry's environmental performance. In its global support to the development of eco-industries, the JRC's approach can best be defined as focused innovation.



The JRC's European Solar Test Installation (ESTI) develops performance verification methods for international standards.

Renewable energy sources

European industry is leading the way in the development of renewable energies with the JRC particularly involved in promoting further innovations in low-carbon technologies. Special emphasis



As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle. Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new methods, tools and standards, and sharing its know-how with the Member States, the scientific community and international partners. Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security, including nuclear; all supported through a cross-cutting and multidisciplinary approach.

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JRC, the European Commission's in-house science service



The European Solar Test Installation (ESTI), managed by the JRC, is the European reference laboratory where photovoltaic devices are tested to certify their power and energy generation. Together with industry, the research community, Member States and EU institutions, the JRC is helping drive the Strategic Energy Technology Plan (SET-Plan). Anchored by six European Industrial Initiatives (biofuels, electricity networks, wind, photovoltaics, nuclear and zero emission fossil fuels), the JRC promotes data exchange and the development of new technologies for which the barriers, scale of investment and risk can best be tackled collectively.

The JRC is also performing studies on biomass in Europe. A new initiative includes the collection of relevant data from National Forest Inventories which is being combined with remote sensing derived products and assess biomass potential. This is making strategic use of the JRC's maps and datasets in high spatial resolution, showing forest cover, forest species distribution maps and other relevant information.

Resources:

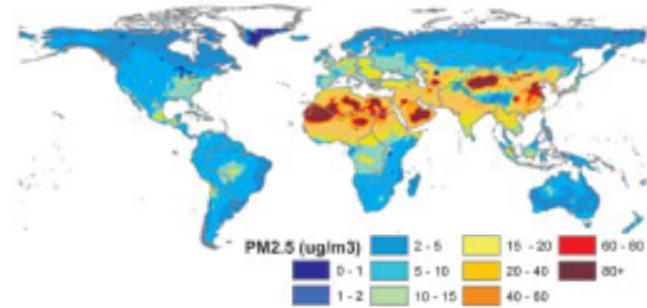
- *European Solar Test Installation (ESTI)* - <http://re.jrc.ec.europa.eu/esti>
- *Renewable Energy Snapshots 2011* - http://re.jrc.ec.europa.eu/refsys/pdf/RE_Snapshots_2011.pdf
- *Strategic Energy Technologies Information System* - <http://setis.ec.europa.eu/>
- *Sustainability of Bioenergy* – <http://re.jrc.ec.europa.eu/biof/index.htm>

Air pollution

Air pollution affects human health through particulate matter and ozone, and ecosystems through deposition of acidifying and eutrophying components. The JRC's scientific and technical support to EU policy has helped to significantly reduce the emission of air pollutants, notably from industry and power generation. The European Integrated Pollution Prevention and Control (IPPC) bureau, which is managed by the JRC, has played a significant part in achieving this through the release of best available techniques reference documents (BREFs). These documents present the most viable means for industry to improve their environmental performance and are used by each Member State when setting emission permits. Each BREF is the outcome of a two to three year process involving up to 100 experts.

In addition, the JRC is studying the complex links between air pollution and climate change, for example by assessing whether the reduction of the concentration of certain airborne particles would increase or reduce global warming. In relation to black carbon, tropospheric ozone and methane, JRC studies have shown that a reduction

Estimated annual average of airborne particles (PM2.5) (2005)



PM2.5 is particulate matter less than 2.5 micrometers in diameter. The World Health Organization Air Quality guidelines suggest levels should not exceed 10µg/m³.

in emissions would be an effective way to mitigate global warming in the short term. JRC scientists are also studying the impacts of air pollutants on human health, and are modelling how emission reductions in our cities will influence pollution on a global scale.

Resources:

- *European Integrated Pollution Prevention and Control bureau (IPPC)* – <http://eippcb.jrc.es/>
- *Air and Climate Unit* – <http://ccaqu.jrc.ec.europa.eu/>

Energy efficiency

Energy efficiency is a central theme of the JRC's energy work in support of the EU's target to save 20% of primary energy consumption by 2020. Today, industry is, on average, using 11% less energy to provide the same service than it did in 2000. Although households are now more efficient than in 2000 thanks largely to improvements in space heating and lighting, they are using more energy than industry. Research shows that full implementation of existing and new energy-efficiency measures has the potential to reduce annual greenhouse gas emissions by 16% of total EU emissions.

Breakdown of the energy consumption of the service sector (2007)



The JRC manages award schemes that encourage organisations in both public and private sectors to cut energy consumption by using innovative and efficient energy technologies. The GreenLight programme encourages partners to install energy-efficient lighting technologies and systems, while the GreenBuilding initiative promotes improved energy efficiency through several measures such as thermal insulation, efficient heating and cooling and intelligent control systems. These programmes alone have obtained annual electricity savings roughly equivalent to the total consumption of all households in Luxembourg.

Another key sector of JRC activities includes the research and development of smart grids. These upgraded, intelligent electricity networks will form the backbone of the future power system of the EU and result in enhanced energy efficiency and security. In November 2011, the US Argonne National Laboratories and the JRC established two partnered centres that will drive forward this

development of smart grid equipment as well as the fostering of global standards.

Resources:

- *End-Use Energy Efficiency portal* - <http://re.jrc.ec.europa.eu/energyefficiency/>
- *E-mobility and smart grids at the JRC* - http://ec.europa.eu/dgs/jrc/downloads/jrc_2011_electromobility_leaflet.pdf

Eco-construction

The construction sector is the largest consumer of raw materials in the EU, with construction and demolition activities accounting for one third of waste generated annually. The type of services of eco-construction that have an impact in the use of natural resources and energy can be clustered in four different phases: design, construction, use and demolition of constructions. Reducing resource use and re-using waste more effectively would cut costs and reduce the pressure on the environment. To date, principal eco-construction efforts have focused on the energy category, as buildings rank high in total share of EU energy consumption.

The JRC's European Laboratory for Structural Assessment (ELSA) plays an important role in helping to establish common technical standards, called Eurocodes, for the design and construction of economical and safe buildings. With this expertise, ELSA is now proposing the creation of further interoperable European standards for the building sector, covering all basic requirements for construction works; safety, energy efficiency, environmental sustainability, hygiene, health and noise. In addition, the development of an integrated Building Performance Index (iBPI) for the assessment of existing structures is underway. This index will be based on performance based standards addressing the use of new materials and innovative structural systems, all of which will require pre-normative research and innovation.

Resources:

- *European Laboratory for Structural Assessment (ELSA)* – <http://elsa.jrc.ec.europa.eu/>



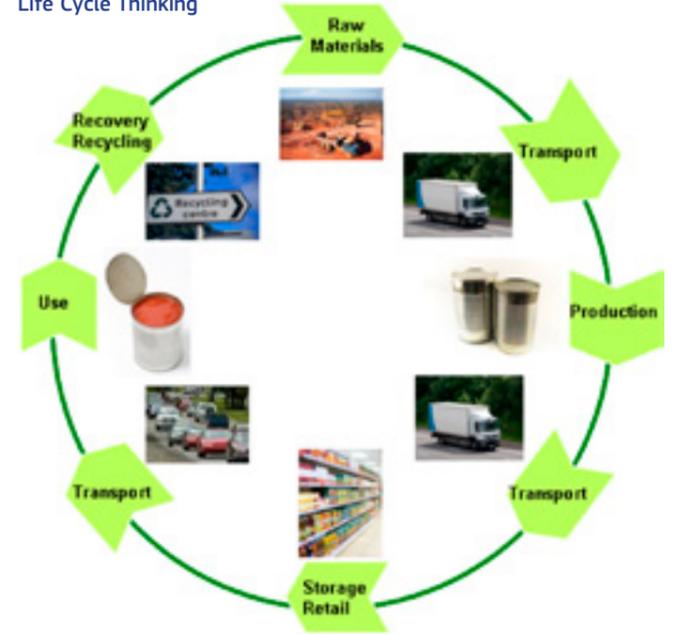
Eco-constructions have a reduced impact on the environment by using resources more sustainably.

Waste management and recycling

Each year, in the European Union alone, we throw away 3 billion tonnes of waste, or 6 tonnes of solid waste per person. By 2020, the OECD estimates that we could be generating 45% more waste than we did in 1995. Currently, only 40% of solid waste is recycled, representing a

significant loss of resources in terms of materials and energy. Research at the JRC looks at and proposes effective ways and means to reverse this trend. For example, a set of practical guidelines was recently published which help apply life cycle thinking and assessment to the European waste management sector, for the best environmental outcome. These guidelines are available online.

Life Cycle Thinking



The life cycle approach looks at the whole lifespan of a product, from raw materials to production, retail and disposal. It takes into account all energy used in production and transport as well as the use of resources and the impact on health and the environment.

The JRC also establishes waste management indicators which assess the environmental impacts of the most important waste streams. These indicators cover the entire waste management chain including collection, transport, storage, conditioning and treatment, and address recycling and final deposition of any remaining wastes. Similarly, proposing improvements on how we collectively handle electronic waste and electrical equipment is a priority.

Resources:

- *Life Cycle Thinking* – <http://lct.jrc.ec.europa.eu/>

Water management

Securing and managing access to clean water is a challenge for developing and developed countries alike. Water supplies are falling while demand is dramatically increasing. UN estimates predict that although access to clean water is expected to improve in developing countries, nearly 50% of Africa will face water stress or scarcity by 2025.

For its part, the JRC is providing pivotal support in several areas, particularly assessing the quality and availability of water resources. For example, it develops modelling tools that take into account climate-induced changes in water availability, timing and seasonality of flows, as well as the occurrence of more extreme events such as floods and droughts. Using its extensive flood forecasting experience, the JRC is starting a pilot project to conduct monthly forecasting studies for improved hydropower and water reservoir management.