

**Serving society**  
**Stimulating innovation**  
**Supporting legislation**

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## Joint Research Centre

*The European Commission's in-house science service*

### JRC mission

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.

### Facts & figures about the JRC

- Established in 1957
- Around 3 000 scientific and technical personnel
- 7 scientific institutes
- 1 433 publications in 2013

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# Science for a Circular Economy

Some JRC examples

In a circular economy, resources – including energy and materials – are used in circles. They are transformed, used, segregated, retransformed and reused in the most efficient and sustainable way possible. The European Commission's in-house science service, the Joint Research Centre (JRC), provides scientific and technical support to the EU policies which aim to bring about the most efficient use of resources, such as those linked to recycling, waste management and efficiency requirements or best available techniques for production.

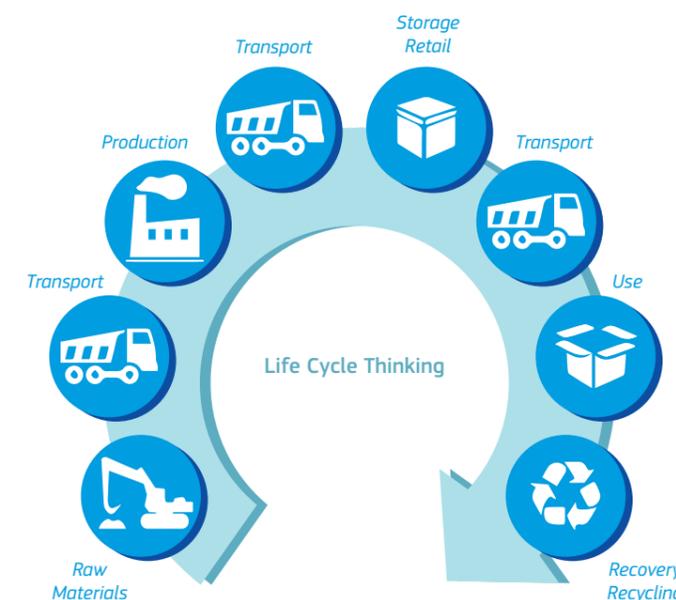
### Material-efficient products

An increasing number of products (TV sets, washing machines, mobile phones, cars, etc.) containing a large variety of electronic material and hazardous substances reach their end-of-life in Europe. The JRC has developed a methodology to assess the material efficiency of products using various criteria: re-usability, recyclability, recycled content and durability. This allows opportunities for the improvement of product design and policy requirements to be identified. Businesses and public authorities can find guidance documents and a selection of tools to help them carry out life cycle assessment on the European Platform on Life Cycle Assessment, set-up by the JRC.

More info: <http://eplca.jrc.ec.europa.eu>

### Best available techniques for sustainable production

The EU's Industrial Emissions Directive has a twofold aim: controlling the consumption of energy, water and raw materials, and preventing the pollution of water, air and soil from approximately 50 000 industrial installations across Europe. Each EU country assures compliance with these requirements through a system of permits, based on the use of the Best Available Techniques (BAT).



The life cycle approach looks at the whole lifespan of a product, from raw material to production, retail and disposal.

The European Integrated Pollution Prevention and Control Bureau, managed by the JRC, produces the Best Available Techniques Reference Documents (BREFs). Based on sound techno-economic information and discussed with the relevant stakeholders, they provide information about what may be technically and economically available to an industry in order to improve their environmental performance.



These reference documents are the main reference used by competent authorities in EU countries when issuing operating permits for industrial installations. BREFs are generated following the exchange of technical information between experts from industry, EU countries, research institutes, environmental NGOs and the European Commission.

**More info:** <https://ec.europa.eu/jrc/en/research-topic/sustainable-production-best-available-techniques>

## End of waste criteria

The EU has a long-term strategy to recycle, avoid waste and re-use any unavoidable waste as a resource. Building on the Waste Framework Directive, the JRC has developed the methodology under which certain valuable waste streams can obtain 'end-of-waste status' and become products again, subject to the same market rules as their primary raw material counterparts. Following this methodology, the JRC has also prepared a series of technical studies proposing end-of-waste criteria for a number of specific recyclable materials including aluminium and iron scrap metals, copper metal scrap, waste paper, waste glass and biodegradable waste.

The studies are the result of intense consultations with experts, and consist of thorough techno-economic-environmental assessments that help verify when a recyclable waste material is safe for the environment and has a high enough quality to merit being released from the waste regime. Based on the results of these studies, end-of-waste regulations on scrap metal, glass cullet and copper scrap were adopted and have entered into force.

**More info:** <https://ec.europa.eu/jrc/en/research-topic/waste-and-recycling>



End of waste criteria defines when waste can be again used as raw material.

## Ecolabel, green public procurement, ecodesign and energy labelling

In Europe, mandatory or voluntary policy instruments address consumption and production of those goods whose use and manufacturing affects the environment. The objective is to exclude the most damaging products from the European single market, while at the same time giving increased visibility to environment-friendly products.

The JRC operates the European Product Bureau, which manages the policy implementation process for the EU Ecolabel Regulation, the Green Public Procurement Communication, the Directive on Ecodesign Requirements for Energy-related Products, and the Energy Labelling Directive. The Bureau provides the technical, economic and environmental information needed for the implementation of the policy proposals related to each product. It also organises consultations with stakeholders from EU countries, industry and NGOs.

**More info:** <https://ec.europa.eu/jrc/en/research-topic/sustainable-product-policy>



Products and services with a reduced environmental impact throughout their life cycle allow for lesser use of energy and resources, lower waste generation and release of hazardous substances.

## Best environmental management practice

Many organisations and companies seek to reduce their impact on the environment, with motivations ranging from eco-efficiency to reputation and concerns about the sustainability of their business. To help them, the JRC identifies best environmental management practices (BEMPs) for different sectors. The JRC studies the most advanced environment-friendly techniques related to energy efficiency, resource efficiency, emissions, but also supply chain management. The results of this work are Sectoral Reference Documents on best environmental management practice.

**More info:** <https://ec.europa.eu/jrc/en/research-topic/best-environmental-management-practice>



Best environmental practices help reduce air, water and soil emissions of industrial installations.

## Environmental technology verification

The concept of the EU's Environmental Technology Verification programme is to offer a verification procedure to cutting edge environmental technologies that may otherwise find it difficult to demonstrate their environmental added value. The JRC chairs and coordinates the technical working groups of the programme which ensure the harmonisation of ETV practices across the different verification bodies of the ETV pilot programme, in order to achieve a high and comparable quality level.

**More info:** <http://iet.jrc.ec.europa.eu/etv/about-etv>

## Sustainable use of resources

### Energy efficiency

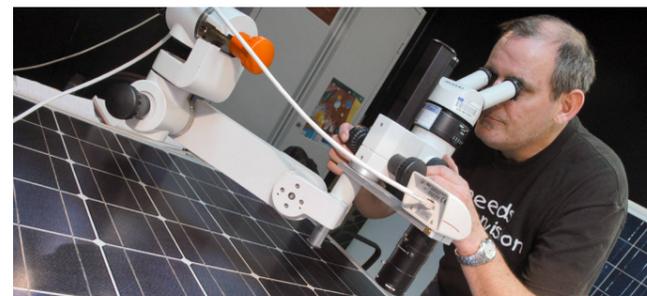
Energy efficiency is at the heart of the EU's energy goals. The JRC provides technical and scientific advice to the Commission's services for the design, implementation and monitoring of EU energy efficiency policies and programmes. It also cooperates with towns and cities within the Covenant of Mayors to go beyond the objectives of EU energy policy in terms of reduction in CO2 emissions through enhanced energy efficiency and cleaner energy production and use. Via the GreenBuilding award scheme, the JRC encourages organisations in both public and private sectors to cut energy consumption by using innovative and efficient energy technologies. Another key sector of JRC activities includes the research and development of smart grids.

**More info:** <https://ec.europa.eu/jrc/en/research-topic/energy-efficiency>

### Renewable energy

European industry is leading the way in the development of renewable energies and the JRC is particularly involved in promoting further innovations in low-carbon technologies. Special emphasis is given to more sustainable, safer and cleaner energy production and use for the future. Together with industry, the research community, Member States and EU institutions, the JRC is helping drive the Strategic Energy Technology Plan (SET-Plan), the technology pillar of the EU's energy and climate policy. By promoting accelerated development of innovative low-carbon technologies, the SET-Plan supports their market uptake.

**More info:** <https://ec.europa.eu/jrc/en/research-topic/renewable-energy>  
[http://iet.jrc.ec.europa.eu/renea/sites/renea/files/jrc82506\\_jrc\\_res\\_snapshots\\_2013.pdf](http://iet.jrc.ec.europa.eu/renea/sites/renea/files/jrc82506_jrc_res_snapshots_2013.pdf)  
<http://setis.ec.europa.eu>



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.

## Natural resources

The JRC carries out studies and assessments of the state of natural resources such as water, soil and land, in support of the roadmap to a resource efficient Europe. For instance, the JRC provides indicators on soil quality and soil erosion and works on a standardised methodology to evaluate the economic impacts of land degradation.

To support the sustainable management of water resources, the JRC has developed an integrated modelling framework that links land-use, hydrological and resource-efficiency models in order to evaluate different scenarios and policy options in terms of efficiency and cost-effectiveness. The JRC studies potential solutions to the increasing competition for scarce global freshwater resources by analysing the water footprint of consumption for different diets in the EU.

The JRC also developed a Land Use Modelling Platform which provides analysis of the impacts of policies and specific proposals in the context of environmental and socio-economic changes in Europe. The platform is based on the combination of a spatially explicit land use models with other modelling activities in thematic fields such as hydrology, agriculture, economy and forestry. The platform is used for ex-ante and ex-post impact assessments of European policies and related initiatives such as integrated coastal zone management, Common Agricultural Policy, resource efficiency and shale gas extraction.

**More info:** <https://ec.europa.eu/jrc/en/research-topic/soil>  
<https://ec.europa.eu/jrc/en/research-topic/water>  
<https://ec.europa.eu/jrc/en/news/water-footprint-eu-different-diets-9674?search>  
Land use modelling platform: <http://moland.jrc.ec.europa.eu/lump/lump.htm>



Soil degradation is closely linked to climate change, biodiversity and desertification.

## Foresight study on a sustainable economy

In a forthcoming JRC foresight study («How can eco-industries best contribute to meeting the EU's sustainability, resource efficiency and growth and jobs objectives?») a set of mid- to long-term scenarios for the transition to a sustainable economy has been developed. This approach allows a systematic look at «eco-industries» across several EU policies, including research. The study identifies how eco-industries could look in the future and how they can be a long-term source of competitiveness. It also identifies key drivers, opportunities and trends and develops possible scenarios in the areas of research and technological development, environment, energy, transport and industrial policy linked to eco-industries.