

The LIFE programme and energy

Key findings from an ex-post study on LIFE+ energy projects

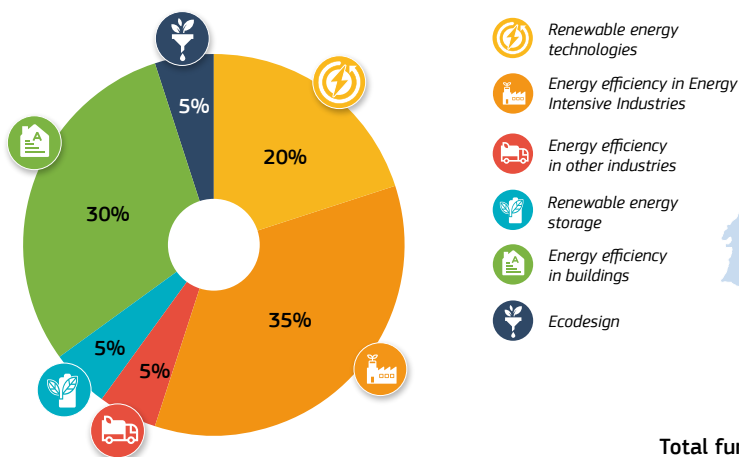
The LIFE programme addresses the challenges and negative impacts of the EU's current energy mix and technologies. LIFE also helps implement relevant EU energy policies. These policies have the potential to bring considerable benefits to consumers and the environment. They can also help the EU achieve carbon neutrality by 2050.

A photovoltaic solar power station near Guadix, Andalucia, Spain.

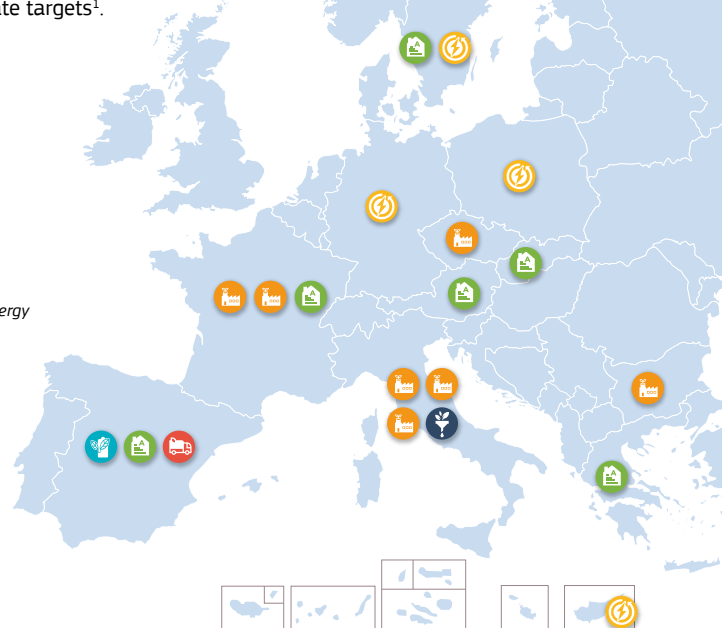
LIFE funds energy projects that typically facilitate the transition towards an energy-efficient, renewable energy-based, climate-neutral and resilient economy. These projects can also help remove market barriers that hamper the socio-economic transition to sustainable energy.

The goal of the ex-post study was to establish the 20 projects' environmental and climate benefits, policy impact, relevance to the sector and continuity. It also examined the contribution of the LIFE programme to achieving the EU's ambitious energy, environmental and climate targets¹.

This factsheet summarises an ex-post study on 20 LIFE+ energy projects in 12 EU Member States completed between 2013 and 2017. These projects focused on reducing primary energy demand, either by implementing energy efficiency measures or by producing energy from renewable sources. They can be grouped into six topics as shown in the below pie chart:



Projects divided by topic



Total funding received: €20 170 255

Locations of selected projects and total funding amount

¹ The successive 2020 and 2030 EU Climate & Energy frameworks

Results at a glance

Key performance indicators (KPIs)

Primary energy savings and greenhouse gas emission reductions achieved by the 20 projects can be seen in the below table.

SAVINGS	END	AFTER 5 YEARS
Primary energy (MWh/y)	58 000	903 000
GHGs emission (tons of CO _{2e} /y)	27 000	143 000

The primary energy savings five years after the projects ended is equivalent to the annual demand for domestic heating from some 88 000 EU households. Also, these savings equate to the yearly greenhouse gas emissions from around 36 000 average passenger cars.

Sustainability

- 15 of the 20 projects have produced long-lasting climate and environmental impacts as most of the measures undertaken or technologies developed are still in place, helping limit the EU's primary energy consumption.
- Concrete continuation, replication or technology transfer can be seen in projects such as **H-REII demo** and **LIFE Sustainable Mission**. In fact, the waste heat recovery technology developed under H-REII demo has already been installed in 19 Energy-intensive industries (EIs) plants.
- Several LIFE projects have gone on to avail of other EU funding sources. Their results have sometimes inspired competitors to innovate more or paved the way for the removal of legislative barriers. **AETHER** and **ZERO-HYTECHPARK** are good examples.
- A number of projects have underlined the importance of LIFE funding. Without it, their technologies would not have materialised. This proves how valuable funding instruments are for realising green innovations.

Market uptake

- More than half of the close-to-market (C2M) projects generated economic gains either directly or indirectly. Examples include **RENEW BUILDING**, **H-REII demo** and **GREEN CITY**.
- In some cases, projects introduced innovations that generated revenue in areas other than those initially envisaged. **LIFE HEO** is a good example as the energy-efficient domestic oven developed during the project is today on the market.

Innovation

- Around half of the projects were deemed innovative at the time of their implementation.
- The level of innovation was particularly high in projects on energy storage systems - these were considered ahead of their time and include **ZERO-HYTECHPARK** and **SAFR**.
- Several industrial projects like **ECOTRANSFLUX** and **ENERGEO** used existing technologies but in sectors traditionally reluctant to embrace change. For this reason, they were also considered innovative.

Policy impact

- One-third of the projects contributed to and impacted policy updates while stimulating revisions of the relevant regulatory frameworks.
- **ZERO-HYTECHPARK** helped craft a Spanish regulation on hydrogen use as an energy vector.
- In Cyprus, **SmartPV** supported the definition of a policy framework for demand response, distributed generation, renewable energy sources, and energy storage.
- **H-REII demo** contributed to the update of Italian legislation on waste heat recovery, which today contains incentive schemes for EIs wanting to convert waste heat to power.

Lessons learnt

- LIFE projects have effectively contributed to the development and implementation of the EU's legislation and climate and energy targets.
- The development of some of the technologies would not have been possible without LIFE funding.
- The LIFE programme has been a catalyst for new ideas, which have brought environmental and economic benefits.
- Policies in the following areas could better support EU emissions targets:
 - Boosting the decarbonisation of EIs through the electrification of thermal use combined with more renewable energy for power generation is encouraged.
 - Non-technical barriers, identified by several LIFE projects, are a hindrance to the diffusion of technologies and products that could help the EU reach long-term climate objectives. They should be removed whenever possible.
 - Incentives based on market mechanisms such as white certificates can stimulate energy efficiency measures and the development of heat recovery technologies.
 - Low-carbon solutions should be stimulated by an increase in carbon market prices.
 - Streamlining procedures to update Best Available Technique (BAT) REFERENCE documents (BREF) would facilitate the replication of innovative technologies.
- The quality and consistency of the data aggregated to measure the performance of the programme in terms of impact would benefit from more standardisation. An example could involve harmonising the Life Cycle Assessment (LCA) using, when appropriate, the standardised Product Environmental Footprint (PEF) methodology.



Photo: LIFE08 ENV/IE/000136

Energy storage system developed in ZERO-HYTECHPARK

Community solar power in Cyprus

Solar panel technology is advancing at a steady pace but its penetration in the overall energy mix is still low in many countries, including Cyprus. And harnessing this energy in a timely and efficient way is vital.

To encourage its uptake, the **SmartPV** project connected almost 300 solar panel owners in Cyprus to a decentralised power network. The team used innovative remote monitoring and net metering to introduce so-called time-of-use tariffs. These schemes rewarded customers for using household equipment at times of the day when energy demand is traditionally lower.

The 300 houses that took part in the trial saved up to €20 per month and reduced their energy consumption by more than 10%. They also reduced carbon dioxide (CO₂) emissions by 800 tonnes.

The Cypriot authorities have since extended the payment scheme to all renewable energy prosumers. The project resulted in a complete



Solar panels on the rise in Cyprus

revision of the network tariffs that today encourage more responsible and timely consumption with fair and accurate billing. And new policies have been introduced on demand response, distributed generation, renewable energy sources (RES), and energy storage. Project results have fed into Cyprus' National Energy and Climate Plan. Also, this approach can be replicated by other EU countries.

Optimal industrial waste heat use

Energy-intensive industrial processes like iron, steel and cement production emit huge amounts of waste heat and CO₂ into the environment. But this waste heat could represent a very important source of power and usable heat if recovered efficiently.

The **H-REII demo** team coupled an integrated fume heat exchanger with an Organic Rankine Cycle (ORC) that generates electricity by recovering heat from the electric arc iron and steel furnaces. The project showed the feasibility of a heat recovery system that is completely integrated into a fume extraction plant. It uses water in a closed-loop process for cooling waste fumes while operating at a higher temperature and pressure than previous methods. Generating power from effluents, generally deemed as waste, dramatically reduces the energy consumption of fume depuration.

During the project, the pilot ORC heat recovery plant was integrated for the first time into an existing steel production process. This resulted in significant energy savings of around 500 MWh and emission savings of around 190 000 tonnes of CO₂.

The team has gone on to replicate the technology in four steel plants. Similar systems have been installed in 19 EIs plants, increasing the turnover and market share of the company. They have also identified and worked to remove regulatory barriers in order to realise the great potential of ORC for reducing the EU's emissions.



Charging devices with ambient light

Screen printing the innovative solar cell technology

An average mobile phone generates 315 kg of CO₂ each year through usage and charging. The **Dyemond Solar** project team invented a new conducting material for use in their patented printable solar cell technology. They demonstrated its seamless integration into consumer products like tablets and wireless headphones. This means that these devices can recharge with ambient light, eliminating greenhouse gas emissions from charging in the usual manner.

The team showed the scalability and economics of screen printing their solar cell technology. They built the world's largest factory

for dye-sensitised solar cells in Stockholm. The aim is to provide the global consumer electronics industry with a new and endless energy source for portable products. They have already partnered with several of the world's leading consumer and wearable electronics manufacturers. A second, mass-scale facility will be completed by 2023 and will provide this revolutionary light-harvesting material globally.

The team has shown that these solar cells are economically viable to power consumer goods, paving the way for their production on an unprecedented scale.

ORC-based heat recovery plant in Riesa, Germany





Operation renovation

Green renovations in action

The thermal renovation of old buildings protects the climate and cuts energy bills. But how to implement renovation measures in the most energy-efficient and ecological way is problematic.

The **Renew Building** project focused on improving the environmental impact of the renovation sector by using climate-friendly construction methods such as renewable resources and eco-friendly building materials. The project team tested different materials, combinations and techniques at two sites in Austria to identify climate-friendly solutions. Newly developed as well as traditional, but forgotten techniques and materials, were also applied.

The project showed that 17 tonnes of CO₂ equivalent could be saved in the production of building materials per average single-family house if renewable, climate-friendly materials such as straw, wood, or hemp were used.

This is equivalent to the CO₂ emissions from driving approximately 63 000 km in an average passenger car. Moreover, reusing roof tiles clay resulted in 82% less construction and demolition waste.

The team also held various training sessions for around 400 craftsmen, architects, planners and other professionals from the construction sector both during and beyond the project.

They went on to build a factory that produces prefabricated building modules using renewable materials. This has allowed them to scale up and standardise the production of natural construction materials, making them more competitive compared to standard building materials.

Some 200 buildings have been renovated following the project's approach. And two companies founded by project members have created 17 jobs in Austria.




Legislation

To deliver on the EU's commitments to the **Paris Agreement**, the European Commission in 2016 proposed the ambitious **Clean Energy Package for all Europeans**, comprising eight legislative acts. This package also takes on board the EU's long-term strategy of achieving carbon neutrality by 2050.

The projects included in this ex-post study addressed at least one of the following main legislative acts: Energy Efficiency, Energy Performance of Building, or Renewable Energy Sources (RES), including smart grids, and the related directives. Some of them focused on the Emission Trading System and Effort Sharing Decision.

All of the projects contributed to the implementation of the EU Directives, either in their current or outdated version.

Learn more

ec.europa.eu/life  LIFE programme
 @LIFEprogramme  LIFE programme

How to apply for LIFE funding

The European Commission organises annual calls for proposals. Full details are available at ec.europa.eu/life

Contact

European Climate, Infrastructure and Environment Executive Agency (CINEA)
 European Commission - W910 - B-1049 Brussels, Belgium
 CINEA-COMMUNICATION-LIFE@ec.europa.eu

Directives relevant to the selected projects	Clean Energy for all Europeans Package (in force)	2020 Energy package (outdated)
Energy Efficiency	2018/2002/EU	2012/27/EU
Energy Performance of Buildings	2018/844/EU	2010/31/EU
Renewable Energy Sources	2018/2001/EU	2009/28/EC
Risk-preparedness in the electricity sector	2019/941/EU	2005/89/EC
Emission Trading System	2015/1814/EU 2018/410/EU	2003/87/EC 2009/29/EC
Effort Sharing Decision	2018/842/EU 2019/1122/EU	2013/525/EU 2009/406/EC

EU Directives relevant to the ex-post study

Note: New LIFE sub-programme – clean energy transition

The LIFE programme (2021 – 2027) has expanded into four new sub-programmes: nature and biodiversity, circular economy and quality of life, climate change mitigation and adaptation, and a new addition called clean energy transition. Building on the success of the Intelligent Energy Europe (2003-2013) and Horizon 2020 Energy Efficiency (2014-2020) programmes, the clean energy transition sub-programme will also fund LIFE projects devoted to sustainable energy. These projects will support the delivery of EU policies such as the European Green Deal.

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