

SUSTAINABLE ENERGY AND BUILDINGS

Iceland
Liechtenstein
Norway grants

SMILE

Sintra Motion & Innovation
for Low Emissions



Circular Economy
and Environment



Energy and
Buildings



Sustainable Urban
Mobility



Community, Art
and Culture



Programme Operator:



Promoter:



Partners:



Developed by:



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01. GLOSSARY



Carbon footprint - The term carbon footprint refers to a measure of the total amount of carbon dioxide emitted directly and indirectly by a person, organization, or product. The concept is used to understand and manage the environmental impact of these entities, aiming at reducing their contribution to climate change.



Climate change - Climate Change refers to long-term shifts in temperatures and weather patterns. Since 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels.



Renewable energy community - A renewable energy community is a group of citizens, local public administrations, and small- or medium-sized enterprises that come together to produce, exchange and use clean energy produced on a local scale.



Sustainable energy and buildings - Sustainable energy refers to energy sources that have a minimal impact on the environment, such as solar, wind, hydro, and geothermal power. Sustainable buildings, also known as green buildings, are designed to reduce the overall impact on the natural environment and human health by efficiently using energy, water, and other resources, promoting the health and well-being of occupants, and reducing waste, pollution, and environmental degradation.



Sustainable development - Sustainable development is the kind of development that requires an integrated approach that takes into consideration environmental concerns along with economic development.



02. WHICH IS THE PURPOSE OF THIS GUIDE?

Due to human activity, our planet's temperature increased by 1.5 degrees since the industrial revolution. With each passing year, the urgency to address environmental preservation and combat climate change intensifies. The detrimental impacts of our reliance on fossil fuels are becoming increasingly apparent, highlighting the critical need for a shift towards sustainable energy.

Fossil fuels (e.g. coal, natural gas and oil) are unsustainable and finite resources of energy. They are polluting air, water and soil, destroying our natural environment and harming the health of people globally.

Choosing renewable energy sources for our home/ company electricity and heating is a great way to reduce carbon footprint, make our home/ company more sustainable, and potentially lower energy costs. Although there is a cost associated with sustainable energy sources and buildings, the long-term investment pays you off in few year, since sustainable energy costs decrease every year.



”

"Once you got a solar panel on a roof, energy is free. Once we convert our entire electricity grid to green and renewable energy, cost of living goes down."

Elizabeth May

The Sustainable Energy and Buildings Guide is a comprehensive tool for spreading awareness about the steps that households and companies can undertake to achieve environmental sustainability at home and at the workplace.

The guide's objectives are:



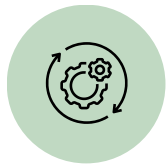
Broaden the comprehension of sustainability and sustainable energy and buildings principles, along with an exploration of the strategies that support the transition to sustainable energy and buildings in the European Union;



Motivate individuals and companies to consider sustainability in their choices;



Understand the hurdles involved in moving towards sustainable energy and buildings;



Promote measures and habits that both households and businesses can implement to overcome these problems.



03. HOW CAN WE DEFINE SUSTAINABILITY, ENERGY AND SUSTAINABLE BUILDINGS?

What is sustainability?

The notion of sustainability shaped by the United Nations in the report “Our Common Future” means leaving a better world with sustainable ecological, economic and social conditions to future generations. According to the report, sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

The Sustainable Development Goals (SDGs), defined in the UN 2030 Agenda, are the blueprint to achieve a better and more sustainable future for all. The 17 Goals are all interconnected, and in order to leave no one behind, it is important to learn more about each issue and take action.

Sustainable development requires an integrated approach that takes into consideration environmental and social concerns along with economic development.



The SDGs are based on three pillars:



Economic development: promote sustainable employment, build resilient infrastructures, reduce inequalities among countries, ensure sustainable consumption and production patterns;



Social inclusion: end poverty and hunger, ensure healthy lives and equitable quality education, achieve gender equality, ensure access to affordable energy, make cities resilient, promote peaceful societies;



Environmental protection: ensure sanitation for all, take urgent action to combat climate change and its impacts, conserve and sustainably use water resources, protect and restore territorial ecosystems and biodiversity.



What are sustainable energy and buildings?

Sustainable energy refers to any source of energy that can remain viable forever, meets our demand for energy without any risk of running out, and does not harm the environment.

They include:



solar power, harnessed from the sun;



Wind energy, generated by converting wind currents into electrical power;



Hydroelectric power, produced by using the flow of water (typically from dams);



Geothermal energy, derived from the heat stored within the Earth's crust;



Tidal energy, generated by the movement of tides and waves in oceans and seas.

“Renewable energy” and “sustainable energy” are often used interchangeably. However, the two concepts are not exactly equivalent.

Renewable energy comes from sources that naturally renew themselves at a rate that allows us to meet our energy needs, while sustainable energy comes from sources that can fulfill our current energy needs without compromising future generations.

Therefore, renewable energy can be sustainable if the natural rate of resource replenishment is greater than the rate of resource utilization.

There is a broad range of benefits from the use of sustainable energy:

- **Improving public health:** switching to sustainable energy can eliminate serious risks for public health caused by the burning of fossil fuels (e.g. breathing problems, cancer, and heart attacks);
- **Creating local jobs:** converting to sustainable energy can help create jobs and improve the economy, by building sustainable energy infrastructures locally, instead of spending more money importing energy from fossil fuel companies;
- **Decreasing our carbon footprint:** switching our own home to sustainable energy such as wind or solar energy creates zero carbon emissions;
- **Increasing energy affordability:** sustainable energy can make a huge long-term difference to the electricity and energy costs for our homes and businesses since they are more cost-effective than traditional energy sources;
- **Improving energy security:** sustainable energy sources are by definition the most reliable and accessible forms of energy.

A sustainable building can maintain or improve the quality of life in the environment in which it is located. Sustainable buildings minimise energy consumption, as well as water consumption, and are a key part of sustainable urban development aimed at combating climate change.



04. WHICH IS THE MAIN CONTEXT?

What is the European Climate Law?

The European Climate Law writes into law the goal set out in the European Green Deal for Europe's economy and society to become climate-neutral by 2050.

The law also sets the intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.

The main objectives are:

- Set the long-term direction of travel for meeting the 2050 climate neutrality objective through all policies, in a socially fair and cost-efficient manner;
- Set a more ambitious EU 2030 target, to set Europe on a responsible path to becoming climate-neutral by 2050;
- Create a system for monitoring progress and take further action if needed;
- Provide predictability for investors and other economic actors;
- Ensure that the transition to climate neutrality is irreversible.



What is the SMILE project?

SMILE is a project financed by EU grants that develops intelligent solutions that promote the transition to a low-carbon society. It includes activities concerning:



Circular Economy and Environment;



Energy and Buildings;



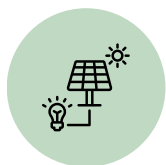
Sustainable Urban Mobility;



Community, Art and Culture.



In the context of **energy and buildings**, the SMILE project:



Created a **Renewable Energy Community (REC)** in the Tabaqueira neighborhood, for local production of electricity of photovoltaic origin and supply of various buildings, helping fight energy poverty;



Constructed a **remote metering system** to consult all the information regarding the production and consumption of this energy;



Created an **online tool**, through which families could learn and better interpret their electricity consumption in real time, in order to identify options to improve efficiency and reduce the energy bills, without compromising the thermal comfort of their homes.



05. WHAT CAN WE DO?

Energy consumption for lighting and appliances

	Issue	Guideline
Households	How to save energy?	Use the washing machine and the dishwasher when the load is full and choose the appropriate program
		Unplug electronic devices when they're not being used (standby power can account for as much as 10% of your energy bill)
		Switch off the lights when leaving the room
	How to increase energy efficiency?	Use LED lights instead of traditional incandescent bulbs
Check your fridge and freezer seals, and clean/replace damaged seals		
Companies	How to save energy?	Don't leave the lights on in your office if it is not necessary
	How to increase energy efficiency?	Use automatic systems to switch off lights and electronic devices

Why taking action?



Energy consumption is the total amount of energy required for a given process and includes the use of electricity, gas, diesel, oil, and biomass. Responsible consumption aims to minimize our ecological footprint through our actions and, simultaneously, save money.



An example of good practice: In Croatia, the city of Novigrad-Cittanova modernized its streets lighting system. The project, co-financed by the Environmental Protection and Energy Efficiency Fund, consisted in replacing 954 older technology lamps with more efficient LED fixtures, leading to an annual saving of 297 MWh electricity, corresponding to 52,000 euros.



In 2021, the net domestic energy use in the EU economy amounted to 62.1 million TJ (trillion joules).

Households account for about one quarter of net domestic energy use; while, the domestic producers of goods and services in the EU account for the three quarters.

[Source: European Commission, 2021]



Energy consumption for heating and cooling

	Issue	Guideline
Households	How to save energy?	Keep the thermostat below 20°C (every degree higher will increase running costs by around 10%)
		Turn the heater or air conditioner off overnight or when you go out
		Set your conditioner thermostat to 24-26°C (every degree lower will increase running costs by around 10%)
	How to increase energy efficiency?	Close off rooms not in use so you only heat or cool down the rooms you are using
		Improve the overall energy efficiency of the building's envelope and windows thermal performance
		In summer, close your curtains during the day to keep the heat out
Companies	How to save energy?	Monitor optimal temperatures in order to reduce gas consumption in the building
	How to increase energy efficiency?	Use a thermographic imaging survey to identify heat flows and losses in buildings
		Improve the overall energy efficiency of the building's envelope and windows thermal performance

Why taking action?



Energy efficiency is the use of less energy to perform the same task or produce the same result. Energy efficient buildings use less energy to heat, cool, run appliances, and produce goods. Improving energy efficiency is one of the easiest and most cost-effective ways to combat climate change and reduce energy costs.



An example of good practice: In Italy, a ceramics factory invested in monitoring system, heat recovery from ovens, compressed air maintenance and in a thermal insulation hot water network. The result annual cost savings accounted for 187,700 euros and for an annual energy savings of 889 MWh of electricity.



The main use of energy by households in the EU in 2021 was for heating their homes, followed by lightning and electrical appliances, cooking and cooling.

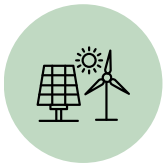
[Source: European Commission, 2021]



Renewable energy

	Issue	Guideline
Households	How to produce clean energy?	Install solar panels to convert the sun's rays to electricity or heat
		Use heat pumps to absorb heat from the air outside and use it at home
		Use solar collectors to heat water for domestic use
		If you live in a suitable location, consider installing a small wind turbine on your property
	How to use clean energy?	Purchase green energy by opting for energy plans from suppliers that generate electricity from renewable sources
Companies	How to use clean thermal energy?	Install heat pumps, solar thermal panels or biomass energy systems
	How to produce clean energy?	Encourage the company to review roof and other spaces that might be suitable for solar production

Why taking action?



The costs of utilities are increasing and concerns about the environment are reaching a fever pitch. That's why an increasing number of people are switching to renewable energy to power their homes and businesses.



An example of good practice: The EU-funded SolMate is a project coordinated by the Efficient Energy Technology GmbH, that is a spin-off of Graz University of Technology in Austria. The project is designed especially for small city apartments, as it does not require any hardware installation or even a roof to install the solar panels. The advantage of SolMate is a saving of up to 300 euros per year in electricity costs.



In 2021, natural gas accounted for 33.5% of the EU final energy consumption in households, electricity for 24.6%, renewables and wastes for 21.2% and oil and petroleum products for 9.5%.

[Source: European Commission, 2021]

Sustainable living practices

	Issue	Guideline
Households	How to support sustainable energy?	Engage in a renewable energy community
		Share knowledge about sustainable energy practices and advocate for policies that support renewable energy development
		Participate and sponsor community projects that demonstrate the practical application of sustainable buildings and energy practices
	How to increase energy efficiency?	Sell the excess of sun's rays converted into electricity to the local power grid
Companies	How to increase energy efficiency?	Design new buildings or retrofitting existing ones to be more energy efficient and to incorporate renewable energy technologies
	How to support energy efficiency?	Consider local energy initiatives and encourage suppliers and customers to adopt renewable energy

Why taking action?



With the rise of renewables, energy generation is increasingly becoming embedded within local communities. This offers the opportunity for communities to democratize energy creation and for companies to be at the nexus of social, environmental, and economic value creation.



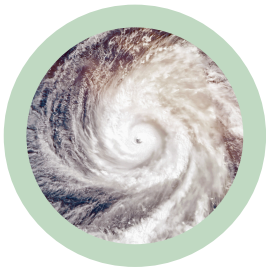
An example of good practice: The RE/SOURCED project carried out in Belgium focuses on maximizing sustainable energy and the circular economy. The aim is to transform a former power station into an energy community. Now it is a multi-functional site with homes, offices and other structures, where various renewable energy sources produce energy (e.g. wind turbines and solar panels, with storage facilities).



In the EU countries there are 9252 energy communities. More than half of these are found in Germany, followed by Netherlands and Denmark.

**[Source: Osservatorio
Balcani e Caucaso
Transeuropa, 2023]**

06. SMILE AND SUSTAINABLE ENERGY AND BUILDINGS



Sustainable energy and buildings, and climate change

Sustainable energy and buildings directly impact climate change by reducing GHG emissions, that are one of the primary drivers of global warming. The shift towards renewable and efficient energy sources lowers carbon footprint and contributes to climate change mitigation.

Moreover, buildings that improve insulation and energy use promote resilience and adaptation to extreme weather events. This ensures both the safeguard of the environment and the well-being of current and future generations.



Sustainable energy and buildings, and circular economy

In a circular economy, resource efficiency, waste reduction, and the reuse and recycle of materials are carefully considered. Sustainable buildings often incorporate renewable energy sources that improve energy efficiency and conservation.

By integrating energy solutions and embracing circular economy principles, buildings can significantly reduce their environmental footprint, support energy independence, and lead to more resilient and adaptable urban environments.





Sustainable energy and buildings, and Sustainable mobility

Integrating sustainable energy solutions in buildings and sustainable mobility can create more resilient urban environments. The design of sustainable buildings often includes considerations for facilitating sustainable mobility, such as creating infrastructures that supports biking and electric vehicles charging points.

This integrated approach ensures that buildings and transport systems complement each other in order to reduce the carbon footprint in urban areas.



Sustainable energy and buildings, art and culture

Connecting sustainable energy and buildings to art and culture inspires environmental stewardship, community engagement, and public spaces. Sustainable buildings can become canvases for cultural expression, where architects and artists collaborate to integrate sustainable design with artistic elements.

These structures not only serve their functional energy-efficient purposes, but also stand as cultural landmarks that reflect local identity and creativity.



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