RECOMMENDATIONS TO EU MEMBER STATES

Updating the 2030 National Energy and Climate Plans

SOLARIMPULSE
FOUNDATION

solarimpulse.com

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Foreword from the Chairman

The success of the ecological transition depends less on the continuous innovation of new technological solutions, and more on creating an enabling environment that will pull the existing ones to market and flourish. So while there are a plethora of solutions that both protect the environment and are economically viable, the conditions are less than ideal for them to succeed. That is why we don't see uptake at the pace and scale required to meet our decarbonisation goals by the end of the decade and beyond.

This document is a series of recommendations to support EU Member States as they prepare their next submission to the National Energy and Climate Plans (NECPs). Along with our recent "Prêt à Voter" campaign in France from the summer of 2022, it represents a new trajectory for the Solar Impulse Foundation, where we step into the legislative arena.

We have to go one step beyond showing that the solutions exist and are economically profitable. We must also demonstrate how we can create a legal and regulatory environment that favours the adoption of these solutions. In this instance, we have worked with a number of associations in Europe dealing with renewable energy, energy efficiency and decarbonisation to identify steps that can be taken by Member States to do just that.

When I flew day and night in the Solar Impulse aircraft, using no fuel but the power of clean and efficient technologies, the out of date and polluting side of our daily life became even more apparent to me. We have all we need to modernize our world. The adventure now is to help our societies let go of this inefficient past and embrace what modern technologies allow us to do, improving the quality of life and unlocking opportunity for all our citizens.

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Contributing Organizations

The organisations listed below have shared their invaluable knowledge with us in order so that we may produce this series of recommendations. We wish to extend our thanks to them for this support and to contribute to the work that they have been doing for many years. We hope this will represent the start of a long and fruitful relationship.

Bioenergy Europe
Coalition for Energy Savings
EBA - European Biogas Association
EGEC - European Geothermal Energy Council
EHPA - European Heat Pump Association
ePure - European Renewable Ethanol Producers
EREF - European Renewable Energies Federation
ESTELA - European Solar Thermal Electricity Association
EU-ASE - European Alliance to Save Energy
EUREC - Association of European Renewable Energy Research Centers
EURIMA - European Insulation Manufacturers Association
EuroACE - European Alliance of Companies for Energy Efficiency in Buildings
Euroheat and Power
European Biodiesel Board
GCP Europe
Ocean Energy
PU Europe
Solar Heat Europe
Solar Power Europe
Wind Europe

Purpose of this document

To meet their energy and climate targets, EU Member States need to establish 10-year integrated National Energy and Climate Plans (NECPs) for the period from 2021 to 2030 and send an update to the European Commission every 2 years. These plans represent a real opportunity for Member States to set a clear strategy, with concrete and efficient measures to not only decrease their greenhouse gas emissions but also ensure a stable, efficient and affordable supply of energy to their industries and citizens. This manual comprises a collection of measures that Member States could put in place to improve the efficiency of their energy systems and increase their share of renewables, both leading to significant GHG emissions reductions.

The Solar Impulse Foundation has gathered input from 20 associations representing the energy efficiency and renewable energy industries in the EU, with a view to increasing ambition of these Member States. Each of these recommendations focuses on creating an enabling environment for the rapid and scaled adoption of technologies and solutions that can help to reduce Member States environmental footprint. Coupled with these recommendations are a series of examples of existing solutions that have been identified by the Solar Impulse Foundation as having the potential to protect the environment and support economic growth and job creation within Member States.

Furthermore, there are a series of "systemic enablers" integrated within the report - steps that, if taken, would allow for a step change in the ecological transition within each Member State.

Lastly, we highlight some of the financing that is available to support the adoption of these technologies.

We would like to extend our thanks to the representatives of the associations mentioned on the opposite page for their support in the production of this series of recommendations from which we borrow heavily, and we look forward to our continued engagement with them.

01

REDUCE ENERGY CONSUMPTION

1.1 New Builds
1.2 Technical Building Systems
1.3 Facade
1.4 Smart Heating
1.5 Insulation
1.6 Ventilation
1.7 Smart Lighting
1.8 Water and Energy Savings
1.9 Industry

In May 2022 in their REPowerEU plan, the European Commission proposed to further reduce the EU's reliance on fossil fuel imports from the Russia Federation. Reducing energy demand is the cheapest, safest and cleanest way to make this happen. To this end, the EC proposed to increase the binding EU energy efficiency target from 9% to 13%, compared to the 2020 Reference Scenario.

While this remains under negotiation at EU level, Member States should not wait for negotiations to conclude to integrate these higher objectives within their NECPs. Saving energy is a no-regret option that is not only good for the climate but also key to industrial competitiveness and increasing the purchasing power of households.

In the following pages we present various measures that we recommend to Member States to integrate into their NECPs, accompanied by examples of technologies that can help them to meet their goals.

> 1.1 New Builds

- Member States **should include their Zero-Emissions Buildings (ZEB) Strategy in this edition of their NECPs** and not wait to move from Nearly Zero-Emissions Buildings.

- Ensure **new buildings are Zero Emissions Buildings with very high energy performance and 100% renewable energy already by 2025**. National governments should **immediately revise the building standards** for new buildings to exclude fossil fuel-based heating. Cost-effective technologies with high energy performance and which include renewable energy exist today.

Hybrid Positive-Economy Building

by Bouygues, from France

Concept-building combining self-generation of the resources it needs to operate and real-time configuration. The concept can be applied to all building projects around the world, especially in cities that need to anticipate urban population growth.

Average CO_2 emissions reductions of 22 kg/m²/year and water savings of 28 k m³/year.

Skywater and Sopranature

by Soprema, from France

Vegetalised roof to reduce heat islands, reuse rainwater, improve building insulation and recycle grey water. The concept includes several stormwater management solutions and the use of high-potential evapotranspiration (PET) plants.

Reduces the temperature by 4ºC during heat peaks.

Blokiwood

by Dom'innov, from France

A bio-based, pre-insulated and airtight wall for the construction of low-carbon buildings with high thermal performance. An alternative to traditional concrete structures, the block is made entirely from panels from sustainably managed forests.

The energy consumption of the new building was halved from 170 KWh/m²/year to 85 KWh/m²/year.

Susteno 3R

by Holcim, from Switzerland

Demolition rubble processed to be re-used as a component in cement, reducing landfill space and CO_2 emissions. it has been used by more than 20 cement-clients for both structural and civil engineering, including shopping centres and apartment buildings.

30% CO_2 reduction compared to a Type I cement, and reduces waste sent to landfills. Furthermore, it can increase property value by up to 7%.

> 1.2 Technical Building Systems

- **Integrate Building Automation and Energy Management Systems**. Building automation and control systems (BACS) monitor and automatically adjust energy use in buildings by using technologies like software and engineering services to deliver a comfortable environment. BACS quick return on investment makes them a very smart option to boost energy efficiency. Installing BACS is an essential part of any renovation project. It requires small upfront costs estimated at around 30€/m^2 in non-residential buildings and 12€/m^2 in residential buildings, and according to industry estimates, the value of savings generated exceeds the value of investments by a factor of 9.

- **Leverage utility obligation schemes** (Energy Efficiency Directive art 7): Oblige utilities providers to prioritize the deployment of building management systems.

- **Activate demand-side flexibility**. This can be provided by smart decentralised energy sources, including demand management, energy storage and distributed renewable generation to support a more reliable and efficient energy system.

- **Fully transpose the electricity market design directive** to give value to flexibility for consumers and communicate to the general public about the value of using flexibility, including thermal flexibility offered by a heat pump for example.

Vertuoz Control

by Engie, from France

A heating and light control system for small-sized buildings. By placing connected and wireless objects to collect various data (temperature, occupancy, light, energy consumption), an AI will control light and heating room by room.

Allows 10% to 15% energy savings annually, with an RoI of 3-5 years depending on installation size.

EFICIA Smart Building

by Eficia, from France

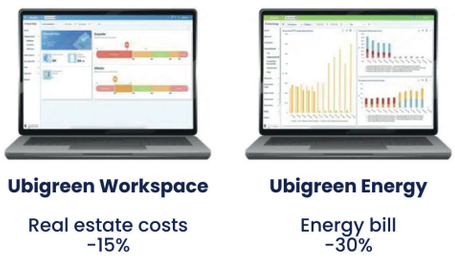
A solution for 24/7 remote-control of buildings to save energy whilst increasing comfort, and to simplify control. Highly modular, this solution can be integrated into existing buildings or new constructions thanks to wireless technology.

Average saving of 15% across 2,500 buildings.

Ubigreen Energy

by Ubigreen, from France

A digital platform to collect, monitor, analyze and optimize building energy consumption. It allows users to build an inventory of the building in terms of its energy use, detecting leaks and malfunctions, defining energy performance indicators, etc.

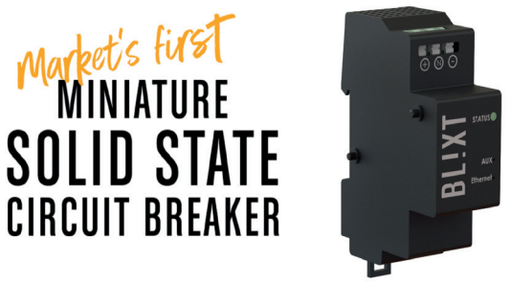


A recent case study showed a 4% reduction in gas consumption and a 11% reduction in electricity consumption could be achieved.

Blixt Solid State Circuit Breaker

by blixt.tech, from Sweden

Solid state circuit breakers for software control of electricity and enhanced electrical safety. Installation opens up further software services, such as energy analytics, demand side management and energy trading.



Can reduce CO_2 emissions in residential sector by up to 22% by optimising renewable energy consumption.

> 1.3 Facade

- Set up a significant **investment campaign that fosters capacity and knowledge for serial/industrial renovation**. Using innovative approaches for façade and roof renovation will reduce intervention time and energy demand on a large scale. It is today possible to undertake these renovations without owners or tenants having to move out of the building. It is also possible to include energy generation such as solar installations in these prefabricated elements.

  Currently, many pilot initiatives exist in Europe which require urgent up-scaling. This renovation solution is suitable for urban areas which are characterized by the same building typologies. Typically, urban quarters built after World War II in a consolidated manner have suitable characteristics for such interventions. The construction industry must be enabled to increase its knowledge, skills and production facilities to make prefabricated renovation solutions the norm for suitable buildings.

Animeo Connect

by Somfy, from France

Integrating sensors on roofs and facades of buildings to measure real-time conditions and allowing for intelligent and efficient remote blind management. The system takes into account shadow movements, sunlight levels, weather and building location.

Reduce building energy consumption by 30-70%, RoI in 3 years.

SageGlass

by Vetrotech Saint-Gobain Int'l, from Switzerland

A dynamic glazing that electronically tints to control the daylight and heat in buildings, providing enhanced occupant comfort and energy efficiency. The system solves solar control challenges without sacrificing aesthetics, energy-efficiency or comfort.

Employees are protected from heat and glare, thus affording them a sense of well-being.

R'Booster

by Air Booster, from France

A system to provide long-lasting heat by transforming the walls of metal-clad buildings into a giant radiator using the sun. It reduces the need for heating in winter and cooling in summer, adapting to all types of buildings during construction or renovation.

One user expects -52% annual energy bill and and -49% carbon footprint compared to their former warehouse.

Soprastar

by Soprema Group, from France

A covering for flat roofs that limits the absorption of solar energy (Solar Reflectance Index of 96) and which reduces both urban heat islands and summer discomfort in buildings. The roof and facades of the building can contribute to urban cooling.

Reduce the impact of a building on urban warming by over 50%, whilst reducing the interior temperature of the building by 1 to 2°C.

> 1.4 Smart Heating

- Promote the installation of **smart heating controls** via subsidies such as VAT exemptions.

- Incentivize the use of **temperature room controls** in buildings, such as thermostatic radiator valves that maintain constant indoor comfort without overheating, which would cut heating energy use in homes by about 18%.

- Promote the installation of **hydronic balancing of heating systems**, which is a low tech intervention needing a few hours per building unit and will make sure that the heating system is running properly and efficiently and not wasting fuel. This measure saves 5-10% of the heating energy. By retrofitting hydronic balancing, 2.5 to 16 KWh/m^2 of energy can be saved annually. For existing residential buildings with radiator heating and existing pre-settable thermostatic valves, these energy savings lead to amortization times of approximately 8 to 9 years for a single-family dwelling or approximately 3.5 to 4 years in a multi-family dwelling.

- 60% of heaters installed today in EU homes are old and inefficient and are mainly based on gas and oil. Those must be replaced by efficient and renewable-based heating and cooling systems; **modern heating is also a prerequisite to installing advanced temperature control features.**

Eco smart radiator thermostat

by Danfoss, from Denmark

A stand-alone smart radiator thermostat that gives easy in-home control of each individual radiator. It is compatible with 90% of all radiator valves.

Can reduce energy consumption by 23-46%.

Boxx

by Engie, from France

An energy insight and management tool compatible with both old classic meters as well as new smart meters, and an automated smart thermostat offering a solution to avoid wasted heating and control most of the energy consumption at home.

Reduces electricity consumption by an average of 10%, payback time typically reached within 2 years.

Covers Energy pack

by Covers S.A., from Belgium

A compact ventilation concept with heat pump recovery that reduces energy costs of homes. The concept is designed to ventilate energy-efficient homes and recovers heat from the air that should be discharged outside to produce domestic hot water and space heating.

The system can reduce the energy consumption of homes by 50%.

Solar Quest

by Lancey Energy Storage, from France

A combined heating and energy management system. The infrared radiant panel provide instantaneous warmth and adapts to users needs, while its battery charges off peak or with renewable energy surplus and discharges to prevent consuming during peak hours.

It emits 50% less CO_2, 40% less KWh usage compared to a classic electric heater.

> 1.5 Insulation

- **Raise awareness on quick fixes for residential buildings**: Loft insulation is a technically simple measure. It is a cheap and a no-regret option in uninsulated or insufficiently insulated attics and roofs. The upfront costs and disturbance to occupants are very limited, with payback periods often as short as 6 months, awareness raising campaigns should prioritise this solution as an immediate response to the energy crisis. The investments can be fully covered by national governments using the Recovery and Resilience Funds made available by the EU as well as ETS revenues and EIB funds.

- **Mandate quick fixes for industrial applications**: Scale up thermal insulation in industrial boilers, ovens, pipes, going beyond the level required for safety and process control, can save up to 14 Million Tonnes of Oil Equivalent. More importantly, industrial insulation measures generally have short payback times of less than 2 years.

- **Channel public money towards deep renovation**: EU governments are rightly focused on quick fixes given the energy crisis, but Europe's medium-long term challenge is to raise the rate of deep renovation, which **typically refers to the reduction of a building's energy needs by at least 60%**. This can only be achieved with comprehensive works on the building envelope, including insulation of the basement and external walls.

  The societal benefits of deep renovation are proportionately much greater than those resulting from shallow or medium-depth energy efficiency improvements, which currently dominate the renovation market. The current rate of deep renovation stands at just 0.2% - a figure that must rise to 3.0% by the end of the decade to meet EU 2030 targets. Deep renovation must become the norm, applying to at least 70% of renovation taking place by 2030.

  Today around 90% of existing EU buildings will still be in use in 2050 and approximately 75% of them are currently energy-inefficient. Assuming most buildings will only be renovated once between now and 2050, failure to mainstream deep renovation in the next decade would lock millions of EU citizens into homes that have undergone extensive works, but are not 2050-ready.

  Government subsidy schemes should be designed in a progressive way, whereby the financial assistance increases with the energy savings achieved. Further, Free Renovation Passports and free technical advice are other tools necessary to help homeowners launch more comprehensive renovation projects.

Geopannel Ecological Insulation

by Geopannel, from Spain

An insulation panel made from recycled textile fibers (80%), 100% recyclable, with very low footprint, and high performance (thermal, acoustic and fire reaction). This technology replaces mineral wool insulation, which requires much higher energy consumption.

Thermal resistance of 1,72 m^2K/W, is 15% higher than wood fiber, cellulose, cork, or hemp with same thickness.

Mattheus

by Isolif, from Sweden

A range of thermal insulation products and a mobile app to automatically identify and isolate all equipment on heat networks. Technicians can identify points of focus and automatically determine the energy savings that could be achieved.

Insulation efficiency of more than 90%, whereas alternatives are less than 40%.

Gramitherm

by Gramitherm, from Belgium

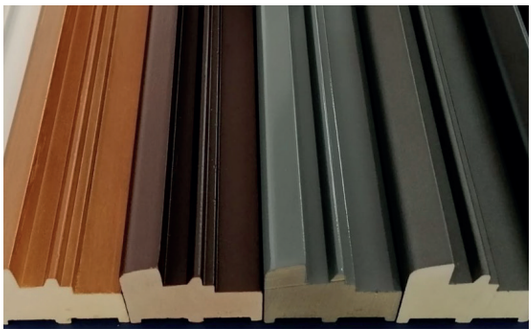
Biobased insulation batts made with grass fibers (upcycling a grass "waste") and providing efficiency against cold and summer heat, humidity, and noise. It is adapted for facade and for roof applications between rafters.

A school that has used this solution has seen a 55% reduction in the consumption of gas and 23% less electricity, and trapped 15 tons of CO_2- eq.

Klima-Pur

by Indresmat, from Spain

Window frame made of a highly insulating bio-polyurethane foam allowing them to remain functional while being highly thermal and acoustic insulating. Repairable and low maintenance as well as easy to recycle.



Consume up to 50% less energy for space-heating and cooling compared to conventional frames, and it costs 20% less than wood framing.

> 1.6 Ventilation

- When devising their national building renovation plans, which are an integral part of their NECPs, member states must ensure that a holistic approach to renovation is pursued. This means **using an appropriate mix of technical solutions that work together to ensure that a highly energy efficient and decarbonised building stock** will be achieved by 2050.

- Highly energy efficient building are well insulated buildings and they are also highly air-tight. As a result, the **inclusion of ventilation systems that ensure a constant supply of fresh air, whilst at the same time limiting heat loss, is essentia**l. Heat-recovery ventilation systems are generally capable of capturing up to 85% of the usable heat from air that is being vented to the outside.

- These systems can be active (using a low amount of energy to operate) or passive (using no energy to operate), but they must all be **designed to ensure high air quality that provides a safe, healthy indoor environment for people to occupy**.

Lepido

by Enjay AB, from Sweden

A self-cleaning, maintenance-free recovery coil, adapted for restaurant ventilation, which prevents clogging up the system and thereby allows restaurants to fully benefit from their ventilation instead of wasting energy.

Payback time expected within 2-4 years, depending on size and operating hours.

Financially viable Green Cooling

by Enersion Inc., from Canada

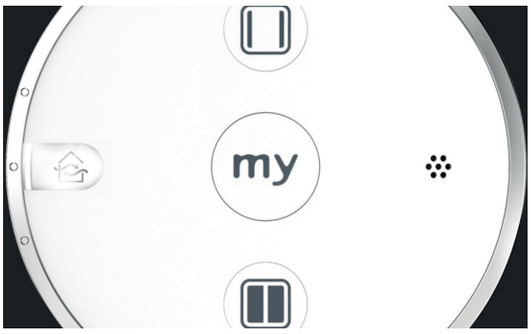
The technology provides cooling by using heat and little electricity. Its strength lies in its ability to utilize low-grade heat (~60 C) instead of electricity as the energy input and water as a refrigerant in a vacuum-sealed system.

70% reduction of electricity consumption compared to conventional solution – representing up to 830 kg of CO_2eq per year for one ton of cooling.

Somfy Air

by Somfy, from France

Provides an automated solution which opens and close windows (securely) even if occupants are not present. The solution has three different levels of natural aeration - manual, sensor-based, or to manage the interior air quality and secured aeration.



Increased interior air quality improves health of occupants (headaches, chronicle respiratory diseases). 1€ spent on renovation brings 0.42€ decrease in public health costs.

SOLVAir(r)

by Solvay, from Belgium

A highly efficient flue gas cleaning solution using a sodium-based sorbent to prevent harmful chemicals being released into the atmosphere and contributing to overcome health challenges.

Generates twice less residue from the flue gas treatment than competing technologies. Applicable from 80°C to 800°C.

> 1.7 Smart Lighting

- **Install LED and smart lighting everywhere**: Lighting is an easy, fast solution to reduce energy consumption. The upgrade of the installation is in most of the cases simply a matter of changing a bulb or replacing the luminaire without any modification to the existing electrical system or building construction. Smart lighting can further bring savings to an already efficient lighting system by switching it off when not needed or dimming to the right light levels benefitting from natural light or adjusting to adequate healthy and safe levels.

  Cities alone spend up to 20% of their electricity bill for roads and streets lighting. The impact on their balance sheet by upgrading their lighting system is huge as LED lighting can save up to 70% of electricity.

  One further step could be the adoption of solar and hybrid solar-powered streetlights. It is also relevant to consider that any immediate saving of electricity by lighting can compensate the growing additional demand for EV charging, thus enabling cities transition to electric mobility.

Lum'In

by Lum'In, from France

Intelligent solar streetlights. The energy produced by the PV modules is stored to be released at night. Ideal for lighting public places as well as roads or private places. Sensors can also capture temperature, humidity, wind strength, pollution, etc.

100% solar energy. The payback varies from 0 to 5 years.

LightFi

by LightFi, from United ingdom

An IoT device using WiFi radio and smart algorithms to count the number of people present in a space in real-time. The device is integrated with the building management system to optimize consumption from lighting.

Average reduction of 3 tCO_2 in 200 m^2, and a RoI within 1 year through energy savings.

Smartec

by Salvi lighting, from Spain

A cloud-based city infrastructure management platform that helps to optimize all connected city services, including lighting. The solution combines hardware (nodes fixed to new or existing infrastructure) and software.

One client expects a reduction of 1,075 KWh to 329 KWh per year per luminary and expected savings of 149 GWh over 10 years.

LCC Retrofit Street

by LCC Licht GmbH, from Switzerland

Made of glass, aluminium and polycarbonate, these bulbs are fundamentally different from LED technology due to their organic coating. The artificial LCC crystals absorb heat to provide more light, making them even more energy efficient.

Saves up to 80% compared to fluorescent tubes and 10% compared to LED.

1.8 Water and Energy Savings

- **Plan and integrate smart management of water systems**. This could reduce the consumption of energy related to the production, treatment and transport of water across sectors including industrial cycles and municipalities. At the level of municipalities, waste water networks and treatment plants hold a great potential for energy savings, heat recovery, recycling, and producing energy from waste with little additional infrastructure investment.

- Impose a **minimum level of performance** for energy and water use in data centers.

- **Capture waste water heat** from showers in residential buildings.

Pure Pilot

by PureControl, from France

Industrial automation and analytics solution for water management, manufacturing and energy optimization. It is deployed by connecting to customers programmable logic controllers and changing in real time the control parameters through AI.

30% reduction of carbon footprint, 10-25% reduction of energy cost.

Hydraloop

by Hydralopp System B.V., from Netherlands

An in-house greywater recycling system which can recycle 85% of mains water. It can be installed like a home appliance that collects bathroom and washing machine water, cleans and disinfects it and therefore saves water by recycling it.

Saves up to 45% on tap water usage, wastewater emissions and water bills.

Flatmate

by Sanura, from Netherlands

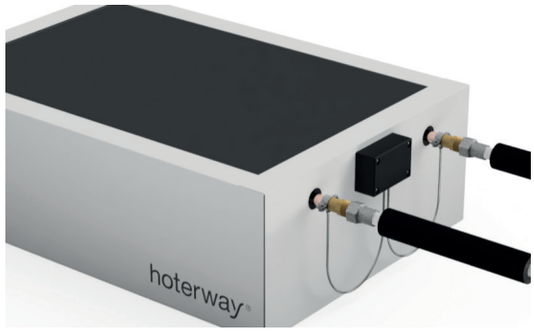
A shower heat exchanger that can be connected to any standard exposed shower faucet within minutes, without need for plumbing works. Specially developed for existing buildings, where conventional shower heat exchangers are difficult to install.

One client expects to save €190,000 and avoid 180,000 kg CO_2 over 15 years.

Hoterway Up

by Heaboo, from Portugal

Storing energy at constant temperature near distribution points, this solution allows for water to be instantly heated, allowing for energy savings of up to 50% for water heating. There is no need for continuous re-circulation which requires significant energy.



Up to 10% less energy consumed in a residential building. Life cycle up to 30 years.

> 1.9 Industry

- Industry accounts for 25% of the EU's energy consumption, and is a major consumer of heating and cooling, which is currently supplied 91% by fossil fuels. **However, 50% of heating and cooling demand is low-temperature (<200°C) for which there are cost-effective renewable energy options**, including through direct renewable electrification, biomass, industrial heat pumps and geothermal solutions.

- Scale up **thermal insulation in industrial boilers, ovens, pipes**, going beyond the level required for safety reasons and process control, can save up to 14 Million Tonnes of Oil Equivalent (MTOE). More importantly, industrial insulation measures have generally a very short payback time, often less than 2 years.

- **Accelerate replacement of electric motors in industry**: Electric motors represent around 70% of the electricity consumption in industry and over 40% in the tertiary sector. There is a significant percentage of operating motors with poor efficiency levels and the potential savings of accelerating replacement rate is estimated at 25 TWh/yr.

- **Optimise water management in industrial cycles** (i.e. cooling tower, steak leak prevention, maintenance of condensers) can also yield significant energy savings that reach on average 2% to 8% energy reduction for individual operation units.

- **Collaborate with industry to tap into the potential of waste heat**: Apart from being a consumer, the industry is also a significant source of excess heat, estimated at 300-350 TWh/year. Only a fraction of that heat is recovered and used for heating buildings.

- **Accelerate the use of energy audits**, especially for SMEs, starting with mandating the application of the recommendations present in the latest audits.

Metron Energy Optimisation

by Metron, from France

An AI-driven platform that analyses all the energy and production data of industrial plants to unlock in real-time new sources of energy efficiency. Using the data collected, the platform virtualizes the factory by creating digital models.

Reduceds energy consumption up to 15%.

VLT HVAC Drive FC 102

by Danfoss, from Denmark

Many mechanical ventilation systems in the existing building stock run at fixed speed featuring low efficient belt-driven fans and low efficient motors. This solution can be installed on traditional motors potentially reducing their energy consumption by 40%.

Can lead to energy cost savings of about EUR 13.5 bn for EU non-residential buildings.

Data Centre Greentech Cooling

by Immersion 4 S.A., from Switzerland

An innovative synthetic liquid coolant solution captures waste heat from data systems without the need for additional external sourcing of cooling, providing data centres with an affordable, sustainable cooling solution.

Up to 80% lower CAPEX and 98% power cooling savings compared to mainstream alternative option.

The Ecostock

by Eco-Tech Ceram, from France

A mobile thermal storage solution that recovers the heat contained in industrial fumes and store it in refractory ceramics. This accumulated heat can either be used as a heating source at constant temperature level (up to 1000°C) or be converted into electricity.

Each EcoStock unit could avoid 1,000 t/CO_2/year, and produce heat at a price up to 80% lower than natural gas.

02

DEPLOY RENEWABLE ENERGY SOURCES

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The RePowerEU plan, presented by the European Commission in May 2022, calls for a massive scaling-up and speeding-up of renewable energy in power generation, heating, industry, buildings and transport to accelerate energy independence, boost the green transition, and reduce prices.

The Commission proposes to increase the headline 2030 target for renewables from 40% to 45% as well as making the renewable heating and cooling sub-target binding.

While the 45% target is still under negotiation, Member States should not delay tapping into the advantages of deploying massively renewable heating, cooling and electricity sources. Apart from the climate benefits, renewables ensure energy security and price stability. Also, one should not overlook the potential of incentivizing the development of a clean industry offering solutions to the climate crisis.

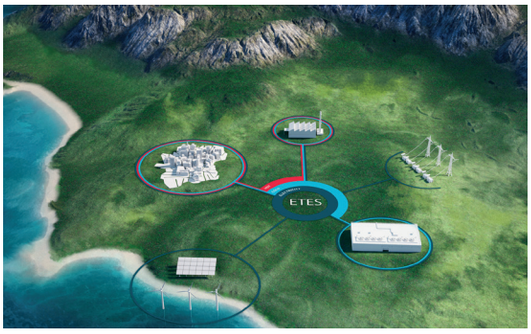
2.1 Renewables in Heating, Cooling and Waste Heat

- **Ban fossil fuel boiler installations** in new buildings and when heating systems need to be replaced in existing buildings.
- **Phase-out fossil fuels in public buildings**.
- Promote the **replacement of fossil fuel heating systems in existing buildings:** evaluate the amount of existing heating oil systems, set a replacement target and set up a direct subsidy programme in place.
- Impose **mandatory integration of renewables** in buildings.
- Establish fiscal incentives such as 0% VAT on equipment and installation of renewable heating installations or shift taxes and levies from the electricity to the fossil fuel bills.
- Increase efficiency of heating systems by **replacing steel or copper pipes with insulated pipes** and where possible, **convert plants generating either heat or electricity only to cogeneration.**
- Support the **transition from small heating systems fueled with fossil fuels to either small automatic appliances (stoves or boilers) fueled with pellets, district heating using biomass and other renewables, or any other renewable heating system**. Such transition to modern technologies will increase the energy efficiency of the heating sector and improve air pollution due to very low emissions of such technologies.
- Accelerate the **recovery and use of waste heat from both industrial and tertiary sources**, such as metro stations, data centres, supermarket refrigeration.
- Where applicable, implement measures **favouring solar water heaters, heat pump water heaters and waste-to-energy plants.**
- Set up rural **support programmes for farmers and small businesses**.
- Encourage and **incentivise the extension of existing cooling equipment with additional heat exchangers and heat pumps** to make use of otherwise wasted energy.

MAN Electro Thermal Energy Storage

by MAN Energy Solutions CH AG, from Switzerland

A tri-generation energy management solution for simultaneous storage, use and distribution of electricity. Through a heat pump system, it provides an intermediate link to balance supply and demand of various forms of primary and secondary energy.



Up to 80MW thermal per heat pump unit, and can avoid 100,000 tons of CO_2 compared to a coal-powered CHP plant.

NovaAir Heat Pump

by Regli Energy Systems AG, from Switzerland

An air-water heat pump that significantly cuts lifetime emissions in the building sector. It runs on the natural refrigerant propane instead of widespread synthetic refrigerants - 700 times lower emissions than those of refrigerants in conventional heat pumps.

Saving approximately 8.5 tons of CO_2 per year compared to conventional large scale heat pump.

Solar Cooling

by Sustain'Air, from France

Using the Dessicant Evaporative Cooling principle, the solution cools incoming outdoor air from 34°C to 18°C using solar heat and water (when dry air is humidified, its temperature drops). No need for an electrical compressor, heat pump, nor refrigerant gas.

Reduces CO_2 emissions by up to 60%. Natural air-conditioning powered by solar heat.

Thermo-acoustic Engine Heat Pumps

by Blue Heart Energy, from Netherlands

An engine that uses sound-waves to create a temperature difference and that replaces the cold circuit in a heat pump, reducing the costs and making them suitable for use in existing homes. Noises are reduced while the toxic refrigerants are no longer needed.

Almost no moving parts and does not require maintenance, with a 15-year lifetime, it is suitable for every type of building.

> 2.2 Renewables in Industry

- European industry has enormous potential for decarbonisation, particularly in sub-200°C temperature ranges – half the heat consumed in industrial processes.
- Set up a national **target for renewable process heat**.
- **Member states could define individual mandates for companies to incorporate a higher percentage of renewables in their heat demand**, for instance 5% by 2025 and 10% by 2030. The use of Heat Purchase Agreements (HPAs) shall be enhanced, in parallel to Power Purchase Agreements (PPAs), considering also heat as an element of the Guarantees of Origin. The decarbonisation of the EU industrial sector requires that this be made also a priority for RD&I.
- Develop **exempt heat tariff or a heat-guarantee price** to create investment security.
- Set up an adequate **compensation for flexibility and grid-serving services**.
- Implement industry clusters for low-threshold joint development of heat potentials and for **greater acceptance of the use of renewable heat and waste heat**.
- Promote **demonstration projects to showcase solution options**. With the aim of accelerating the market ramp-up, the focus should be on ensuring that the technology can be implemented and function quickly on an industrial scale.
- Introduce an **innovation bonus** for innovative technologies to reduce CO_2 emissions. The CO_2-abatement costs, for example, could be used as a criterion for this.
- Establish **a pool of consultants for application and system-oriented consulting**. In the industrial segment, there are no one-size-fits-all solutions - a considerable challenge for the industry in identifying a suitable combination of technologies.
- **Promote the development of solution concepts for individual industrial sites** and companies through free, proactive consultation in the form of funding/design checks.
- Support setting up an industrial ecosystem that can serve as an accelerator for the **development of a European value chain for renewable solutions**, ensuring R&D, components and skills are ready for fast deployment.

TurboSol

by Hevatech, from France

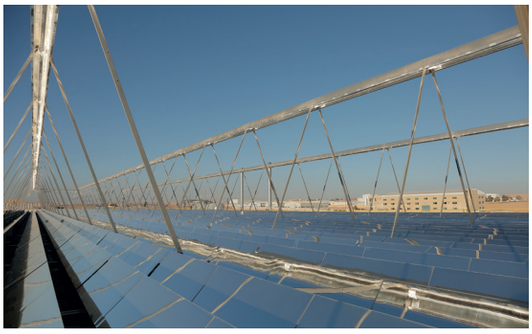
This system converts waste heat from burning processes (+300°C) into electricity. A mixture of vegetable oil and vapour is propelled at high velocity onto a turbine which, coupled to an alternator, enables electricity production.

A 800 kWe system installed in a cement plant can reduce by 33,000 m^3/year the use of refrigeration.

Fresnel Solar Steam Generator

by Industrial Solar GmbH, from Germany

Solar collectors which concentrate sunlight to produce steam up to 400°C, covering a large share of the industrial heat demand for various processes. The solution is modular to increase the power output according to user needs.



1 KWh generated = 216 g CO_2 avoided.

Efficiency Pack

by Orcan Energy AG, from Germany

Based on Organic Rankine Cycle principle, the evaporator transfers heat into the efficiency PACK, pressurizing fluid which is heated and then routed to the expansion machine. The vaporized fluid drives the expansion machine, producing electricity.

Can save around 750 tons of CO_2 per year, payback time of 2-4 years.

Qpinch Chemical Heat Tranformer

by Qpinch, from Belgium

This solution captures residual heat from 40°C and up, transforming it to new process heat with temperature increases of up to 100°C. It requires only marginal electrical energy consumption and can pay for itself in less than five years.

2,200 tonnes CO_2 savings per MW thermal energy output, compared to natural gas steam production.

2.3 Renewables in Transport

- Support local urban and rural authorities to **develop additional cycling infrastructure** (lanes, bicycle parking…) as soon as possible.

- **Scrappage mechanisms** to replace polluting cars with electric bikes can for example be a complementary measure to encourage soft and clean mobility.

- Set targets for smart Electric Vehicle (EV) charging: all existing **non-residential buildings should be ready for smart EV charging** by 2035, with intermediate targets for 2025 and 2030.

- Increase the Electric Vehicle ambition by **setting the target of EV parking to one in five parking spaces in large non-residential car parks**. This is all the more important given REPowerEU proposals to increase the number of EVs and to green large corporate fleets.

- **Channel the Innovation Fund toward the roll-out of smart EV charging at private level**, for both residential and non-residential buildings.

- Prescribe smart functionalities in EV charging stations such as:
  - connectivity features.
  - **bi-directionality components**, giving the vehicle the ability to interact with an electrical energy network or a local energy network (**Vehicle-2-Grid**).
  - **a minimum level of control**, such as shifting the start time of charging in response to price signals; intermittent recharging; or recharging with power modulation to optimize the use of those distributed energy resources.

- Increase **mandatory biofuel blending**. For example, implement or expand the distribution of E10 (ethanol at 10% in gasoline) and E85 as renewable fuel produced from sustainably grown crops, wastes and residues.

- State support to consumers for **vehicle conversion.**

- Permitting **support for exploration and sustainable extraction of lithium in geothermal wells.**

CMF Drive

by Cm Fluids, from Germany

A process for upcycling old diesel buses powered 100% by renewable biomethane fuel with a patented generator-electric drive (GEV). The combustion engine serves as an on-board charger while the fuel tank for liquid biomethane has a range of 800 km.

30% more energy efficient than conventional buses, and extends the vehicle lifetime by 12 years.

EcoStruxure EV Management System

by Schneider Electric, from France

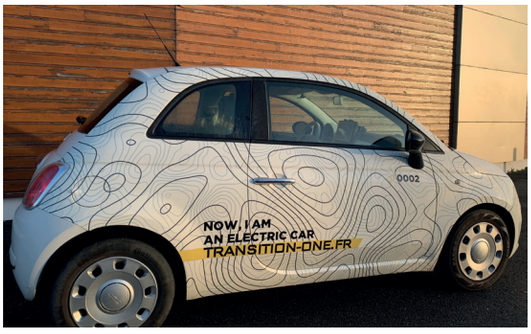
Smart system to manage EV charging while ensuring power availability in buildings, and eliminating the need to upgrade the transformer or electrical equipment. When electricity demand is likely to exceed the supply, the system will redistribute the current.

Less than 10% of the cost and implementation time of an ordinary power grid upgrade.

Transition-One

by Transition-One, from France

A vehicle retrofit process replaces the internal-combustion engine with an electric powertrain. The generic architecture means it can be integrated on many ageing vehicle models with only a few vehicle-specific parts required.



New electric car reduces CO_2 emissions by 47%, a retrofitted car reduces CO_2 emissions by 66%.

Smatch

by Engie, from France

The EV charging solution optimizing local and global energy profiles. The system is capable of responding to specific needs of the grid operators by raising/reducing the charging speed, or even injecting energy on the grid (also called Vehicle-2-Grid).

Is able to reduce by 15-22% the charging power peaks in a city, with charging sessions only 5% longer on average compared to the classical, non-smart situation.

> 2.4 Waste to Energy plants

- Promote **the waste hierarchy as the enabler of sound waste management policies:** prevention, re-use, recycling, recovery and disposal. Waste-to-Energy should only be competing with landfilling for residual waste

- Promote the role of **Waste to-Energy as the preferred treatment option for residual waste**. Technological progress allows Waste-to-Energy plants to recover massive quantities of metals and minerals from the generated residues. Some Member States even require that 100% of the mineral fraction of these residues be recovered.

- **Minimise the amount of landfilling** to the amount strictly necessary. For that purpose, mandatory disposal reduction targets as well as restrictions on landfilling for several waste streams should be implemented as early as possible.

- **Recognise Waste-to-Energy as a sustainable waste management option**. An appropriate and sustainable interaction of different waste management options, compatible with the local conditions, must be carefully designed and executed. This can only be done through sound planning of treatment capacity, including for residual waste that cannot be recycled. In many Member States, such planning will uncover capacity shortages for the treatment of residual waste. Therefore, it is important that public and private finance remains available for the creation of integrated sustainable waste management systems, for which the waste hierarchy remains a key guide.

Waste Transformers

by Waste Transformers, from Netherlands

This containerized Plug&Play waste transformer solution processes between 500 kg to 3,600 kg of non-consumable organic waste per day and converts it into biogas for electricity, residual heat, recovered water and organic fertilizer.

1,000 kg organic waste turned into 840 litres of organic fertilizer to replace artificial (oil-based) ones. Also, no CO_2 emission from trucks transporting organic waste to landfills.

Treatech

by Treatech Sàrl, from Switzerland

An innovative technology for the valorization of waste. It transforms waste into local, contaminant-free methane-rich gas and clean water while recovering valuable minerals creating a positive impact on circular economy, energy independence and climate change mitigation.

The technology produces energy at prices as low as 30 U$/MWh compared to other gas producers (Anaerobic Digestion US$>100; Pyrogasification US$>120; Power to Gas US$>200).

PAG – Plasma-Assisted Gasification

by Boson Energy S.A., from Luxembourg

A clean energy recovery technology that transforms non-recyclable waste such as medical waste and other hazardous waste into hydrogen power, heat or greenhouse-gas-free thermal cooling for direct local use – without toxic residues or urban stress.

Treats 8,000 – 16,000 tons of medical or hazardous waste per year. Output of 100 kg of clean, local and affordable hydrogen per ton of waste.

The Patented Plagazi Process

by Plagazi AB, from Sweden

A process that converts all types of waste (e.g. auto-shredder residue, contaminated plastic, hazardous waste and medical waste) into green hydrogen through plasma gasification. The process is fully enclosed and doesn't produce any dangerous by-products.

For one project, integration of this solution is expected to eliminate up to 175,000 tons of CO_2-eq emissions per year.

> 2.5 District Heating

- **Promote the roll out of renewable district heating and cooling networks in cities**.

- **Modernize and accelerate deployment** of renewable district heating networks.
  - Increase **energy efficiency of district heating infrastructure** through renovations and replacement of old heating systems.

  - **Insulate pipes in district heating**. By installing new pre-insulated pipes, redesigning and digitalising the distribution system, it is possible to halve thermal losses and reduce energy consumption. Furthermore, current design principles and pre-insulated pipes enable the transportation of industrial surplus heat and hot water (86C) over 20 kilometres with a temperature drop of less than 1 degree Celsius. This makes it possible to tap into the potential of excess heat from industrial sites, data centres and commercial activities to use on the industrial site or to inject into district heating where applicable.

  - Modernise the district heating network - **Mobilise EU financial support for investmentsin the development of new regional district heating networks and the renovation of existing networks** in municipalities with an existing or planned heat grid intensity of more than 2 MWh/m.

  - **Implement appropriate metering and billing systems** to ensure fair and accurate distribution of heating and cooling costs among users.

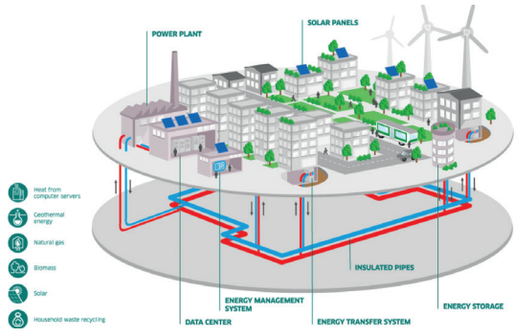
  - Develop **economic incentives for final consumers to connect** to the district heating network.

  - Develop **support schemes and risk-mitigation tools for industrial and commercial excess-heat recovery (infrastructure); geothermal and solar thermal (production, integration) and infrastructure modernization.**

Sustainable cooling

by Engie, from France

Global demand for AC will triple by 2025. District cooling is more energy-efficient than traditional cooling solutions, more cost-effective for customers, and it reduces peak power requirements. It also integrates well with solar and other RE technologies.

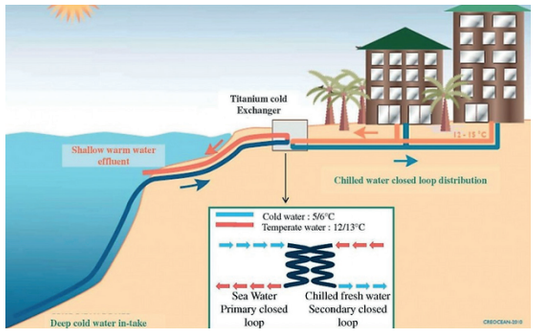


Lifecycle cost reduction of 10% compared to conventional cooling.

Sea-Water Air Conditioning

by Pacific Beachcomber, from French Polynesia

A solution to considerably decrease the AC energy needs using the natural cold temperature of the seas and oceans to cool an AC loop, releasing seawater back to the source with no environmental impact.



This system permits to save about 42% of energy comparing to a conventional AC system.

Energy Geostructures

by Geoeg, from Switzerland

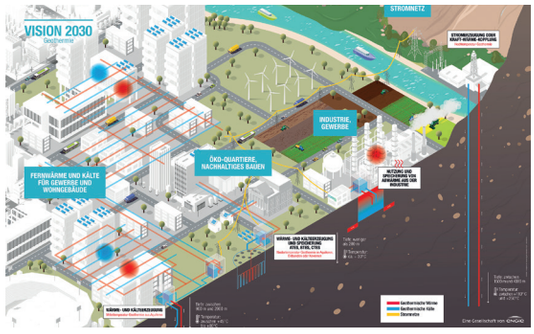
Heat and cool urban districts using integrated geothermal heat exchangers. The structures serve as heat source/sink for ground source heat pump (GSHP) systems to provide heating (space and domestic hot water) and cooling to the surrounding environments.

Opportunity for foundations and underground infrastructures to serve a dual purpose. Reduces environmental impact by up to 60% compared to gas boilers and air conditioners.

Targeo

by Storengy, from Germany

Providing a digital interface for a building-specific analysis of its geothermal potential and giving the CO_2 emission per building and the CO_2 saving per simulation. The technical solution is cold district heat or a system of ground-sourced heat pumps.



Replacing every gas heating system in Germany with a geothermal system would save 60 Mt of CO_2/year.

> 2.6 Biomethane

- Where applicable, develop **an overall vision for the role of biomethane in the national energy system and economy** for the time horizons 2030 and 2050, as mentioned in the Biomethane Action Plan (Action 1.2).

- In Member States where the biomethane market is nascent or does not exist, launch first actions as soon as possible to **kick start the market and develop biomethane production in the short term based on immediately accessible feedstock**.
  - **Introduce a 'right to inject' policy.** Introduce a regulatory framework granting all biomethane plant operators the right to connect to the gas infrastructure and inject their production directly into the grid.

  - **Ensure measures to stimulate feedstocks are coherent with broader energy, agricultural, waste and environmental policies.**

  - Set up a robust system to **monitor biomethane production**.

  - Set up a **national biomethane registry** with guarantees of origin (GOs). Enable robust and transparent traceability and accounting of biomethane production and consumption via a national biomethane registry.

  - **Promote the use of Renewable Gas Purchase Agreements (GPA)**. Similar to Power Purchase Agreements (PPAs) in the power market, GPAs provide revenue certainty to biomethane producers and result in lower government spending.

- **Ensure sustainable feedstock**:
  - In accordance with the Biomethane Action Plan, unlock fundings for agricultural research to provide guidelines on sustainable approaches to sequential cropping for different regions. This will **enable clarity for farmers to set up new cultivation practices to leverage more feedstock potential**.

  - **Leverage industrial sources of waste organic feedstock (biowaste, wastewater)**.

  - Leverage waste-based feedstock. **Unlock additional feedstock with the Revised Waste Framework Directive which requires a separate biowaste collection or recycling at the source by 31 December 2023** (Directive 2018/851/EU,§10).

Wagabox

by Waga Energy, from France

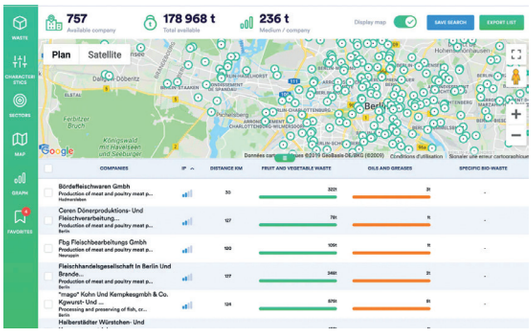
This solution extracts methane from landfill gas using a process combining membrane filtration and cryogenic distillation so that it can be injected in gas grids as a substitute for fossil natural gas. The result is 98% pure, grid-compatible biomethane.

A landfill site can supply 3,000 households therefore saving the emission of 4,000 tons/year CO_2-eq.

iNex Sourcing

by iNex Circular, from France

The first European platform for the implementation of the circular economy between industries, it is a digital detection tool built on a predictive waste detection technology designed to improve the efficiency of supply to recyclers and biogas producers.



4,000 times faster than a traditional manual analysis.

Bioreactor BioRenGaz

by BioRenGaz, from France

A modular and patented anaerobic digestion bioreactor to treat bio-waste that is 4 times more efficient and much more compact than conventional biogas plants thanks to vertical silo design. The system is modular, so can easily be expanded as needed.

A surface area reduction of up to 90% compared to conventional digesters (CSTR).

BiON – Biological Methanation

by Viessmann, from Germany

Long term storage technologies are one of the main challenges in the transformation of our energy system. This power-to-gas technology process converts wind and solar power into Hydrogen and then to pure renewable methane.

100% renewably produced gas, 97% methane product gas quality, 100% storable and reusable in the gas grid.

> 2.7 Wave and Tidal Energy

- Where applicable, develop a national strategy for wave and tidal energy.

- Set up **national targets for wave and tidal energy to give market visibility**. Targets for the development of ocean energy will give the necessary market visibility to convince those large actors to invest early on into riskier projects.

- **Enhance support for R&D and prototype projects**, which aim to test components or devices and do not generate revenue. Grants are the only way to finance them. Grant programmes should be awarded via a series of competitive calls, covering up to 100% of the cost. The calls should target improvements in devices, components, and sub-systems, and be assessed according to clear metrics and standards.

- **Develop Demonstration and pre-commercial farms**: Grants never cover 100% of the project during this phase. A blend of financial instruments and revenue support is needed to finance demonstration and pre-commercial farms, including:
  - Grant funding to reduce the total financing requirement and cost of finance.
  - Public-supported equity and loans to improve access to capital, lower cost of finance.
  - Insurance and Guarantee Fund – to cover technical risk, reduce financial exposure and allow private investors to fill the remaining financing gap at lower cost.

- **Revenue support to allow demonstration and pre-commercial projects to reach financial closure** and hit the water. Revenue supports are needed to finance OPEX and the cost of capital (interest from debt and dividends) which is a heavy burden for developers (often 50% of cost of the project).

- **Support the phase from Demonstration to industrial roll-out**: demonstration and pre-commercial projects are generally project-financed. Grants only cover a portion of overall project costs, decreasing as technology becomes more commercial. Innovative projects such as ocean energy cannot attract debt or equity if they are not making a return.

- Improve licensing and consenting procedures to bypass major bottlenecks: Simplify and shorten procedures, identify pre-consented sites for tidal and wave energy.

- Include wave and tidal into National Marine Spatial Plans.

Tidal Stream Turbine

by Sabella, from France

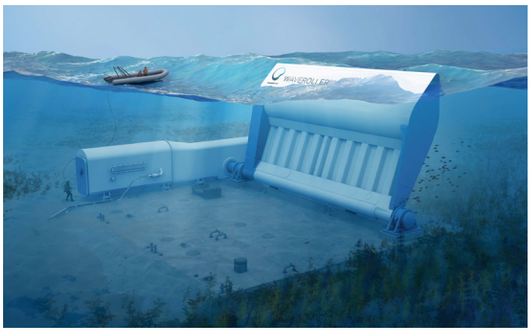
A turbine harnessing tidal current energy, especially useful for off-grid island communities with fossil-based energy. Coupled with wind, solar and an energy storage system, it is 5-10 times more competitive than fuel-based models.

For remote communities, relative to a 1.5 MW wind turbine + storage energy system, a 1.5 MW tidal hybrid system saves £6.4 m on oil expenditure over the 25 year life of the project.

Waveroller

by AW-Energy Ltd, from Finland

Modular electricity generation from wave power, operating in near-shore areas (0.3-2 km) at depths of 8-20 metres. As the panel moves and absorbs energy from waves, a hydraulic piston drives electricity generation, whose output is connected via a subsea cable.

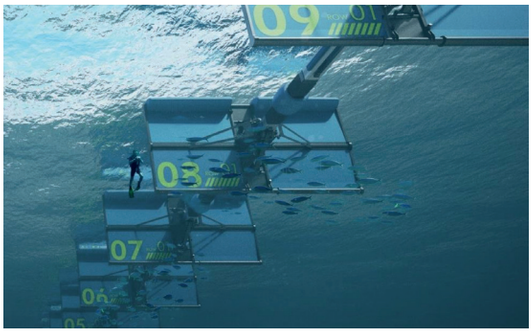


Emissions intensity of just 34g CO_2/KWh, 30% less than solar PV installations.

Wavepiston

by Wavepiston, from Denmark

Harvesting wave energy for conversion to power and/or desalinated water. Multiple energy collectors consisting of a pump and a plate are attached between two anchor points that move back and forth when waves pass by, ultimately powering the system.



+90% reduction of CO_2 emission replacing fossil fuels.

Eco Wave Power

by Eco Wave power, from Israel

Near-shore electricity from waves. This is done through floaters attached to any man-made structure on the shore line which rise and fall with the motion of waves. This movement is converted into fluid pressure that spins a generator, producing electricity.

Zero emissions from operation, and with a RoI in 3-6 years. It avoids over 2,500 tonnes of CO_2 per MW, compared to fossil fuel use.

> 2.8 Solar Installation

- **Implement the EU Solar Mandate** and set up a high target on NECPs that reflects the potential of solar. The solar standard for new and renovated non-residential buildings (large roofs, commercial, industrial, public buildings) will enter into force with the implementation of the Energy Performance of Buildings Directive.

- **Set up accelerated deployment programs for buildings, such as a Solar Rooftop Program**. Develop a framework programme to be deployed that allows for the large scale and fast deployment of solar energy, solar thermal and/or solar PV on European rooftops. This programme shall promote the adoption at national level of solar obligations, including the use of solar (thermal or PV) and green-roof solutions in new buildings and large renovations and prioritise the use of solar thermal for domestic hot water preparation. Can be complemented by flanking measures, such as facilitating permitting, installation and decision within co-ownership associations.

- **Set up a solar installation campaign on all suitable roofs to provide solar thermal and/or solar electric energy.** Installation on flat roofs of large buildings should be mandatory and supported financially to trigger large investments.

- A clear timeline to install solar on all non-residential buildings. This should include binding milestones and measures to achieve the objectives. This will facilitate sustainable growth for the solar industry.

- Installations up to 50 kW should benefit from simplified permitting procedures - permits should be granted following notification to the municipality, instead of waiting for approval.

- The presumption of **overriding public interest for solar installations**. This presumption should go hand in hand with a careful spatial planning where needed and a preservation of protected areas.

- The principle of **tacit agreement** in case of no reply by administrations - paramount to provide certainty to the investors and ensure that the deadlines are met.

- The accelerated procedure for solar assets on **artificial structures**, the simple notification procedure and the exemption from building permit for small-scale projects. Artificial structures are no-regret options with fast installation times.

Ecomesh Hybrid solar panel

by EndeF, from Spain

This solution is capable of producing electricity and heat simultaneously, by acting like a traditional PV but also recovering the heat lost from both the front and back of the panel itself, thus achieving higher electrical and thermal output per square meter.

Increase of electricity production by 15%, with a reduction of surface area required by 40%.

Agrivoltaic

by Ether Energy, from Belgium

Ether Energy provides local green energy to industries and SME by developing photovoltaic and agrivoltaic solutions.

1% of current farmland in Belgium would be needed for agrivoltaics to meet 19% of Belgium electricity generation.

Altivar 312 Solar

by Schneider Electric, from France

Operating pumps with solar photovoltaic (PV) for agricultural purposes poses challenges. This solution provides a variable speed drive for pumps with PV arrays for people with limited or no access to grids.

Reduces fuel consumption by 60% compared to mainstream alternative.

Hydrelio

by Ciel and Terre International, from France

A floating system for solar plants to be installed on inland water bodies and make better use of these areas. Further, the technology reduces solar exposure of water, therefore limiting water evaporation and also reducing algae growth and eutrophication.

Saves valuable land like natural areas or fields and is no danger to existing ecosystems.

2.9 Concentrated Solar Thermal (CST) Technologies

Concentrated Solar Thermal (CST) is a mature technology that concentrates sunlight onto a receiver to generate heat. CST can provide strategic solutions for the energy transition, such as **24/7 dispatchable electricity, industrial process heat** (up to 1,500°C) or **even green hydrogen and other solar fuels.**

Concentrated Solar Power (CSP)

- **Renewable electricity auction design should include elements concerning firmness, security of supply and system integration** to capture the market welfare increase that a non-intermittent and synchronous production like concentrated solar power (CSP) can help realise. On the other hand, hybridization (like combined CSP+PV plants) is also key to achieve minimum electricity cost with round the clock dispatchability.

- To ensure the strategic autonomy of the continent, **thermal energy storage of the CSP plants should be recognised as the safest, locally sourced alternative to the batteries.**

- **Recognise CSP as complementary to intermittent RES such as PV and on-shore wind**, providing the necessary CO2-free backup to increase their share in the electricity generation mix.

Concentrated Solar Heat (CSH)

- **Accelerated deployment programs**, including revolving funds aimed at innovative CSH integration in industrial processes, as well as programs to demonstrate the integration of CSH in a new range of industrial processes for medium and high temperatures.

- **Create national mandates for companies to proactively incorporate a higher percentage of renewables, such as CSH, in their heat supply**, enhancing the security of supply, at foreseeable and competitive costs. This measure will contribute to reach the target of RES in industry foreseen in the revised Renewable Directive.

- **Set up instruments aimed at de-risking investments from industrial companies on in-loco renewable heat supply**, including CSH, to accelerate the deployment of such solutions, while facilitating and shortening the financing negotiation period.

Solar Fuels

- Facilitate the development and deployment of **innovative CST applications for the production of hydrogen and solar fuels**. includes financing R&I actions aiming to **evolve new solutions from medium TRLs to demonstration and market entry stages**.

Concentrated Solar Thermal Solution

by Azteq, from Belgium

Parabolic mirrors concentrate solar irradiation on a collector, generating temperatures up to 400°C. The thermal oil running through the collector tube is piped into a heat exchange unit, generating steam or heated thermal oil depending on customer applications.

The parabolic system take 4 times more energy from the sun than a PV system. All components can be recycled.

Absolicon T160

by Absolicon Solar Concentrator, from Sweden

Highly efficient for a small parabolic trough (less than 2 m), over 76% of the direct solar radiation is converted to heat, the result is heat and steam up to 160°C that can be used in industries, district heating or solar cooling.

A solar thermal system can provide energy at $11/MWh to $45/MWh, 3-5 years payback time.

CSMED

by Low Impact Technologies, from USA

Uses solar thermal energy to process water from a range of sources including agriculture, industry, mining or municipal wastewater, brackish bore and hyper-saline water, which can then be reused, even as drinking water, taking pressure off freshwater sources.

Each CSMED unit can supply around 10,000,000 litres of distilled water p.a to where there is need from otherwise unusable sources, reducing stress on available fresh water sources.

Heliac Solar Thermal

by Heliacl, from Denmark

A low-cost method for producing transparent lenses that work like magnifying glasses. Each collector is 20 m^2 and rated at 14 kW, and integrates into existing systems that produce heat for industrial processes, allowing the user to choose based on conditions.

The solar collectors are 99% recyclable and can be manufactured from 90% recycled materials. RoIs of 3-5 years for project developers.

> 2.10 Storage

- **Illustrate the uptake in national legislation of the storage provisions from the Clean Energy Package**, including on the definition of storage, the removal of double charges, the possibility of stacking different services, the storage ownership rules for system operators, and so on. If such provisions have not yet been implemented, the NECPs should include a list of planned corrective actions to address this.

- **Set an objective in terms of power and thermal storage capacity to facilitate the integration of renewables.**

- Develop Clean Flexibility Plans to evaluate flexibility needs and establish a support framework for short- and long-term flexibility. A well-functioning support framework includes improving the rules on the provision of system services such as firmness, frequency services and redispatching/congestion management. **Clean Flexibility Plans should set national storage targets ensuring that the energy system is well equipped to meet energy demand with green electricity most times of the year.**

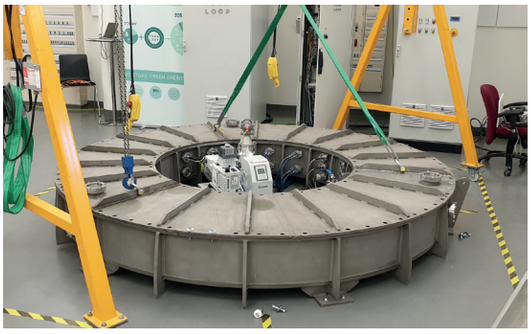
- **Roll-out of thermal storage capacity.** Introducing financial support to the installation of modern thermal storages (able to integrate different thermal sources) and introducing references to storage capacity in building regulations.

- **Promote storage through hybrid RES auctions and other financial support schemes**. These include CAPEX and OPEX remuneration mechanisms, capacity markets, and other support schemes that specifically target RES technologies and provide indirect incentives to storage.
  - **Italy**: a scheme to provide long-term remuneration to storage capacity meet RES targets for 2030. Projects typically have up to 4 years to be built and receive capacity payments for up to 15 years.
  - **Greece**: a measure to support the construction and operation of 900 MW storage facilities in the electricity system. The mechanism provides annual operational support payments to mitigate market risk exposure.
  - **UK**: An annual scheme with a 4-year delivery lead time. Capacity is awarded with a fixed price contract and a duration that ranges from 1 to 15 years.
  - **Spain**: Connection capacity auctions provide an indirect incentive to storage uptake. To secure connection, RE projects must score highly with around 20% of the points related to the project having storage sized up to 5% of its capacity.
  - **Czechia**: CAPEX subsidies to RES projects are available and projects are selected via a multi-criteria point system, based on cost-efficiency and technical aspects. Co-location of storage in solar and wind projects provides extra points.

Teraloop Hubless Flywheel

by Teralopp Oy, from Finland

Energy storage for ultra-fast EV charging and micro-grid retrofitting. Flywheels have demonstrated advantages such as high energy efficiency, high durability and high power density, making them ideal for applications requiring heavy cycling.

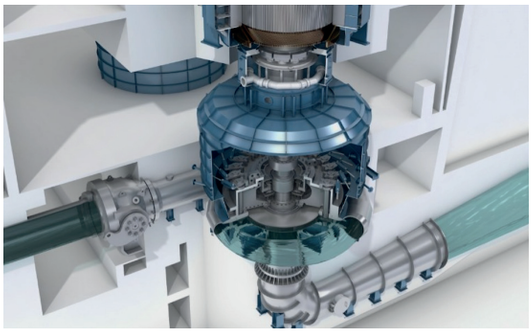


Cradle-to-grave energy consumption 96% lower than a lithium battery.

Pumped Hydro Storage

by General Electric, from France

Pumped hydro storage plants serve as giant water batteries, storing energy using a system of two interconnected reservoirs with one at a higher elevation than the other, providing great reactivity to serve base-load energy needs in a sustainable manner.

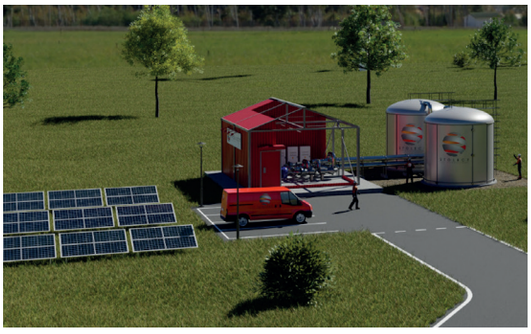


Pumped Hydro Storage capacity is 100 times higher than that of any available battery solution.

Stolect Carnot Battery

by Stolect, from France

A battery that stores electricity by heating refractory materials such as basaltic rocks or recycled ceramics using turbines and compressors that circulate air in a closed circuit. It is not dependent on critical materials and can be installed anywhere.



A single charging cycle of the system avoids the emission of more than 1 tonne of CO_2 in the atmosphere when compared with diesel generators.

ELSA

by Bouygues, from France

An electrical lithium-ion storage assembled using 2nd life electrical vehicle batteries for stationary application in buildings. The storage can be less expensive than a storage with new batteries all while delivering the same services.

30 to 50% less expensive than a new battery with the same characteristics.

> 2.11 Geothermal Energy

- **Where applicable, geothermal energy should be promoted.** It provides baseload heating, cooling, electricity and the most sustainable means of extracting lithium as well as other minerals. The International Energy Agency and ADEME, the French energy agency, found that geothermal district heating and geothermal heat pumps are the cheapest forms of heating and cooling.

- The EU committed to **tripling the capacity of geothermal by 2030, to install at least 30,000 hydronic geothermal, an air-source heat pump, and introduced emergency measures to fast-track the permitting process for geothermal heat pumps.**

- **Traffic light system for permitting of geothermal heat pumps**: Member States or Geological Surveys should identify areas where a simple notification is required prior to install, where a permit is required and where installations are not permitted.

- **Set up Heat Purchase Agreement (HPAs)**: These are an efficient financial de-risking mechanism for the design, construction, building or heat networks and supply of geothermal heating and cooling. It requires agreement of a long-term supply contract (20 years or more), at set price ranges. It has been used to decarbonise towns and cities in France as well as public buildings such as local government buildings and even agriculture users.

- Local authority renewable heat planning: EU institutions have provisionally agreed to support local authority renewable heat planning for regions with greater than 35,000 inhabitants in the new Energy Efficiency Directive. **Recommendation that geological surveys provide maps or undertake geothermal heat assessments to all regions with over 35,000 inhabitants to aid local authority heat planning.** The plans should be based on local renewable resources to ensure low-cost heating and cooling for local citizens, businesses and industry. For example, the geothermal district heating systems in Szeged in Hungary and Ferrara in Italy reduced heating prices for consumers this winter due to the low operational cost of geothermal.

Geothermal Panel

by Enerdrape, from Switzerland

Heat exchangers using scalable, modular geothermal panel technology to provide a new source of heat/cold for heat pumps, turning any new or existing underground infrastructure into a renewable source for the heating and cooling of buildings.

1 panel can produce up to 150 W of thermal energy permanently throughout the year.

Celsius Energy

by Celsius Energy, from France

A drilling and installation service for geothermal energy for heating and cooling of new and existing buildings. Its unique characteristic is its applicability in dense urban environments, minimizing its physical footprint without compromising on capacity.

Reduces CO_2 emissions by 90%, and captures energy savings up to 60%.

Accenta

by Accenta, from France

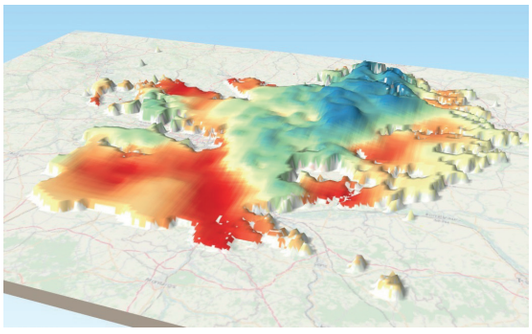
A hybrid system composed of geothermal probes and aerothermal heat pumps. Using AI to anticipate the needs of the building and factor in the impact of weather, the system optimizes operations to ensure the lowest possible energy consumption and costs.

-77% energy consumption and -87% CO_2 compared to a standard solution using gas and chillers.

Geosophy

by Geosophy, from France

Software using machine learning techniques to automate and refine feasibility studies of geo-energy installations. Geosophy assesses the potential of buildings based on their location to determine the potential of each site.



Models estimated savings at -90% CO_2 compared to gas & -50% compared to standard electrical heat pumps.

> 2.12 Wind Energy

- Targets. Europe wants wind energy to generate 43% of its electricity demand by 2030, up from 17% today. **Member States should ramp up the wind energy targets they pledged collectively in their NECPs in 2020 to meet this new target.**

- Auction schedule. **Member States should give at least three years' visibility on auctions.**

- Permitting. **Member States need to simplify and accelerate the permitting of wind projects**, and follow governments such as Germany that are leading the way, having doubled their rate of new onshore wind permits compared to three years ago, and their average permitting time has dropped to two years.

- Competitiveness. **Member States should spell out their strategy to preserve the industrial leadership of wind in Europe**. Europe's wind energy supply chain continues to struggle with low volumes (due to permitting bottlenecks) and inflation in input costs. The EU Net-Zero Industry Act **should make state aid rules more flexible and facilitate grants and finance for investments in new plants and infrastructure**. Investments to expand grids, ports, roads, vessels, access to raw materials, and new production facilities are needed. **National investment tax credits are key**, and the EIB should be allowed to finance individual plant investments.

- Investment certainty. **Member States should provide investment certainty in the revamped EU electricity market design**. In 2022, not a single offshore wind farm reached final investment decision. Wind turbine orders fell by 47% on 2021 to 11 GW.

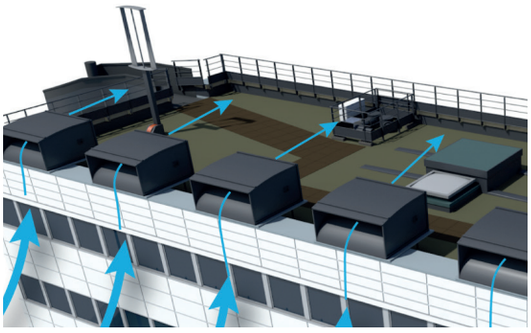
- Wind investments are falling due to inflation in input prices which is insufficiently reflected in developers' revenues. Higher commodity and other input costs have added 25-40% to the price of turbines, but wind farm developers are often stuck with a revenue base that is not properly indexed. **Member States must fully index their auction prices and tariffs.**

- Unhelpful interventions in electricity markets by national governments have badly undermined investor confidence. **The upcoming Electricity Market Design reform must restore it, clarifying that emergency measures are temporary and must be aligned between Member States**. Revenue caps must not become a permanent piece of the market design. And while Contracts-for-Difference will play a key role for new investments, **investors must also be allowed to finance their projects with Power Purchase Agreements (PPAs) and on a purely merchant basis**.

Windbox

by Wind my Roof, from France

Exploit the wind that travels up the facades of buildings to capture a maximum amount of energy. Thanks to its modularity, it enables the multiplication of production sources to obtain significant electrical production, comparable to that of solar PV.



A WindBox can produce as much electrical energy as ten square metres of solar panels.

Powercone

by Powercone, from Canada

This solution improves the power curve of wind turbines for greater efficiency and therefore makes wind power profitable in lower average wind conditions and thus applicable in more places.

Enables wind turbines to produce around 10% more power, while reducing loads and noise.

Floating Foundation for Offshore Wind

by Ideol, from France

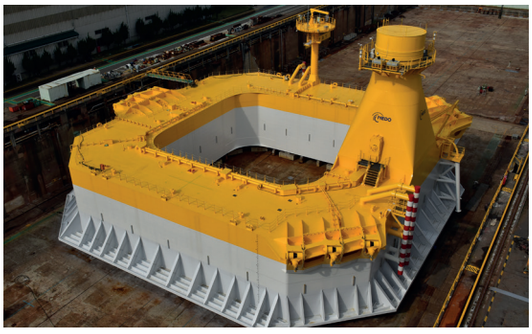
A foundation for offshore wind turbines removing all depth constraints. The technology is based on a Damping Pool, a hydrodynamic system comprising a central pool that that optimizes the stability and performance of the floating wind turbine.

CO_2 footprint is diminished by 50% compared to traditional offshore wind installations, solving a main challenge of offshore bottom-fixed wind turbines.

Offshore Floating Wind Turbine System

by Seawind Ocean Technology Holding B.V., from Netherlands

A teetering hinge that allows to de-couple the rotor from the shaft enabling simpler wind turbine control and lower fatigue compared to the conventional 3-bladed technology.



Put together at a pier or dry dock and brought to the installation site completely assembled, reducing installation time; a 500+ MW wind farm can be completed in under a year.

03

SYSTEMIC ENABLERS

3.1 Planning - Energy Efficiency
3.2 Planning - Renewable Energy
3.3 Planning - Building Renovation
3.4 Boosting Skills
3.5 Permitting
3.6 One-Stop Shop
3.7 Acceptance and Consultation Process
3.8 Data-Sharing

Up to this point in this document, we have highlighted a number of steps specific to either increasing energy efficiency measures or deploying more renewable energy. However, there are a number of additional steps that can be taken that apply to these and other sectors. These systemic enablers integrate new ways of thinking that better capture the benefits afforded by these technologies and solutions. Cross-cutting by their very nature, they range from creating innovative financing mechanisms that make for more attractive investment opportunities, to practical measures such as training personnel that can install these solutions, it being recognized that a lack of capacity is holding back the growth of these industries, and vice-versa.

One of the most critical elements in this section is permitting, recognizing that the processes in place to install in particular renewable energy infrastructures is often too cumbersome. It is critical that we get out of our own way, and ensure that the process to gain approval for a project is smooth, clear and predictable. Currently, this is the exception rather than the rule, and it dissuades investors and practitioners alike.

3.1 Planning – Energy Efficiency

- Mainstream the application of the energy efficiency first principle (EE1st), meaning **using the EE1st as the overarching principle guiding the NECP drafting to ensure that demand side solutions are always assessed and prioritized when they bring additional benefits from a societal perspective.**

- Member States shouldn't wait for the adoption of the revisions of the Energy Efficiency Directive, the Renewable Energy Directive and Energy Performance of Buildings Directive to **update their energy efficiency and renewable energies objectives according to the new climate target.**

- Base national targets on **bottom-up assessment of energy saving potential**. The target shall reflect the untapped cost effective potential across sectors, both in the demand and supply side. The discussion about the national target, the existing potential and new policies and measures should take place at the same time.

- Reflect different dimensions of energy and climate policies. The proportion of fossil fuel, nuclear or renewable electricity generation as well as the evolution of the Member States' energy balance directly influences the conversion factor between final and primary energy. Member States shall fully take into consideration the impact of fuel switching and the accelerated deployment of renewable energy when setting their target.

- Fulfill the annual energy savings requirement with measures leading to **credible and additional savings**. Article 7 of the Energy Efficiency Directive (DIRECTIVE (EU) 2018/2002) is one of the crucial delivery tools for energy efficiency measures at the national level. Savings under this Article should be a result of increased activity levels regarding the implementation of energy efficiency measures and should be additional to what would happen anyway – for example as a result of existing measures or autonomous efficiency improvements. Otherwise, the real savings delivered would be lower than what is claimed, which would put the achievement of the energy efficiency target at risk. The impact of these measures should be easy to monitor and verify in a reliable way.

- Set up a dedicated process to apply an **energy savings test** for infrastructure decisions. Member States are only one or two investment cycles away from a net-zero greenhouse gas emission Europe. Each decision taken today must be judged for its contribution to and compatibility with a decarbonised continent, otherwise policymakers will direct investments into infrastructure that might become stranded or delay investments in energy efficiency, making the transition more expensive. Member States shall set up an appropriate mechanism to deal with the issue in a transparent manner.

- Use the NECP as a **national capital raising plan**. There seems to be no shortage of money ready to be invested, nor of investment gaps to be filled. Member States, supported by the European Commission, should engage closely with public and private financiers, banks and pension funds in particular, to increase the visibility of energy efficiency projects, and should promote the use of innovative financing schemes to leverage public and private investments. They should build their NECP as a national capital raising plan.

- Include **energy efficiency targets in corporate emission reduction plans**. The EU Directive on Corporate Sustainability Due Diligence outlines criteria according to which major companies may be required to publish emission reduction plans. These plans should include energy efficiency targets.

> 3.2 Planning – Renewable Energy

- **Develop a robust Heating and Cooling Strategy** to align with the Climate Law and energy security imperative.
  - Introduce **mandatory heat planning** for local authorities. The EU Fitfor55 Regulation includes provisions for mandatory heat plannings as of 2025 (Energy Efficiency Directive art 23). It is preferable to start building up capacity to carry out heat planning as soon as possible.
  - A heat strategy should be based on **multiple technologies and multiple fuels,** harvesting locally available and sustainable heat sources such as renewable heat (geothermal, solar thermal, ambient), waste heat, heat from sustainable bioenergy and deploying highly efficient heating technologies (such as heat pumps and combined heat and power), in addition to renewable electricity.
  - Provide the **human resources** fit for the challenge.
  - Develop a **mapping tool** with databases to support local planning (see Slovenia).
  - Initiating an educational and **awareness-raising campaign** to encourage households to invest in renewable heating solutions that are decentralized at household level in most cases, or to encourage connecting to a decarbonized renewable district heating network.

- **Stop aid for fossil fuels and redirect it to efficient renewable and sustainable waste heat solutions:**
  - Whenever possible/relevant, local authorities should be financially supported to harvest available renewable and waste heat resources and maximize their use with the most efficient technologies.

  - **State Aid for local audit, heat planning assessment and implementation.**

  - **Financial aid to reduce investment-risks and capital costs for new projects covering**:
    - The recovery and use of available and sustainable heat sources (data centers, metros, supermarkets, hospitals).

    - The deployment of renewable heat sources.

- Set up a CO_2 emission tax for non-ETS stationary sources emitting more than 30 tonnes of CO_2 annually.

- Establish a subsidy programme that favors exchange of old and polluting installations. This guarantees that the tax measure is socially fair.

- Reduce electricity taxes for heat pumps. Lower VAT on renewable heating equipment.

- Provisions should include **technical and financial support to carry out the transition at local level**:
  - **Reskilling and upskilling** programs at national and local level (not just installers, also other profiles are needed, e.g. experts for project development).

  - **Training local and national administrations**. Need for dedicated aid schemes could be envisaged for local authorities as part of REPower EU, and the Recovery and Resilience Plans.

3.3 Planning – Building Renovation

- **Plan long-term renovation strategies (LTRS) well ahead**, and in parallel to the NECP to ensure the two planning documents are perfectly aligned, well integrated and mutually reinforcing. Buildings represent 40% of energy consumption in the EU and over a third of our GHG emissions.

- Renovation Strategies should be based on **minimum energy performance standards** (MEPS) without delay, as obligation is arriving from EU negotiations. To accompany these MEPS, supportive policies should be put in place such as subsidy schemes, EPC and renovation passport roll-out, development of local one-stop-shops for renovation, setting up new training programmes for practitioners.

- Design policies and measures that result in the deep renovation of the building stock, such as the **Building Renovation Passport**. Detailed information for building owners and tenants about the tools available in their country or region will contribute to successfully deliver long-term renovation strategies. It can also be used to link financial measures with the energy savings achieved through renovation.

- **Re-assess national Resilience and Recovery Facility (RRF) plans and re-allocate with a focus on energy saving measures**. The European Commission and national governments should re-assess the budget allocations to building renovation which were defined in the plans submitted to the EU's Recovery and Resilience Facility. These plans can provide significant funds to pay for national measures.

- Promote renovation through **tax benefits** for large non-private owners of buildings if they bring forward and make already decided and planned renovation projects more ambitious.

- **Examples** of measures adopted:
  - Retrofit in priority social dwellings >40 years old. Same for commercial buildings and public buildings. Support the renovation of rental apartments.
  - Can be supported by reduced tax rates on renovations, grants or subsidies. Further incentives could be given to energy efficiency combined with the use of renewable energies. Subsidy could be linked to amount of energy saved.
  - Set up subsidy schemes based on the revised European guidance on state aid and targeting low-income households.
  - Shift taxes and levies from the electricity bills to the fossil fuel bills.
  - Reduce VAT on renewable heating equipment and installation to 0%.

3.4 Boosting Skills

- The lack of qualified workforce is a significant bottleneck for the energy transition and security. The current revision of the Energy Performance of Buildings Directive (EPBD) is likely to require Member States to undertake skills mapping and launch upskilling/reskilling programmes. Also, the European Commission is putting an important focus on skills in 2023, with upcoming work on this subject.

- Member States should anticipate this requirement in a **sector roadmap for buildings** and win a few years in the implementation of their energy and climate transition.

- **Train installers**. A shortage of skilled installers limits scale. Leverage the NextGeneration EU fund to invest accordingly in training programs. Smart financial incentives should be introduced.

- Set up a **Boosting Skills campaign** in the construction industry to enable a growth of renovation rates and depth. The construction sector is largely dominated by SMEs who often have little capacity to invest in growing skills to address new challenges. National governments should support their domestic sector so that skills in deep renovation and zero carbon heating technologies are increasing and enabling the sector to deliver deep renovation at scale.

3.5 Permitting for Renewable Energy Projects

- Include national permitting schemes in NECPs and monitor the deployment of fast and efficient permitting procedures based on Key Performance Indicators (KPIs).

- Invest in new capacity to deliver environmental impact assessments to fast-track permits.

- Identify renewable energy projects as of **overriding public interest**. Networks (power and heat) for renewables and hybrid power plants (i.e. combination of different RES technologies and coupling with storage) should also be included as of overriding public interest. This should not exempt them from environmental impact assessment or from mitigation and compensation measures.

- Ensure that network capacity and access is available, and facilitate the access of renewables to the related transmission and distribution networks. **Priority access** to the grid should be given to renewable projects and available grid connection points for renewable energy projects should be disclosed.

- Ensure **sufficient staffing and skilling of local administration**. The financing of staffing and skilling of local authorities can be done thanks to a blending of EU funding instruments such as RRF, ESF+, ERDF, Erasmus and InvestEU (see below all EU available funds). Also, a better coordination between local and national authorities is necessary as well as better definition and transparency regarding allocation of competences.

- Identify **priority and favourable zones** for installation of renewable projects. These zones should be defined in cooperation with the local authorities and in line with the Regulation on Nature Restoration (2022/0195 (COD)). The Renewable energy directive recommends prioritising artificial and built surfaces such as rooftops, transport infrastructure, parking areas or industrial sites. These "go-to" areas, where the deployment of renewables will be less likely to have an impact should be defined in advance. They should also take into account grid/heat networks connection availability and must also be located in urban settings, close to end-users, and dedicated to heating and cooling generation and storage. In order to ensure acceptance of these areas and a smooth administrative procedure at local level, it is paramount that the central administrative authority consults with local authorities when it comes to the designation of these zones. Also, this should not prevent the ongoing and future installation of renewable energy projects in all areas available for renewable energy deployment.

- Introduce **fully digital permit-granting procedures** and e-communication to substitute the use of paper. This digital permit-granting shall be supported by a GIS based information tool for decision makers, so as to integrate all the informative layers useful for making decisions into only one tool and system. Relevant information should be made available to project developers centrally as part of an online manual of procedures, including templates for applications, environmental studies and data, as well as information on options for public participation and administrative charges.

- Set-up **one-stop shops** and a single permitting procedure for the whole permitting process.

- Include **clear time limits** for all steps of the procedure, "silence means agreement" in administrative procedures, and clear motivation in case of project refusal.

- Introduce specific provision to foster the **participation of local citizens** in renewable energy projects. The involvement (e.g. via shares in the company or distribution of the benefits of the project) of local communities or collective self-consumption is key to foster the deployment and the acceptance of renewables. Simplified permitting procedures for energy communities could be introduced.

- Set up **clear guidelines** on environmental and landscape integration to help project developers.

3.6 One-Stop Shops for Energy Renovations

- Establish One-Stop Shops to transform a complex set of multiple-actor decisions into **a single entry and customer-centric service**. OSSs have the potential of establishing a bridge between the fragmented demand and supply sides of the traditional renovation value chain.

- Ensure that OSSs integrate access to financing so as to be well-placed to contribute to **tackle energy poverty by assisting vulnerable households** to participate in renovations.

- OSSs are **critical to upscaling deep renovation** which already suffer from low uptake rates. Without comprehensive home renovation services covering the implementation phase, this will not change as homeowners will find it overly complex to engage.

- OSSs should offer the full set of services to potential users, ensuring that **they offer services that audit the homes of the interested individuals, that guarantees are afforded to those that choose to move forward, and that financing options are also available** through the OSS itself. Such a range of services ensures there is trust built into the system itself, which is central given the scale of the investments being made.

- Having **local branches located close to the customer** has been seen to be beneficial in creating trust and making use of local businesses. So while one-stop-shops could be run entirely online, the local element is deemed critical to their success.

3.7 Acceptance and Consultation Process

- **Awareness campaigns** should be launched to highlight the environmental, financial and social benefits from the deployment of renewable and energy efficiency projects to the local communities. Specific aspects could be put forward:
  - The existence and the potential use of manageable/dispatchable renewables, towards decarbonisation not only of the power system but also regarding the dependency on fossil fuels.

  - The fact that such manageable resources are not competitors to cheaper renewables such as PV and on-shore wind, but on the contrary are providing the necessary CO2-free backup to increase their share in the generation mix (via a balanced mix of intermittent and dispatchable RES).

  - The above said should also lead to new types of dedicated procurement mechanism (tenders and their specific design) for new capacities and their remuneration taking into consideration at least the electrical system value of such generation and possibly its macroeconomic value (return on investment for the national economy).

- Communities should be involved in decision making via consultation processes. **Build a participative process**. The public consultation provisions of the EU Governance Regulation (Article 10) should be seen by Member States as an opportunity. Governments are indeed reliant on third parties to deliver on targets, and those third parties are incentivised by policies and public funding. Governments should therefore consult broadly on the NECPs, through existing dialogue structures, but also via new ones, particularly the multilevel climate and energy dialogue. A consultation should not be a one-shot exercise, but rather a participative process that regularly involves the relevant parties. The multilevel climate and energy dialogue was designed as an ongoing forum and should therefore also look at Member States' national energy and climate progress reports and the Commission's recommendations.

- Provide access to all material early on. The public should have **full and easy access to all relevant documents** and background material and be presented with different drafts and scenarios rather than just with the final project.

3.8 Data sharing to exploit benefits of Big Data

- The European Commission's 2022 Action Plan on "Digitalising the Energy System" identifies use cases where exchanges of data can hasten the transformation of the energy system:
  - flexibility services for the energy markets and grids;
  - smart and bi-directional charging of electric vehicles;
  - and smart and energy-efficient buildings, including boosting private and public investments and harnessing the proposed solar rooftop initiative.

  The revised Energy Performance of Building Directive looks set to hand building users access to the data generated by their "building systems" and to give them the right to share it. This must be encouraged.

- NECPs should **set out a strategy for promoting the sharing of energy data** in the use cases above. Member States should **adopt the Common European Energy Data Space**, a framework derived from it, or equivalent national initiatives that articulate with it as a repository or clearing house for energy data.

- Member States should **track the number** of building owners, tenants and managers accessing their building system data and allowing access to third partners, and the number of products being offered to these people using this data. The reasons for differences between Member States must be understood.

- Public bodies monitoring electricity supplied by large renewable energy installations should **make available accurate datasets** with high temporal resolution a short time after acquisition along with relevant metadata. The data would be gathered at the grid connection point, which these bodies already monitor closely.

- Commitments are needed from Member States to launch **tenders for new renewable energy installations specifying the gathering of high-quality data** from the winning plants and the sharing of that data under reasonable conditions clearly specified in the tender. The scientific community must be consulted in the design of the tender.

- Member States should commit that any new plants on their territory that are financed through the **Renewable Energy Financing Mechanism** will share data.

04

AVAILABLE EU FINANCING

The EU is proposing a large list of financing mechanisms to help Member States achieve their energy and climate transition:

- Recovery and Resilience Facility: is a temporary (until 2026) recovery instrument. It allows the Commission to raise funds to help Member States implement reforms and investments that are in line with the EU's priorities and that address the challenges identified in country-specific recommendations under the European Semester framework of economic and social policy coordination. It makes available €723.8 billion (in current prices) in loans (€385.8 billion) and grants (€338 billion). This programme climate financing is dedicated to clean energy, energy efficiency, building renovation measures, sustainable transport, as well as renewable and low-carbon hydrogen.

- Cohesion policy also provides significant support to energy efficiency, renewable energy and energy infrastructure. In June 2022 a new model financial instrument to support the REPowerEU was prepared with the European Investment Bank (EIB).

- InvestEU programme: Key initiatives under the InvestEU Advisory Hub (the central entry point for project promoters and intermediaries seeking advisory support and technical assistance), cover the areas of energy efficiency and hydrogen:
  - Since 2011, the ELENA facility (EU local Energy Assistance) provides technical assistance for energy efficiency and renewable energy investments targeting buildings and innovative urban transport. With a leverage factor of 33, it has an impressive capacity to attract ('crowd-in') private financing.
  - The Commission is cooperating with the EIB to develop an advisory facility supporting the renewable power purchase agreement projects, including to support hydrogen uptake and electrification in industrial sectors.

- The Horizon Europe programme to support research and innovation in renewable energy technologies, energy efficiency, electrification of heating and cooling and digitalisation of the energy system.

- CEF Energy is financing the better interconnection of energy networks towards a single EU energy market and the clean energy transition. In March 2022, the Commission launched the first CEF call for renewable energy cross-border projects. In May 2022, the Commission launched a new call for key cross-border energy infrastructure projects for projects included in the 5th EU list of Projects of Common Interest.

- LIFE Clean Energy Transition (CET): in May 2022, the LIFE CET Call for proposals was published, making available EUR 98 million for energy efficiency and clean energy projects. This Call covers REPowerEU objectives, such as reduction in fossil fuel consumption for heating and accelerated deployment of energy efficiency solutions in housing, businesses and public sector.

- In 2022, the first ever cross-border tender will take place under the Renewable Energy Financing Mechanism. The tender will focus on solar photovoltaic projects.

- Carbon prices increased during 2021, and so did the total revenues from the EU ETS, amounting to about EUR 31 billion in total. This money will support the Innovation Fund (funding programmes for the demonstration of innovative low-carbon technologies.) and the Modernisation Fund (financing programme targeting 10 baltic and Eastern European Member States to meet 2030 energy targets by helping to modernise energy systems and improve energy efficiency).

- The Common Agricultural Policy (CAP) also supports energy efficiency, renewable energy and energy infrastructure through the European Agricultural Fund for Rural Development (EAFRD). Depending on the needs identified and the strategy developed in the current Rural Development Programmes or future CAP Strategic Plans, Member States have the possibility to support investments in the production of renewable energy or in the improvement of energy efficiency for agricultural holdings but also for rural businesses.

References

Below are a series of documents, presentations and reports that have contributed to this series of recommendations. It is by no means exhaustive and does not capture the recommendations that have been shared directly with our team as this document has been built out. As previously mentioned, we thank all those organizations and their staff for their contributions to this work.

A 10-Point Plan to accelerate the EU heat transition
October 2022. Multiple authors (see link)

Accelerating the EU's uptake of Green Public Procurement
February 2023. Stockholm Environment Institute

Analysis of National Energy and Climate plans vs. European market Outlook (PPT)
January 2023. Solar Power Europe

Energy Efficiency to Address the Energy and Climate Crisis: Short to Mid-term measures to reduce gas consumption in Europe
September 2017. European Alliance to Save Energy

Energy Efficiency. Getting Real: from EU law to action on the ground
December 2018. The Coalition for Energy Savings

ePURE's assessment and recommendations regarding countries' NECPs
January 2023. ePURE

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