Citizens as change-makers

Shaping the EU's energy future through renewables

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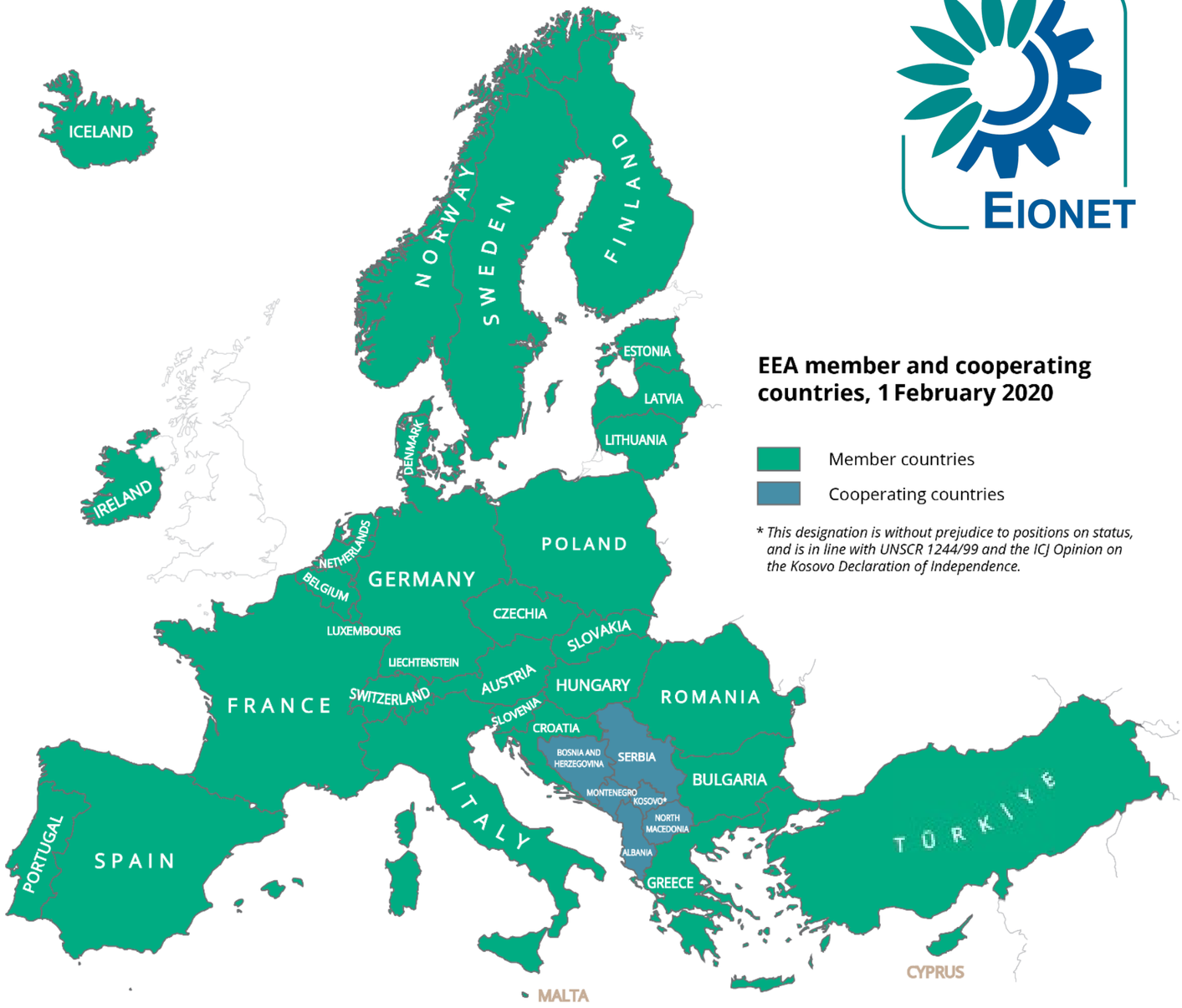
European Environment Agency

European Environment Agency (EEA)

- Agency of the European Union
- EEA **gathers** data and information from across Europe and **translates** them into assessments and knowledge to **inform** policy and decision-making
- **Eionet**: network of more than 1000 experts and 350 institutions in 39 European countries



European Environment Agency

highlighting the need for accelerated climate action

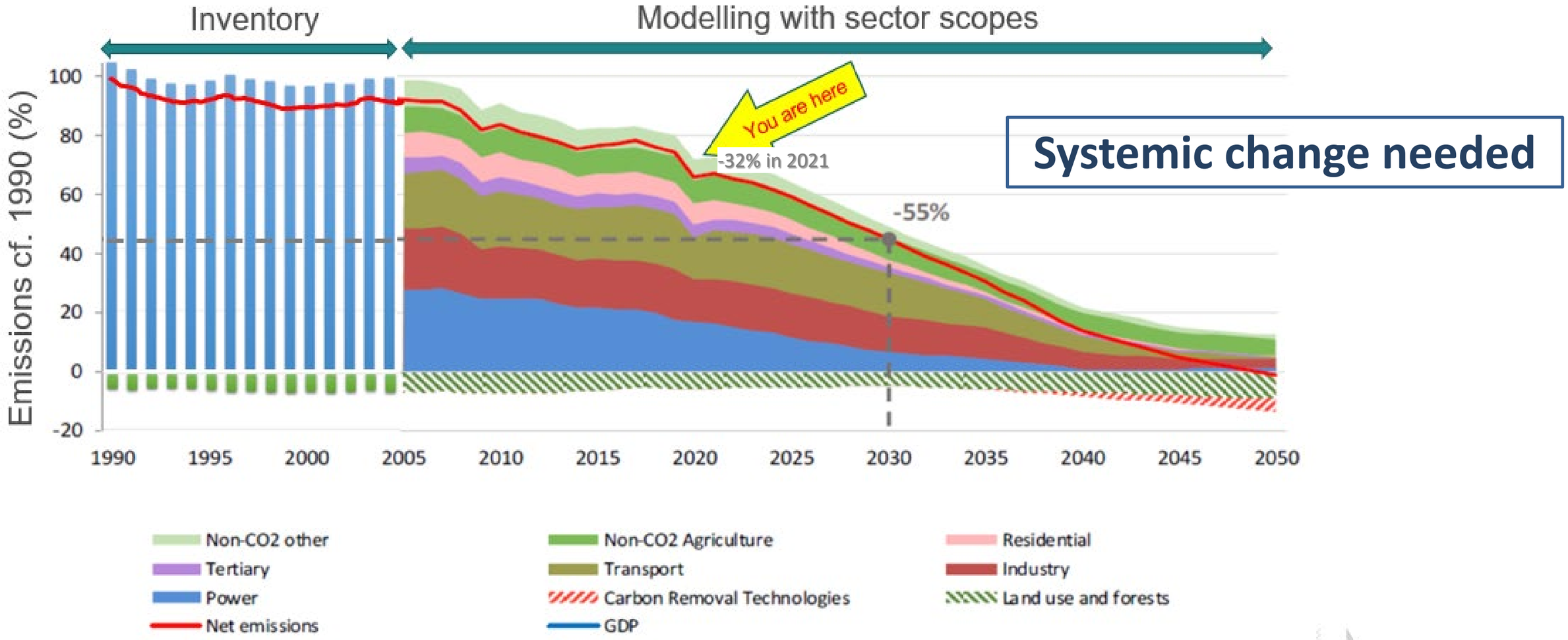
[Flexibility solutions for a decarbonised and secure EU electricity system]

[Energy Prosumers in Europe – Citizen participation in the energy transition]

[Urban adaptation in Europe: What works?]

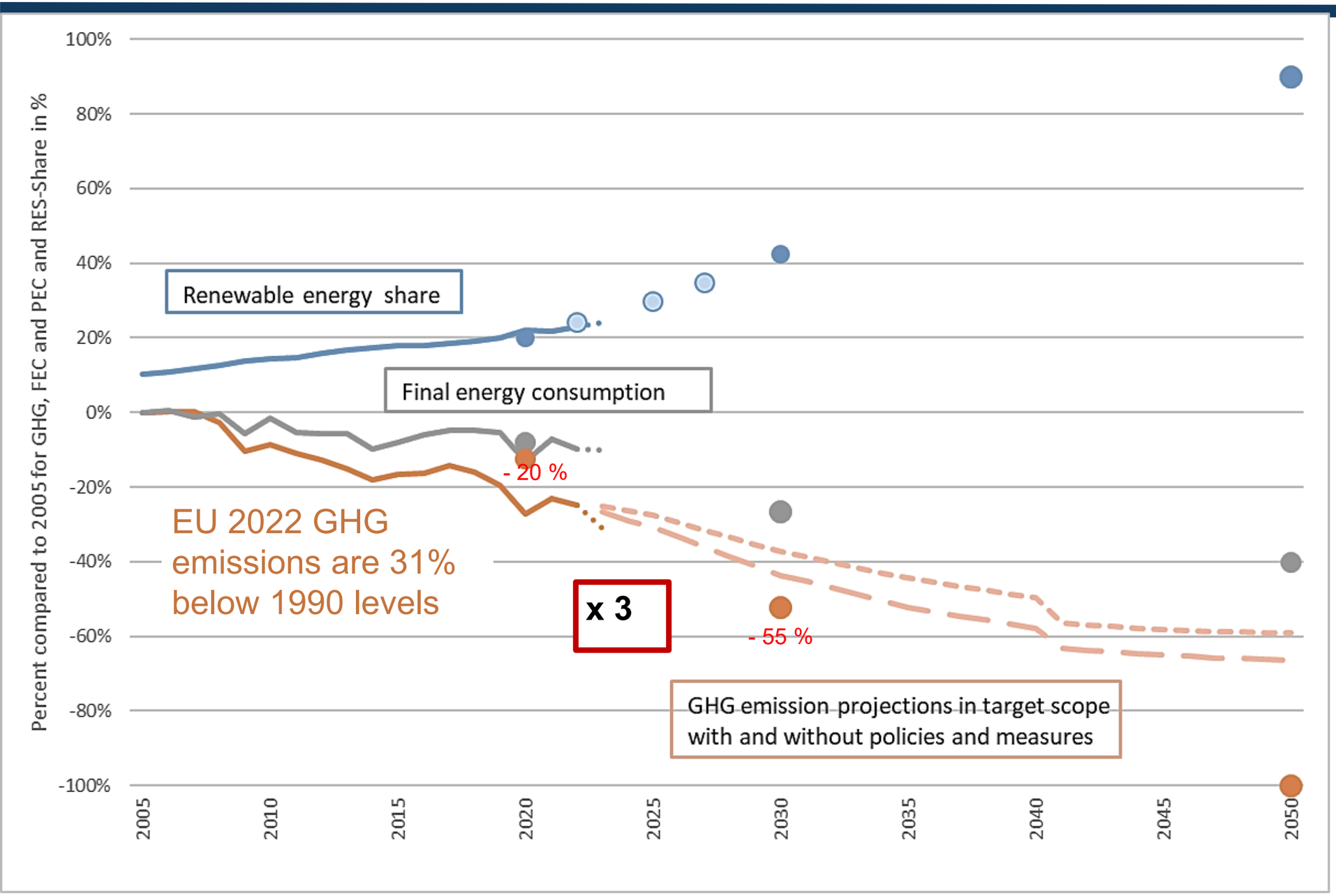
[Responding to climate change impacts on human health]

Schematic EU pathway to climate neutrality

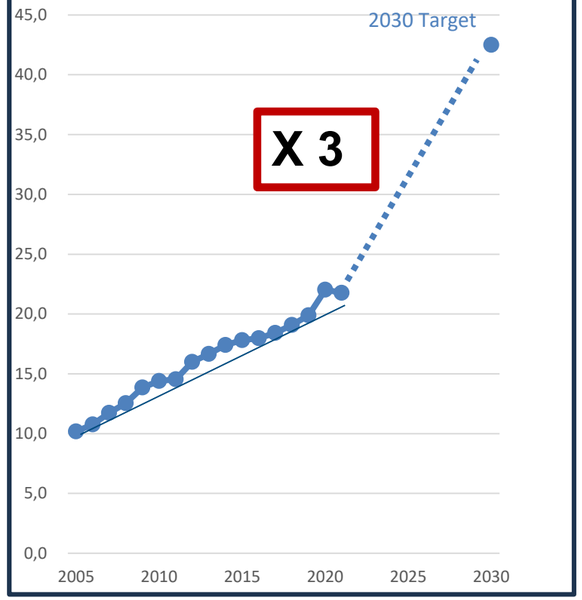


European Commission

Schematic EU pathway to climate neutrality



Increase renewable energy

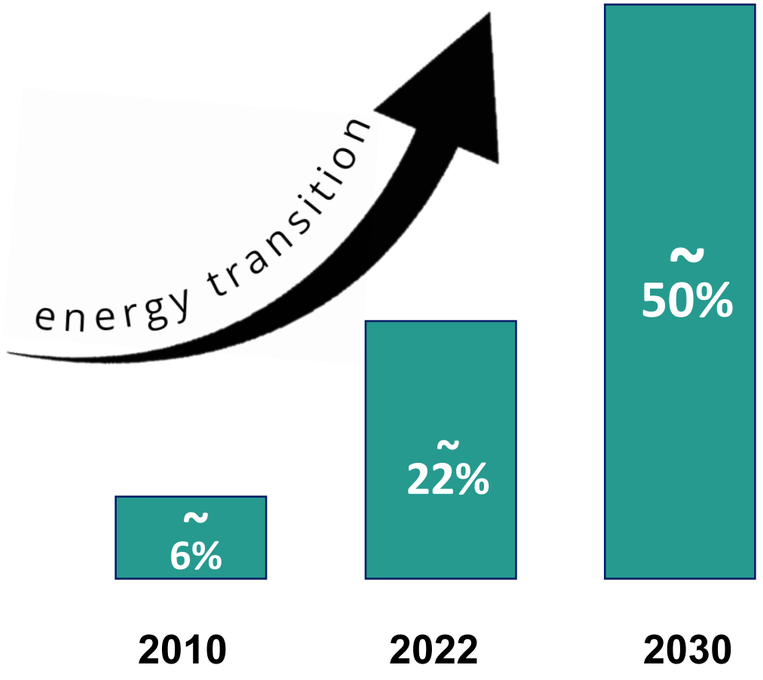


Net climate neutrality

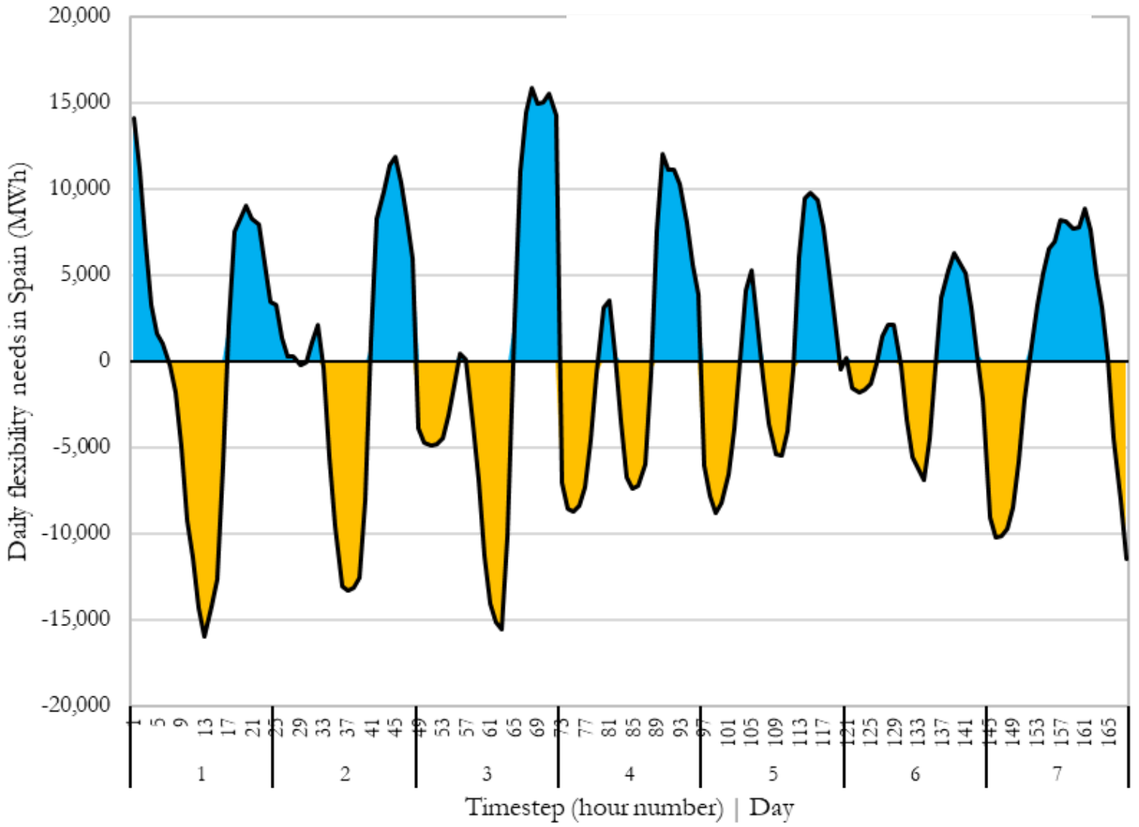
Source: EEA Trends and Projections in Europe (forthcoming)

Great benefits from variable renewables, but also challenges

Share of energy produced by wind & solar in the EU



Example: Forecast daily flexibility needs in Spain in January 2030



Positive residual demand – daily average
Negative residual demand – daily average
Residual demand – daily average

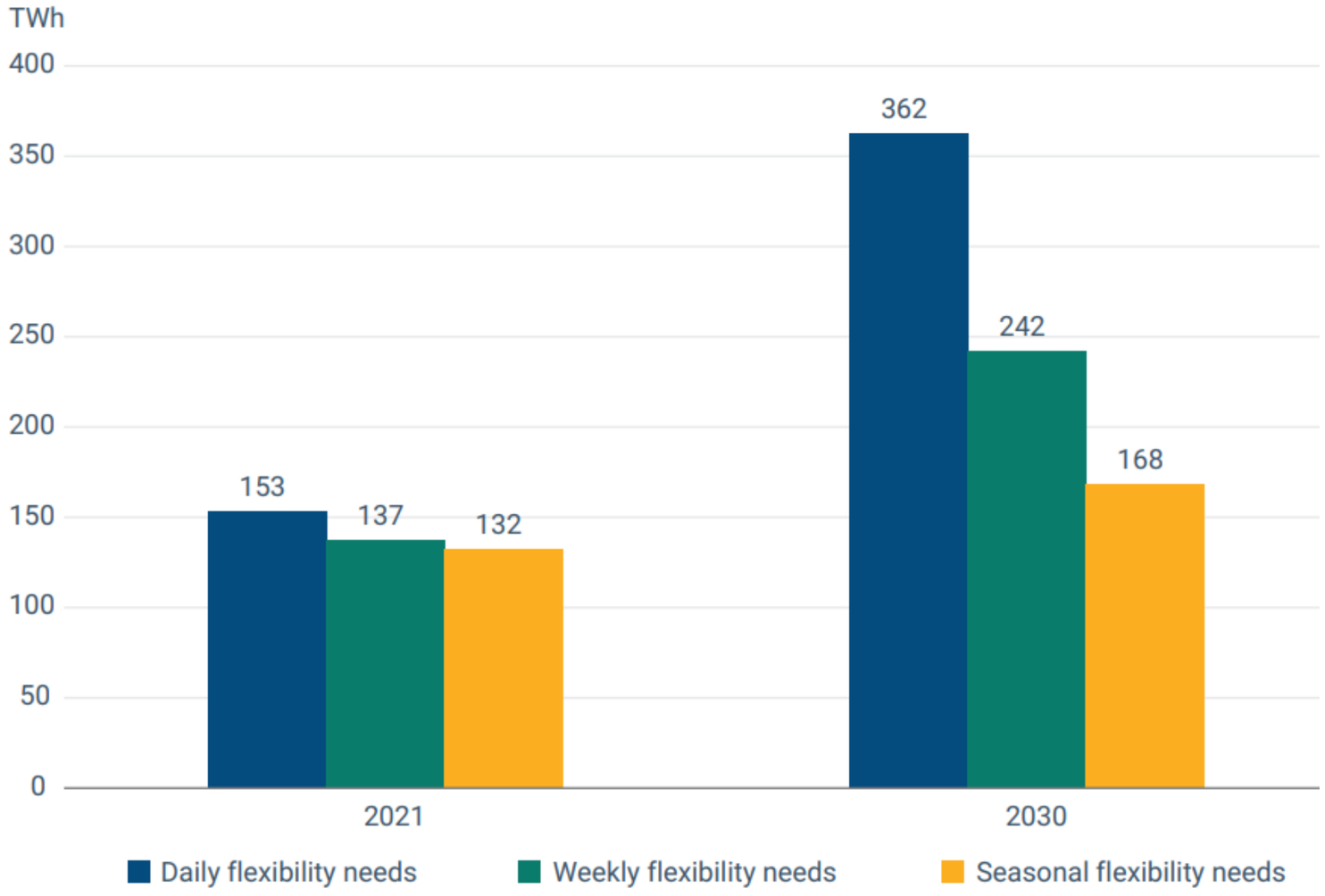
- Increasing shares of variable wind and solar power
- Need for more ‘flexibility’ in EU electricity system

Source: [Ramboll, Background Report for EEA-ACER report]

A broad mix of clean flexible resources and supportive policies are needed

Flexibility must double to keep up with renewables (right amount)

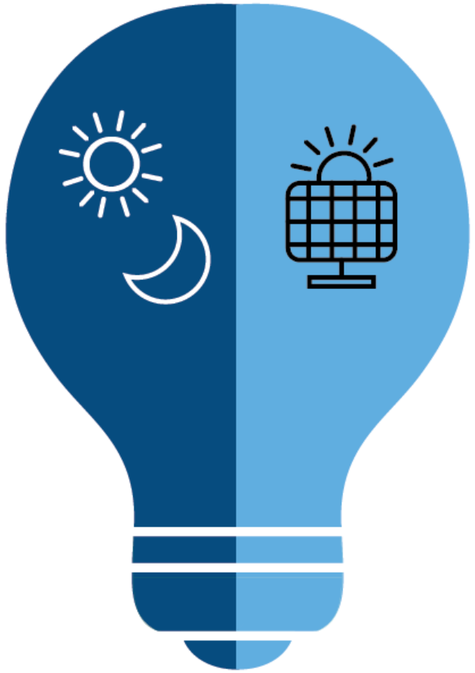
Daily, weekly and annual flexibility needs in 2021 and 2030 in Europe



- Increased solar generation requires substantial daily flexibility
- Wind generation mostly requires weekly flexibility
- Increased electrification of heating (via heat-pumps) requires more seasonal flexibility, but it unlocks demand-side flexibility and cheaper thermal energy storage.

Source: ACER-EEA - Flexibility solutions to support a decarbonised and secure EU electricity system

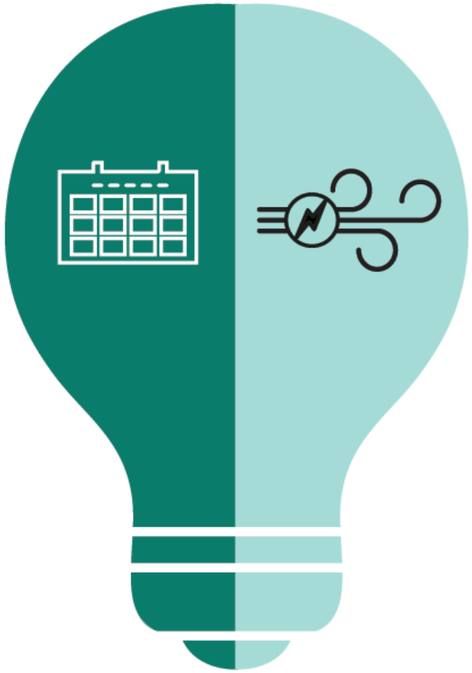
Flexibility needed across all timeframes (right time)



Daily flexibility

Morning/evening demand peaks

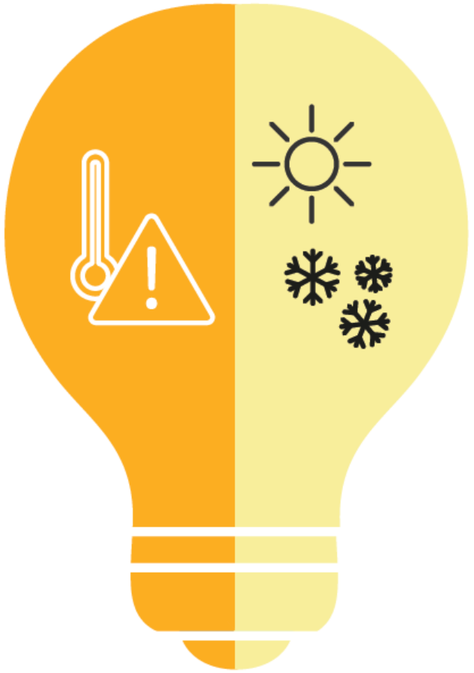
Day-night generation difference



Weekly flexibility

Weekday-weekend demand difference

Wind pattern fluctuations



Seasonal flexibility

Heating-cooling periods

Seasonal weather patterns

As supply increasingly fluctuates, demand must accommodate and catch up

Solutions are promising, but coordinated policies are needed

For instance, demand response and savings are essential this decade:

A 5% peak shaving and 10% demand savings could, in 2030:

- Cut flexibility needs equivalent to Austria's annual power consumption
- Cut backup supply needs for solar and wind power equivalent to Spain's annual power consumption

Here, demand response stands out, requiring dismantling of barriers

Barriers come in ‘many sizes and shapes’

- Difficulties to access markets.
- Lack of national rules.
- At times (too) cushioned retail prices.

Households need incentives & information to become active

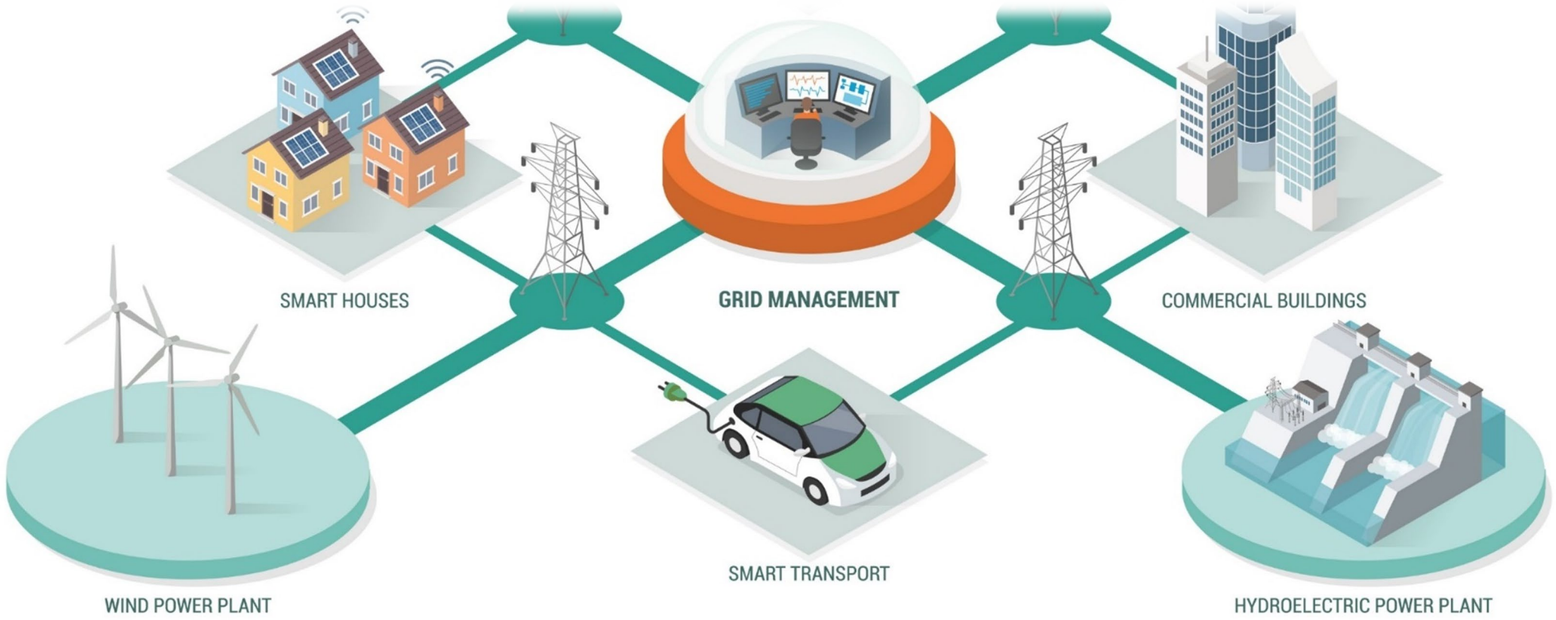
- Retail contracts that reward flexible use.
- Public advisory tools to compare offers; understand benefits & risks.
- Rapid deployment of smart meters a prerequisite.

Market rules should become *“demand response friendly”*

- EU-wide network code on demand response to facilitate access to electricity markets.
- Harmonised rules (e.g. on aggregation) improve the business case for demand response providers.

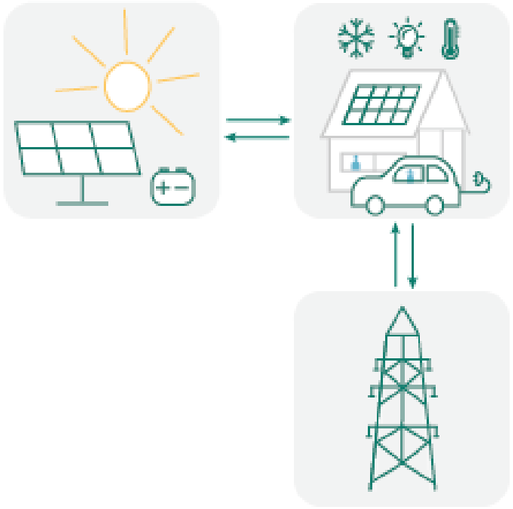
Europe’s interconnected power system is a key lever to meet flexibility needs and to cost-efficiently integrate renewables into industry, buildings and transport

Further connectivity of distributed flexibility resources is next



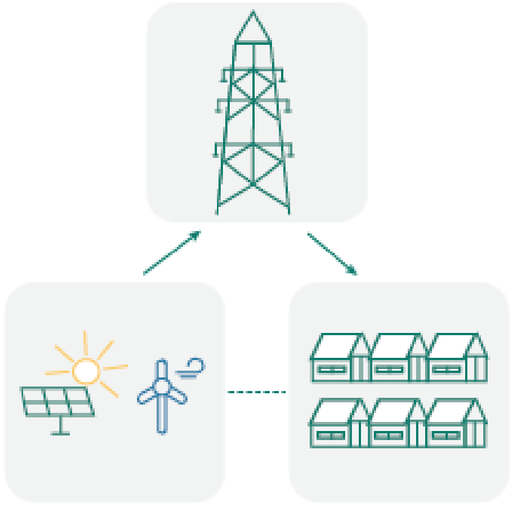
- **Electric Vehicles**, **Heat Pumps** and **Power-to-Gas** units: harmonised connection rules ensure system stability during the energy transition while providing economies of scale and facilitate mass uptake.
- **Storage**: customised connection rules to harness the advanced capabilities of storage technologies.

Prosumer models



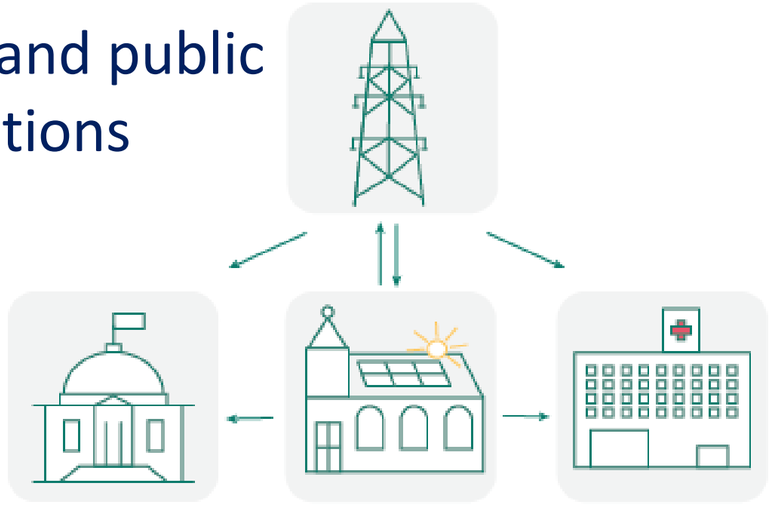
Individual households

Collective prosu-
mers in buildings



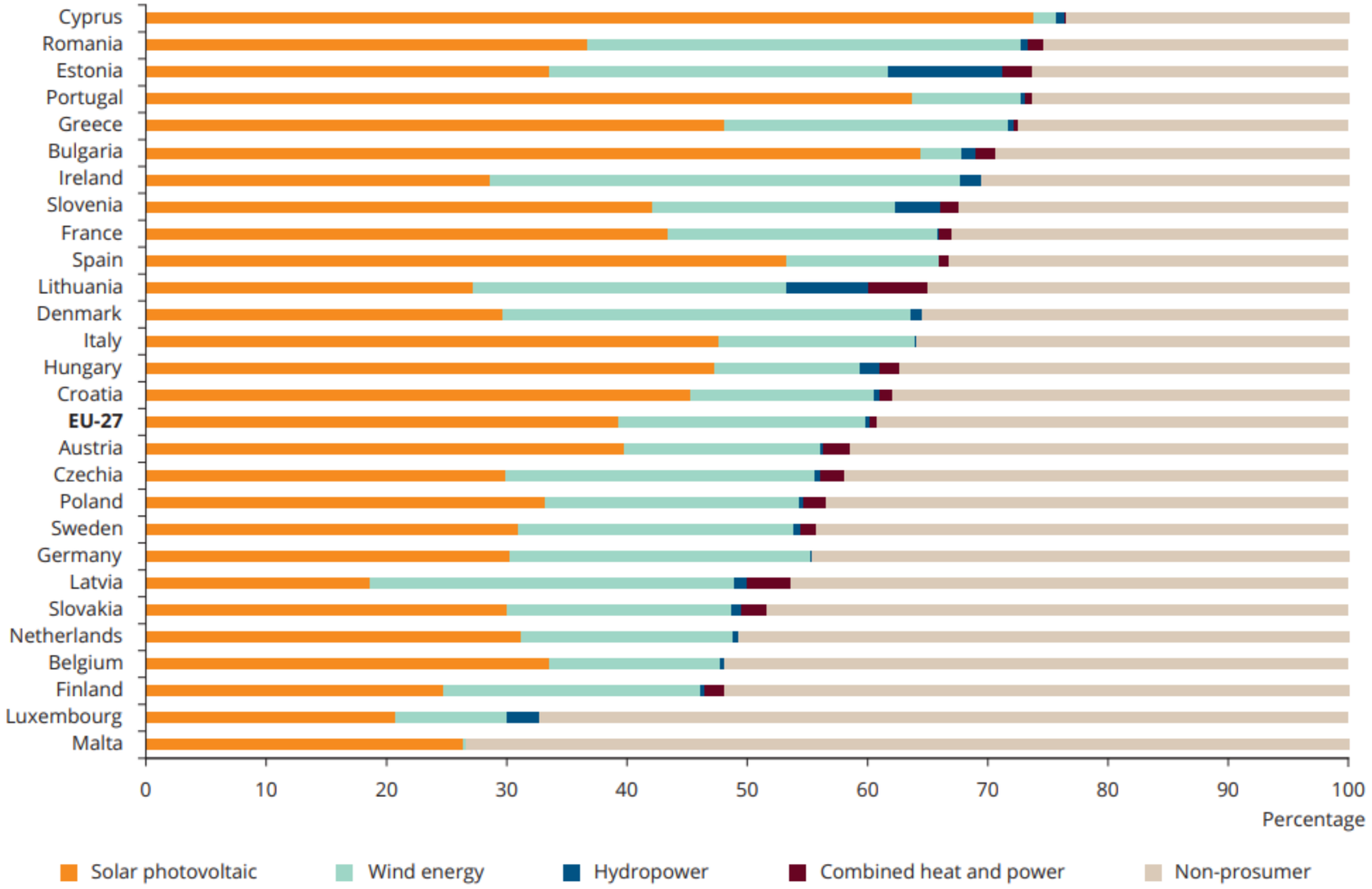
Energy communities
and cooperatives

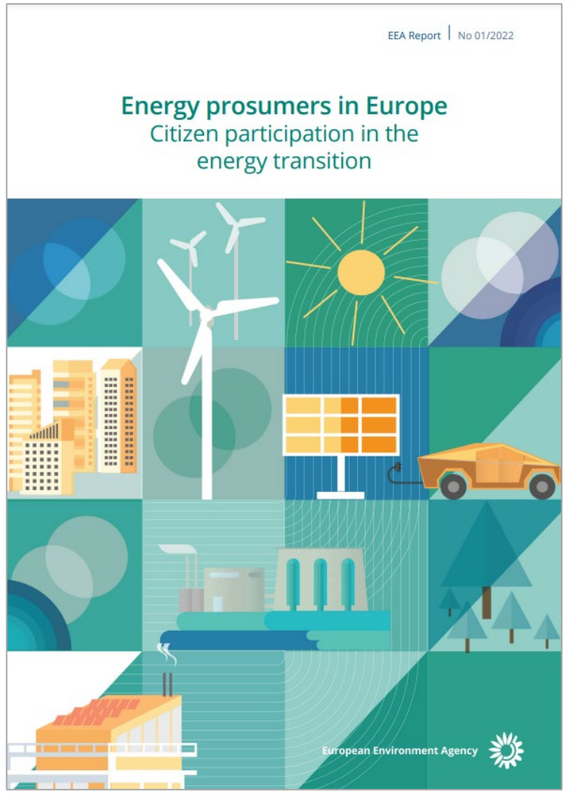
SMEs and public
institutions



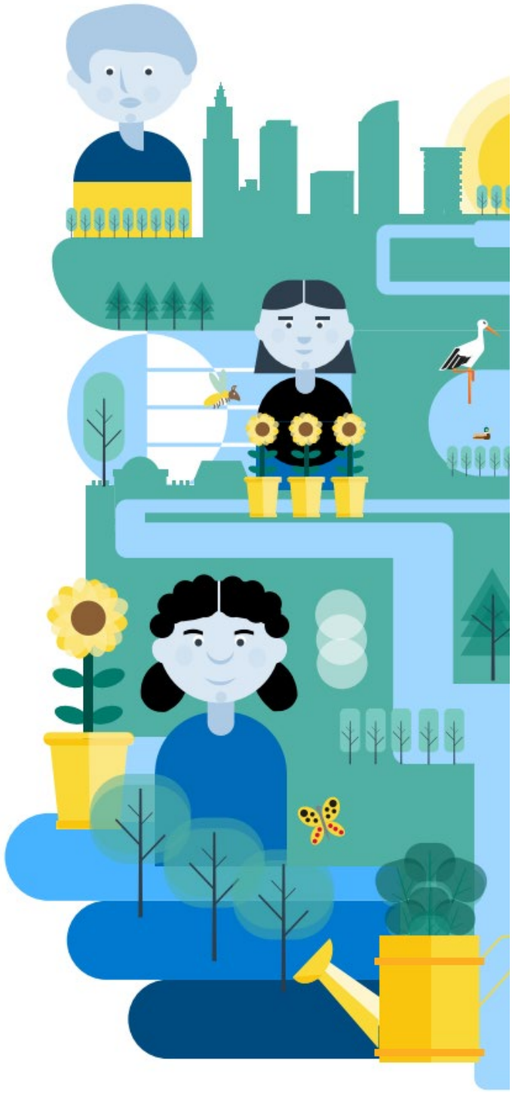
What is the technical potential of prosumption?

Figure 3.6 **Technical potential electricity production by prosumers in 2050, relative to the total electricity demand in the EU**





Benefits



Benefits	Individual prosumers	Collective prosumers	SMEs and public organisations
Environmental			
GHG emission reduction	All types of renewable energy prosumers contribute to reducing GHG emissions when compared with fossil-fuel based systems.		
Reduction in land required for renewable energy production	Rooftop PVs can reduce the amount of land used for RESs; heat pumps may reduce biomass use; and local production and use can reduce the need for transmission lines.	Same benefits can be achieved as for individual prosumers, but land-based PV installations or wind turbines are also possible.	
Social			
Public support for RES	All types of prosumer models contribute to public support for RES.		
Empowerment	All types of prosumer models increase empowerment, since citizens/parties are (partly) responsible for their own energy supply. Not all citizens may have the opportunity to invest and get actively involved, but our case studies of Som Energía and Compile do illustrate that investment requirements can be low.		
Sense of community	Limited.	Prosumers from a community work together to produce their energy.	Depends — citizens from a community may work together.
Fairness of distribution of benefits	Allows participation of those citizens who own buildings.	All participants in a community or collective could benefit from RES technology.	At least allows participation of SMEs and public organisations acting for the benefit of the community.
Financial			
Benefits and revenues for prosumer	Depends on various factors, e.g. type of business model, costs of prosumer technology and policy framework.		
Less grid investment	The effect on grid investment is highly dependent on the local grid conditions.	If the collective is local, decrease in energy transport depending on local grid conditions.	The effect on grid investment is highly dependent on the local grid conditions.
Access to finance for RESs	All prosumer models create access to funds for investment in renewable energy projects.		

Barriers

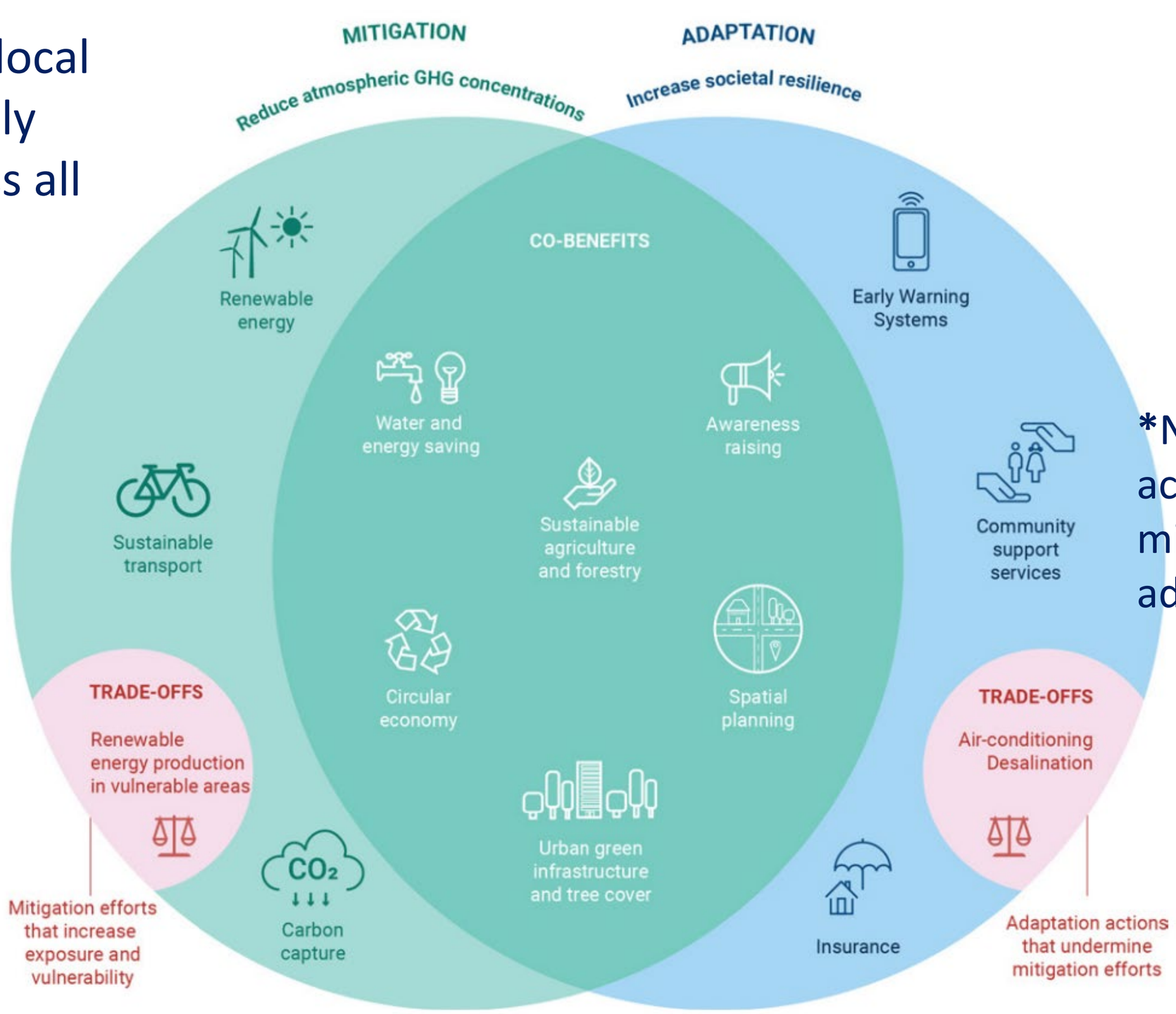
Barrier	Individual prosumers	Collective prosumers	SMEs and public organisations
Legislative			
The current, uncertain legislative setting	Regulation for individual prosumers is relatively well developed.	The rules for energy production by collectives, e.g. energy communities, are not clear in some countries (Toporek and Campos, 2019).	Relatively clear rules when acting as individual prosumer entities. Less clear when acting as part of a collective.
Financial			
High cost to end consumers	Depends on the specific case and the country-specific regulations. Not all prosumer models have a viable business case.		
Access to finance	Investments in RES technologies are significant. Depending on the country and individual context, it may be difficult for individual prosumers to get the necessary financing.	Sometimes. It is easier for collective prosumers to get the necessary financing, since the investment is split between all participants in the collective.	Sometimes. It is easier for SMEs and public organisations to get access to finance than households, but the investments required are also larger.
Technical			
Required energy infrastructure not present	Self-consumption with PV panels usually requires no additional energy infrastructure.	Yes. Usually, power grid reinforcement is necessary for new collective prosumer projects, e.g. wind turbines or solar fields. This is perceived as one of the main negative factors by collectives (Horstink et al., 2019).	Self-consumption with PV usually requires no additional energy infrastructure.
Lack of knowledge			
Lack of knowledge of legislation, policies and renewable energy technologies	Often, households have little specialist knowledge.	Since collectives have multiple members, they have more knowledge. However, legislation for collectives is usually more complex. This is perceived as one of the main negative factors by collectives (Horstink et al., 2019).	Depends. Some SMEs and public institutions have knowledge of legislation and policies, but certainly not all of them. One challenge here is that energy is not the core business of most SMEs and therefore is often neglected.

How to promote citizen action and community engagement?

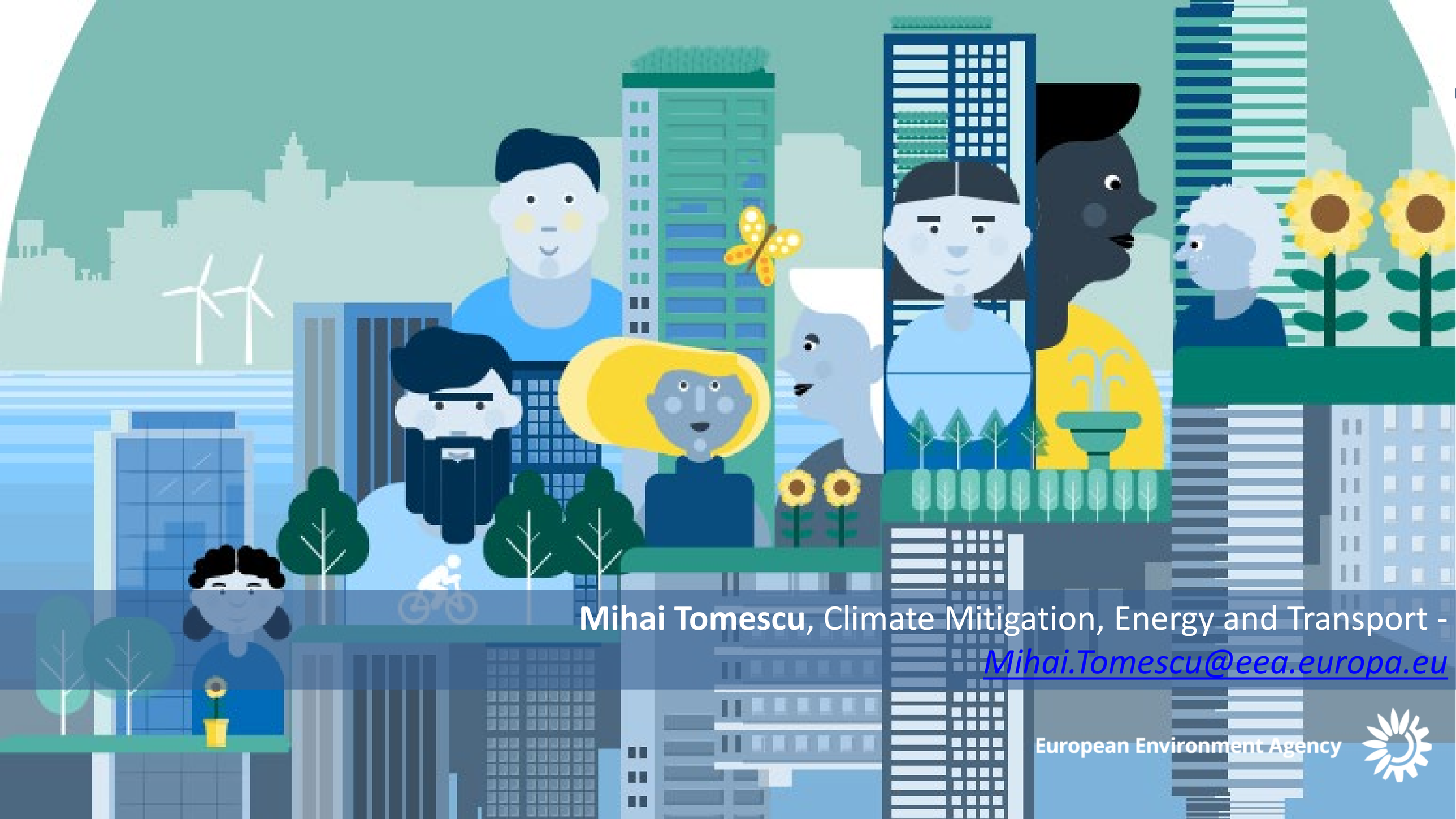
Recommendations to municipalities:

- Promote off-site generation (e.g. virtual net-metering) to overcome the lack of space.
- Provide surfaces for citizen-led energy generation (e.g. unused land or roof-top of public buildings)
- Deploy financial support schemes
- Involve citizens in energy planning
- Set requirements to publicly owned companies
- Act as information hubs and centres of expertise
- Promote skills through vocational training

Upscaling of local action urgently needed across all sectors



*Need to prioritize actions meet ***both*** mitigation & adaptation goals



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