



**ΚΑΠΕ
CRÉS**

ΚΕΝΤΡΟ ΑΝΑΝΕΩΣΙΜΩΝ ΠΗΓΩΝ
ΚΑΙ ΕΞΟΙΚΟΝΟΜΗΣΗΣ ΕΝΕΡΓΕΙΑΣ



Renewable Energy Sources and their role in the energy supply for Greece and Europe

26th National Conference
Energy & Development 2022
Europe's Critical Energy Choices

Session on
**Renewable Energy Sources
High penetration, Net-Metering and PPAs**

22/11/2022

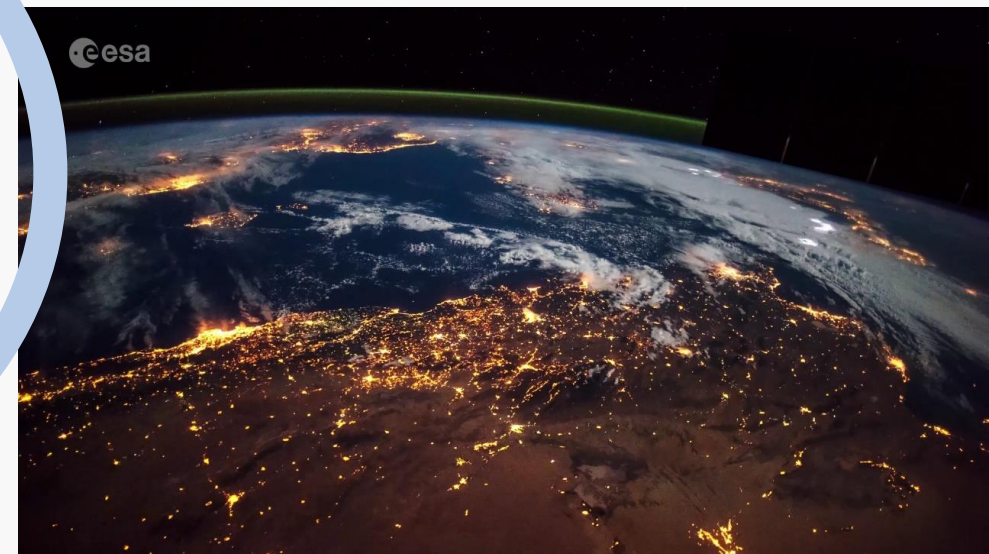
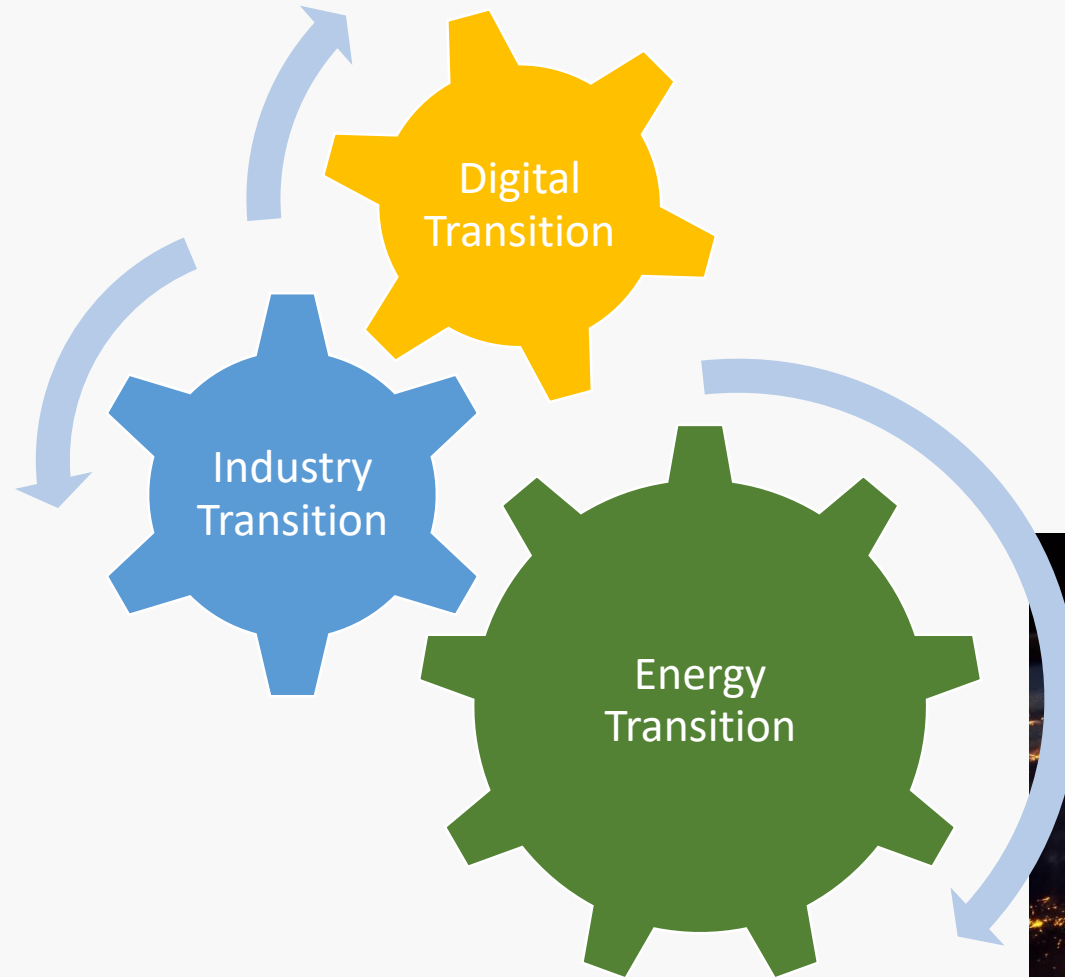
Divani Caravel Hotel

Spyridon Economou, Eng. Ph.D.

President

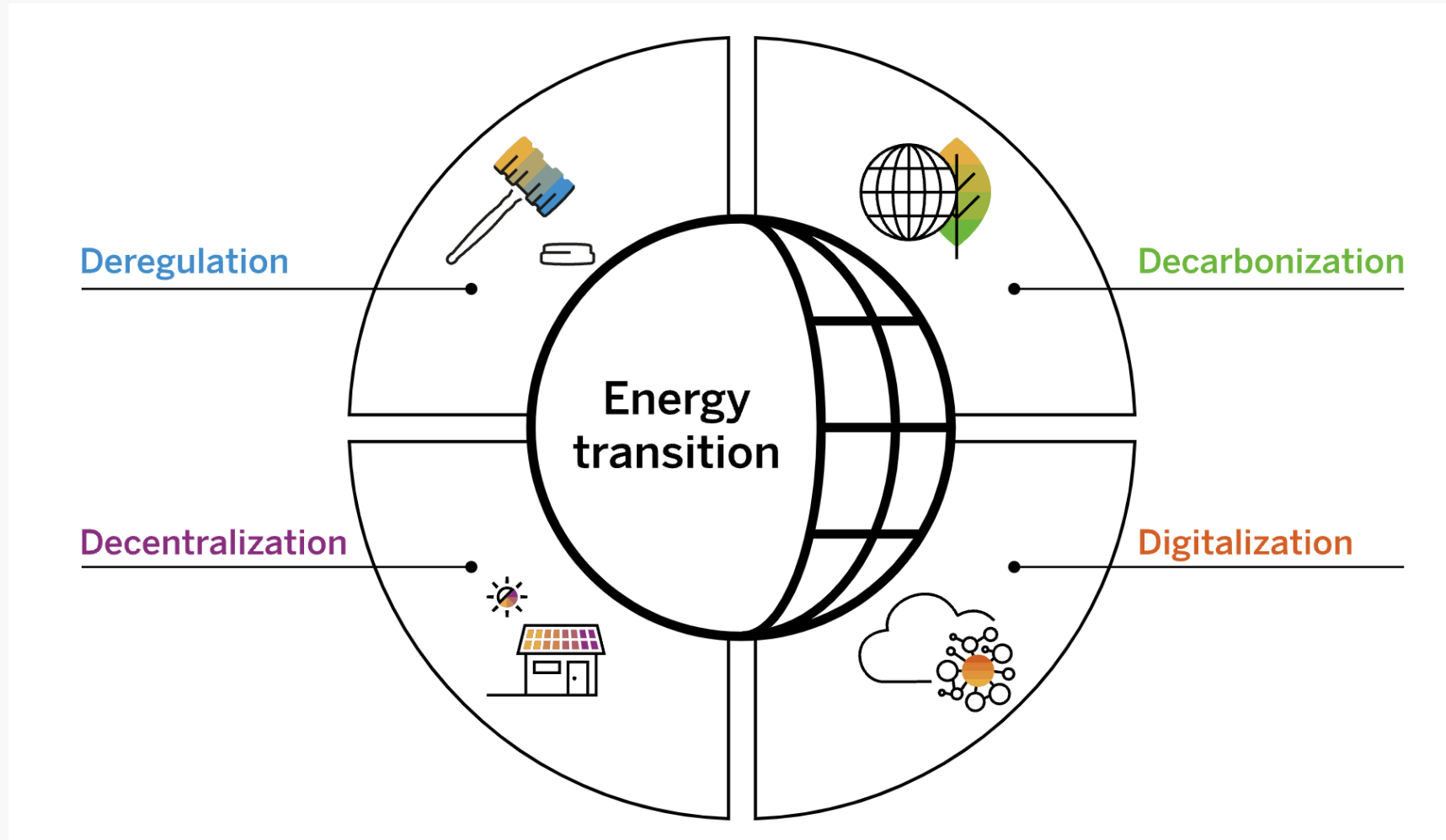


Energy Transition Landscape



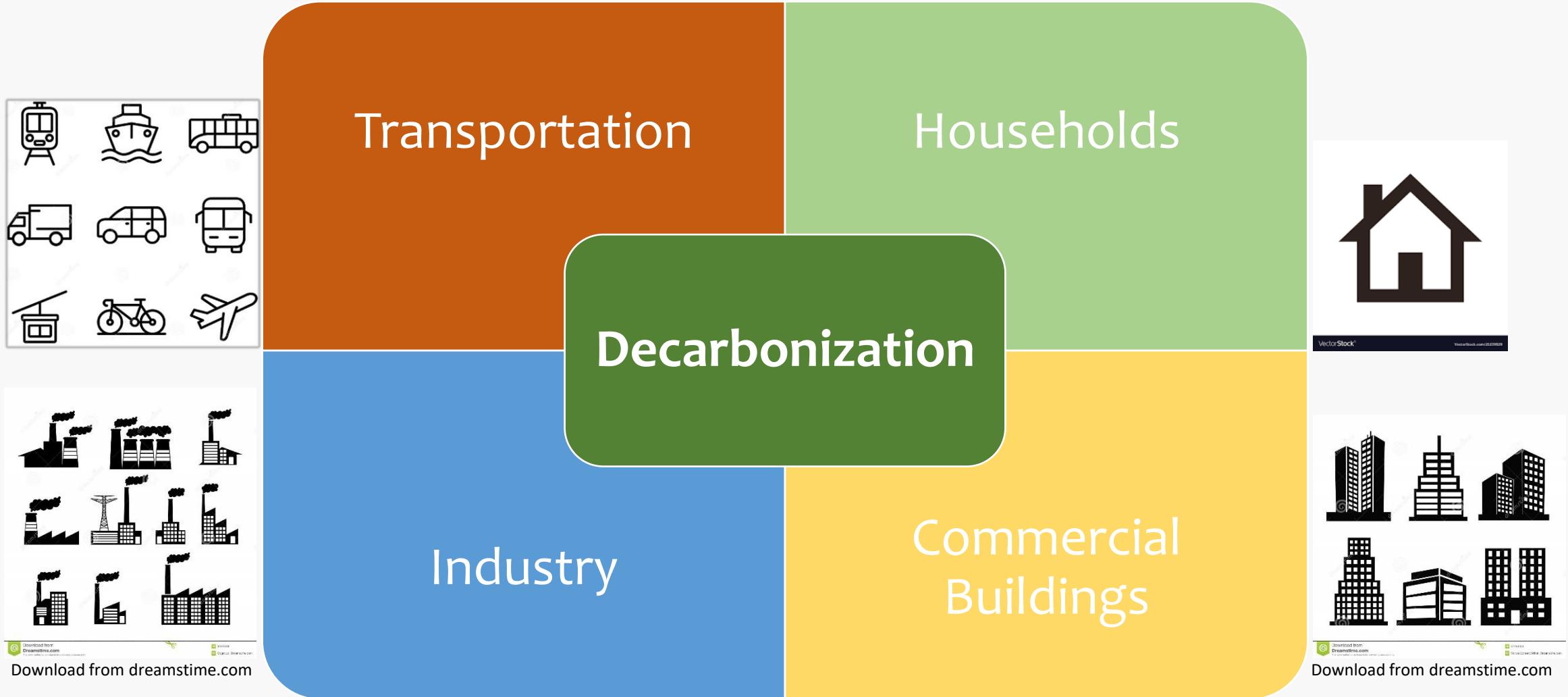


The four driving forces of the Energy Transition



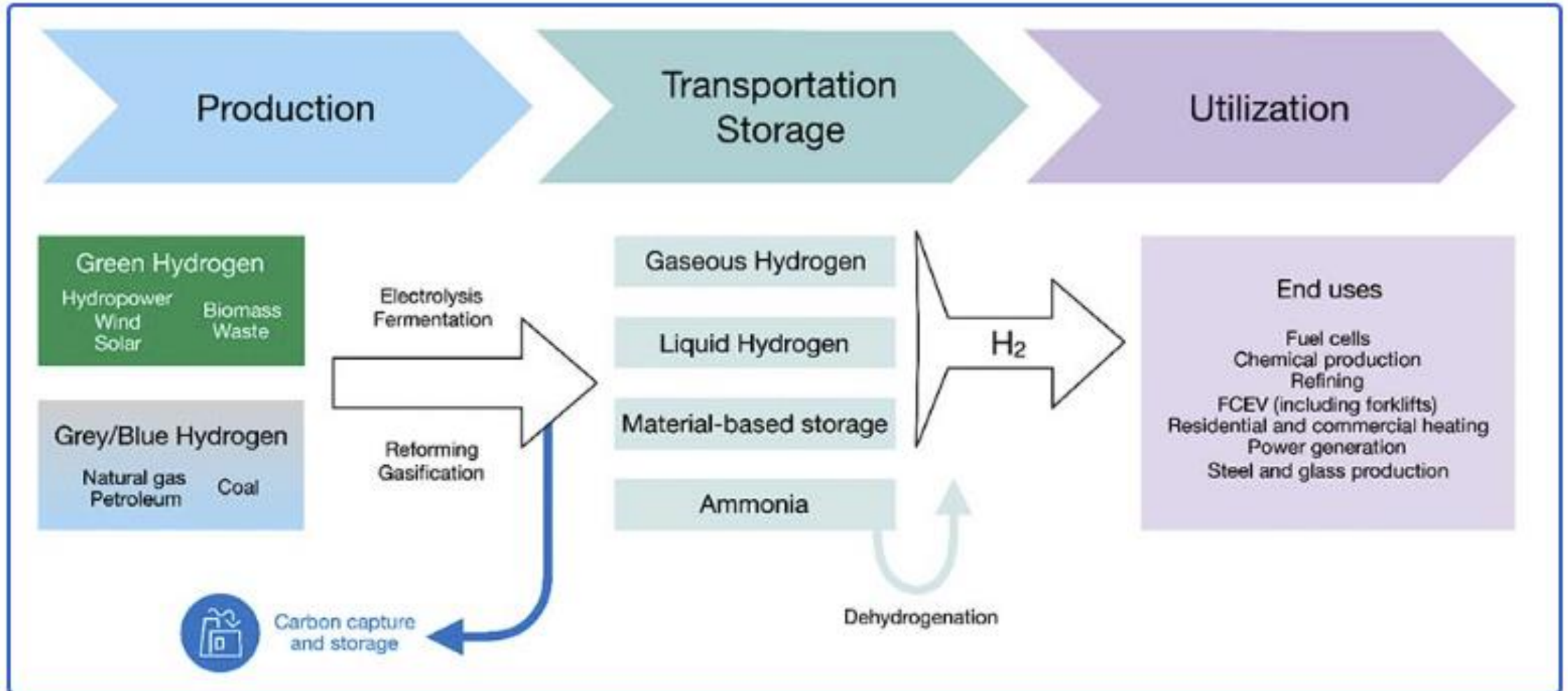


Energy Transition - Decarbonization





Energy Transition – Decarbonization – Hydrogen Value Chain





Energy Transition - Decentralization

RES penetration in
electricity
production

Ideal penetration:
100% -120%

Electricity Grid

Current capacity: 10 GW

Ideal future capacity:

20 GW (2028)

30 GW (2030)

Electricity Storage

3 GW (2030, ref:
IPTO)

Higher capacity will be
needed for the
implementation of the
FF55 package



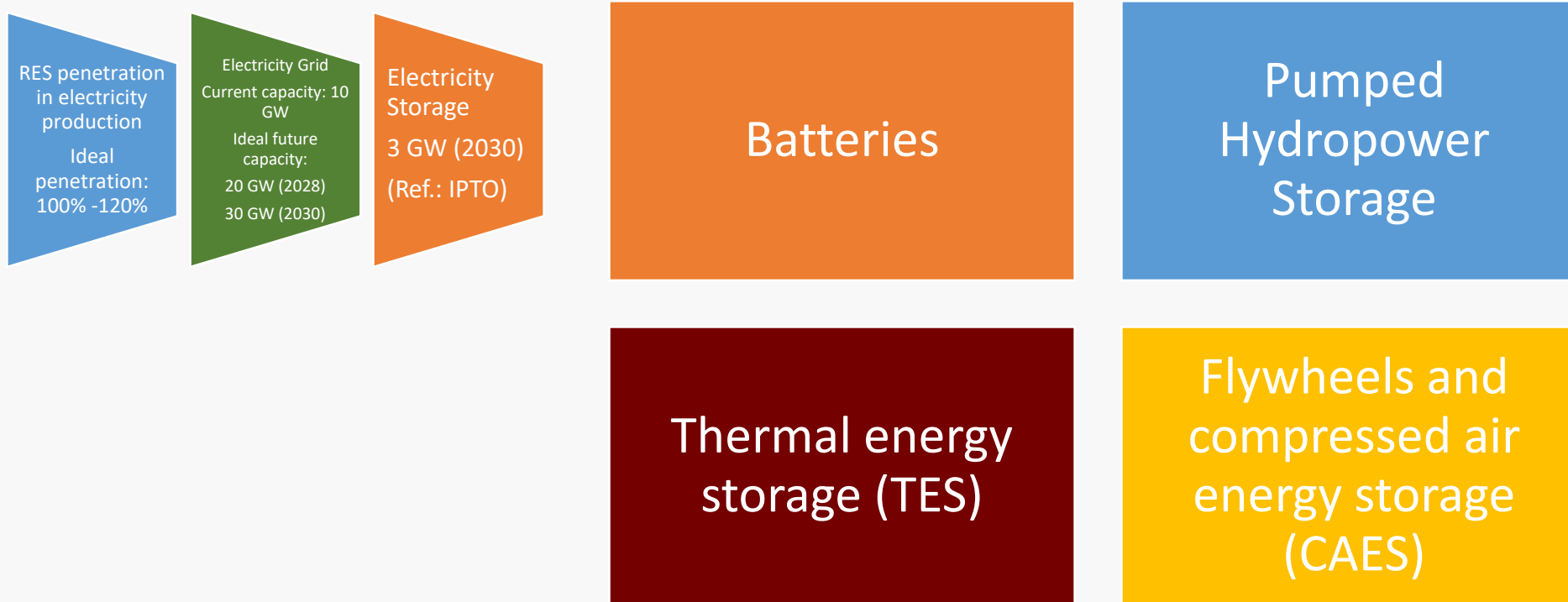
Decentralization – Renewable Energy Sources Technologies

	Total installed costs			Capacity factor			Levelised cost of electricity		
	(2021 USD/kW)			(%)			(2021 USD/kWh)		
	2010	2021	Percent change	2010	2021	Percent change	2010	2021	Percent change
Bioenergy	2 714	2 353	-13%	72	68	-6%	0.078	0.067	-14%
Geothermal	2 714	3 991	47%	87	77	-11%	0.050	0.068	34%
Hydropower	1 315	2 135	62%	44	45	2%	0.039	0.048	24%
Solar PV	4 808	857	-82%	14	17	25%	0.417	0.048	-88%
CSP	9 422	9 091	-4%	30	80	167%	0.358	0.114	-68%
Onshore wind	2 042	1 325	-35%	27	39	44%	0.102	0.033	-68%
Offshore wind	4 876	2 858	-41%	38	39	3%	0.188	0.075	-60%

Source: IRENA (2022), Renewable Power Generation Costs in 2021, International Renewable Energy Agency, Abu Dhabi.



Decentralization – Electricity Storage



Greece is becoming a key energy storage market hub for Europe.



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Digitalization - Electricity Grid Strategy - Industry



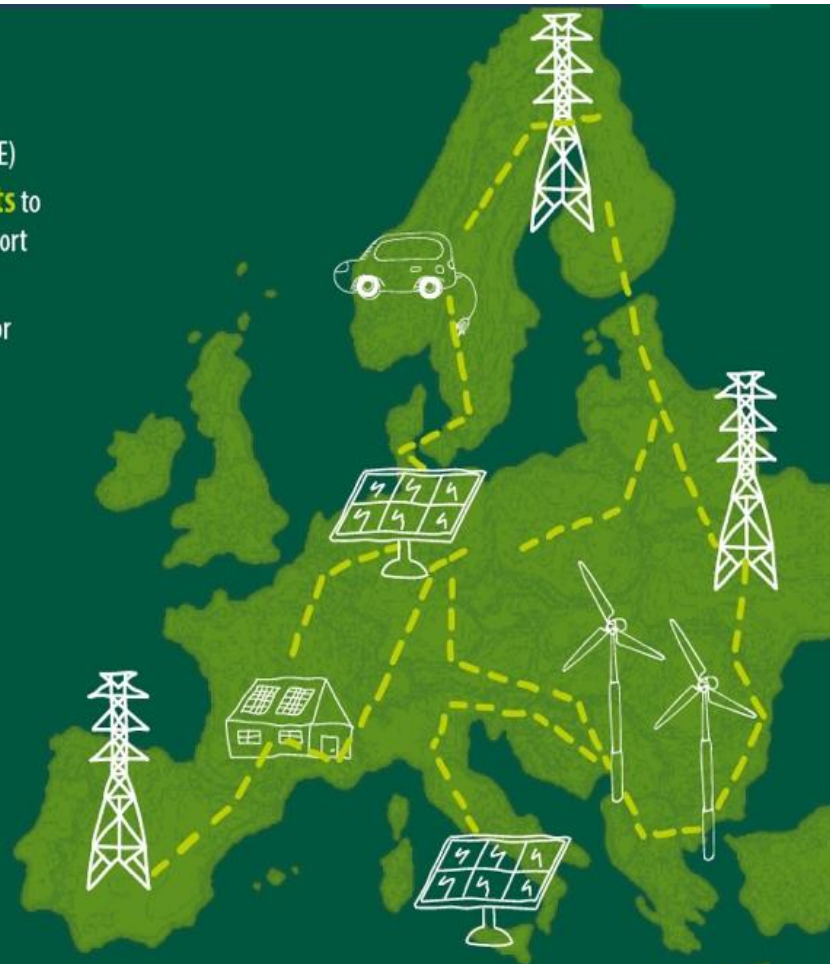


Digitalization - Electricity Grid Strategy - Europe

The trans-European networks for energy (TEN-E) regulation supports **cross-border projects** to link member states' energy networks and support the **integration of renewables**. It sets corridors across the EU to chart priority areas for investments.

The revised policy identifies 11 **priority corridors** focusing on:

- electricity
- offshore grids
- hydrogen and electrolysers



Three **priority thematic areas** are also defined:

- the deployment of smart electricity grids, improving the efficiency of electricity networks
- a cross-border carbon dioxide network, enabling CO₂ capture and storage
- smart gas grids, focusing on renewable and low-carbon gas sources

THE MAIN INNOVATIONS ARE:



compulsory **sustainability criteria** for all projects



a new focus on **offshore electricity** and **hydrogen**



ending support for new **oil and natural gas** infrastructure



the acceleration of **smart grid** deployment and electrification





Energy Transition - Deregulation

Globally, EU is leading in energy market deregulation by

- a) opening its energy markets and fostering competition and
- b) adopting policies to promote small-scale distributed energy generation.

On November 12th, 2018, EU negotiators agreed upon a legal framework for “citizen energy communities”. European energy communities are now allowed to own, rent, or buy their electricity distribution network⁽¹⁾.

Future actions: efforts needed to design the market which will allow citizen communities and SMEs to generate and distribute energy on a small scale, making them part of the energy transition.



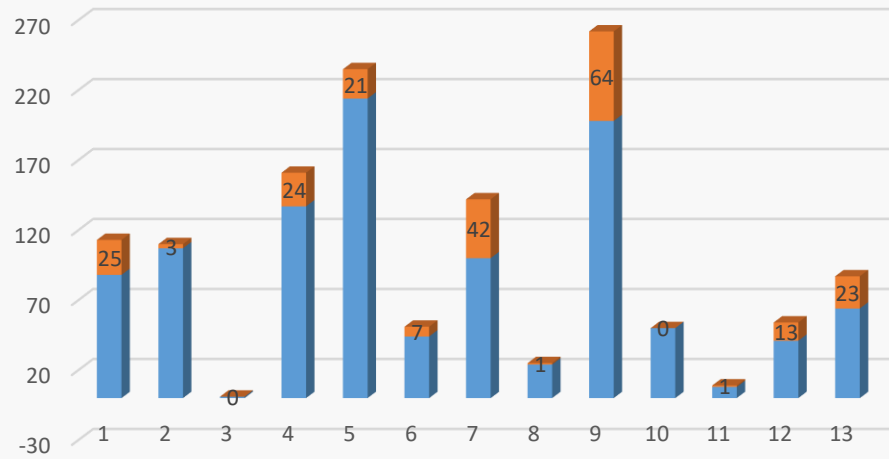
Deregulation – Energy Communities in Greece

Number of Energy Communities: 1300

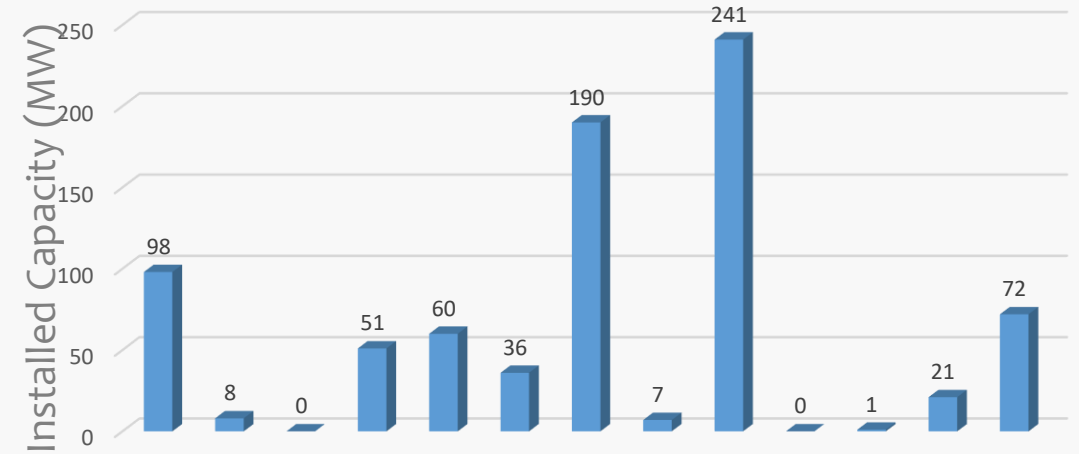
Installed capacity, total: 785 MW

September 2022

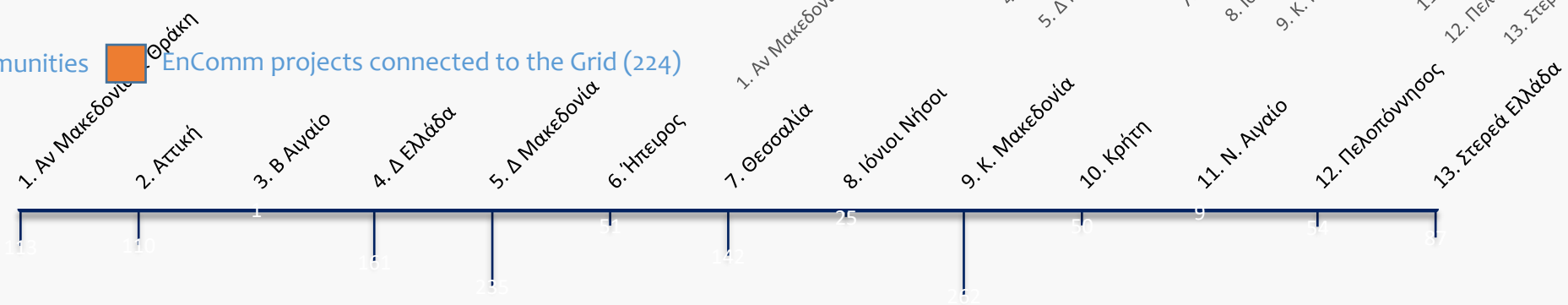
September 2022



Active Energy Communities EnComm projects connected to the Grid (224)



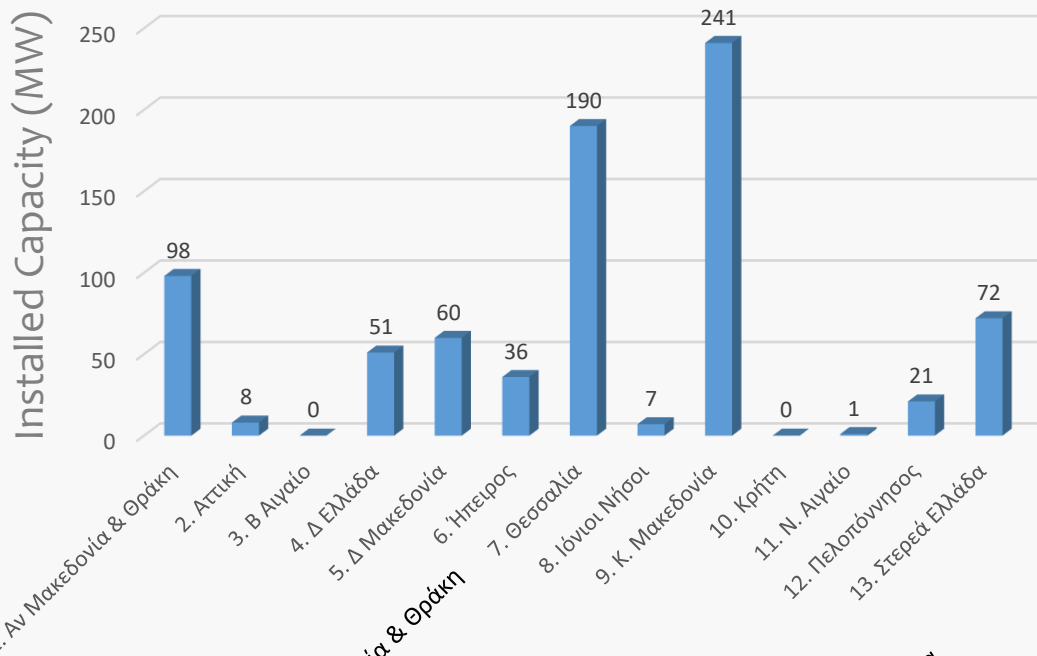
Active Energy Communities



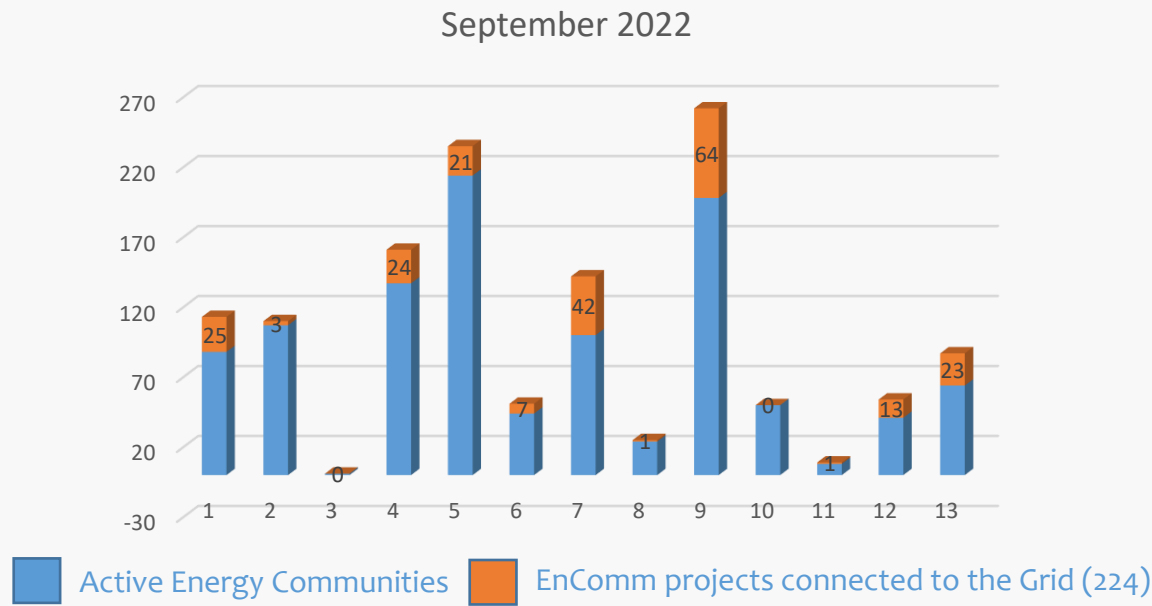


Deregulation – Energy Communities in Greece

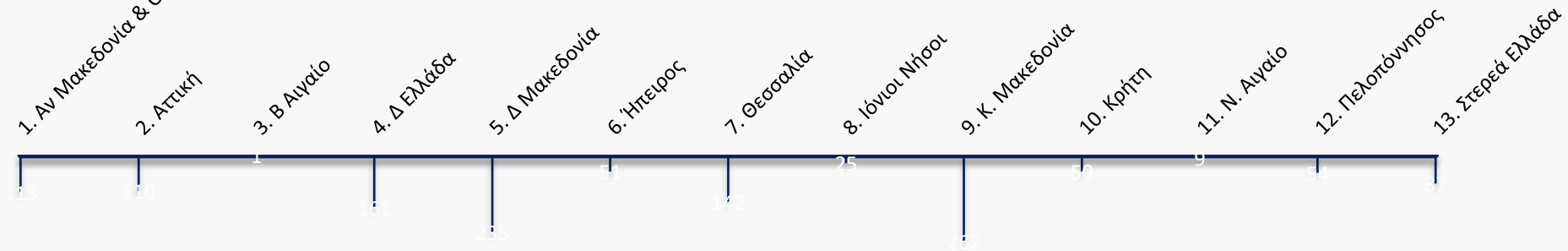
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Active Energy Communities





Renewable Energy Sources Driving Forces

What is driving it?



Necessity

Policy

Technology

Environmental drivers

- need to reduce CO₂
- need to control air pollution
- need to address water scarcity

Geopolitical drivers

- escaping energy dependence
- wish for geopolitical influence
- risk that fossil fuel rents end

Citizens First

Government actions

- International agreements (G7 & Paris Agreement 2015)
- reduced subsidies to fossil fuels
- subsidised renewable technologies
- imposed efficiency targets
- increased taxes on fossil fuels

Private sector actions

- Divestment movement mobilised capital to drive decarbonisation
- Tech giants installing renewables in their supply chains

These 3 major energy sources enjoy both rapid growth and technology-driven learning curves

For each doubling in capacity their costs have been falling by 20%

Wind

Solar PV

Li-ion batteries

Electricity Grid



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Thank you

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