



## PRE-MEETING PORTUGAL PRESENTATION

Ricardo Aguiar, Directorate-General for Energy and Geology

63<sup>rd</sup> Task 1 Meeting November 2024 [Bora Bora, French Polynesia]

# What is IEA PVPS?

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- The International Energy Agency (IEA), founded in 1974, is an autonomous body within the framework of the Organization for Economic Cooperation and Development (OECD).
- The Technology Collaboration Programme was created with a belief that the future of energy security and sustainability starts with global collaboration. The programme is made up of thousands of experts across government, academia, and industry dedicated to advancing common research and the application of specific energy technologies.

# What is IEA PVPS?



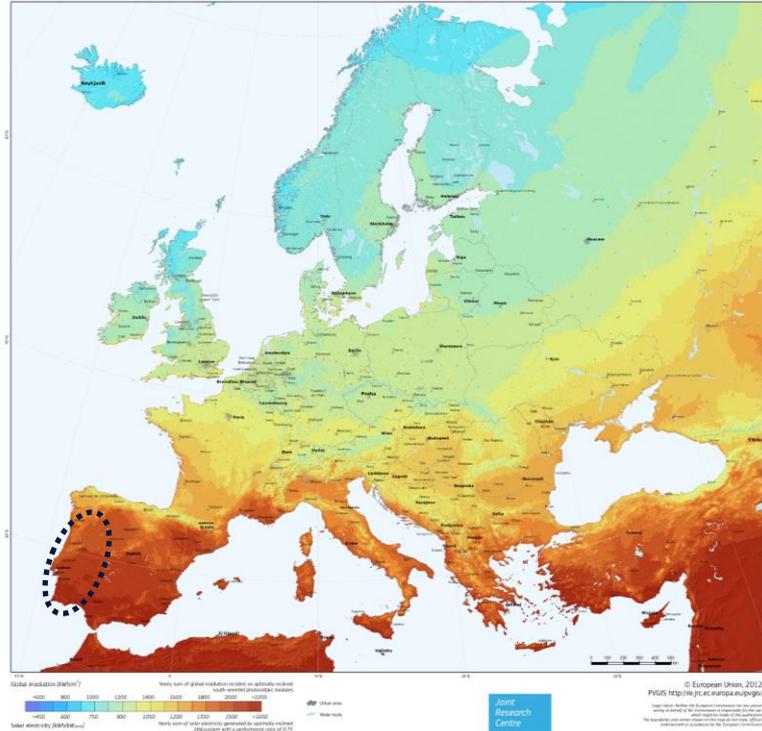
- The IEA Photovoltaic Power Systems Programme (PVPS) is one of the Technology Collaboration Programme established within the International Energy Agency in 1993
- 32 members - 27 countries, European Commission, 4 associations
- *“To enhance the international collaborative efforts which facilitate the role of photovoltaic solar energy as a cornerstone in the transition to sustainable energy systems”*



# Portugal | solar resource

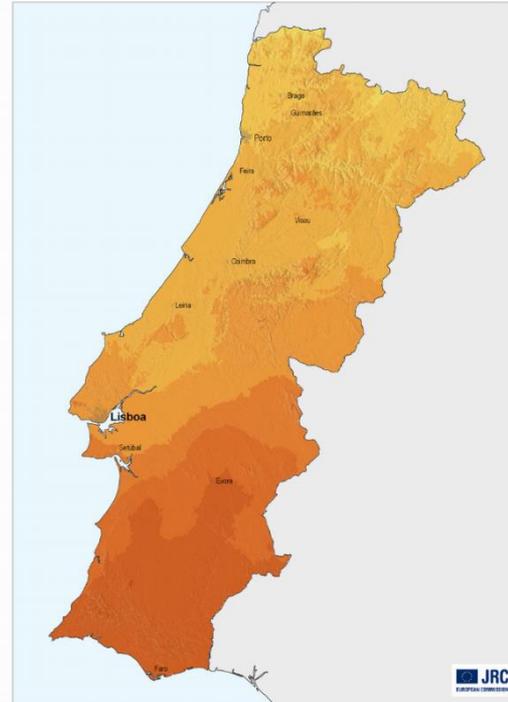


Photovoltaic Solar Electricity Potential in European Countries



Global irradiation and solar electricity potential  
Horizontally mounted photovoltaic modules

Portugal



Yearly sum of global irradiation [kWh/m<sup>2</sup>]

<1500 1600 1700 1800

<1125 1200 1275 1350

Yearly electricity generated by 1kW<sub>peak</sub> system with performance ratio 0.75 [kWh/kW<sub>peak</sub>]

Authors: M. Suri, T. Cebecauer, T. Huld, E. D. Danks  
PVGIS © European Communities, 2001-2008  
<http://re.jrc.ec.europa.eu/pvgis/>

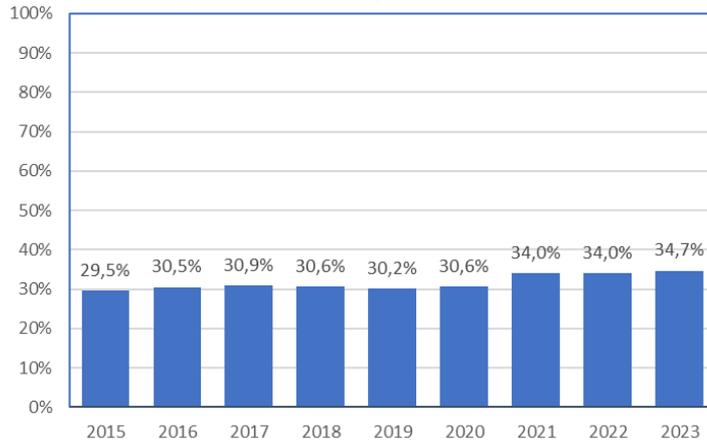
PV capacity factor = 0.16  
ie. 1400 eq. hours / year

# Portugal | main statistics



Population 10,6 million, slightly growing due to immigration

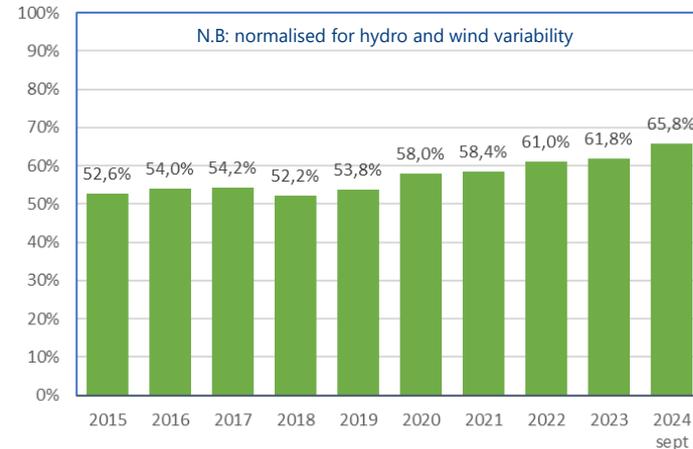
Share of renewables in gross final energy consumption



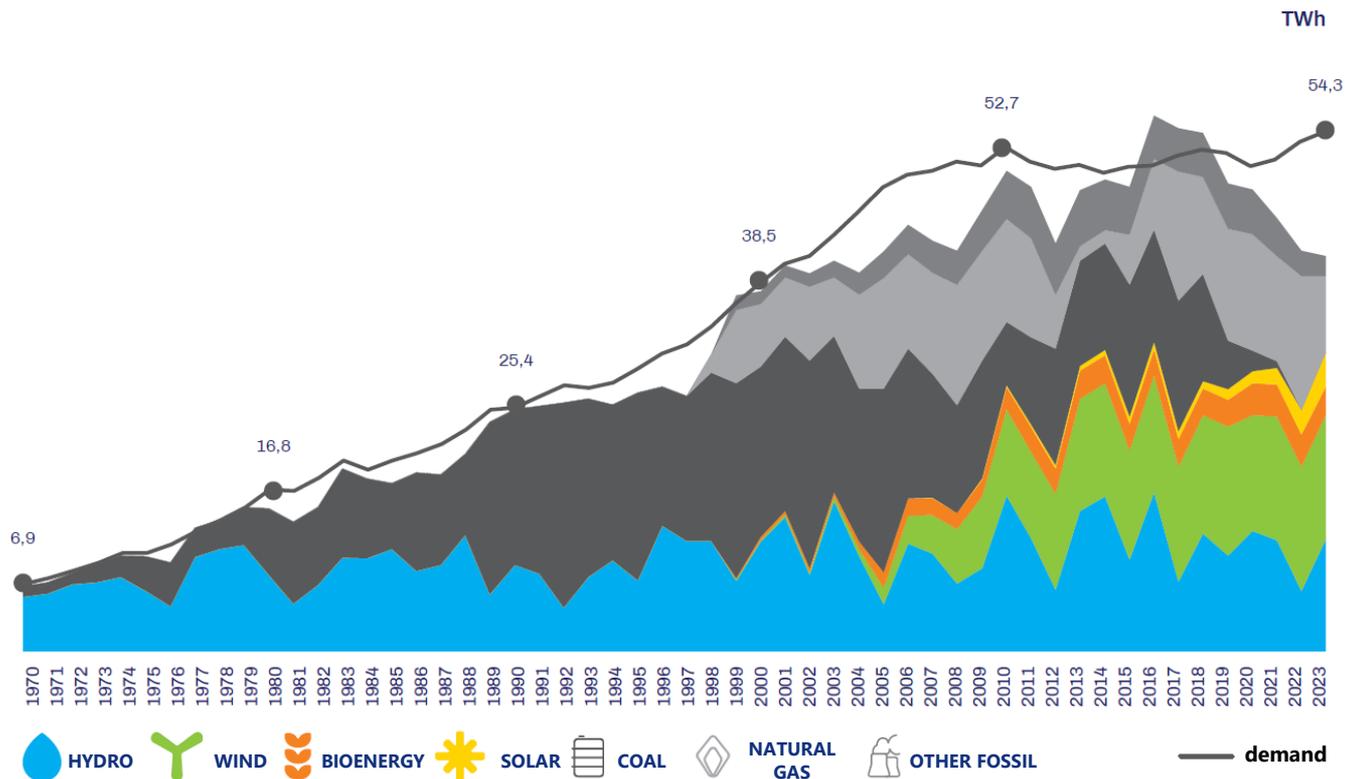
Electricity final demand *ca.* 50 TWh, average growth *ca.* 0.5% / year

Electricity share of final energy demand stable at *ca.* 21%, expected to grow *ca.* 0.6%/year

Share of renewables in final electricity consumption



# Portugal | electricity production



Sources:

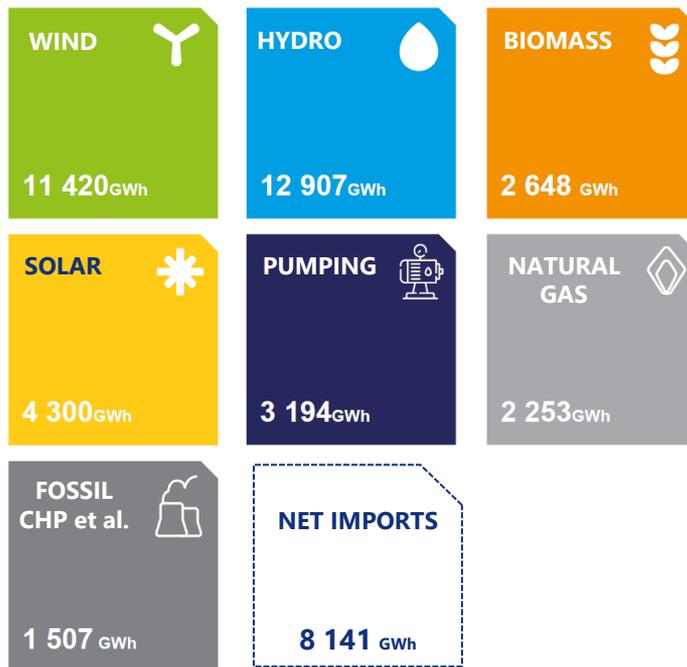


# Portugal | electricity production\*



\* mainland

January to October 2024



**National  
production**

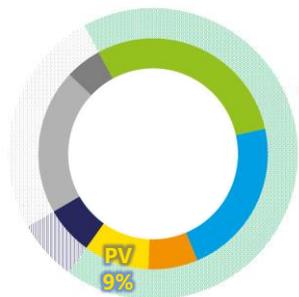
**38 229<sub>GWh</sub>**

# Portugal | electricity mix\*



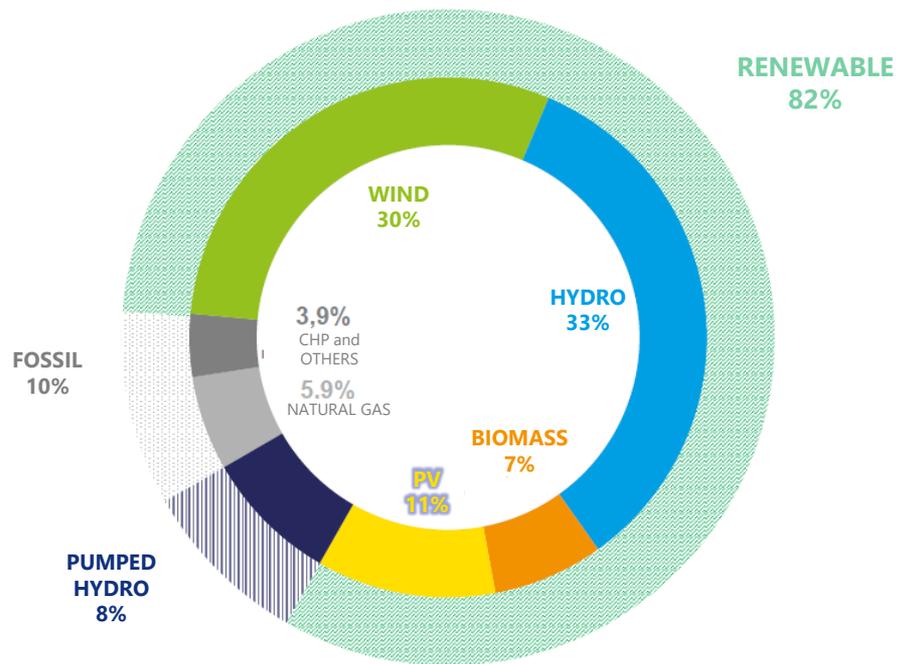
\* mainland

2023



RENEWABLE  
68%

January to October 2024



RENEWABLE  
82%

FOSSIL  
10%

PUMPED  
HYDRO  
8%



1,08  
Wind  
index



1,36  
Hydro  
index

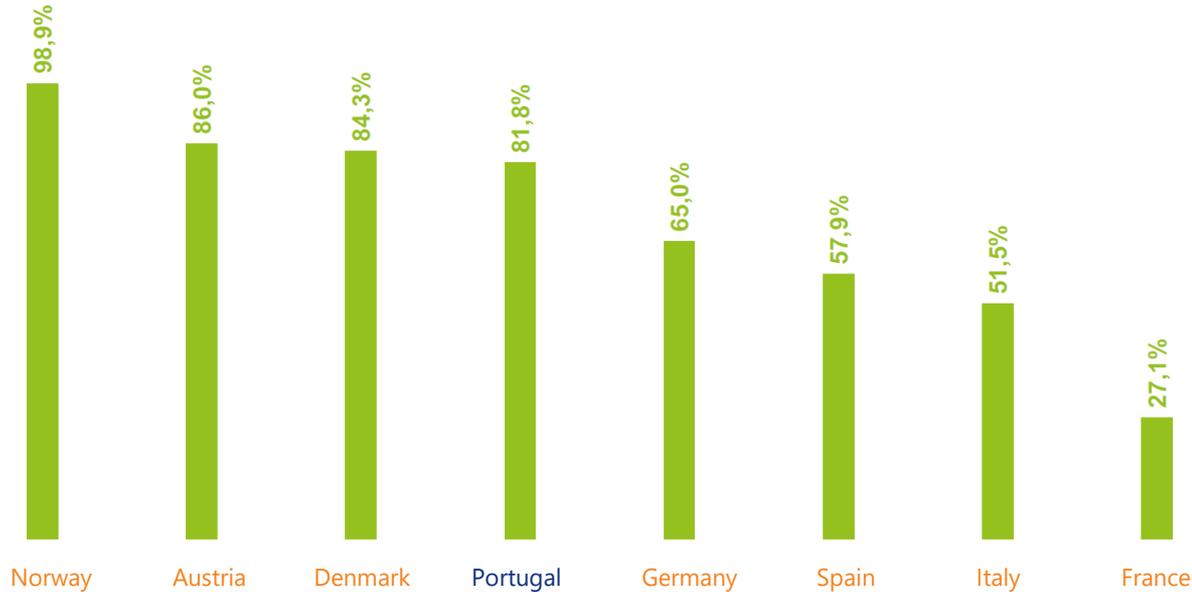


0,94  
Solar  
index

# Portugal | renewable electricity comparisons



January to October 2024

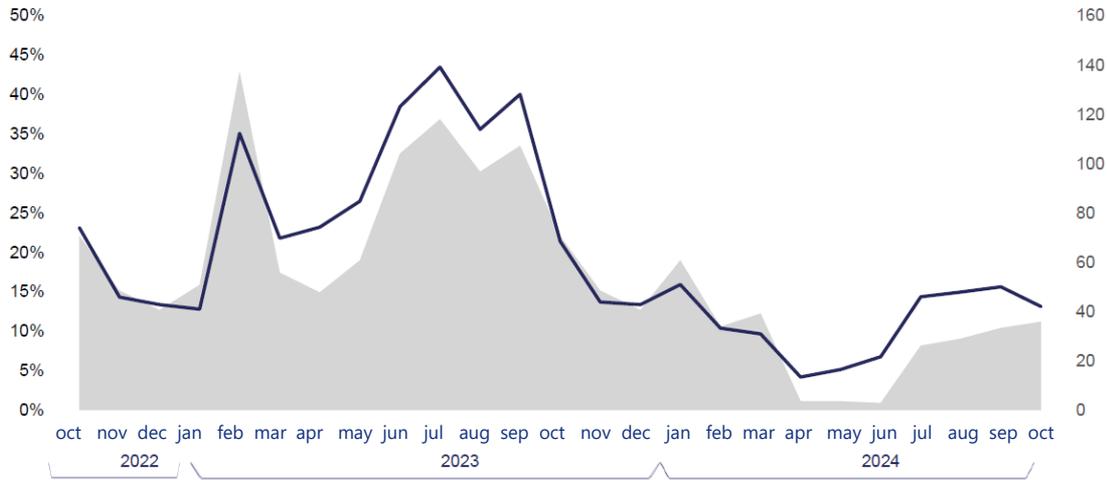


# Portugal | GHG emissions from electricity



% use of CCNG  
power plants

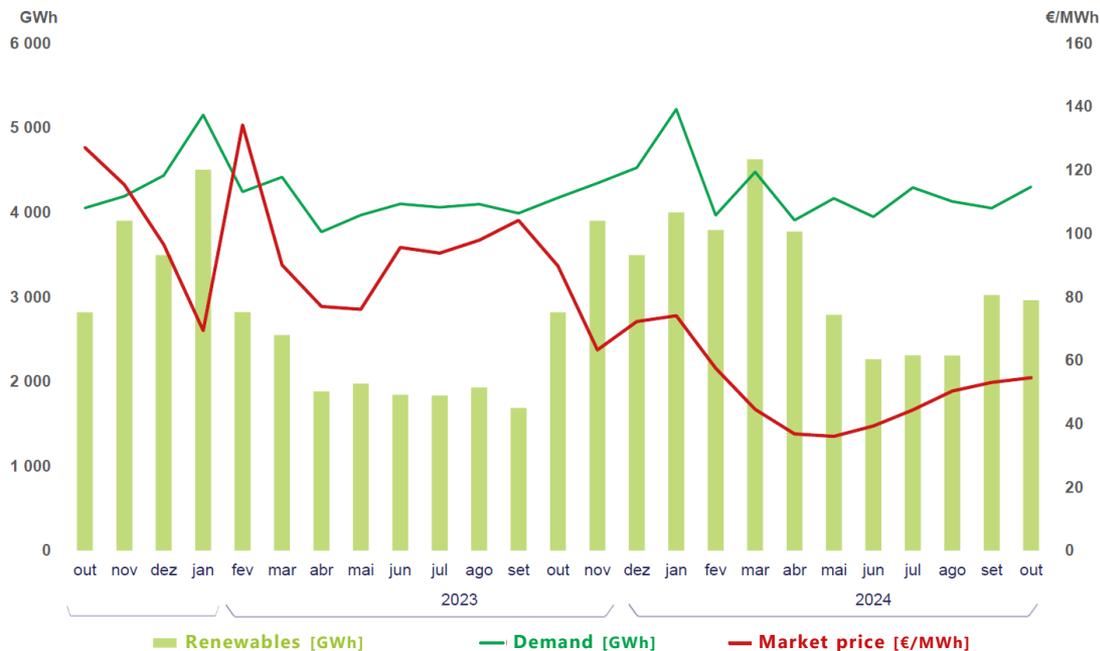
Emission  
intensity



January to October 2024

39 kgCO<sub>2</sub>/MWh

# Portugal | electricity prices



MIBEL\* price  
January to October 2024

**55 €/MWh**

...during the 1749 hours  
with 100% renewables

**43 €/MWh**

1<sup>st</sup> semester industrial

**75 – 272 €/MWh**

1<sup>st</sup> semester residential

**232 – 393 €/MWh**

LCOE self-consumption

**40 – 50 €/MWh**



## 2020 CNR - Carbon Neutrality Roadmap 2050

Published in 2020, currently under review, with an aim to anticipate carbon neutrality for 2045

## 2024 NECP - National Energy and Climate Plan 2030

Original version released in 2020, reviewed 2023-2024, now at final legislative stages

## 2020 EN-H2 - National Strategy for Hydrogen

Original version at 2021, review just starting, exclusively green hydrogen from wind and **PV** inputs

## 2024 PDIRT - Development Plan for the Electricity Transport Infrastructure

The updated 2024 version foresees +1500 km power lines in the next 3 years, focused on enabling more absorption of wind and PV electricity

## 2024 ZLT – Technological Free Zones

For emergent technologies like offshore wind, hybrid power plants, **agrivoltaics**, includes regulatory sandboxes

## 2024 PAB – Action Plan for Biomethane

## 2024 RONDA – Roadmap for Decarbonization of Aviation

(and numerous other changes and updates of national legislation)

# Portugal | PV outlook



No specific national targets for solar PV (or for any other technology)

However, scenario data for 2030 in the NECP are very relevant in practice

Capacity (GW)	Self-consumption	Power plants	Total
Original NECP (2020)	2.0	7.0	9.0
NECP Revision 2024	5.0	8.8	13.8

plus another  
**8 GW for  
electrolysis**

**Grand total  
22 GW**

# Portugal | statistical data categories



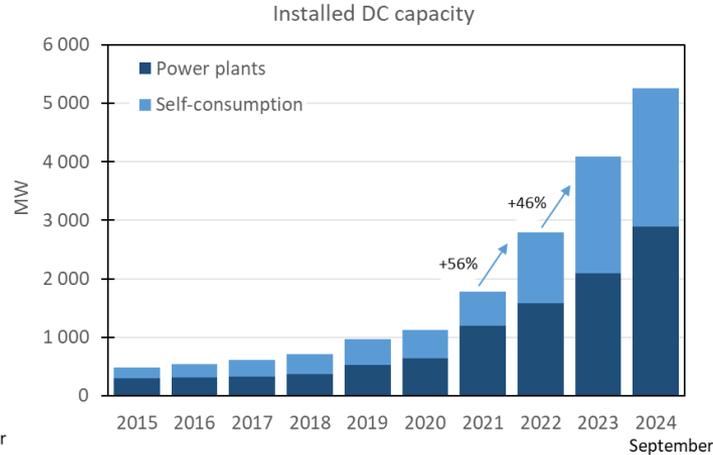
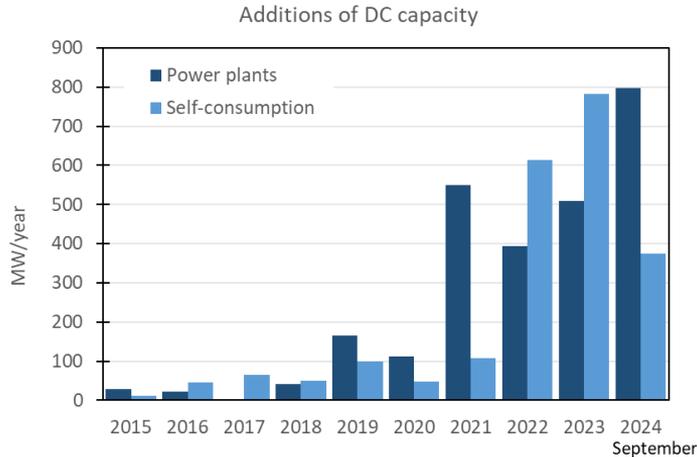
No statistical categories like residential, commercial, industrial, BIPV, BAPV, agriPV, floatPV, etc.  
PV systems are just either **self-consumption units** or **power plants**

	Power Plants		Self-Consumption Units		
Power at injection point	< 250 kW	> 250 kW	< 4 kW	4 kW to 1 MW	> 1 MW
Type	Small Production Unit	Large Power Plant	Self-Consumption Unit		
Licensing	yes	yes	no	no	yes
Metered	yes	yes	no	yes	yes

# Portugal | PV market evolution



- Capacity growth continues strong for all types of systems
- Large power plants from the 2019 and 2020 auctions have been delayed but are now coming online
- Growth of self-consumption systems outpaced that of power plants in 2022 and 2023, but not this year

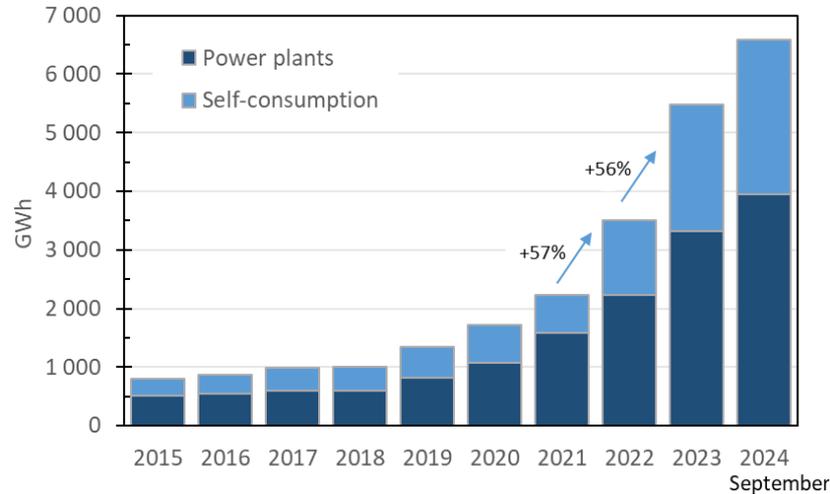


[MW]	Self-consumption	Power plants	TOTAL
2015	182	297	479
2016	228	319	547
2017	292	322	614
2018	342	364	707
2019	441	529	970
2020	488	641	1 129
2021	595	1 191	1 786
2022	1 209	1 583	2 792
2023	1 902	2 093	4 084
2024	1 969	2 890	5 255

# Portugal | PV production



Production growth rate has increased above capacity growth rate in 2023 mostly due to sunny weather, but the current year is being less sunny





## Large Power Plants

The previous Governments launched very successful auctions:

- in 2019, 1292 MW for large power plants (> 10 MW)
- in 2020, 700 MW for large power plants (> 10 MW)
- in 2024 (April 4), 183 MW for floating PV

Launching of new auctions in 2025 by the new Government is expected

Abundance of interested developers for large power plants, even without financing or other support mechanisms

However, the market is constrained by the scarcity of grid injection points and future production of H<sub>2</sub> by electrolysis is likely to aggravate the problem

## Small Systems

VAT 6% not 23%

BAPV electricity at least 2 to 4 times cheaper than prices proposed by utilities

Very active competition of utilities and SMEs to install self-consumption systems with little effort for the clients

Governmental incentive of 30 M€ available to families that buy PV systems, covering up to 85% of the cost (limited to 1100 € for systems without battery, 3300 € for systems with battery) – to be discontinued



- Grid use costs are high in Portugal
- This holds back some potential self-consumption systems
- It is also a problem for PPAs, including those needed for H<sub>2</sub> production
  
- The previous Government had foreseen to decrease the costs in 2024 by saving 1 200 M€ via
  - revenues from ETS licences auctions
  - revenues from Guarantees of Origin sales
  - remaining revenues from a past special tax applied to large utilities
  - a part of the Environmental Fund

but no news yet on the position of the current Government



Portugal handles only the initial and final parts of the PV value chain: research at TRL 1-3 and production of mounting structures, inverters, control systems, software.

However, at the end of 2023 a production line for **assembling** flexible PV panels became active. It is owned by LuxOEnergy, that has a partnership with Austrian DAS Energy. It occupied the facilities of the former 'Moura Fábrica Solar' that closed in January 2019. Production volumes are not yet known.



The instability at international module manufacturing capacity and price seemingly has not affected Portuguese PV policies and value chains



- No strong opposition from municipalities, that receive substantial compensations for large PV projects
- However, complaints by local communities about impacts of large PV power plants emerged in 2022 and increased much since then, starting in the southern region but now spreading
- Local populations also seem to have changed opinions, e.g. now placing high value at eucalyptus trees, formerly considered harmful
- Environmental NGOs have mixed positions, speak in favour of “renewables in general” but often against specific projects
- A floating PV auction was already an attempt by the (previous) Government to use alternative surfaces
- **During 2024 social opposition emerged also to floating PV**
- **The Environment Protection Agency (APA) is now refusing licensing several PV projects previously considered acceptable**



**Exclusivo**  
ENERGIA  
Agência do Ambiente chumba projeto de energia solar e eólica da Finerge em Vieira do Minho e Montalegre



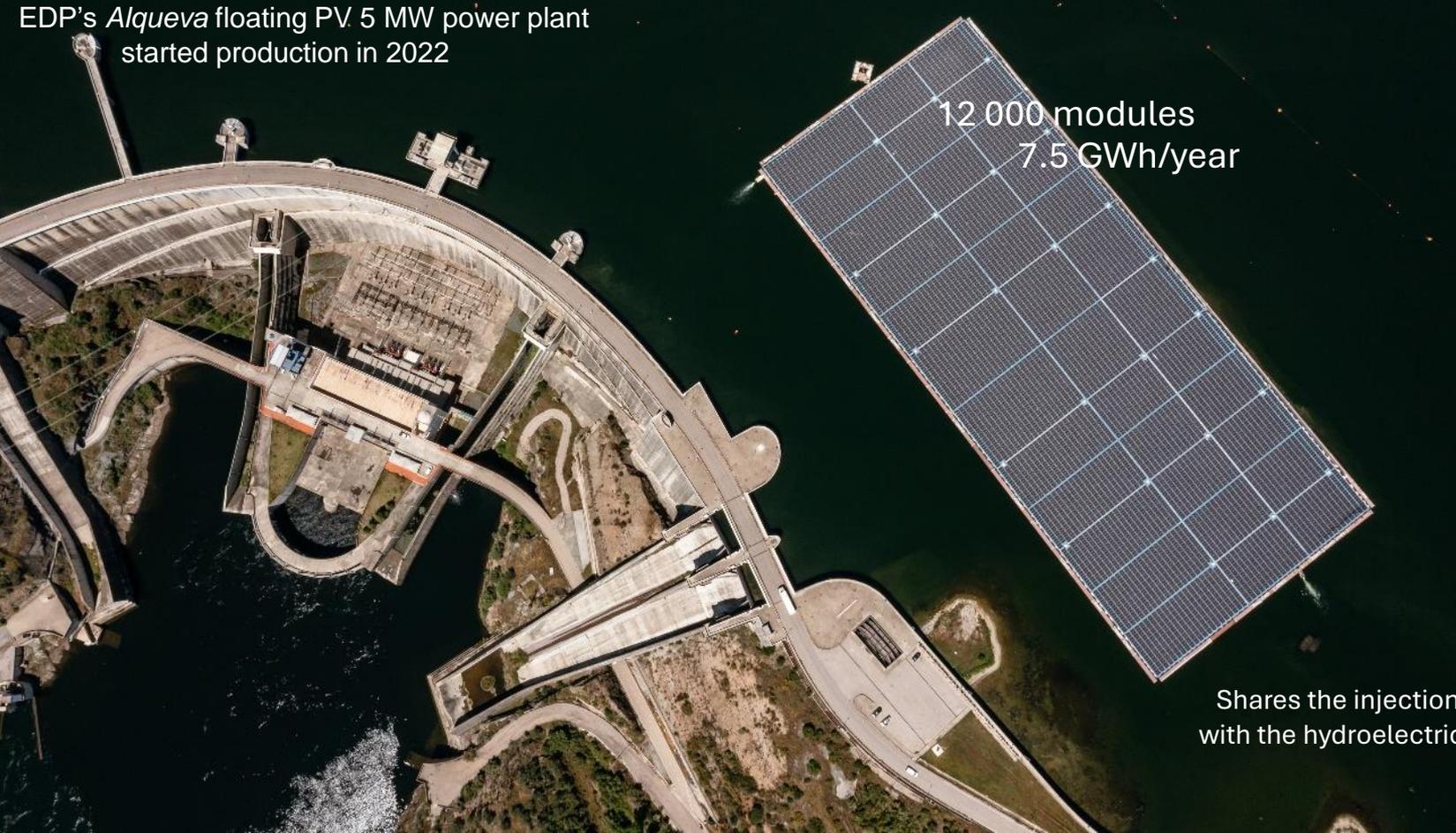
A Finerge teve da APA uma decisão desfavorável no licenciamento de um projeto de 28 milhões de euros. Em causa estão um pequeno parque eólico e uma central fotovoltaica que resulta de um lote ganho no leilão de 2022 do anterior Governo. João Galamba, ex-secretário de Estado da Energia, qualifica como “vergonhosa” a decisão da APA, por ter sido a própria APA a validar as áreas disponíveis para centrais solares flutuantes



# Portugal | Showcase system



EDP's *Alqueva* floating PV 5 MW power plant  
started production in 2022



12 000 modules  
7.5 GWh/year



Expansion to  
70 MW is  
foreseen



Floaters are  
made from cork,  
produced by  
trees of this  
same region

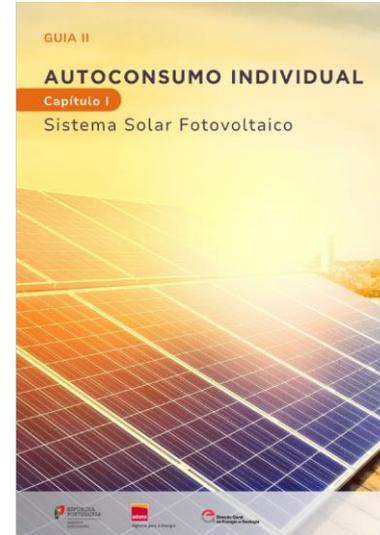
Shares the injection point  
with the hydroelectric power plant



For many years the most complete guide for PV installations (2004)...



Guide for developing a renewables-based energy community (2022)



Guide for individual PV self-consumption (2023)



Courses for PV installers, collective self-consumption, licensing procedures, etc.

# Portugal | key subjects this year for PV



- Municipalities are starting to receive compensations for large PV projects at 13 500 €/MVA (as established in a 2022 legislation)
- Also, compensations for expansion of grid infrastructure (1% - 5% of investment)
- Change of Government is bringing new views on public policies for renewables
- Approval of the NECP revision (last month)
- Approval of the expansion of the electricity transport grid
- Launching of a Mission Group for the acceleration of the licensing of renewable energy projects
- Launching of an auction for biomethane and (mostly PV based) green hydrogen
- Plans for a capacity market, especially focused on (underutilised) hydro and natural gas power plants, as well as on large battery banks
- Plans for a platform that would enable individuals and SMEs to negotiate Power Purchase Agreements
- Support to installation of PV modules on buildings to end soon

# Obrigado

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