

*L'Ordre des Ingénieurs Tunisiens*  
*Ordem dos Engenheiros Portugueses*



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Tunis, 2024, 29th June

# Energy transition in Portugal: where we are

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Ordem dos Engenheiros  
Portugal

## AGENDA

1. EVOLUTION OF INSTALLED CAPACITY AND SUPPLY IN PORTUGAL
2. INTERCONNECTION CAPACITY IN 2022
3. PNEC 2030 TARGETS
4. GRID CONNECTION REQUESTS
5. REQUIREMENTS FOR GENERATORS – RfG
6. FUTURE INTERCONNECTION CAPACITY UNTIL 2030
7. PROGRESSIVE PARTICIPATION OF RENEWABLES: A CHALLENGE FOR SYSTEM MANAGEMENT
8. NEW CONSUMERS: DECARBONIZATION; DIGITAL TRANSITION; ELECTRIFICATION
9. NEXT FUTURE: OFFSHORE WIND
10. RENEWABLE GASES
11. ENERGY TRANSITION AND THE RENEWABLE INTEGRATION CHALLENGE



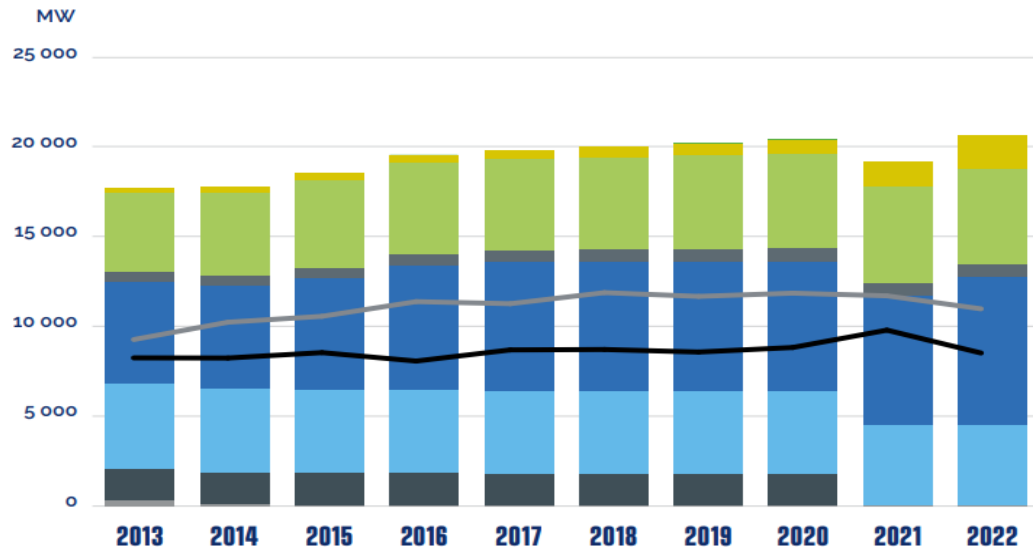
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# EVOLUTION OF INSTALLED CAPACITY AND SUPPLY IN PORTUGAL



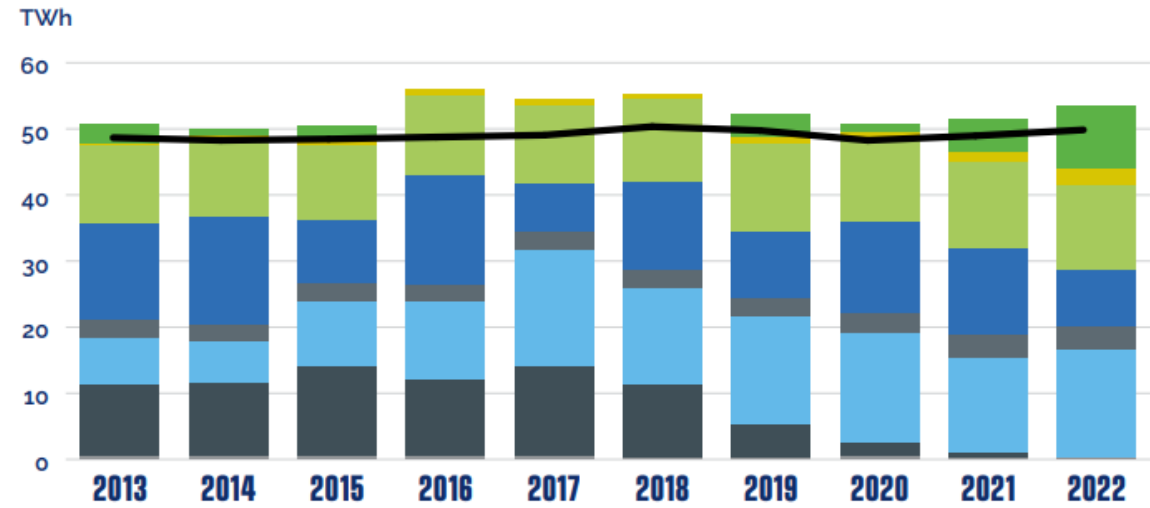
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## EVOLUÇÃO DA POTÊNCIA INSTALADA E PONTA INSTALLED CAPACITY AND PEAK EVOLUTION



- Solar
- Eólica
- Biomassa
- Hídrica
- Gás Natural
- Carvão
- Outros
- Ponta da Produção
- Ponta Consumo

## SATISFAÇÃO DO CONSUMO SUPPLY



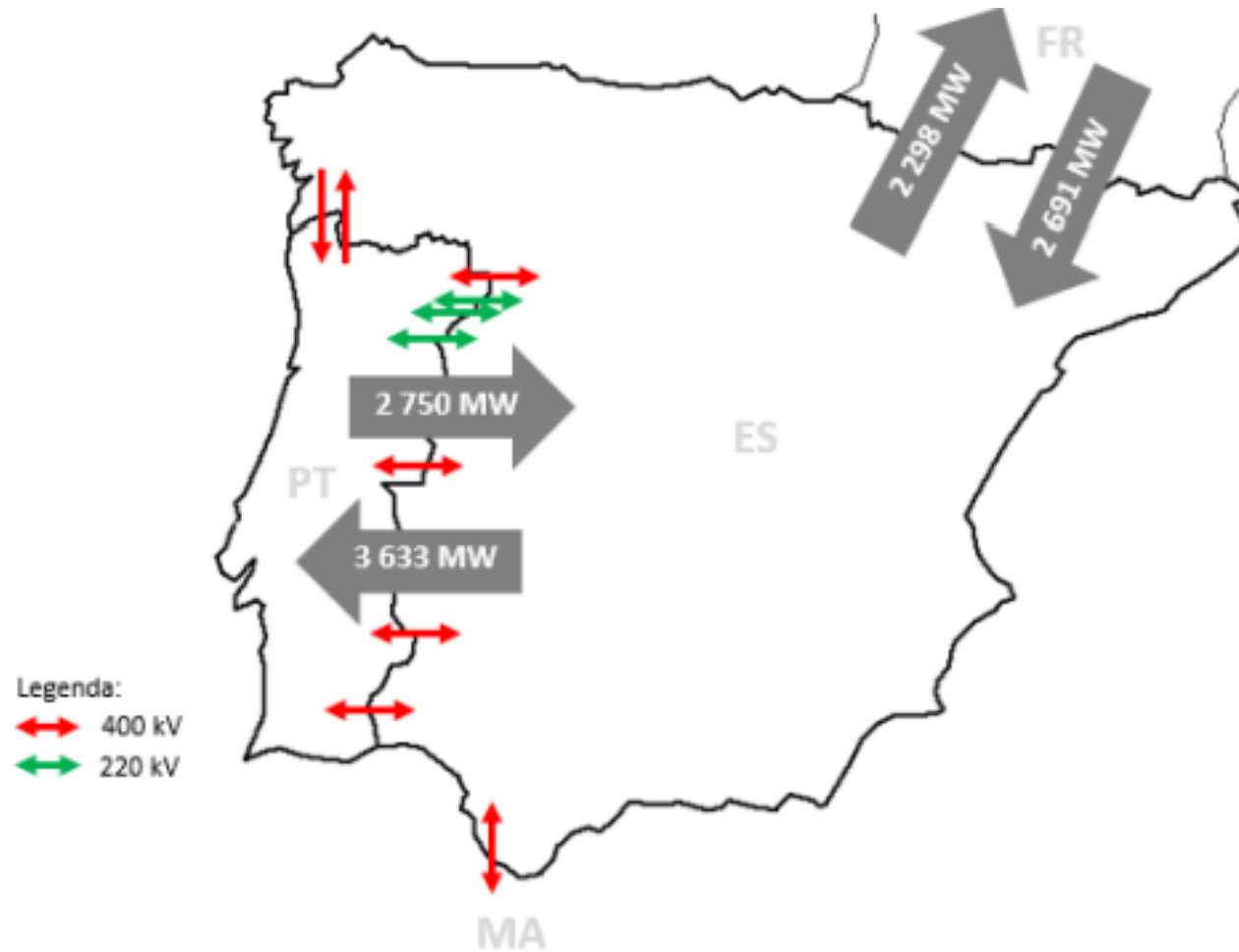
- Outros
- Gás Natural
- Hídrica
- Solar
- Consumo
- Carvão
- Biomassa
- Eólica
- Saldo Importador

Annual Production Values: HYDRO highly variable and WIND stable.  
**SOLAR** (still) with few contribution, but **with upward trend**.  
**FUEL** ceased in 2013 and **COAL** ceased in 2021.  
 2016, 2017 e 2018 with Export Balance.

# INTERCONNECTION CAPACITY IN 2022



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Source: RMSA-E 2023



## Installed Capacity at 2023, 31st December

	2023 (GW)
Hydro	8,2
Wind	5,3
Solar	2,6
Other Renewables	0,7
Coal	0
Natural Gas	4,5
TOTAL	20,5

Source: REN  
"Caracterização RNT 31/12/2023"

## PNEC 2030 Targets

	2030 (GW)
Hydro	8,1 (3,9 pumping)
Wind	12,4 (2 offshore)
Solar	20,4 (5,5 UPAC)
Other Renewables	2,3
Coal	0
Natural Gas	3,8
TOTAL	47

Source: PNEC 2030  
(under revision)

**Very ambitious goals!**

# OURIKA! PV POWER PLANT – 1<sup>ST</sup> PV POWER PLANT CONNECTED TO TRANSMISSION GRID



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Three ways to obtain the “Título de Reserva de Capacidade (TRC)”:

➤ General Access

➤ Bilateral Agreements

➤ Auctions

- Injection Capacity managed by DGEG
- TRC are issued by the Grid Operators



## TÍTULO DE RESERVA DE CAPACIDADE DE INJEÇÃO NA RESP

(alínea a), do n.º 2 do art.º 5.º-A, do Decreto-Lei n.º 172/2006, de 23 de agosto, na sua atual versão)

Ao abrigo e nos termos do disposto na alínea a), do n.º 2 do art.º 5.º-A, do Decreto-Lei n.º 172/2006, de 23 de agosto, na sua atual versão, a Concessionária e Operadora da Rede Nacional de Transporte na sequência de pedido do requerente, atribui o presente título de reserva de capacidade de injeção de potência produzida em Centro Eletrprodutor a partir de energia solar fotovoltaica, nos termos e com as características seguintes:

Requerente	
Nome:	
Morada:	
Código Postal:	
NIF/NIPC:	

Características do Ponto de Receção	
Potência de Ligação do Centro Electroprodutor (MVA):	
Nível de Tensão (kV):	
Subestação:	
Notas:	
1.	O ponto de ligação da instalação de produção deve situar-se na área de influência da subestação de interligação, no nível de tensão indicado e a uma distância máxima que, permita a ligação em condições técnicas regulamentares.



### TRC's issued by TSO (essentially for solar projects):

- General Access: 16 TRC / 1270 MVA;
- Solar 2019 Auction: 10 TRC / 1022 MVA;
- Solar 2020 Auction: 7 TRC / 583 MVA;
- Floating Solar 2021 Auction: 1 TRC / 70 MVA;
- Pego 2021 Auction: 1 TRC / 224 MVA;
- Bilateral Agreements: 25 + 7 Agreements / 7062 MVA;

### Total Solar Bilateral Agreements Requests to TSO

- 78 TSO Bilateral Agreements Requests ~ 17 GVA
  - According to list published by DGEG

**Total Solar Capacity already reserved in Transmission and Distribution Grid ~ 17,0 GW (considering UPAC < 1 MVA)**





Regulation (EU) 2016/631 (*Requirements for Generators – RfG*)

Portaria 73/2020, 16th March

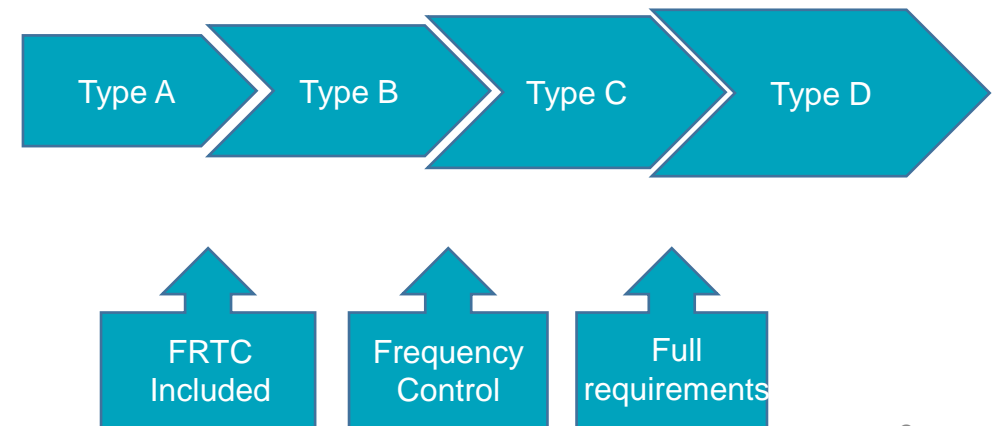
European network code on **requirements for grid connection of generators** and **new operational notification procedure for connection and compliance** of Power-Generating Modules (PGM).

Despacho DGEG n. 7, 2018, 24th January

### Threshold power-generating modules :

- **Type A:**  $P \geq 0,8$  kW connected to  $U \leq 60$  kV
- **Type B:**  $P \geq 1$  MW connected to  $U \leq 60$  kV
- **Type C:**  $P \geq 10$  MW connected to  $U \leq 60$  kV
- **Type D:**  $P \geq 45$  MW connected to  $U \leq 60$  kV or  $P$  connected to  $U > 60$  kV

### General requirements for power-generating modules:



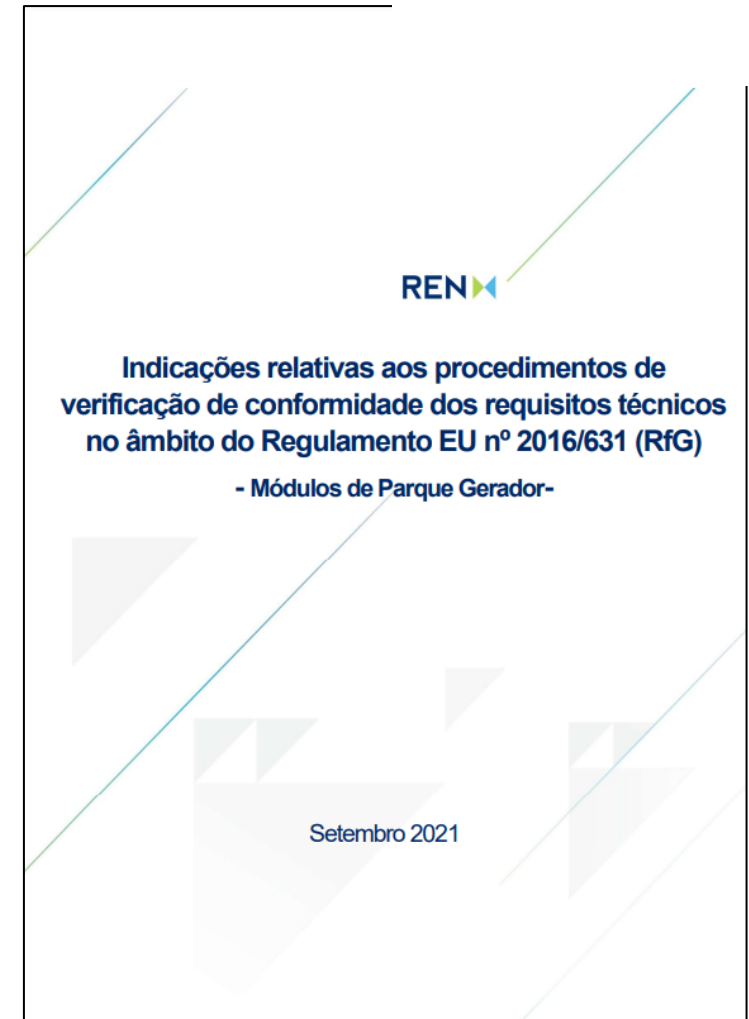


## The promotor of the PGM has to:

- Compliance Simulations
  - Deliver Report
  - Deliver Simulation Module (PSS/E)
- Promotor and Manufacturer Declaration
- Compliance Tests

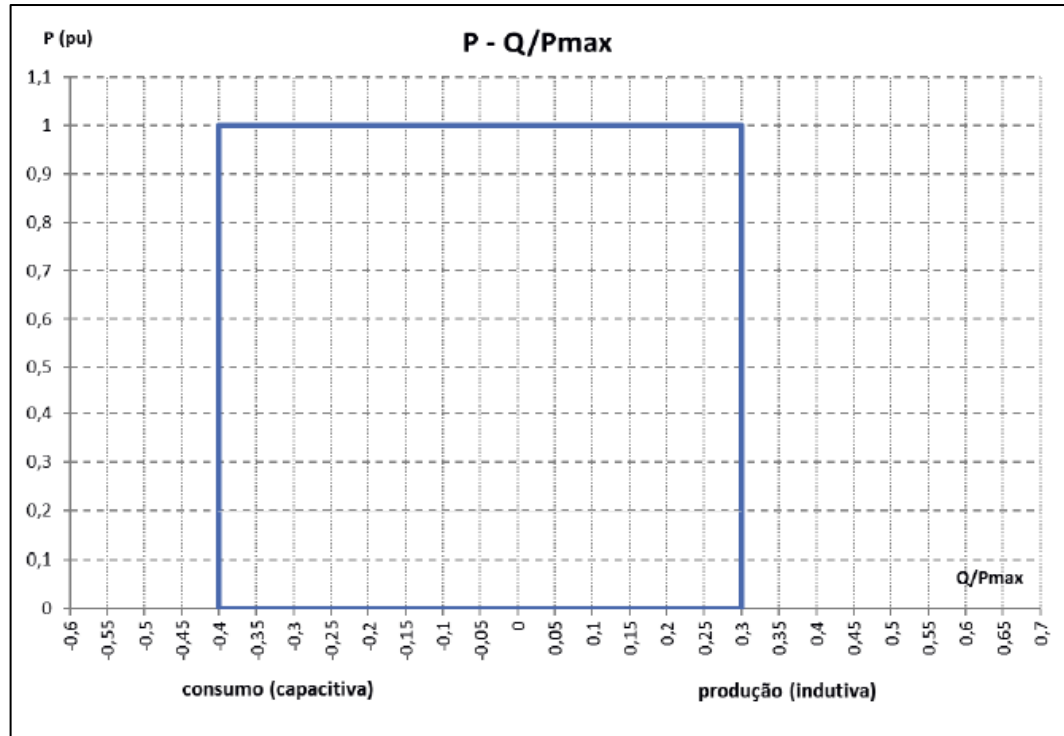
Published in TSO website in September 2021

[https://mercado.ren.pt/PT/Electr/AcessoRedes/AcessoRNT/LigProd/BibLigProd/Procedimentos%20de%20verifica%C3%A7%C3%A3o%20de%20conformidade\\_MPG\\_Set2021.pdf](https://mercado.ren.pt/PT/Electr/AcessoRedes/AcessoRNT/LigProd/BibLigProd/Procedimentos%20de%20verifica%C3%A7%C3%A3o%20de%20conformidade_MPG_Set2021.pdf)



## Reactive Requirement for PV

## Example of Compliance Test

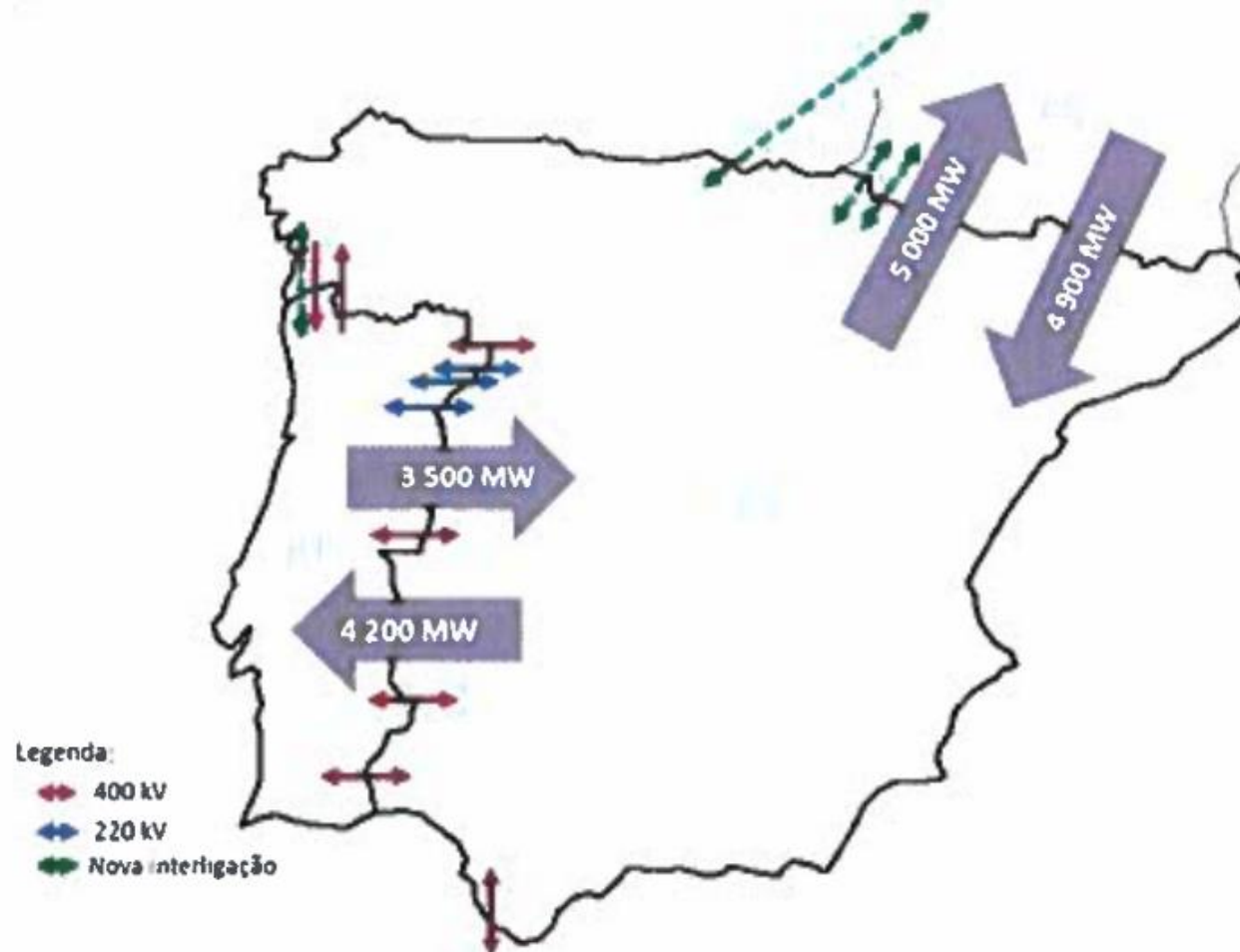


The Solar Power Plants remain connected to the grid during the night to provide voltage control!

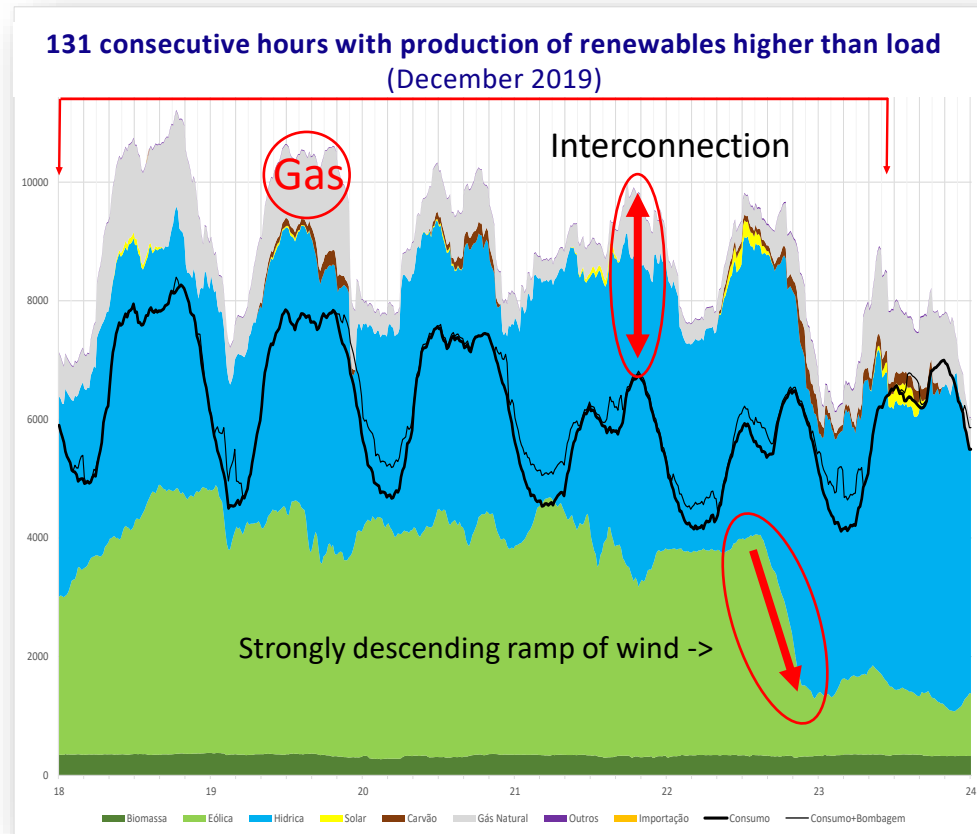
# FUTURE INTERCONNECTION CAPACITY UNTIL 2030



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Source: RMSA-E 2023



## SOME CRITICAL FACTORS FOR A SAFE AND SUSTAINABLE ENERGY TRANSITION

- Reversible Hydro, Interconnections and Storage
- Natural Gas (progressively larger mixtures with renewable gases, e.g. H<sub>2</sub>)
- Demand Flexibility
- Observation, control and digitalization
- **Fast deployment and resilience of network infrastructures** (licensing and external environmental factors)

### Decree-Law n.º 15/2022, of 14th January

- Flexible Management of the grids
- Probabilistic approach of network planning
- Re-equipment and non-firm capacity concept

Some of the innovative changes to the new legal framework for the electricity sector are based on a concept and a cross-challenge among all the Electric System stakeholders: RISK management.



# NEXT FUTURE: OFFSHORE WIND

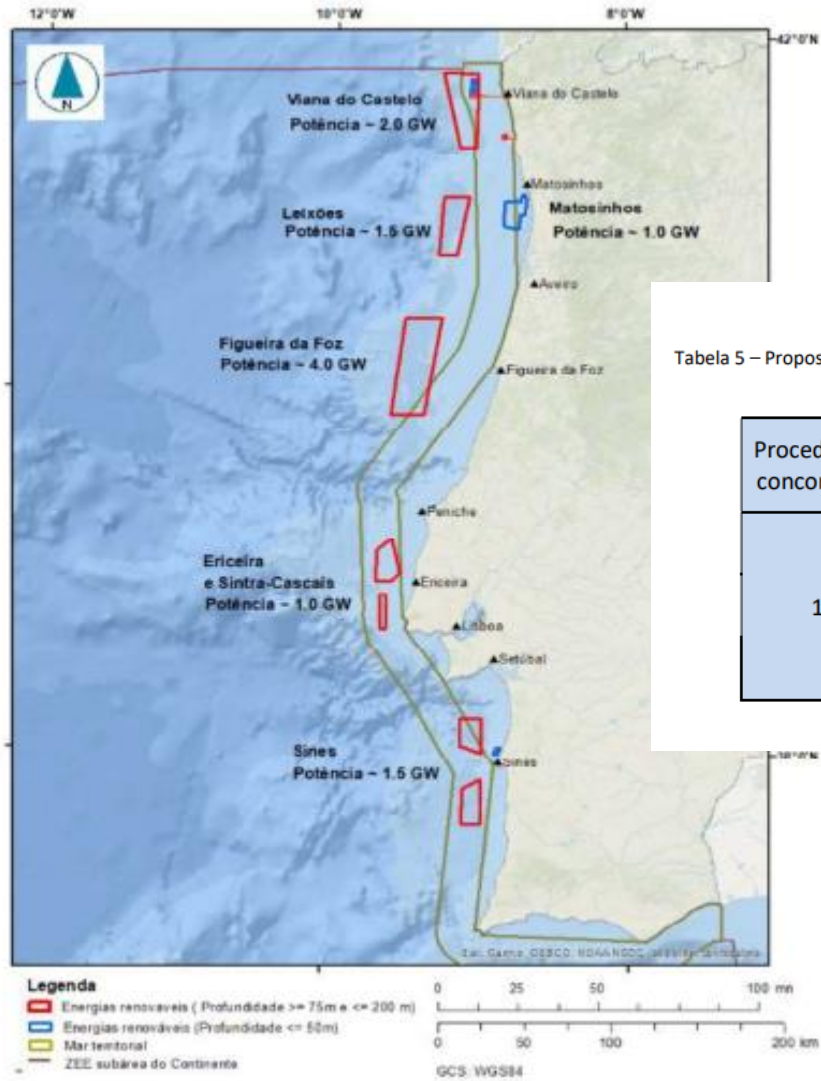


Tabela 5 – Proposta de sequenciação temporal das áreas e dos lotes a disponibilizar no âmbito do lançamento do primeiro procedimento concorrencial

Procedimento concorrencial	Áreas preferenciais	Zona das áreas preferenciais	Nº de lotes dentro da zona	Potência passível de ser instalada (GW)
1.º	Viana do Castelo	Zona norte da área	2	1
	Leixões	Zona norte da área	1	0,5
	Figueira da Foz	Zona norte da área	4	2

Auction:

Fisrt 2 GW to be in operation in 2030?

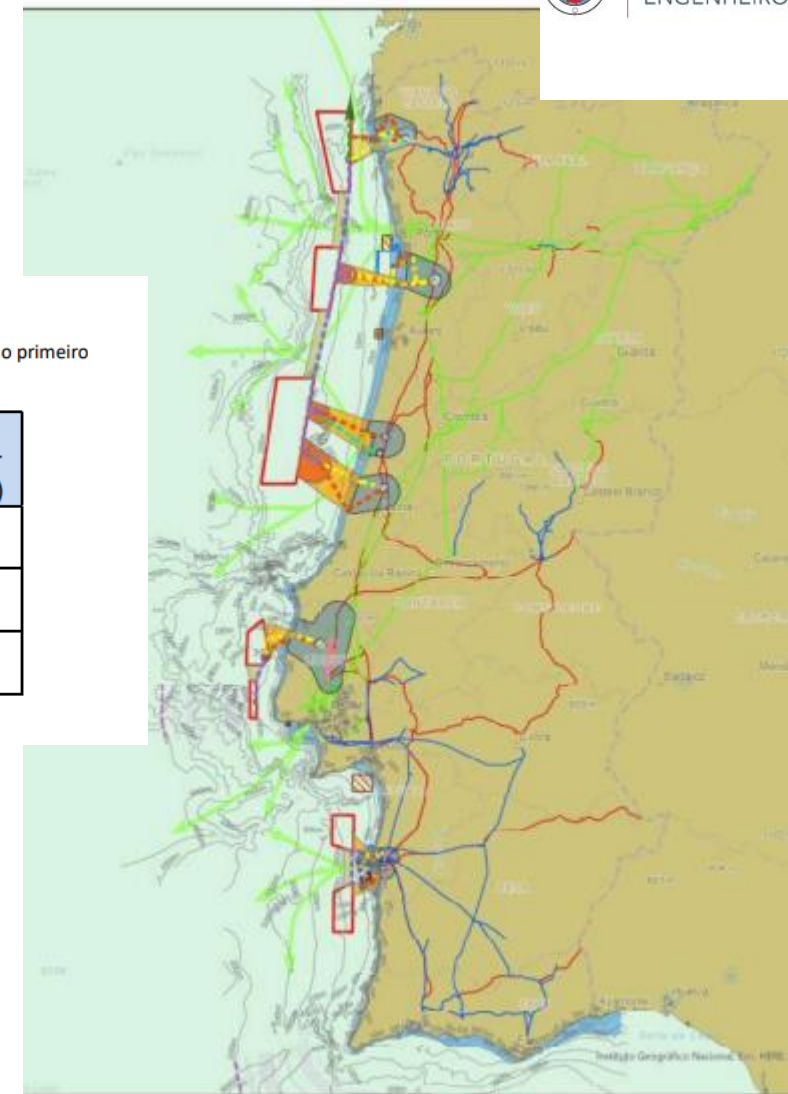


Figura 8 – Esquema da rede offshore em muito alta tensão

Council of ministers resolution 63/2020 of August 14 approved the national hydrogen strategy

- gradual introduction of green hydrogen as a sustainable pillar and integrated into a more comprehensive transition strategy to a decarbonized economy



The National Hydrogen Strategy establishes goals to be met by 2030, namely:

- 10% to 15% injection of green hydrogen into natural gas networks
- 2 GW to 2.5 GW of installed capacity in electrolyzers



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## Portugal entre os principais vencedores do primeiro leilão do banco europeu de hidrogénio



Refinaria da Galp em Sines. D.R.

Dois projetos para produzir hidrogénio verde em Portugal, um da Galp e outro da Madoquapower2X, estão entre os sete projetos escolhidos pela Comissão Europeia para a distribuição de apoios de 720 milhões de euros. Na corrida estavam 132 promotores

ENERGIA

## Governo anuncia lançamento de leilão de gases renováveis no valor de 140 milhões de euros

O Governo anunciou o lançamento, esta segunda-feira, do leilão de compra centralizada de gases renováveis - que abrange a produção de hidrogénio verde e biometano -, no valor de 140 milhões de euros.

## Government announces launch of renewable gas auction worth 140 million euros

## Portugal among the main winners of the first European hydrogen bank auction



- ❖ **COMMITMENT OF SOCIETY** and not just of energy sector stakeholders
- ❖ Accept **RISK** as a critical decision factor
- ❖ Promoting **INNOVATION** throughout the value chain
- ❖ Ensuring the **SPEED** of **LICENSING** processes
- ❖ Explore **ENERGY POTENTIAL** in a **SUSTAINABLE** way
- ❖ Promote the **INTEGRATED** development of the **GAS** and **ELECTRICITY** sectors
- ❖ Ensure **TECHNICAL** and **REGULATORY** adequacy

...FOR EFFECTIVE ENERGY TRANSFORMATION!

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