

# SEA in energy sector: Two different approaches from Iberian Peninsula



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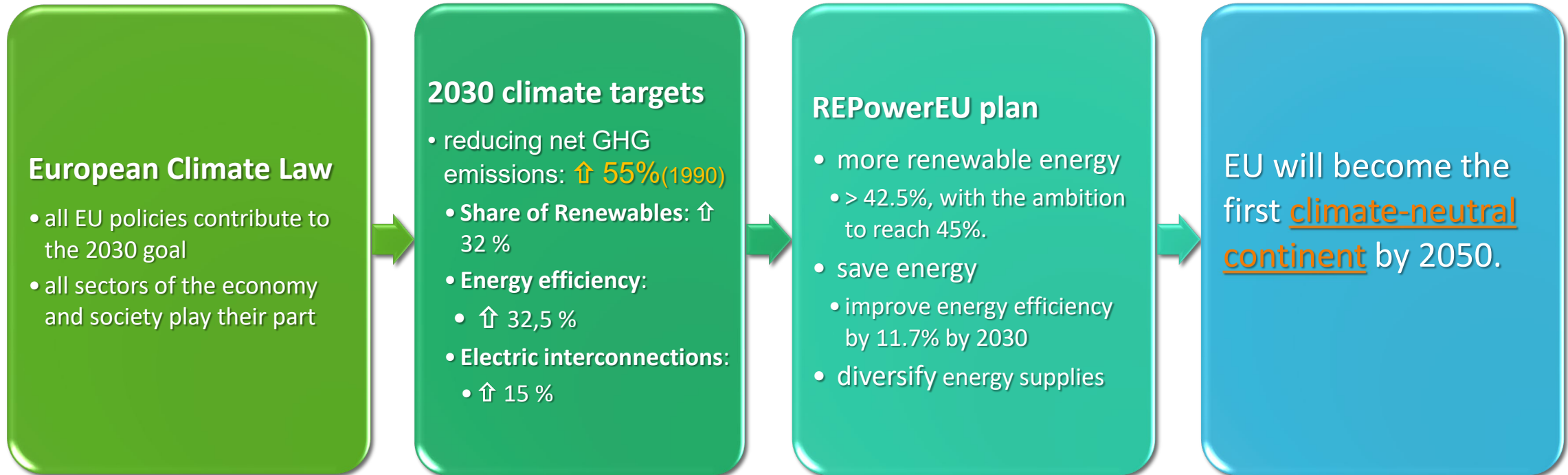
# Iberia an energy 'island'

Electricity Grid,  
Production &  
Consumption



[https://www.esa.int/ESA\\_Multimedia/Images/2019/10/Iberian\\_Peninsula\\_at\\_night](https://www.esa.int/ESA_Multimedia/Images/2019/10/Iberian_Peninsula_at_night)

# Background...



# Climate Action Progress Report 2023

## Progress so far...



### PT

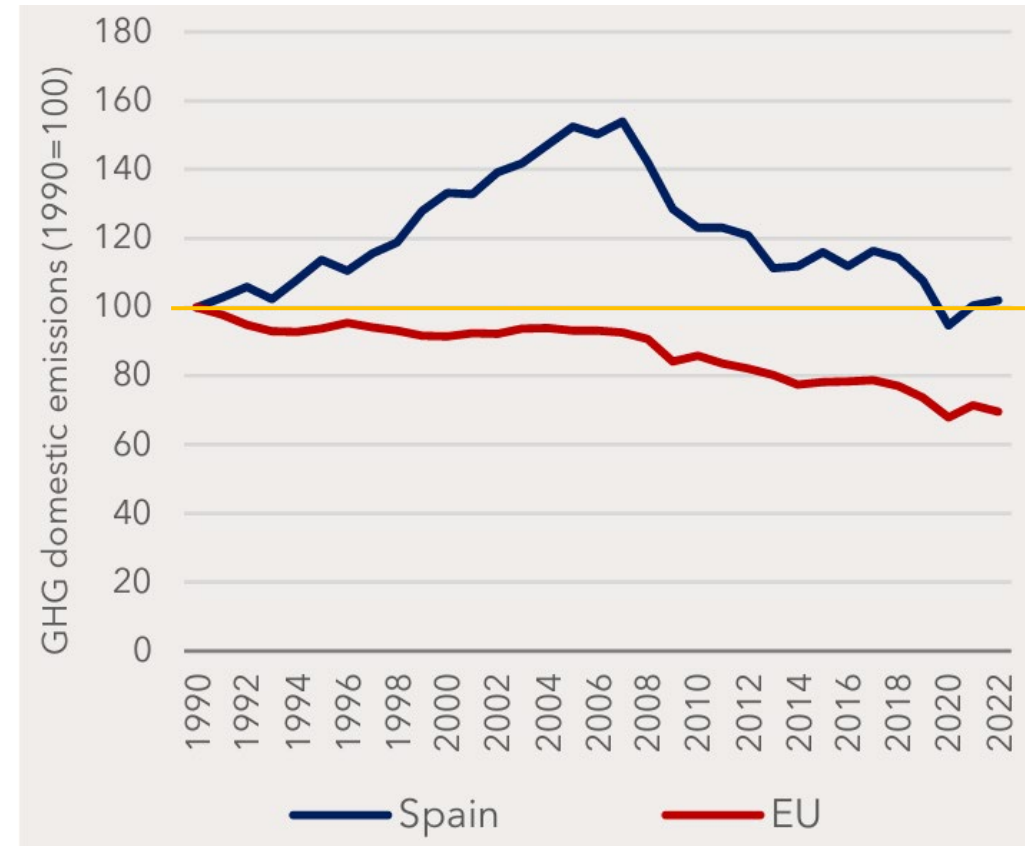
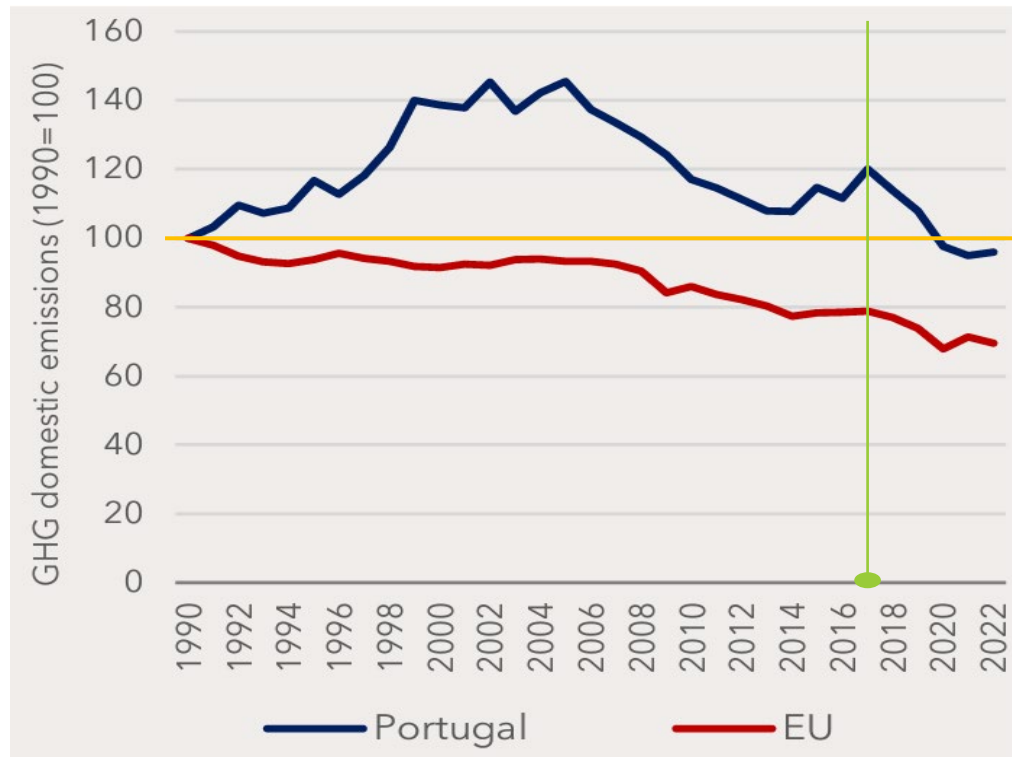
- Net GHG emissions (i.e. including LULUCF) in 2022 were **23.6% lower than 1990 levels**.
- Emissions covered by the Effort Sharing Regulation *decreased by 0.8% compared to 2021*.
- **By 2050**, net GHG emissions in Portugal are expected to be **0.3 tonnes per capita**.

### ES

- Net GHG emissions (i.e. including LULUCF) in 2022 were **1.8% higher than 1990 levels**.
- Emissions covered by the Effort Sharing Regulation *decreased by 0.3% compared to 2021*.
- **By 2050**, net GHG emissions in Spain are expected to be **2.9 tonnes per capita**.

# Climate Action Progress Report 2023

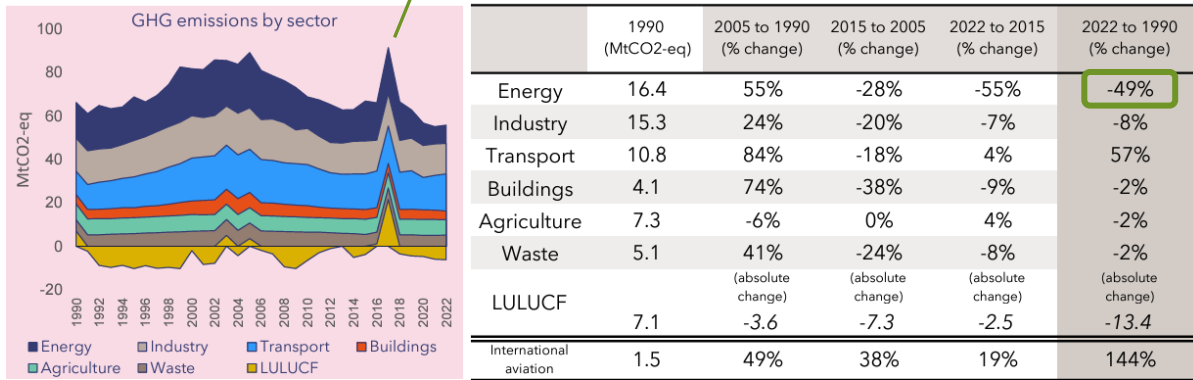
## Greenhouse Gas Emissions (total)



2017  
Forest  
fires

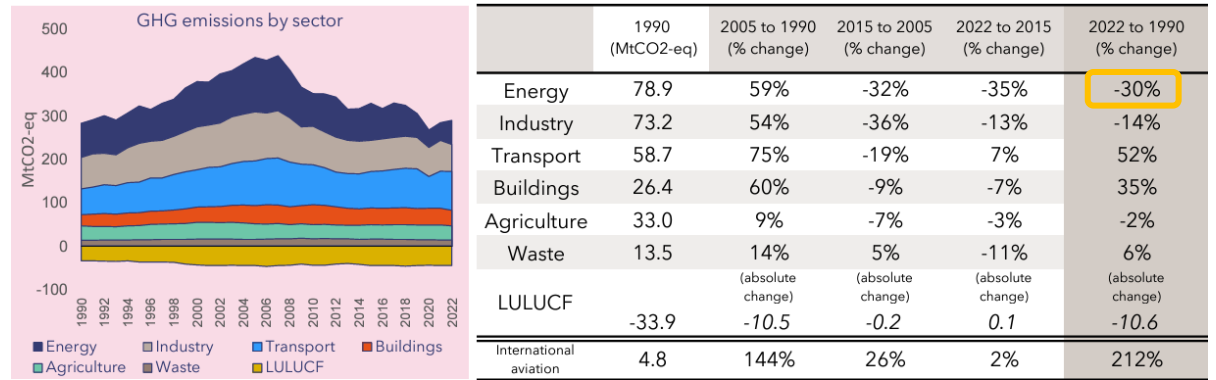


### 3) Greenhouse Gas Emissions by Sector



Notes: (1) Energy sector refers to electricity and heat production and petroleum refining. (2) Industry includes fuel combustion in manufacturing and construction and emissions in industrial processes and product use. (3) Buildings includes emissions from energy use in residential and tertiary buildings, and energy use in agriculture and fishery sectors. (4) For LULUCF, the table reports differences between the given years in absolute values (MtCO2-eq). Negative values indicate a reduction of net emissions or an increase in net removals.

### 3) Greenhouse Gas Emissions by Sector



Notes: (1) Energy sector refers to electricity and heat production and petroleum refining. (2) Industry includes fuel combustion in manufacturing and construction and emissions in industrial processes and product use. (3) Buildings includes emissions from energy use in residential and tertiary buildings, and energy use in agriculture and fishery sectors. (4) For LULUCF, the table reports differences between the given years in absolute values (MtCO2-eq). Negative values indicate a reduction of net emissions or an increase in net removals.

# Climate Action Progress Report 2023

## Progress in GHG emissions by sector

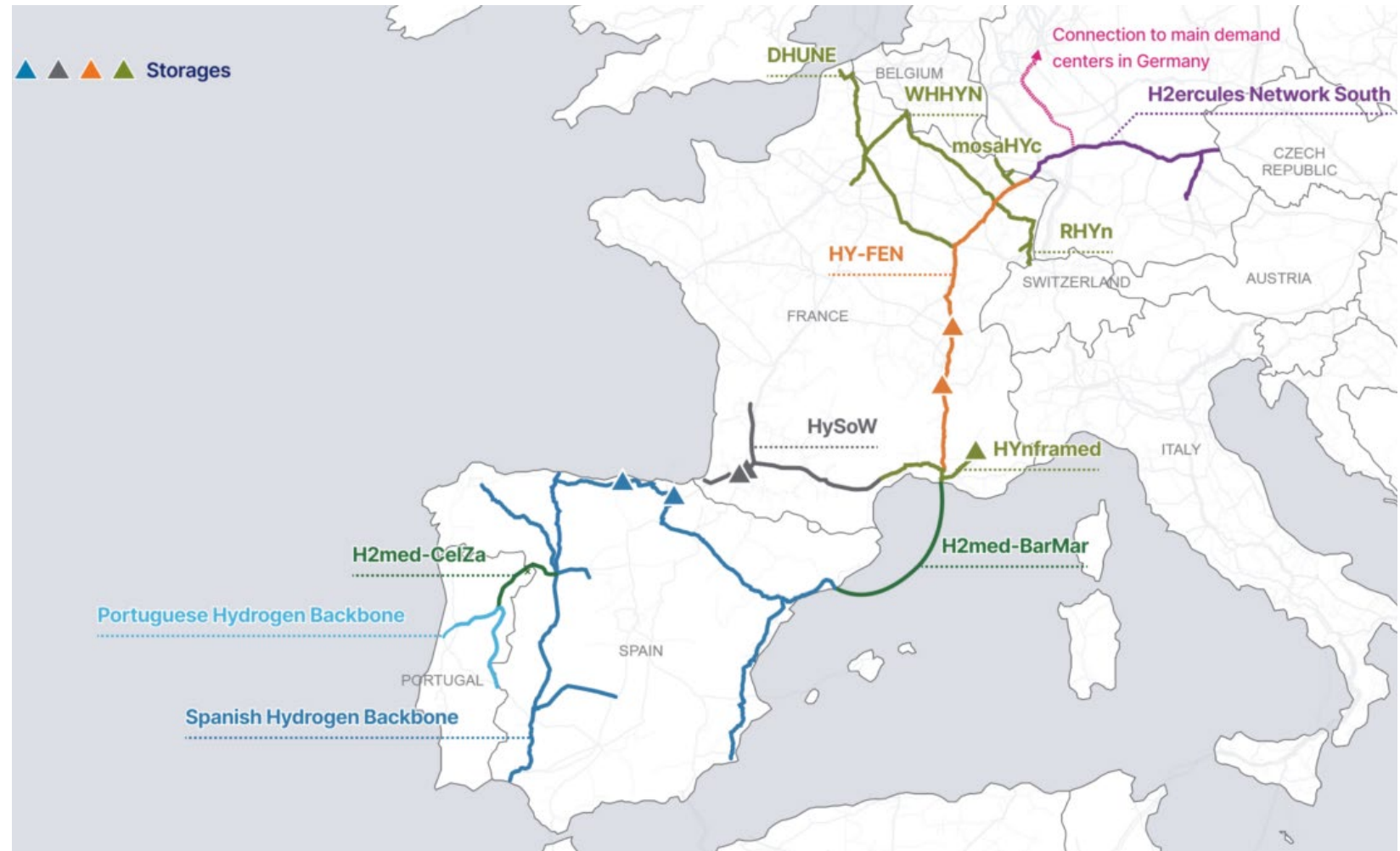
(PT – ES)



# Iberia an energy 'island' Green gases: H2med

aiming to be complete by 2030

H2med will create a clean energy corridor from the Southwest to the Northwest of Europe.



## H2med potential and benefits for Europe

### Energy and Environmental



Transport 10% of expected hydrogen consumption in Europe by 2030



Accelerate Europe's decarbonization roadmap



Supply Europe with carbon-free hydrogen produced at competitive costs



Ensure the flexibility of the energy network through access to hydrogen underground storage capacities

### Socio-Economic



Contribute to European and national objectives for the deployment of the hydrogen sector



Enable the development of hydrogen valleys and an intra-European industry with high added value

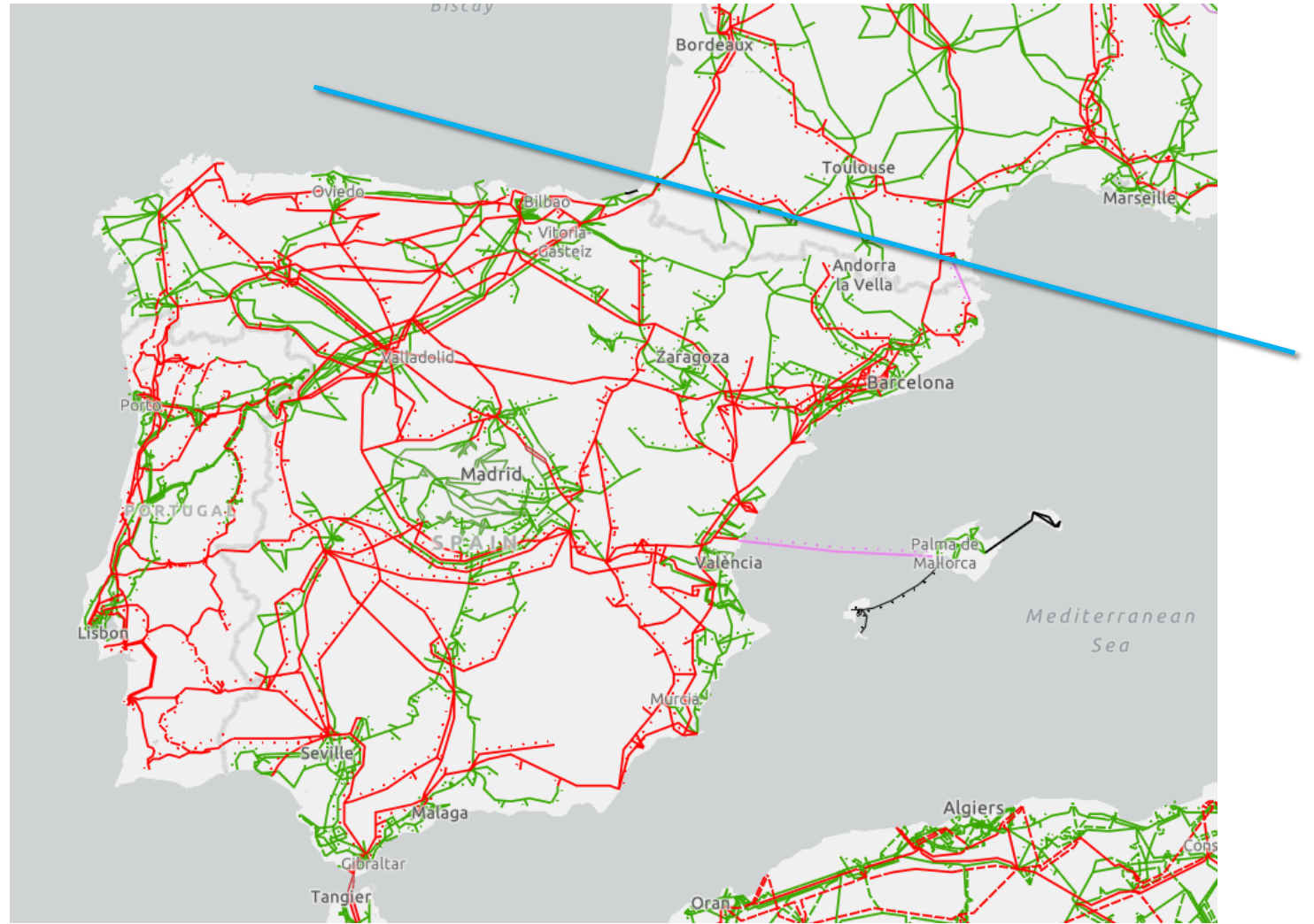


Facilitate the creation of ecosystems of decarbonization



# Iberia an energy 'island' Electrical Grid

Figura 6. Capacidad de intercambio para el horizonte 2026





# Legal Framework

Flexibility solutions for new investments in the grid

## PT

- National Electrical System (NES) Law ([Decreto-Lei n.º 15/2022, de 14 de janeiro](#))
  - Establishes the organization and operation of the National Electrical System

- General concerns:
  - **prior control** of activities in the energy sector
  - network **planning**;
  - introduction of **competitive** mechanisms;
  - **active participation** of consumers, in production and markets
  - **new** investments: re-equipment, hybridization and storage.

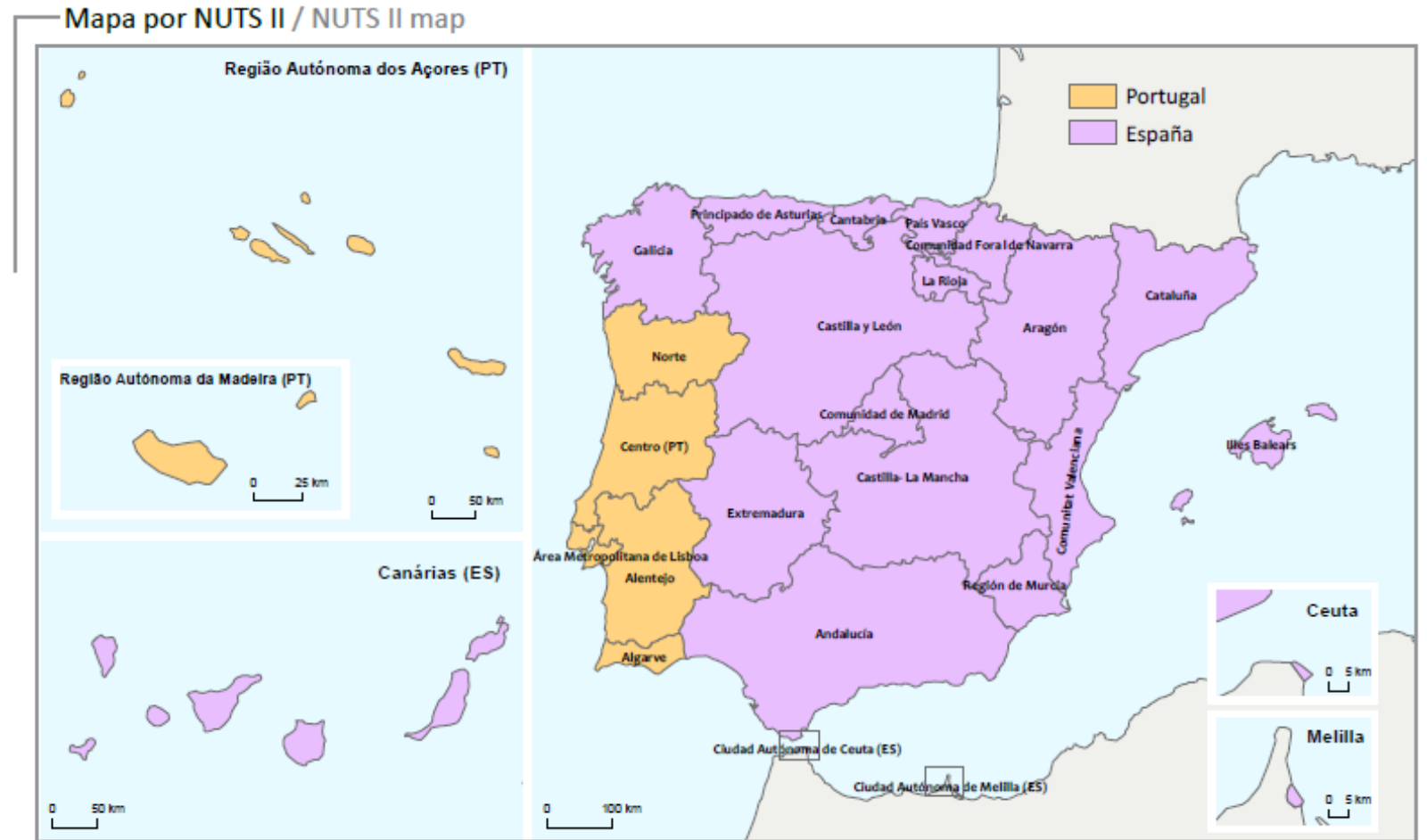
## ES

- Electric Sector Law ([Ley 24/2013, de 26 de diciembre](#))
  - establish the regulation of the electrical sector

- Network planning
  - principles of **environmental** and **social** sustainability:
    - Do not disregard the impacts on territories and populations;
    - Meet energy needs of local authorities and populations.
  - principles of **economic** sustainability:
    - maximizing reception capacity;
    - obligation to preserve the territory (only build strictly necessary power lines for the operation of the SEN).

# ≠ Administrative organization

Large differences PT-ES



# Most relevant stakeholders

Large differences PT-ES

- ≠ Planning responsibilities

## PT

### Ministry

– establish policies & targets

### ERSE

– Regulatory body

### DGEG

– Licensing body

### Transportation Grid Operator

– Transportation network planning

### Distribution Grid Operator

– Distribution network planning

## ES

### Ministry

– establish policies, targets & grid strategy  
– initiate a participation process to collect planning needs  
– Network planning and strategic assessment

### Autonomous communities

– participate in network planning  
– states the consumption needs, the production expectations and the expected grid expansion

### Grid Operator

– implement the grid development plan

# Network Planning process

Large differences PT-ES

## PT

(...)

(...)

(...)

Studies stage

Consolidation

Approval

## ES

Proposal stage

Studies stage (I)

Arguments

Studies stage (II)

Consolidation

Approval

# Risks and challenges

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Risks of simplification in the environmental assessment system speeding up renewable energy project approval processes in order to accelerate decarbonization and energy independence and energy independence

Go To Areas (Europa)

[https://joint-research-centre.ec.europa.eu/scientific-tools-databases/energy-and-industry-geography-lab-eigl/acceleration-areas-renewables\\_en](https://joint-research-centre.ec.europa.eu/scientific-tools-databases/energy-and-industry-geography-lab-eigl/acceleration-areas-renewables_en)

[https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/repower-eu-new-mapping-tool-supports-identification-go-areas-renewables-2022-05-18\\_en](https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/repower-eu-new-mapping-tool-supports-identification-go-areas-renewables-2022-05-18_en)

[https://www.miteco.gob.es/content/dam/miteco/es/calidad-y-evaluacion-ambiental/temas/evaluacion-ambiental/documento1memoria\\_tcm30-518028.pdf](https://www.miteco.gob.es/content/dam/miteco/es/calidad-y-evaluacion-ambiental/temas/evaluacion-ambiental/documento1memoria_tcm30-518028.pdf)

# Risks and (...)

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- Excessive simplification of environmental assessments
- Coexistence of the electrical grid with
  - Heritage
  - Biodiversity
  - Landscape
  - Urban settlements
  - (...)



# (...) and challenges

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- Speed up renewable energy project approvals
- Accelerate decarbonisation
- Accelerate energy independence
  
- Type of projects
  - Hybridisation
  - Re-equipment
  - Solar farms
  - Offshore wind farms
  - Grid expansion



# Let's continue the conversation!

Post questions and comments in the IAIA24 app.

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## #iaia24

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## Planeamento

Compete à REN realizar os estudos de planeamento da evolução da rede de transporte, de forma a adequar os planos de desenvolvimento da rede com as previsões da produção e do consumo. Estes estudos têm de ser enviados às entidades competentes, sem a aprovação das quais não é possível passar à fase de investimento. É também obrigação legal da REN colaborar na elaboração dos estudos oficiais de segurança de abastecimento elétrico do país, numa perspetiva de médio/longo prazo.

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## ATIVIDADE RENEletricidade

Enquanto gestor técnico global do Sistema Elétrico Nacional, a REN - Rede Elétrica Nacional é a entidade responsável pela segurança e continuidade do serviço de eletricidade, com o seu centro de Despacho a assegurar permanentemente o equilíbrio entre a produção e o consumo de energia elétrica.

No âmbito do contrato de concessão com o Estado português, a REN, desenvolve e opera a Rede Nacional de Transporte, que cobre a totalidade do território continental e as interligações com a rede elétrica de transporte espanhola.

A Rede Nacional de Transporte liga os grandes produtores de energia aos centros de consumo, através de pontos de entrega, que permitem alimentar os grandes consumidores industriais e asseguram as ligações à rede de distribuição, a partir da qual são abastecidos a maioria dos consumidores finais.

A gestão do sistema elétrico está cada vez mais complexa. A transição energética e o aumento das energias renováveis – especialmente as solar e eólica -, a produção cada vez mais dispersa geograficamente, novos padrões de consumo e novos grandes consumidores, o desenvolvimento dos mercados e a integração europeia são desafios que a REN está a acompanhar, através de todas as suas vertentes de atuação.

Comprimento das linhas:2022 9 424km Rede Nacional de Transporte de Eletricidade

Potência instalada:2022 20 675MW Sistema Elétrico Nacional

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La Planificación Energética es un elemento esencial en el nuevo modelo energético que hemos desarrollado y que tiene por objeto disponer de un sistema más sostenible y competitivo, garantizando el aspecto fundamental de la seguridad de suministro. La planificación realiza una previsión de las necesidades energéticas futuras y de las actuaciones que es necesario llevar a cabo para asegurar la prestación del servicio. En particular, las infraestructuras de transporte de energía eléctrica que dan soporte a esta actividad requieren de un largo periodo de maduración, desde que se identifica la necesidad hasta su puesta en funcionamiento. Ello hace absolutamente necesario organizar, preparar y proyectar las instalaciones con gran adelanto. La anticipación y la constante adaptación de las previsiones a la realidad cambiante se convierten así en parte integrante y en herramientas imprescindibles de la política energética. Por todo ello, la planificación se integra en la reforma regulatoria del sector eléctrico, enmarcándose en un contexto general caracterizado por tres aspectos clave. En primer lugar, el principio de sostenibilidad económica del sistema eléctrico ha permitido revertir la acumulación anual de déficit y, en estos momentos, el sistema se encuentra en equilibrio o ligero superávit gracias a dicha reforma. Tal principio de sostenibilidad económica ha estado muy presente en todo el proceso de planificación donde, para cada nueva actuación estructural de la red de transporte, se ha realizado un análisis coste-beneficio que optimizará las inversiones a realizar. En segundo lugar, otra de las características de la nueva planificación es el mayor compromiso logrado con la Unión Europea para impulsar un mercado interior de la energía, aumentando nuestro nivel de interconexión energética con Europa. Esto es relevante para disminuir precios e integrar nueva generación renovable. Por último, la planificación toma en consideración los cambios ligados a los avances tecnológicos, la mayor facilidad de los consumidores para gestionar su demanda y la mayor competencia e información sobre precios. Estos avances conllevan nuevos retos de mayor electrificación de la economía y mayor eficiencia (menor intensidad energética) que la planificación debe satisfacer. En este contexto, el Ministerio de Industria, Energía y Turismo ha elaborado esta planificación siguiendo un proceso riguroso, de gran complejidad, con participación de todos los agentes del sistema, contando con la colaboración de las Comunidades Autónomas y Ciudades de Ceuta y Melilla y del Operador del Sistema eléctrico, así como con la Comisión Nacional de los Mercados y la Competencia. También se ha contado con la participación del Ministerio de Agricultura, Alimentación y Medio Ambiente, al tener en cuenta la regulación en materia de evaluación ambiental, que establece la obligatoriedad de realizar el procedimiento de Evaluación Ambiental Estratégica

# Energy Transition Index (ETI) | Country Overview



Select a Country Portugal



Select a Year

2023



## Portugal

ETI rank: **15/120**

ETI 65.8

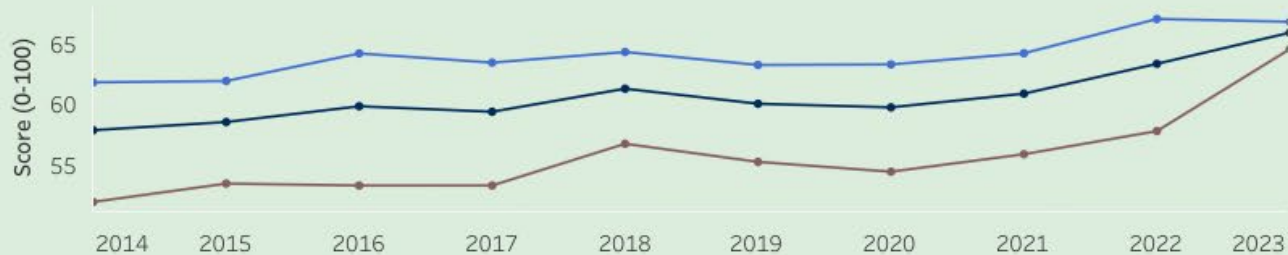
System Performance 66.7

Transition Readiness 64.5

### Key Macroeconomic and ETI Data

Population (millions)	10.3	Energy consumption per capita (GJ/capita)	81.9
GDP (US\$ trillions)	0.25	Energy intensity (MJ/\$2017 PPP GDP)	2.56
Net energy imports (% of Total Energy Supply)	71.5	CO2 Intensity of Total Energy Supply (kg/GJ)	43.47

### Country ETI, System Performance & Transition Readiness, 2014 - 2023

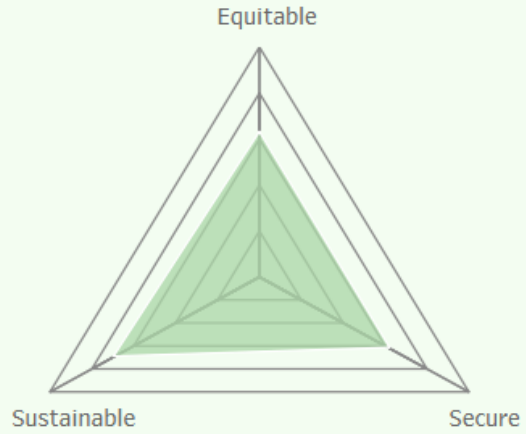


Country results and Benchmark

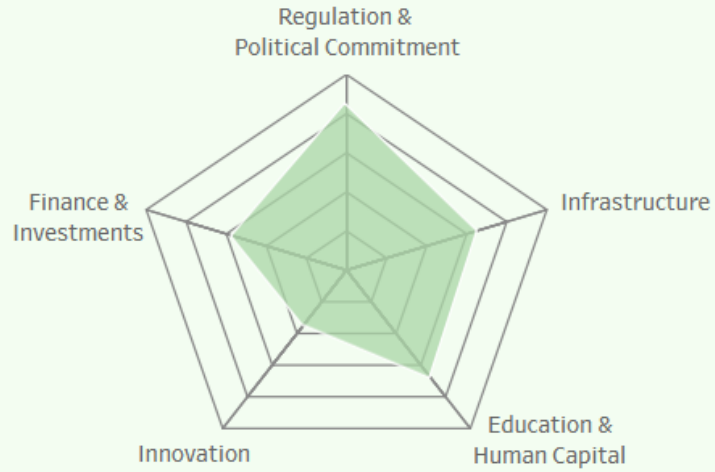
Compare **Portugal** with

Select a Region or Country

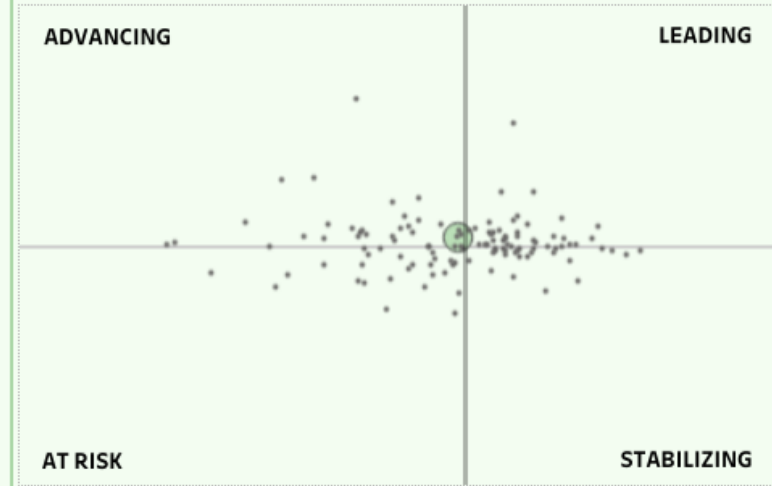
System Performance



Transition Readiness



Transition Momentum (only available for 2023)



- Dimension
- EQUITABLE
  - SECURE
  - SUSTAINABLE



## Equitable -

63.8

Access to Electricity, urban (% of urban population)	100.00	●		Threshold (lower to upper): 0 - 100
Access to Electricity, rural (% of rural population)	100.00	●		Threshold (lower to upper): 0 - 100
Access to clean cooking fuels and technologies for cooking (% of population)	100.00	●		Threshold (lower to upper): 0 - 100
Household electricity prices (incl. taxes) (USc15p/kWh PPP)	33.62	●		Threshold (lower to upper): 50 - 6
Electricity prices for industry (USc15p/kWh)	11.94	●		Threshold (lower to upper): 30 - 4
Wholesale gas price (USD/MMBTU)	13.35	●		Threshold (lower to upper): 7.3 - 1
Energy subsidies (% GDP)	0.26	●		Threshold (lower to upper): 3 - 0
Net fuel imports (% GDP)	2.74	●		Threshold (lower to upper): 10 - -10
Comparative advantage in low carbon technologies	0.92	●		Threshold (lower to upper): 0 - 2.38



## Secure -

64.3

Diversification of import counterparts	0.13	●		Threshold (lower to upper): 1 - 0
Diversity of Total Energy Supply	0.18	●		Threshold (lower to upper): 1 - 0
Net energy imports (% of Total Energy Supply)	71.48	●		Threshold (lower to upper): 100 - 0
Diversity of electricity supply	0.18	●		Threshold (lower to upper): 1 - 0
Flexibility in electricity system	66.74	●		Threshold (lower to upper): 0 - 100
Gas supply resilience	0.05	●		Threshold (lower to upper): 0 - 1
System Average Interruption Duration Index	0.54	●		Threshold (lower to upper): 65 - 1.5
System Average Interruption Frequency Index	0.61	●		Threshold (lower to upper): 60 - 1
Electric power T&D losses (% of power generation)	8.08	●		Threshold (lower to upper): 15 - 4



## Sustainable -

72.1

Energy intensity (MJ/\$2017 PPP GDP)	2.56	●		Threshold (lower to upper): 9.69 - 2
Energy consumption per capita (GJ/capita)	81.90	●		Threshold (lower to upper): 306 - 80
CO2 emissions per capita (T/capita)	3.56	●		Threshold (lower to upper): 15.52 - 0
CO2 Intensity of Total Energy Supply (kg/GJ)	43.47	●		Threshold (lower to upper): 80 - 0
CH4 Intensity of Energy Production (kT/GJ)	0.08	●		Threshold (lower to upper): 1 - 0.03



## Regulation & Political Commitment -

86.8

RISE Energy Access Score	100.00	●		Threshold (lower to upper): 0 - 100
RISE Energy Efficiency Score	83.79	●		Threshold (lower to upper): 0 - 100
RISE Renewable Energy Score	83.06	●		Threshold (lower to upper): 0 - 100
RISE Clean Cooking Score		●		Threshold (lower to upper): 0 - 100
Country Commitment to Net Zero	0.96	●		Threshold (lower to upper): 0 - 1
Stability of policy	3.83	●		Threshold (lower to upper): 1 - 7
Effective Carbon Rate Score	73.60	●		Threshold (lower to upper): 1-87



## Infrastructure -

66.7

Renewable capacity buildout score	0.67	●		Threshold (lower to upper): 0 - 100
Quality of transportation infrastructure	66.86	●		Threshold (lower to upper): 0 - 100
Digital infrastructure readiness	65.63	●		Threshold (lower to upper): 0 - 100



## Education & Human Capital -

69.1

Jobs in renewable energy as share of total industrial workforce (%)	2.59	●		Threshold (lower to upper): 0 - 6
Quality of education	4.71	●		Threshold (lower to upper): 1 - 7
Availability of skilled workforce score (mid-level and high-level skills)	41.92	●		Threshold (lower to upper): 0 - 100



## Innovation -

34.9

Innovative Business Environment	3.87	●		Threshold (lower to upper): 1- 7
Public investment in research and development, as % of GDP	1.62	●		Threshold (lower to upper): 0 - 2.5
Development of environmental technologies as % of all technologies	6.72	●		Threshold (lower to upper): 0 - 50



## Finance & Investments -

57.4

Credit rating	0.60	●		Threshold (lower to upper): 0 - 1
Domestic credit to private sector (% of GDP)	101.00	●		Threshold (lower to upper): 0 - 165
Foreign Direct Investment (FDI) Regulatory Restrictiveness	0.01	●		Threshold (lower to upper): 0.372- 0
Rule of Law	89.90	●		Threshold (lower to upper): 0 - 100

# Energy Transition Index (ETI) | Country Overview



Select a Country Spain



Select a Year

2023



## Spain

ETI rank: **16/120**



### Key Macroeconomic and ETI Data

Population (millions)	47.4	Energy consumption per capita (GJ/capita)	96.4
GDP (US\$ trillions)	1.43	Energy intensity (MJ/\$2017 PPP GDP)	2.68
Net energy imports (% of Total Energy Supply)	73.5	CO2 Intensity of Total Energy Supply (kg/GJ)	42.58

### Country ETI, System Performance & Transition Readiness, 2014 - 2023



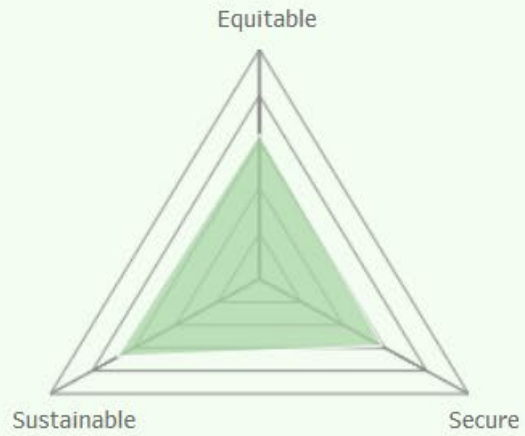


## Country results and Benchmark

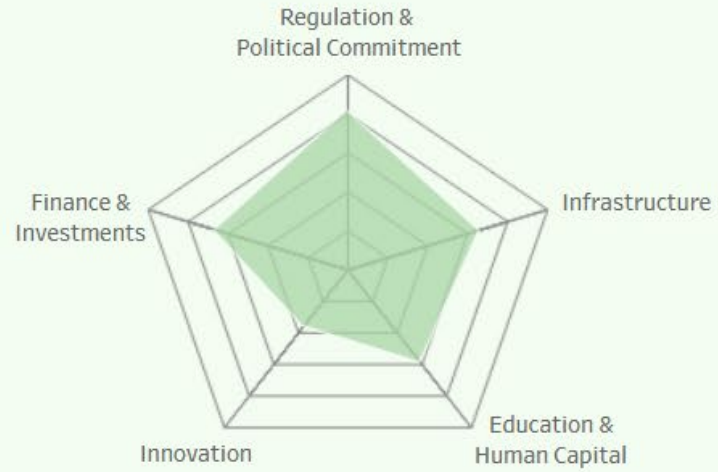
Compare **Spain** with

Select a Region or Country

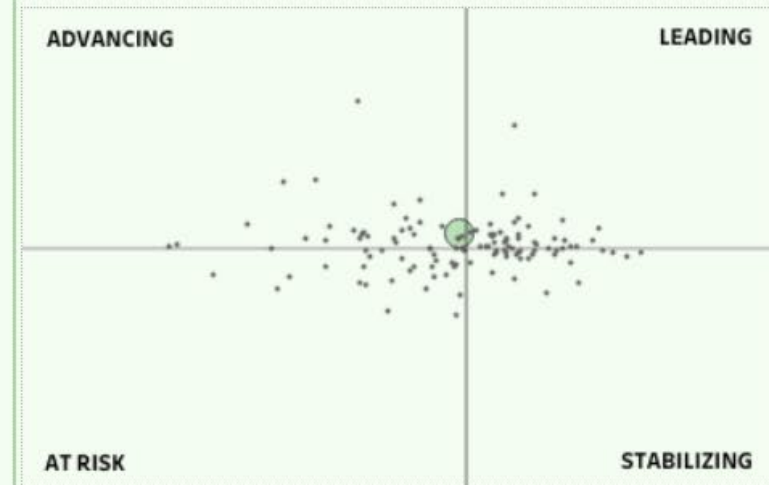
### System Performance



### Transition Readiness



### Transition Momentum (only available for 2023)



- Dimension
- EQUITABLE
  - SECURE
  - SUSTAINABLE



## Equitable -

63.9

Access to Electricity, urban (% of urban population)	100.00	●		Threshold (lower to upper): 0 - 100
Access to Electricity, rural (% of rural population)	100.00	●		Threshold (lower to upper): 0 - 100
Access to clean cooking fuels and technologies for cooking (% of population)	100.00	●		Threshold (lower to upper): 0 - 100
Household electricity prices (incl. taxes) (USc15p/kWh PPP)	36.93	●		Threshold (lower to upper): 50 - 6
Electricity prices for industry (USc15p/kWh)	12.78	●		Threshold (lower to upper): 30 - 4
Wholesale gas price (USD/MMBTU)	8.17	●		Threshold (lower to upper): 7.3 - 1
Energy subsidies (% GDP)	0.12	●		Threshold (lower to upper): 3 - 0
Net fuel imports (% GDP)	2.09	●		Threshold (lower to upper): 10 - -10
Comparative advantage in low carbon technologies	1.08	●		Threshold (lower to upper): 0 - 2.38



## Secure -

61.0

Diversification of import counterparts	0.06	●		Threshold (lower to upper): 1 - 0
Diversity of Total Energy Supply	0.18	●		Threshold (lower to upper): 1 - 0
Net energy imports (% of Total Energy Supply)	73.47	●		Threshold (lower to upper): 100 - 0
Diversity of electricity supply	0.10	●		Threshold (lower to upper): 1 - 0
Flexibility in electricity system	43.92	●		Threshold (lower to upper): 0 - 100
Gas supply resilience	0.03	●		Threshold (lower to upper): 0 - 1
System Average Interruption Duration Index	0.51	●		Threshold (lower to upper): 65 - 1.5
System Average Interruption Frequency Index	0.71	●		Threshold (lower to upper): 60 - 1
Electric power T&D losses (% of power generation)	9.72	●		Threshold (lower to upper): 15 - 4



## Sustainable -

70.5

Energy intensity (MJ/\$2017 PPP GDP)	2.68	●		Threshold (lower to upper): 9.69 - 2
Energy consumption per capita (GJ/capita)	96.43	●		Threshold (lower to upper): 306 - 80
CO2 emissions per capita (T/capita)	4.11	●		Threshold (lower to upper): 15.52 - 0
CO2 Intensity of Total Energy Supply (kg/GJ)	42.58	●		Threshold (lower to upper): 80 - 0



## Regulation & Political Commitment -

83.4

RISE Energy Access Score	100.00	●		Threshold (lower to upper): 0 - 100
RISE Energy Efficiency Score	82.91	●		Threshold (lower to upper): 0 - 100
RISE Renewable Energy Score	81.49	●		Threshold (lower to upper): 0 - 100
RISE Clean Cooking Score		●		Threshold (lower to upper): 0 - 100
Country Commitment to Net Zero	0.88	●		Threshold (lower to upper): 0 - 1
Stability of policy	3.48	●		Threshold (lower to upper): 1 - 7
Effective Carbon Rate Score	62.43	●		Threshold (lower to upper): 1-87



## Infrastructure -

66.9

Renewable capacity buildout score	0.64	●		Threshold (lower to upper): 0 - 100
Quality of transportation infrastructure	72.73	●		Threshold (lower to upper): 0 - 100
Digital infrastructure readiness	66.51	●		Threshold (lower to upper): 0 - 100



## Education & Human Capital -

59.6

Jobs in renewable energy as share of total industrial workforce (%)	2.26	●		Threshold (lower to upper): 0 - 6
Quality of education	3.87	●		Threshold (lower to upper): 1 - 7
Availability of skilled workforce score (mid-level and high-level skills)	39.86	●		Threshold (lower to upper): 0 - 100



## Innovation -

36.0

Innovative Business Environment	3.64	●		Threshold (lower to upper): 1 - 7
Public investment in research and development, as % of GDP	1.41	●		Threshold (lower to upper): 0 - 2.5
Development of environmental technologies as % of all technologies	10.94	●		Threshold (lower to upper): 0 - 50



## Finance & Investments -

67.1

Credit rating	0.70	●		Threshold (lower to upper): 0 - 1
Domestic credit to private sector (% of GDP)	108.90	●		Threshold (lower to upper): 0 - 165
Foreign Direct Investment (FDI) Regulatory Restrictiveness	0.02	●		Threshold (lower to upper): 0.372 - 0
Rule of Law	87.20	●		Threshold (lower to upper): 0 - 100