# Grid investments for the energy transition

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**Technologies for Global Energy Grid** 



What should the electricity grid look like in 2030 and 2040 to create maximum value for Europeans, ensure continuous access to electricity throughout Europe and deliver on the climatic agenda?



#### **ST 2030**

No Action Scenario

commissioned by 2027

impact of project portfolio

commissioned by 2034

ST2030

ST2030

ST2030

**DG 2030 EUCO 2030** Sustainable Transition 2030 Distributed Generation 2030¤ EUCO·2030¤ Avg. hourly marginal cos differences (C/MWh) From 0 to 2 No Action Scenario Are, hourly marginal cost differences (C/M/III) From 0 to 2 No Action Scenario Ave. hourly manginal cost differences (KMWh) From 0 to 2 From 2 to 5 EUCO2030 DG2030 From 2 to 5 From 2 to 5 - From 5 to 10 From 5 to 10 From 5 to 10 - From 10 to 15 - More than 15 - More than 15 - Monthan 15 Marginal Cost differences : Marginal Cost differences : Marginal Cost differences : Ave. hourly marginal cos differences (C/MWh) Ave, hourly marginal cost differences (4,MWh) Ave. hourly marginal co differences (CANWA) impact of project portfolio impact of project portfolio impact of project portfolio From O to 2 From O to 2 From O to 2 From 2 to 5 commissioned by 2027 From 2 to 5 From 2 to 5 commissioned by 2027 From 5 to 10 - From 5 to 10 From 5 to 10 DG2030 EUCO2030 - From 10 to 15 From 10 to 15 - More than 13 - More than 15 Marginal Cost differences : Marginal Cost differences : Marginal Cost differences : Ave. hourly marginal con differences (CANWh) From 0 to 2 Ave. hourly marginal cost differences (C/MWh) From 0 to 2 Are, hourly marginal cos differences (C/MWh)

From 2 to 5

From 5 to 10

- From 10 to 15

- More than 15

impact of project portfolio

commissioned by 2034

EUC02030

From O to 2

From 2 to 5

From 5 to 10

- From 10 to 15

- More than 15

impact of project portfolio

commissioned by 2034

DG2030

from 2 to 5

- From 10 to 15

- More than 15

## Impact of TYNDP projects on Price Differences per Boundary in 2030

No Action: only

projects under construction are added to the existing grid

### **TYNDP** projects planned by 2027

### Avg. hourly marginal cost differences (€/MWh)

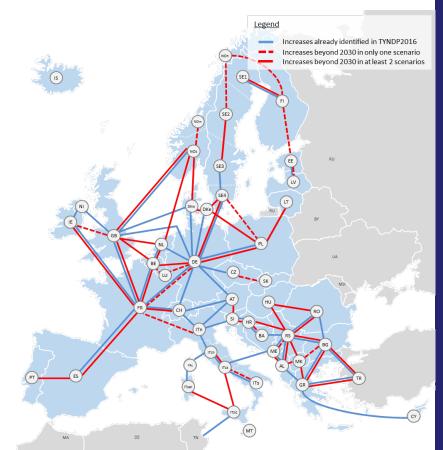
- From 0 to 2
- From 2 to 5
- From 5 to 10
- From 10 to 15
- More than 15

### More than 40

### **All TYNDP projects**



### Optimal grid 2040 compared to "no-action" delivers...





3 to 14 €/MWh reduction in marginal costs of electricity generation



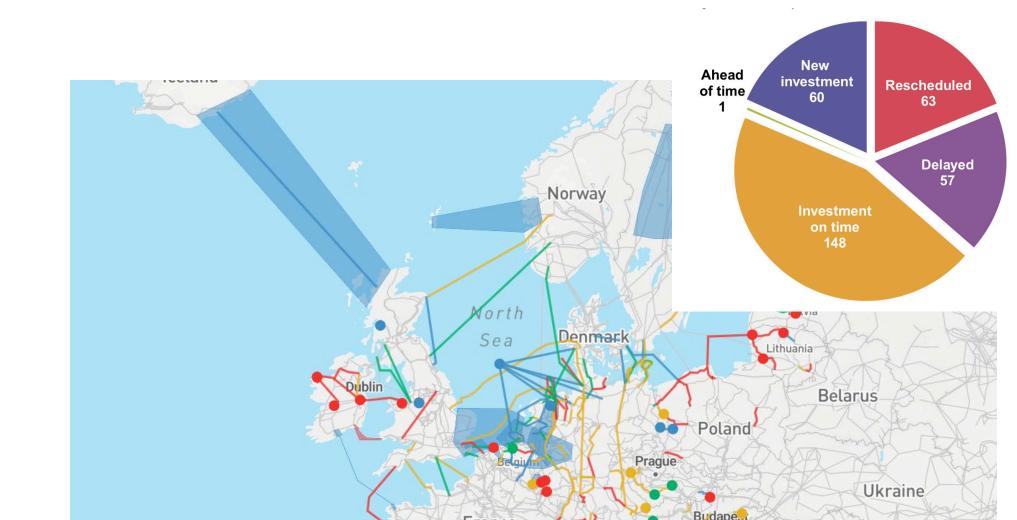
# 58 to 156 TWh less curtailed renewable energy



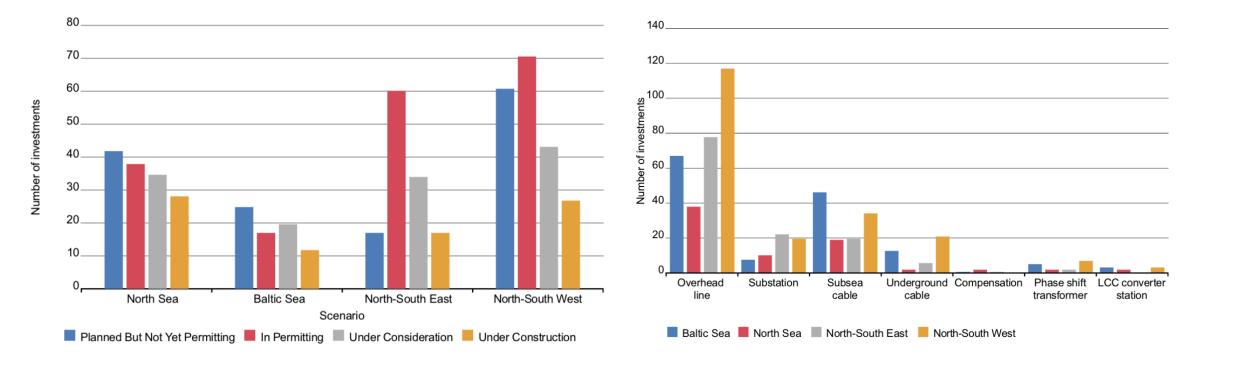
**37 to 59** Mton reduction in CO<sub>2</sub>



24 to 471 gwh reduction in Energy Not Served

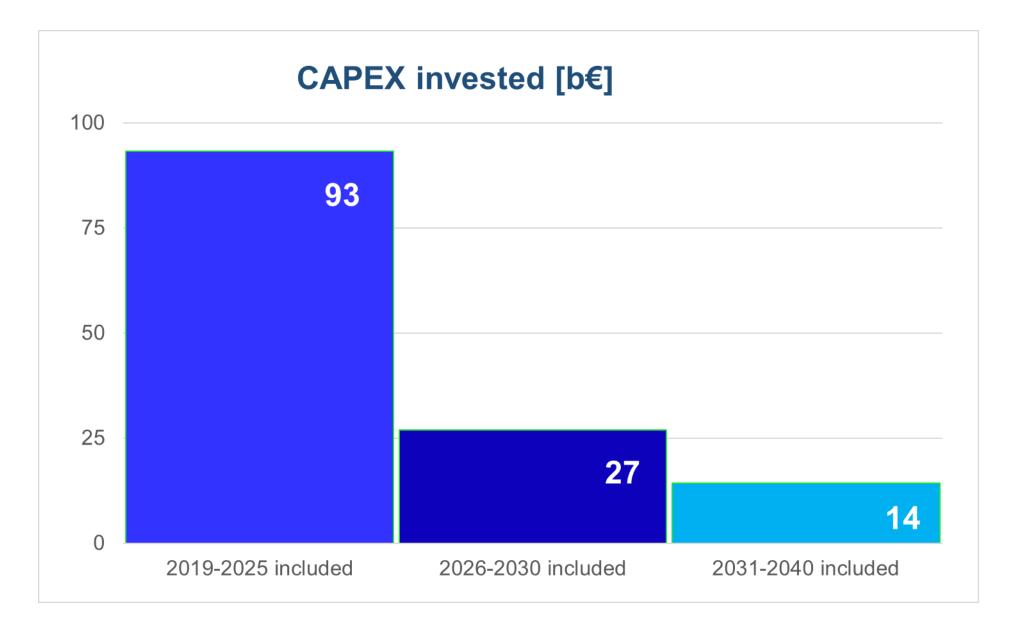


## Investing for the energy transition: Investments in the TYNDP 2018



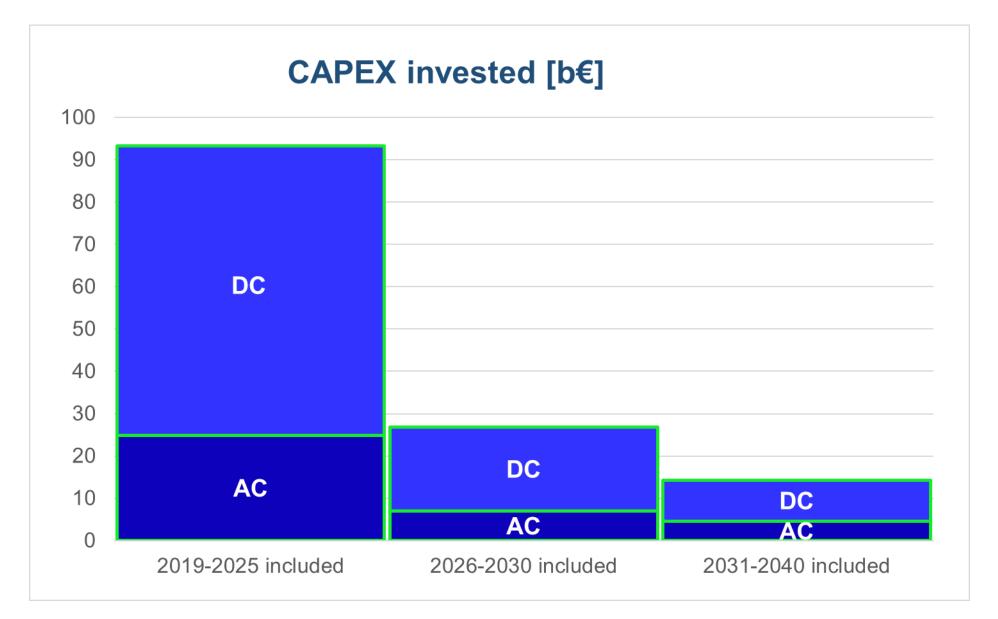


## Overall investments in the grid



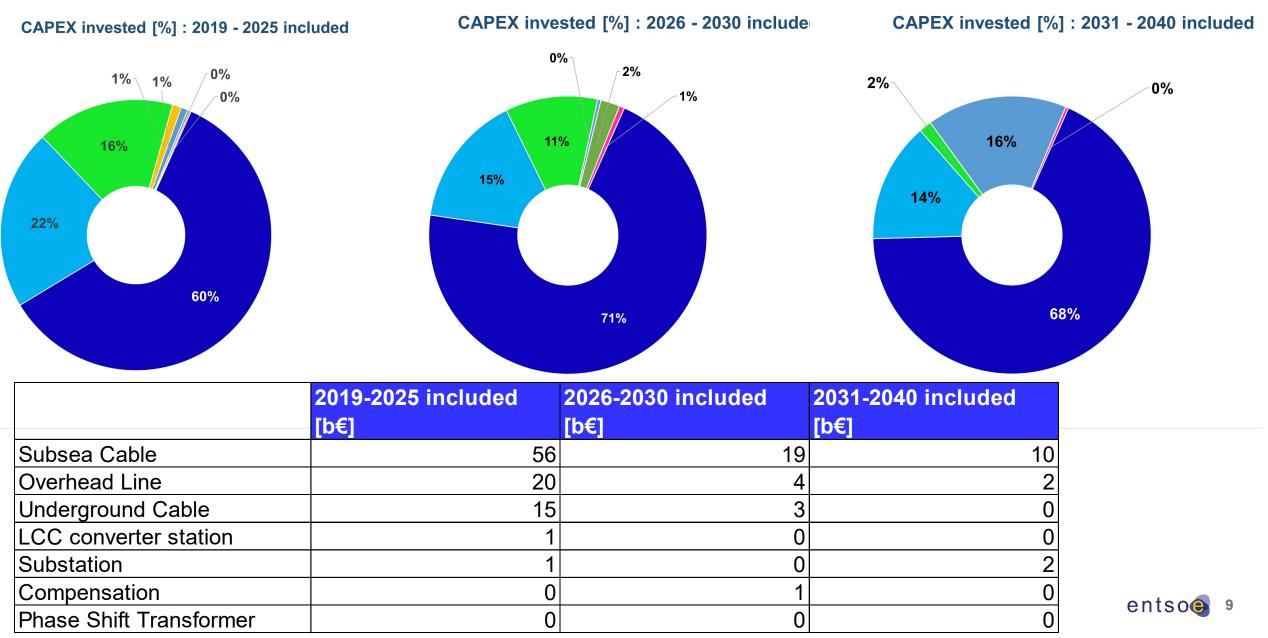
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## Overall investments in the grid: AC/DC





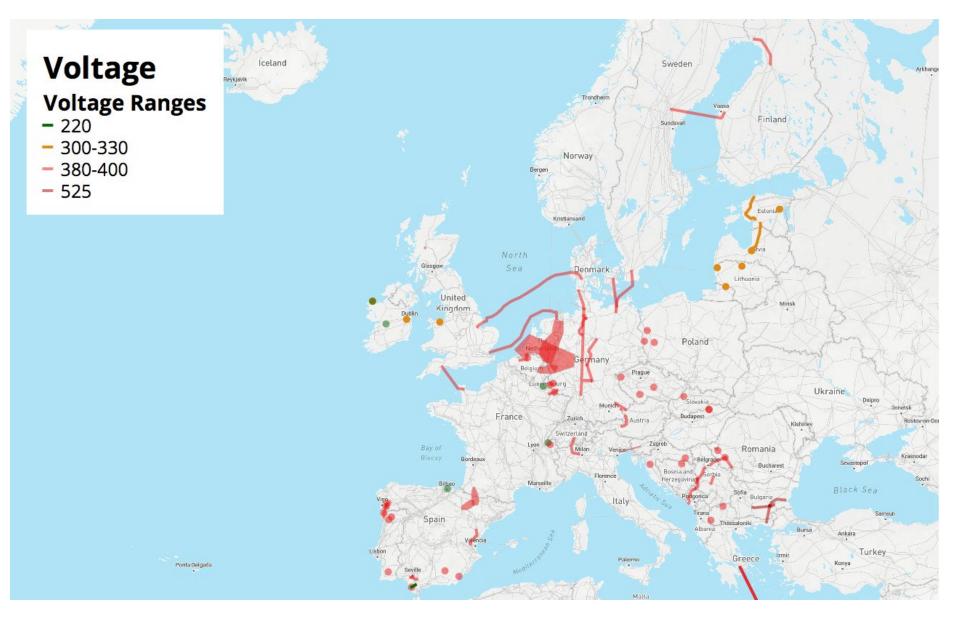
## Overall investments in the grid: elements



## Background



## Investments by Voltage Ranges



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## Investments till 2025

### < 2025 Investments

- In Permitting
- Under Consideration
- Under Construction
- Planned but not yet permitting

Ponta Delgada





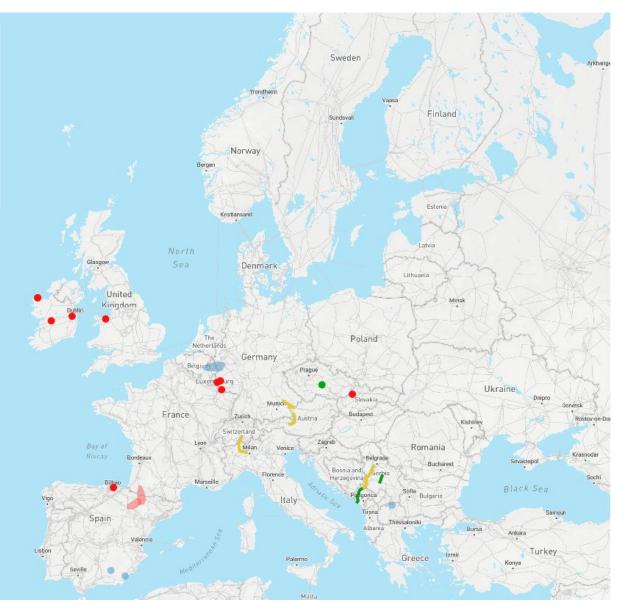
## Investments 2025 - 2030

### 2025 - 2030

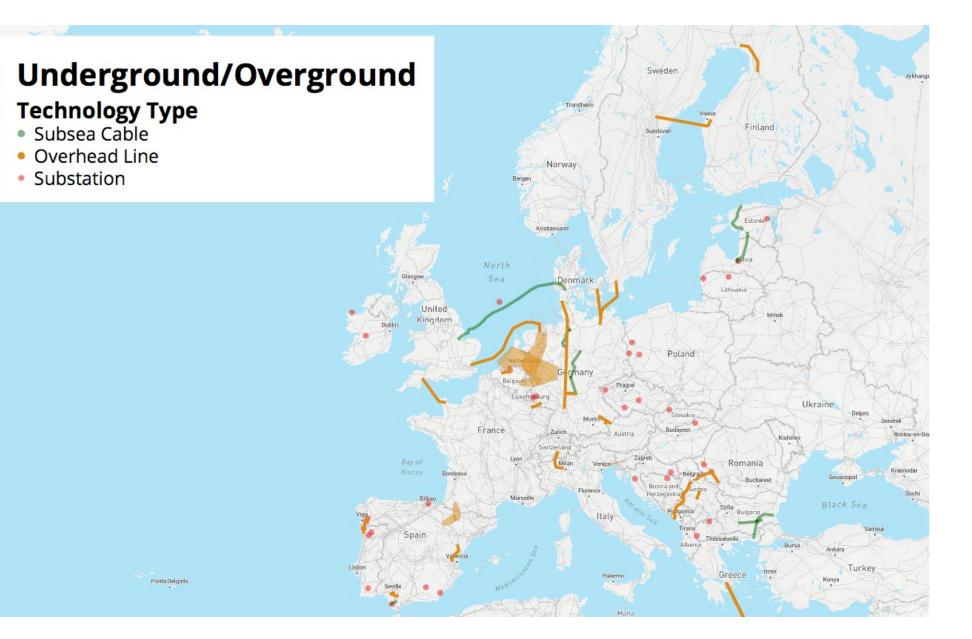
### Investments

- In Permitting
- Under Consideration
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Ponta Delgada



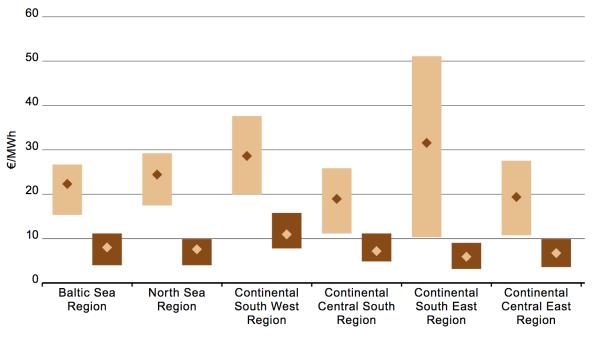
## Investments by elements





# The system in 2040: high RES create new needs

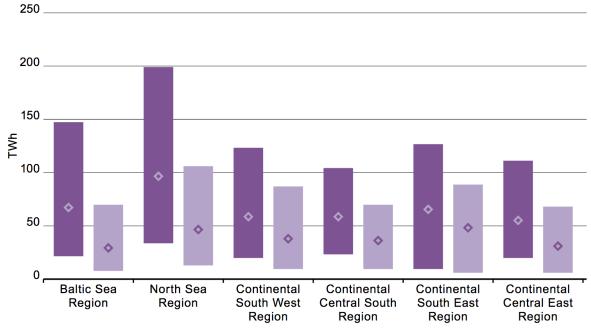
#### Range and average of all scenarios and climate years



No Grid scenario

43 Md €/year

#### European – Curtailed energy Range and average of all scenarios and climate years



No Grid scenario
2040 scenarios with scenario grid

## 156 TWh/year

