# ΞΜΡΞ

Energy Modelling Platform for Europe

# EMP-E 2021: Re-Energising Sustainable Transitions in Europe

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# Discount and hurdle rates – the dark horses of capacity expansion planning

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hosted in cooperation with the European Commission



### Contribution





How **sensitive** are the outputs of state-of-the-art capacity expansion models and **related policy take-aways** to changes in the **discount and hurdle rate assumptions**?

#### Today:

Illustrating the impact of hurdle rates on key outputs of generation capacity investment models: the **investment mix and carbon emission intensity**.

#### In the paper:

Illustrating the variety of the **energy system development pathways** resulting from various assumptions on hurdle rates, social discount rates and energy futures.



### Methodology



- Bottom-up energy system **optimization** model.
- **Greenfield** investment problem (endogenous investments in conventional, renewable generation and storage technologies).
- **Pan-EU** geographical scope | country-based nodal structure.
- Hourly dispatch of electricity | four milestone years (2020, 2025, 2030, 2040).

### Scenario Set-up





# Results – Impact of HR on cumulative investments until 2040 [GW]

1200

1000

800

600

400

200

0



■ Nuclear ■ Lignite ■ Hard Coal ■ Gas ■ Wind Onshore ■ Wind Offshore ■ PV ■ Hydro

Preliminary results Please do not cite or copy

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# Results – Impact of HR on cumulative investments until 2040 [GW]





## Results – Carbon emission intensity reduction





#### Preliminary results Please do not cite or copy

## Take aways



### **Modelling take-aways**

- ✓ The evaluation of the hurdle rate is a challenging issue that is often left to the modeller. However, HR exerts substantial influence on the outputs of the energy system optimization models.
- Lower hurdle rates facilitate larger shares of renewable technologies in the optimal investment mix, leading to a more decarbonized system.
- ✓ Hurdle rates fitted for energy transition leads to an even more decarbonized system.

### **Policy take-aways**

✓ Low discount rates fostered by the European Central Bank & a set of policies that reduce risks for renewable generators make climate and energy targets attainable.

### **Contact information**



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