The economic value of electricity distribution networks in German energy transition

E.ON Digital Energy Talk

29 October 2020

Understanding the challenge from energy transition on investments and the economic value of electricity distribution networks

Objective of the study

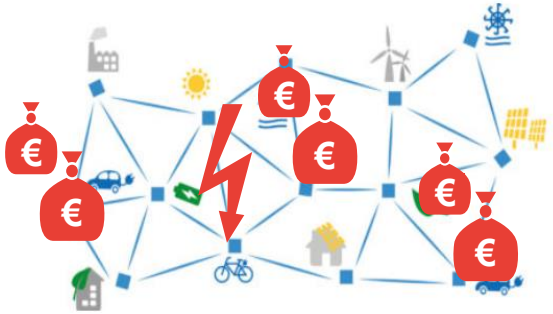
- Analysis of the **technical consequences of underdimensioning** the electricity distribution networks in Germany up to 2050
- Quantification of the **economic costs** of under-/overdimensioning
- Understanding possible implications for **future regulation**

Analysis approach

Target network: investment needs until 2030/2050

- Definition of a **target network**
- Identifying the **investment needs to achieve** this
- **Variation of** the target network by reducing network expansion due to under-investment

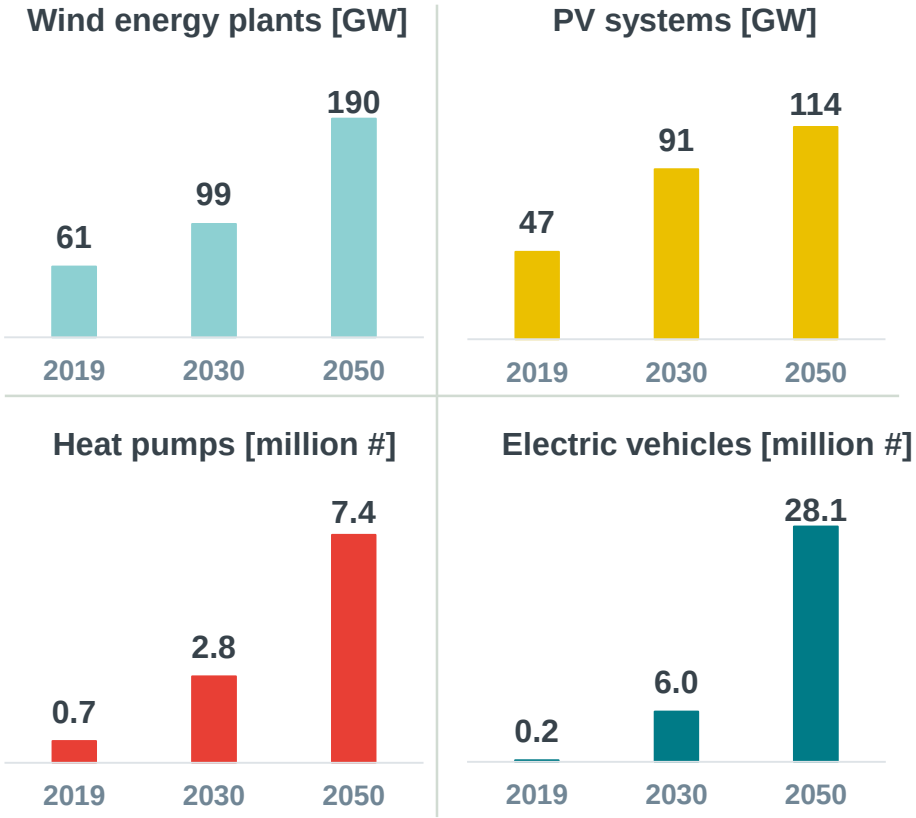
Costs in case of deviations from the target network



- Determination of the costs for
  - **Security of supply**
  - **Climate protection targets**
  - **Customer applications**
- ... and **savings** in network costs/tariffs

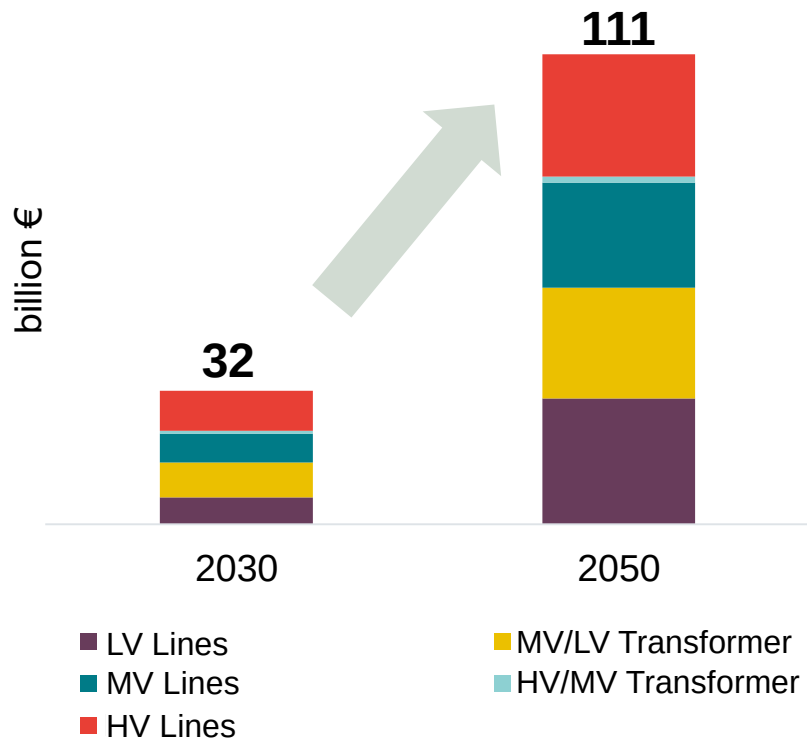
Electricity distribution grid operators are already important enablers of the energy transition. The associated requirements ...

Energy transition and decarbonisation are increasingly taking place in decentralised distribution networks ...



Source: Network development plan (2019), Dena (2018)

... and the need for investment in the electricity distribution network is growing rapidly



Source: IAEW

... and network investments will increase significantly by 2050

Network investments are a key requirement for a successful energy transition and decarbonisation ...

Failure to invest in the network leads to system costs consisting of ...

Costs of undersizing

Components	Costs caused by ...
1 RES integration	Feed-in management
2 Electric mobility	User‘s assurance of network*
	Restriction of comfort

Components	Costs caused by ...
3 Heat	Own assurance of network integration*
	Restriction of comfort
4 Supply reliability (LV/MV)	VoLL Households
	VoLL Industry/Commerce

Saving of undersizing

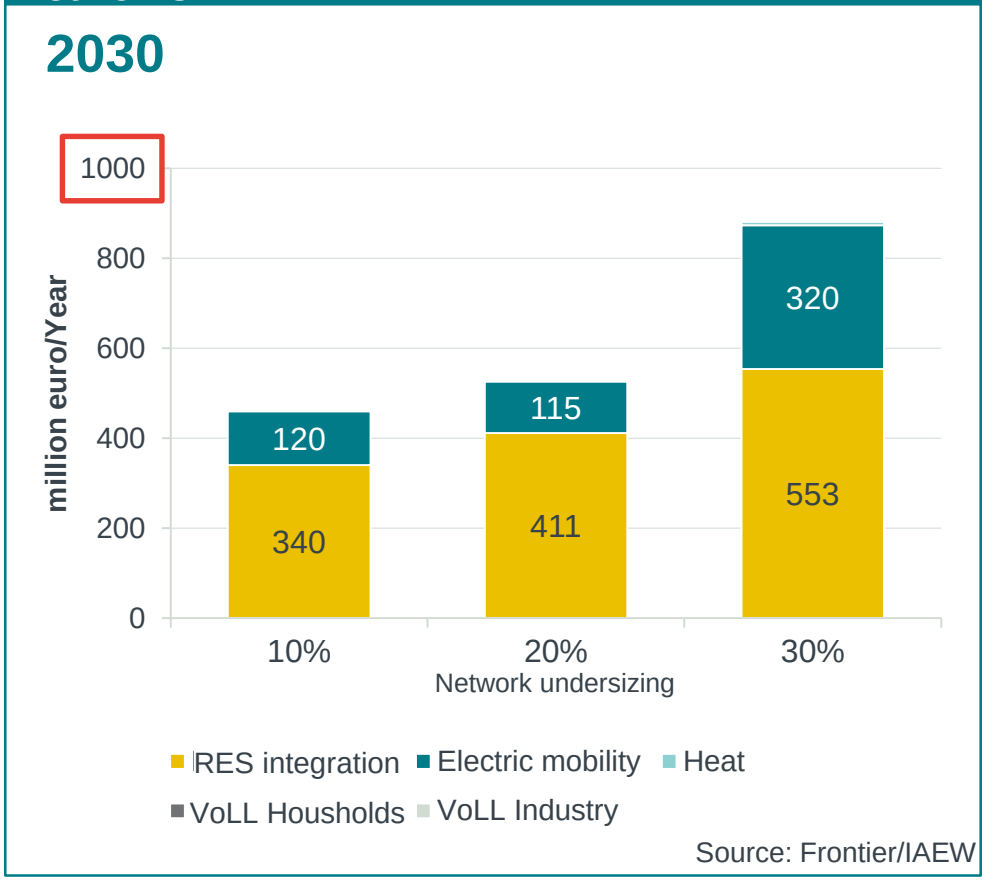
Components	Savings through ...
5 Network expansion	Lower network investments and as a result lower network costs

... and are causing substantial benefits

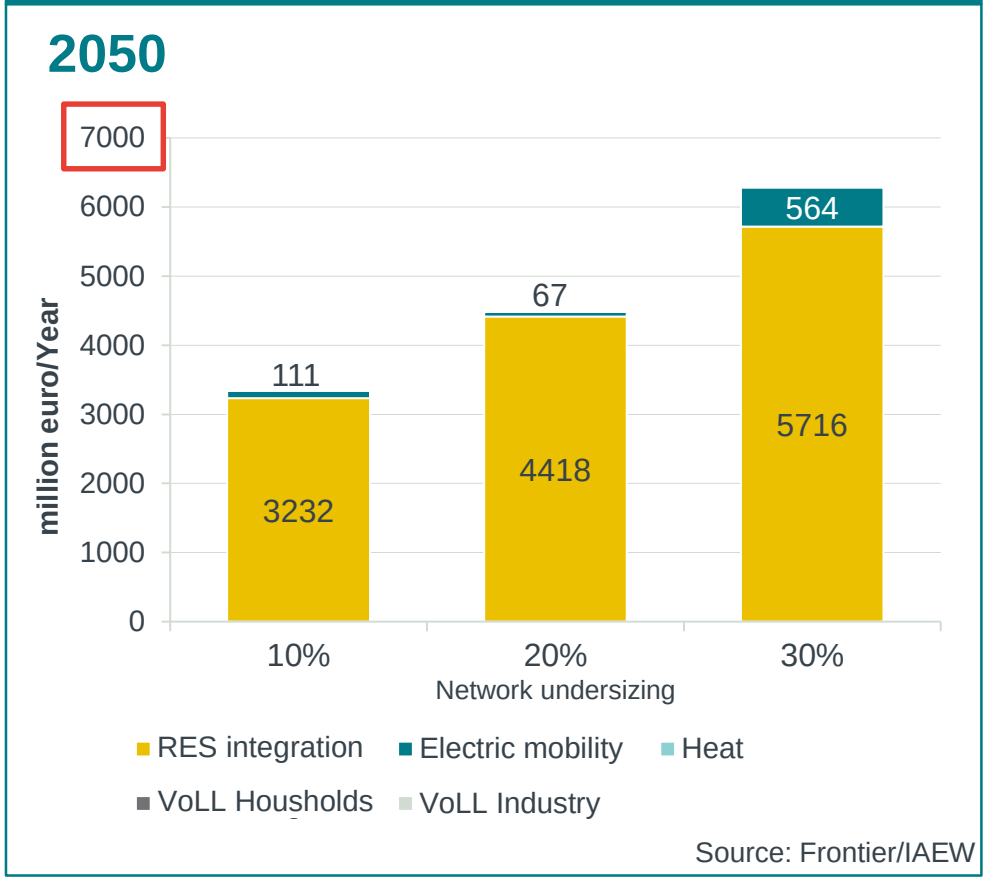
* e.g investments by some network users into decentral batteries or heat storage on the ground

The curtailment of renewable energy plants and electric vehicles are the main drivers of ...

The costs of undersizing the distribution networks ...



... increase disproportionately over time

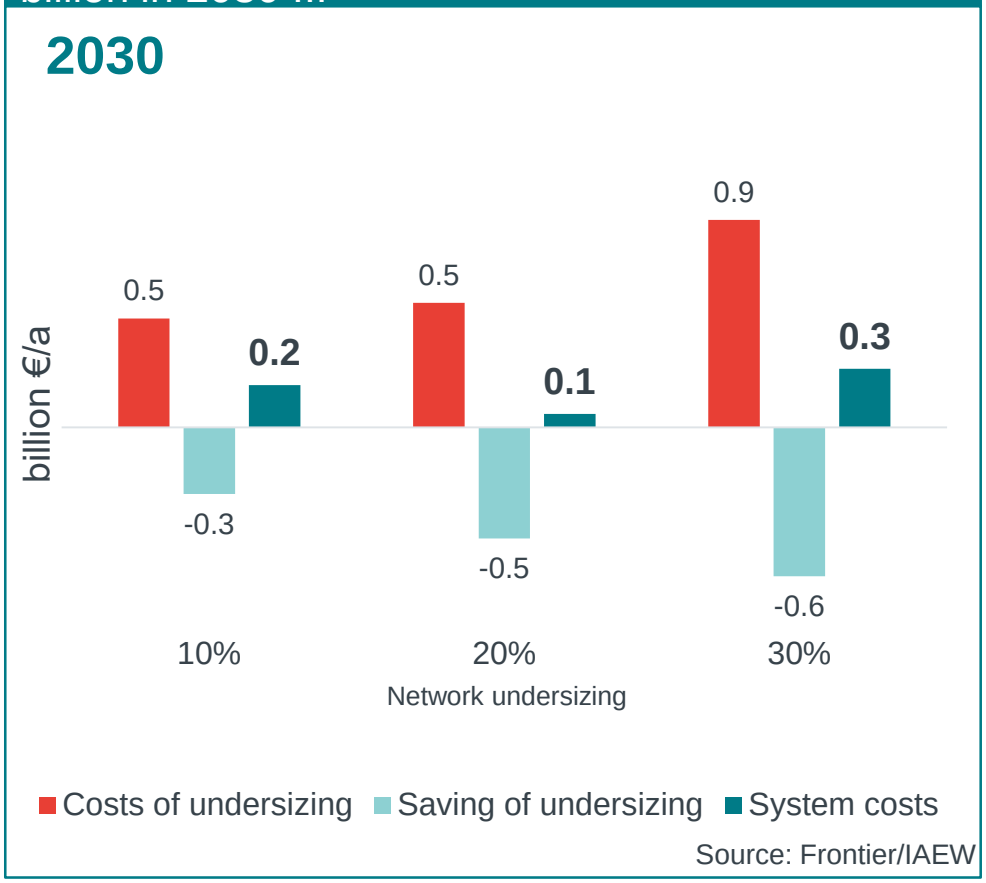


Note: 10%/20%/30% stands for scenarios, i.e. variant 10% assumes that only 90% of the budget of the necessary investment requirement will be used.

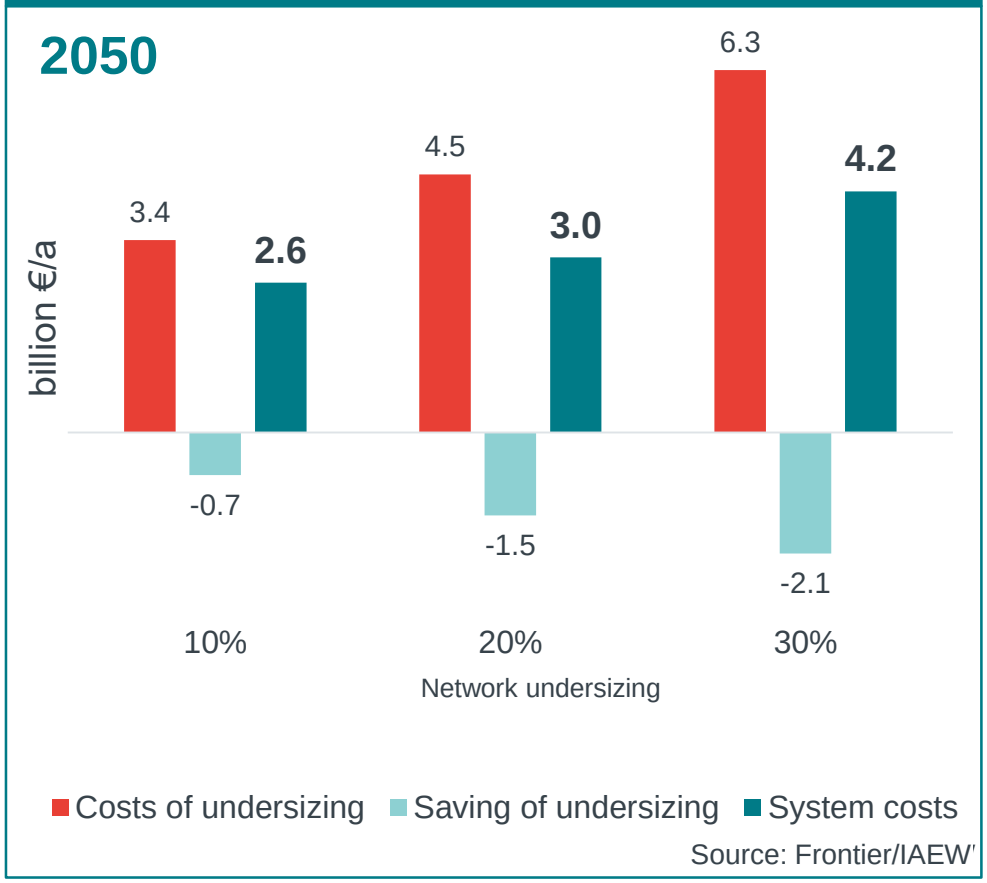
... considerable costs from undersized networks

The costs of undersizing networks clearly exceed the possible savings from lower network investments ...

System costs increase from € 0.2 billion to € 0.3 billion in 2030 ...



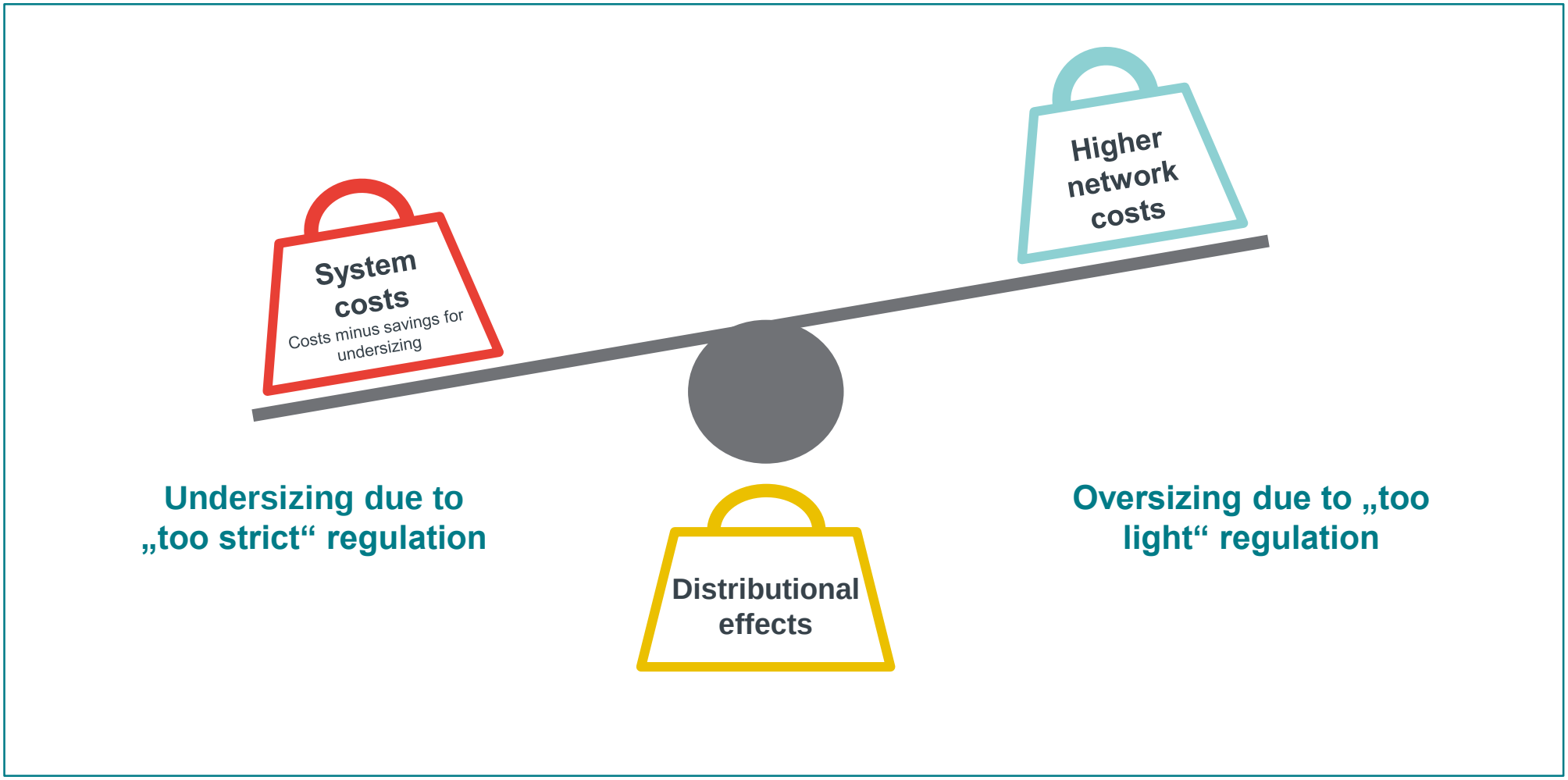
... to €2.6 billion up to €4.2 billion in 2050



... therefore too little network investment should be avoided from an economic point of view*

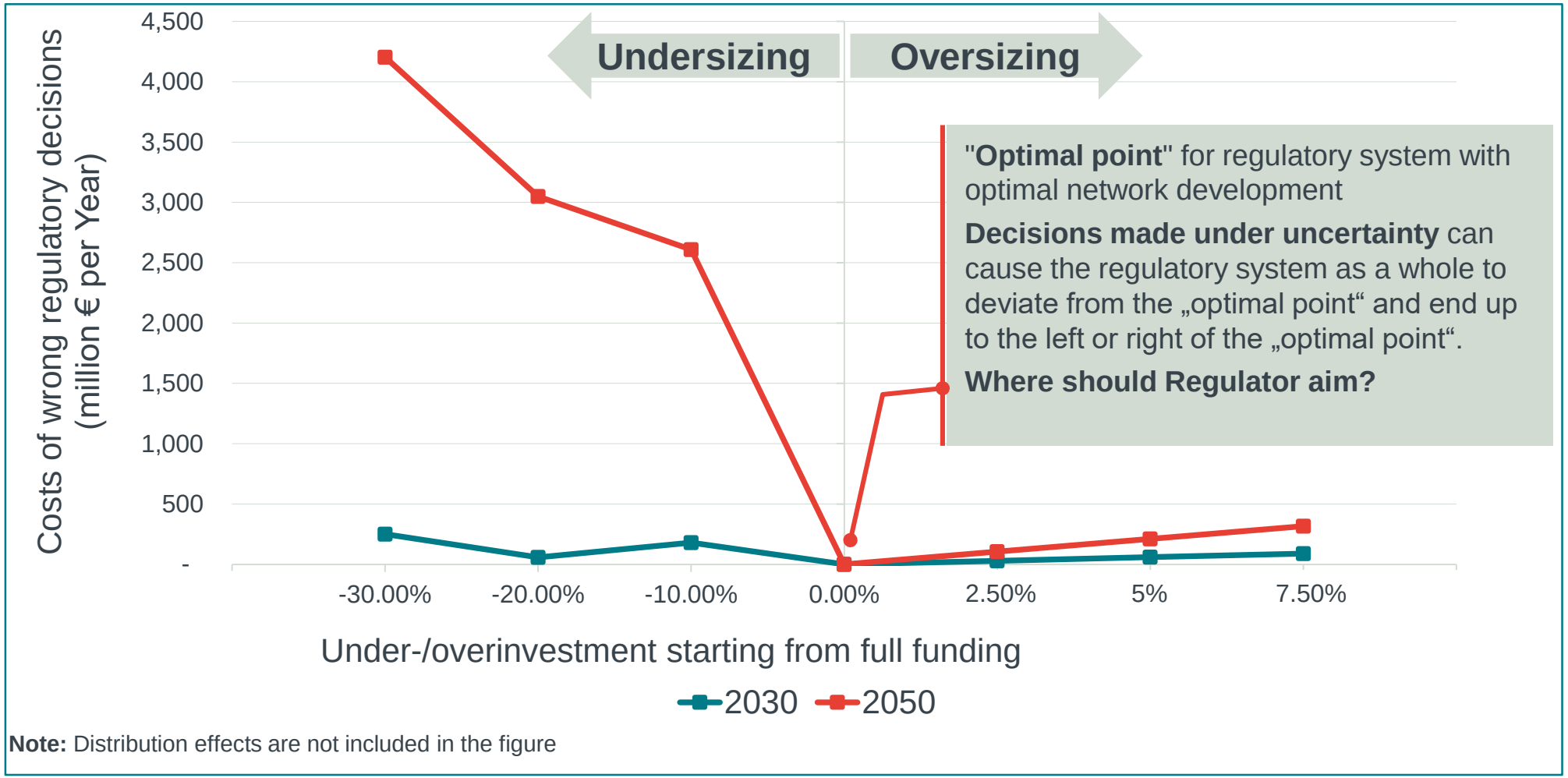
* This does not necessarily mean aiming at a full „copper plate“ but at a limited amount of efficient curtailment (in Germany this is assumed to be around 3% for onshore wind and PV. This has already been reflected in the full investment scenario and these curtailment costs are therefore not included as part of the additional costs from underinvestment shown here).

Regulation affects the sizing of networks. When setting regulatory parameters a balance is necessary...



... between the cost risk of „too little“ and “too much” networks

The risk of economic costs from „too little“ network investment ...



Note: Distribution effects are not included in the figure

... exceeds the cost risk from „too much“ network investments

German electricity distribution networks are facing dynamic changes of their supply tasks. Regulatory decisions under uncertainty need to take this into account ...

1 **Timely and efficient network expansion** has a high **economic value**

2 **Regulation** should **aim to minimise** the overall economic costs of under-/oversizing of networks

3 **Regulation takes** place under **uncertainty.** A **trade-off** is necessary ...

4 ... between the risk of **„too strict“** and **„too light“** regulation

5 Due to **asymmetric risks** of under-/oversizing, it is more expensive from an economic point of view if ...

6 ... the **regulatory system as a whole** lands on the "too strict" side than on the „**slightly too light“** side.

... in the interest of the overall economic efficiency

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