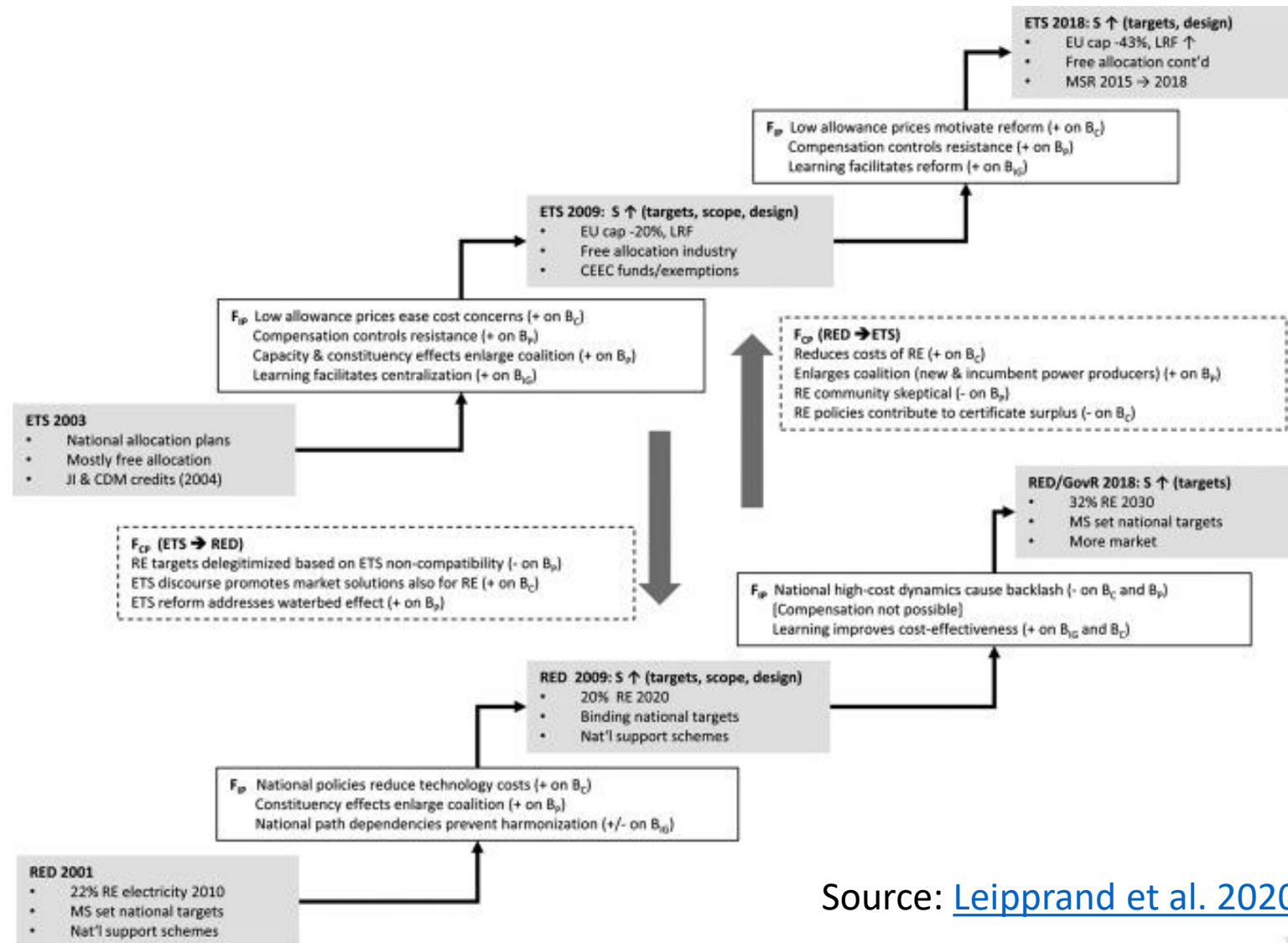


Renewable energy in the systems perspective

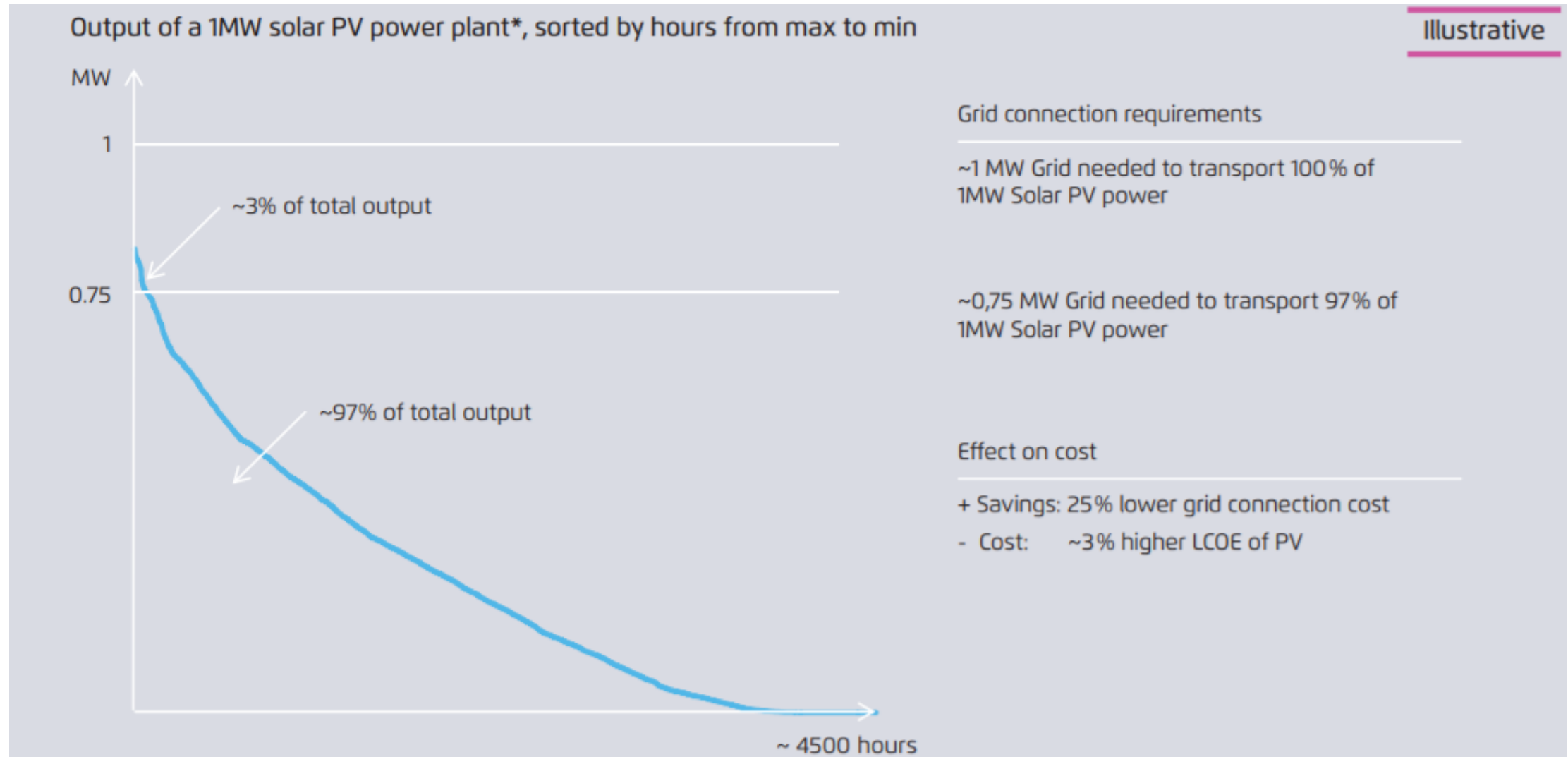
Case study: Policy sequencing



Source: [Leipprand et al. 2020](#)

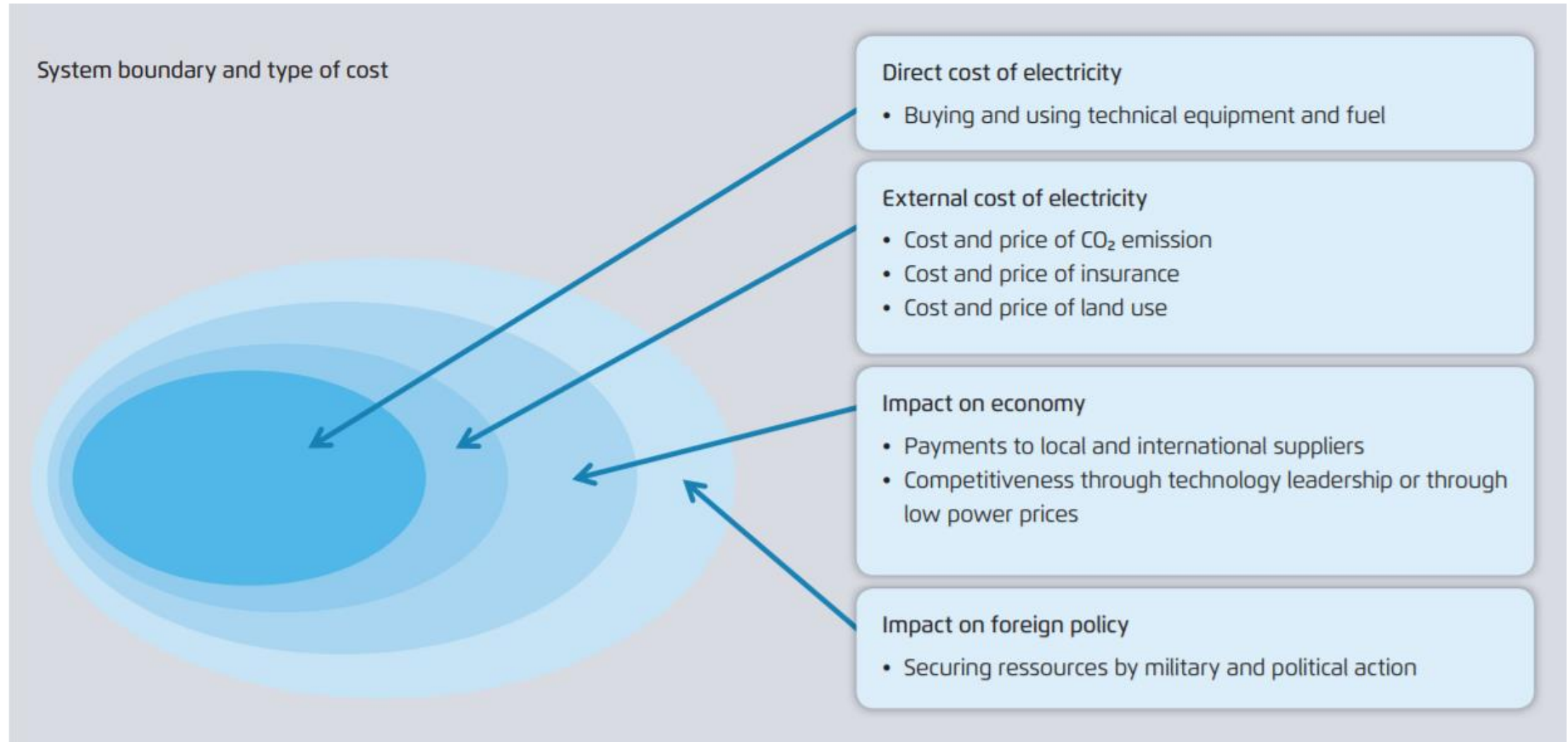
- Synergies (positive feedback)
 - RE enables actors to decrease ETS costs
 - Enlarged coalitions (eventually)
 - Learning (market solutions)
- Conflicts (negative feedback)
 - RE increases certificates surplus
 - Both communities initially skeptical

CS 2: Defining system boundaries (costs perspective)

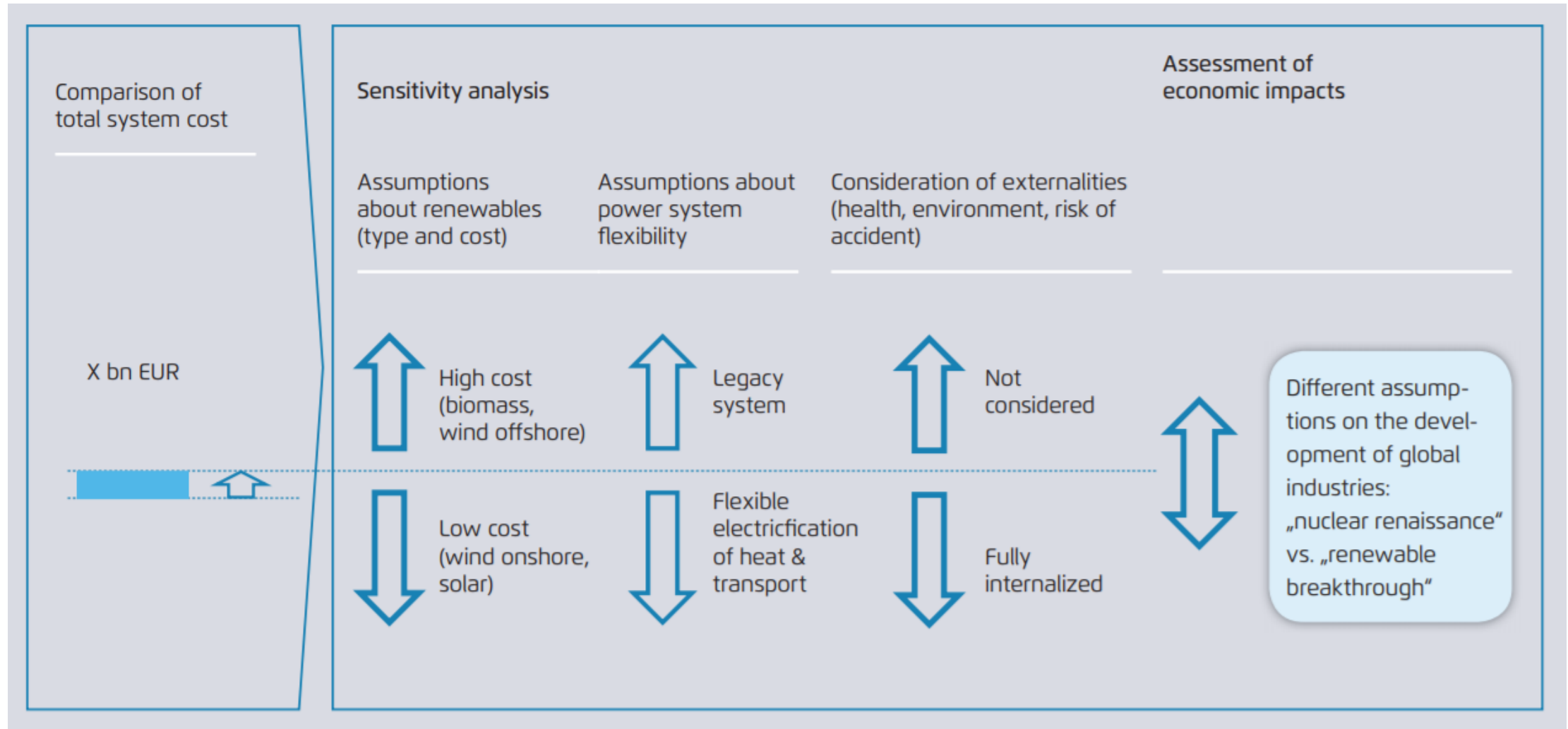


Source: [Agora EW](#)

CS 2: Defining system boundaries (costs perspective)



CS 2: Defining system boundaries (costs perspective)



Systems perspective

System components	What to watch	Acting upon a system
<ul style="list-style-type: none">• Function or purpose• System boundaries• Parts• Interactions	<ul style="list-style-type: none">• Feedback loops• Stocks and flows• Delays	<ul style="list-style-type: none">• System levers• Unintended consequences

Feedback loops

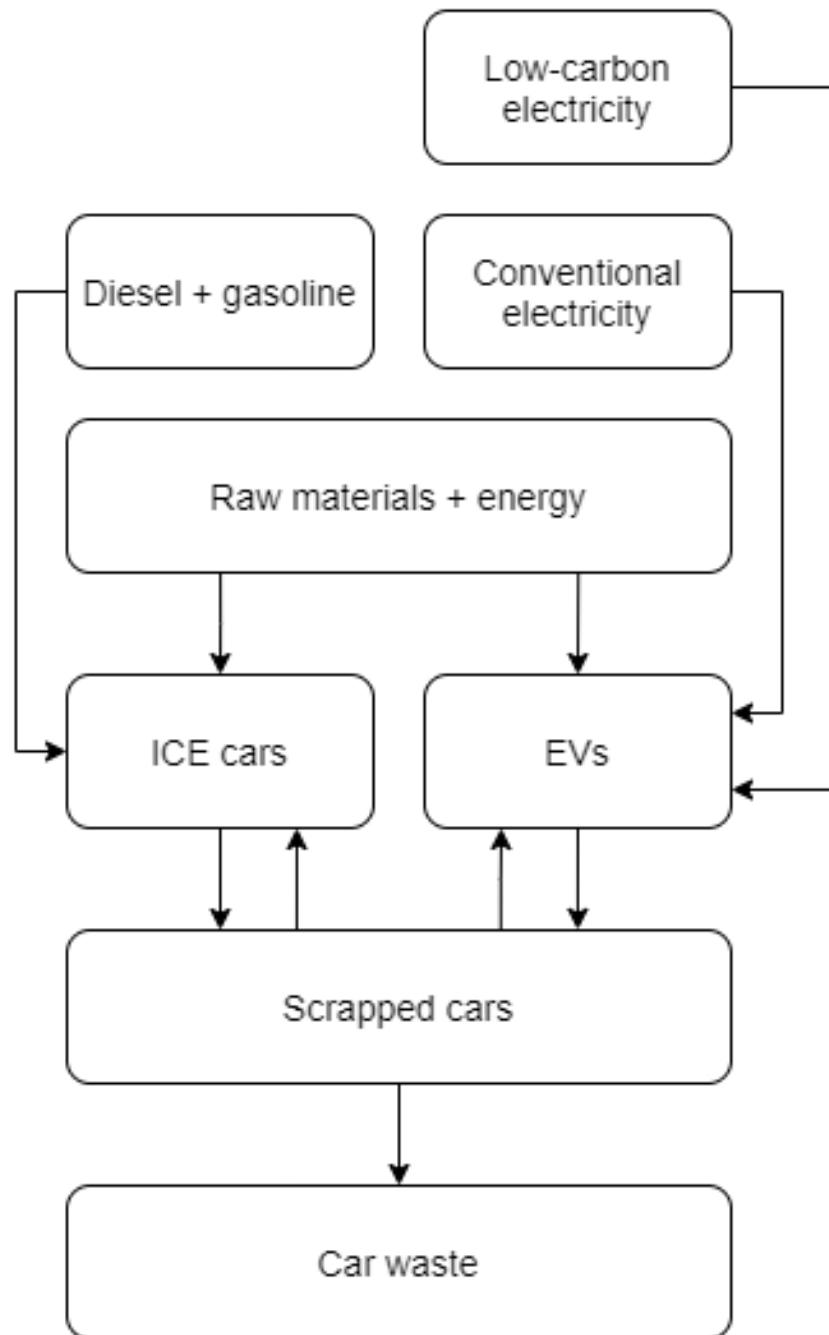
Reinforcing

- RES deployment <> RES costs
- RES deployment <> integration tech costs
- RES deployment <> system costs
- RES deployment <> acceptance
- RES deployment <> political feasibility

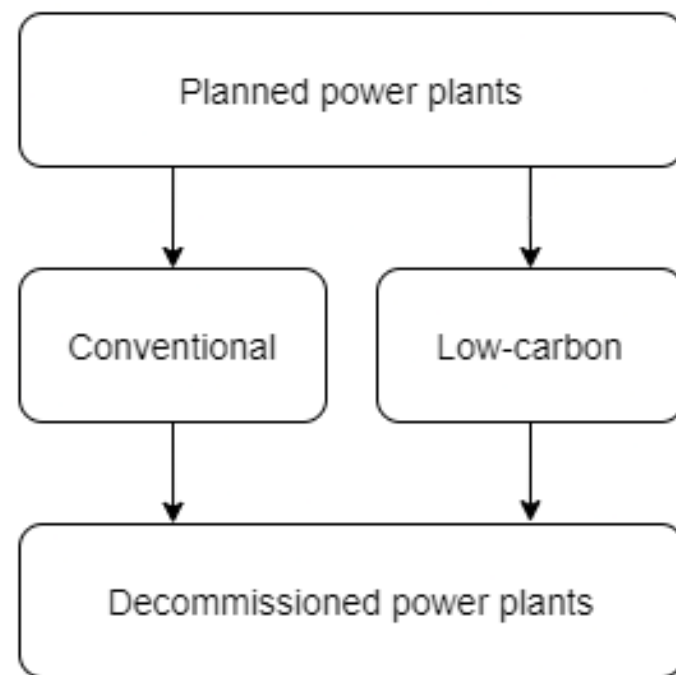
Balancing

- RES deployment <> wholesale price
- RES deployment <> system costs
- RES deployment <> acceptance

Stocks and flows in individual car transport

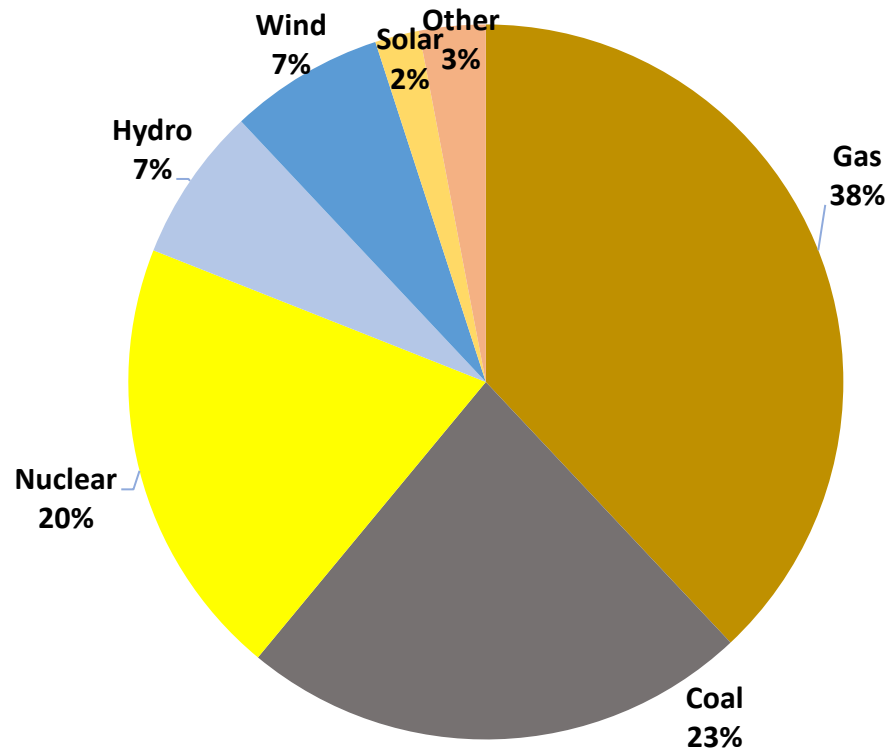


Stocks and flows in the power plant population

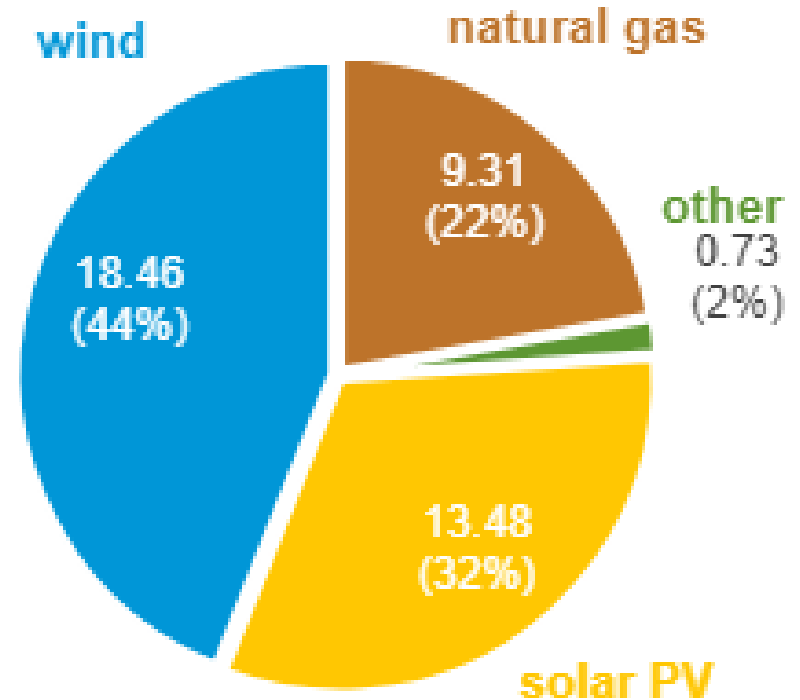


Stocks and flows, delays

Electricity generation mix (2019)



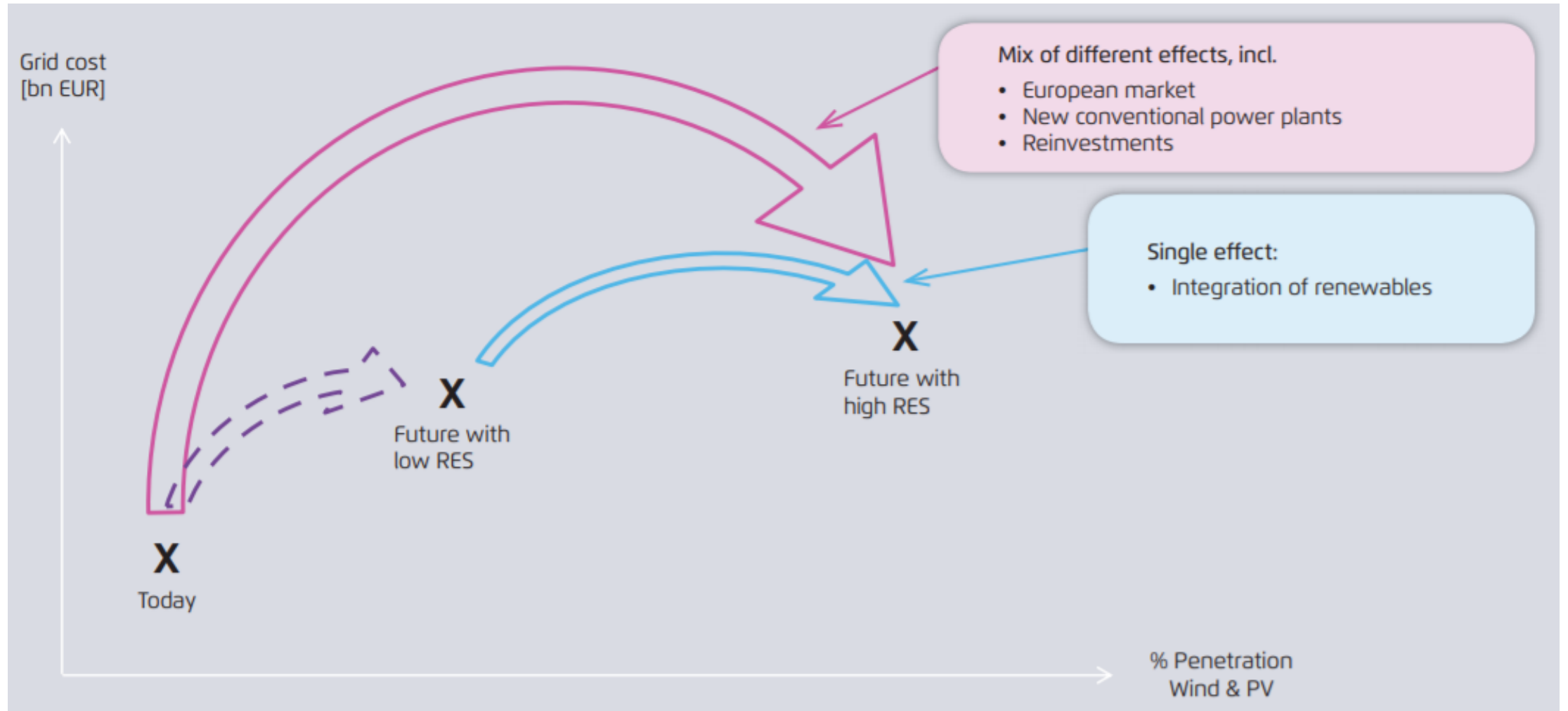
Expected new capacity (GW, 2020)



System levers = system characteristics

- Numbers and events
- Stocks and flows
- Feedback loops (balancing and reinforcing)
- Information flows
- Rules
- Goal(s)
- Paradigm(s)

Unintended effects



Source: [Agora EW](#)