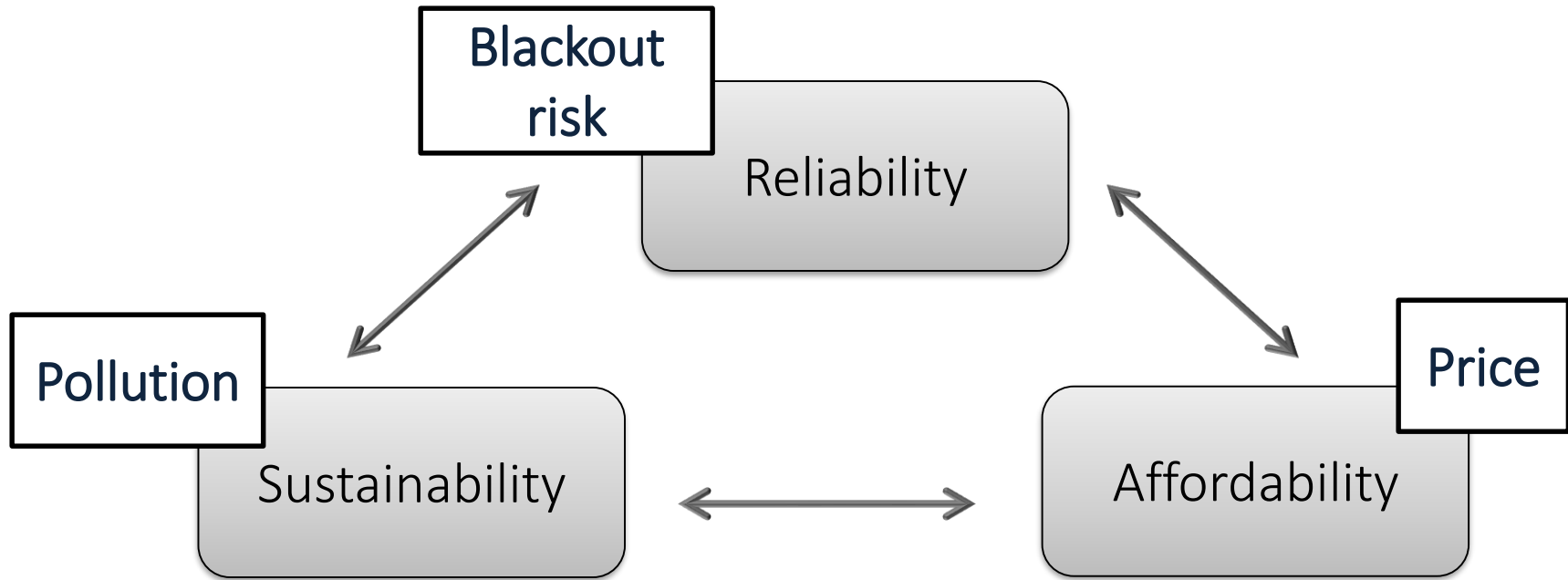# How do roadmaps and their framing impact regulatory decisions towards environmental targets?

Busra Gencer*
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Problem Statement

Blackout risk

Reliability

Pollution

Sustainability
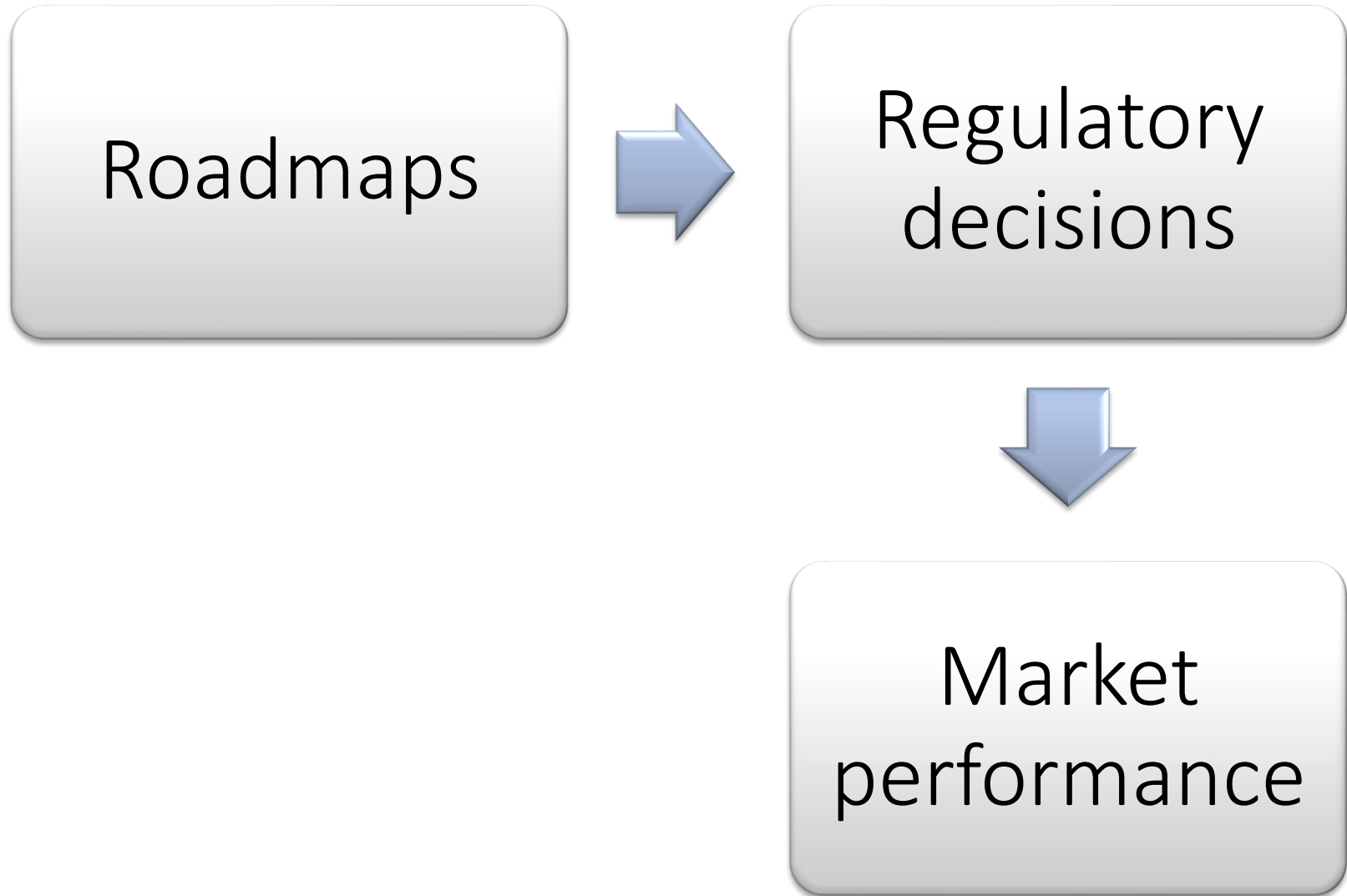
Price

Affordability

- Electricity markets are complex
  - Long lead times, feedbacks
  - Several stakeholders
  - Technological improvements
  - Environmental targets

- European Union
 Final energy consumption from renewables
    - 2020 → 20%
    - 2030 → 27%

Research Goal

Roadmaps → Regulatory decisions → Market performance

- **Stylized electricity market**
  - Constant exogenous demand
  - Two generation technologies: green & thermal
  - Merit order dispatch
  - Lifetime: 20 years, Construction time: 1 or 3 years
  - Thermal investments based on profitability
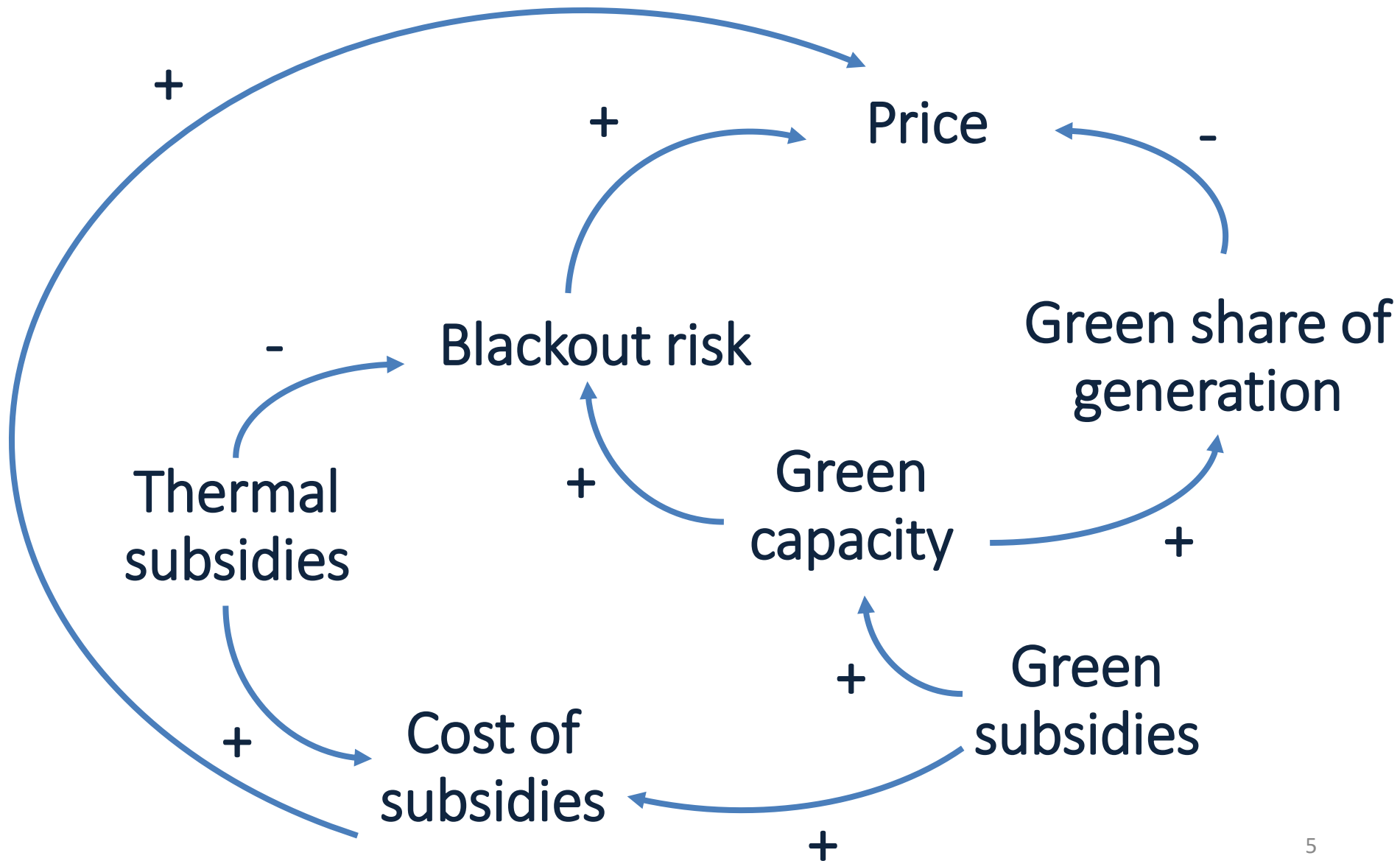
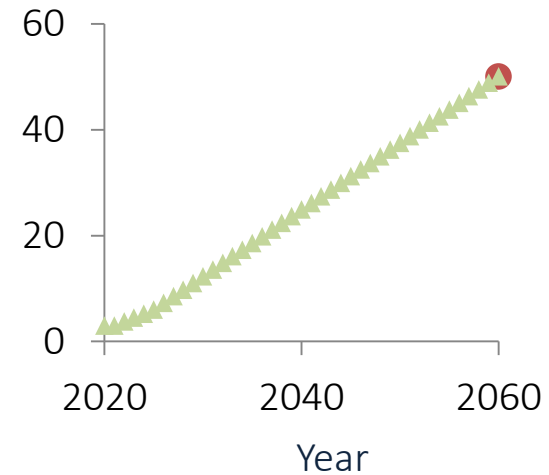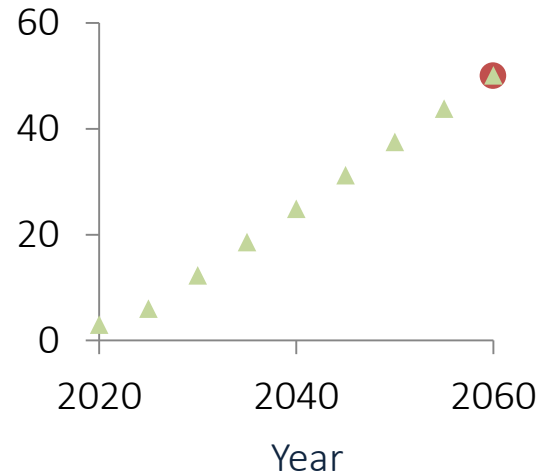- **Transition from thermal to green**

50%

3%

2020   2060
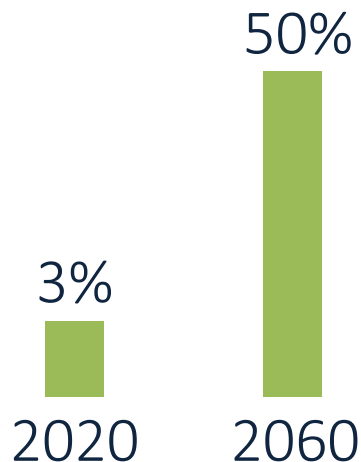
Annual decisions
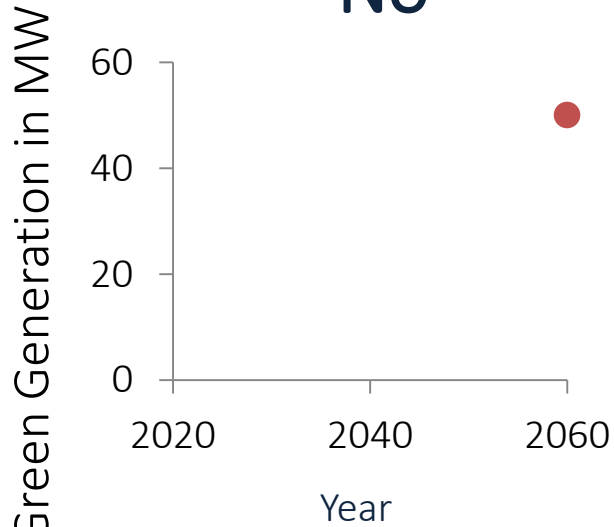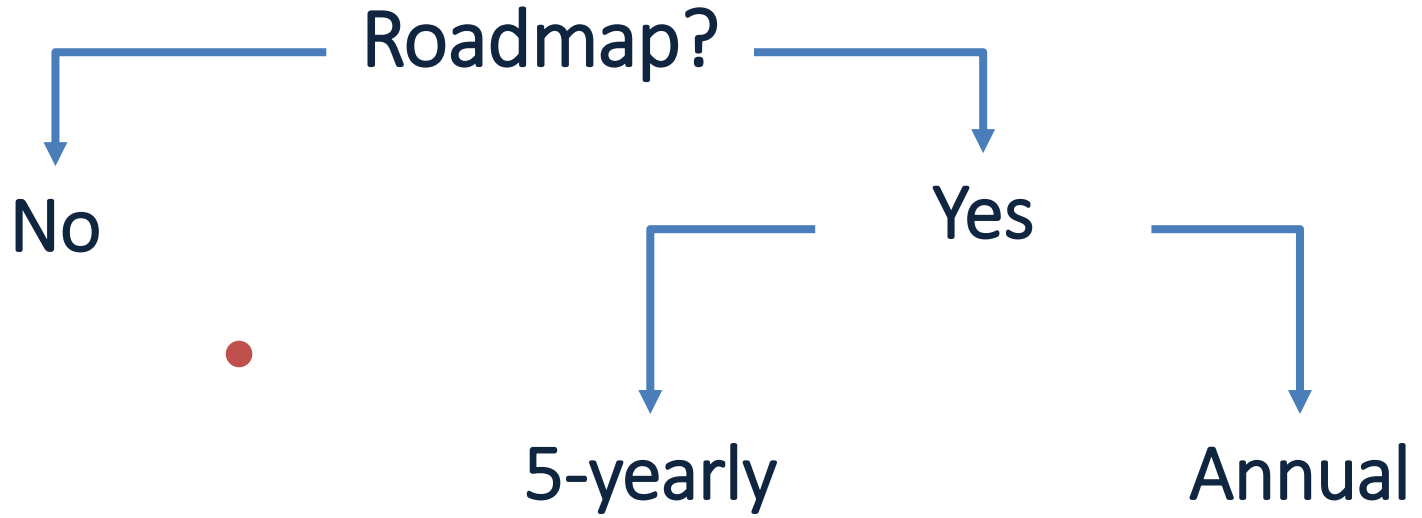
Subsidized Green Capacity

Subsidized Thermal Capacity

Trade-offs

Experimental Manipulations

Experimental Design

- ## Experiments: 125 students
  - ≥ 40 participants per condition
- ## 60 min per session
  - 20 min training

- ## Payment
  - If target reached without blackouts
    - Price
    - Blackout risk
    - Total cost of subsidies
    - Roadmaps (where relevant)
  - If target not reached or blackout
    - Minimum payment

Generalized Additive Model (GAM)

$$E(Y) = \beta_0 + \beta_1 X_1 + \beta_2 X_2$$

$Y : dependent$

$X_i : independent$

Nonlinear relationship

$$E(Y) = s_0 + s_1(X_1) + s_2(X_2)$$

where $s_i(X)$ is a smooth function

- **Dependent variables**
  - Subsidized green and thermal capacity per year
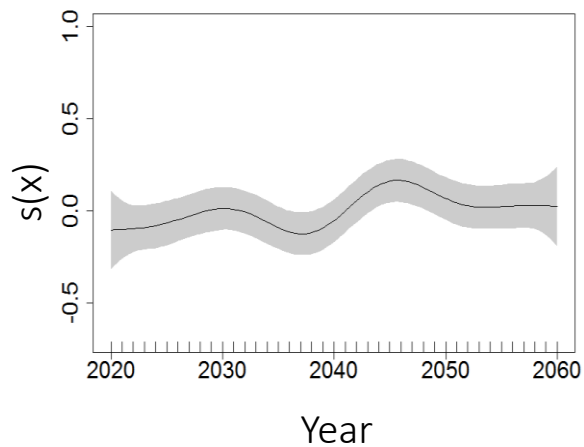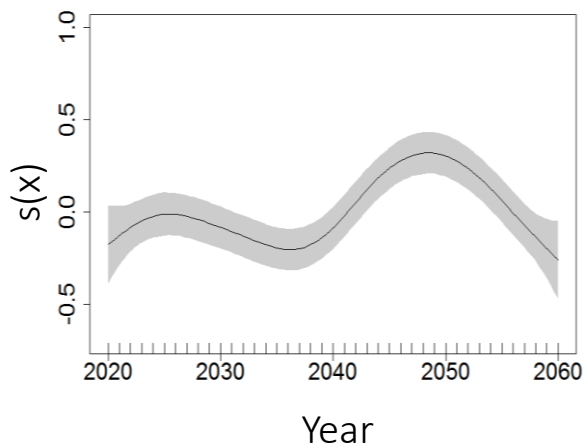
- **Predictor variable**
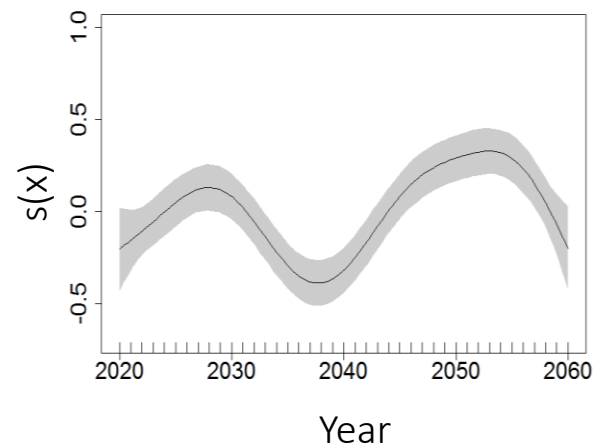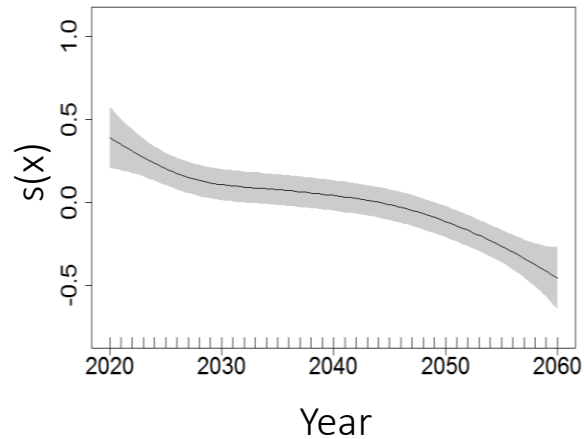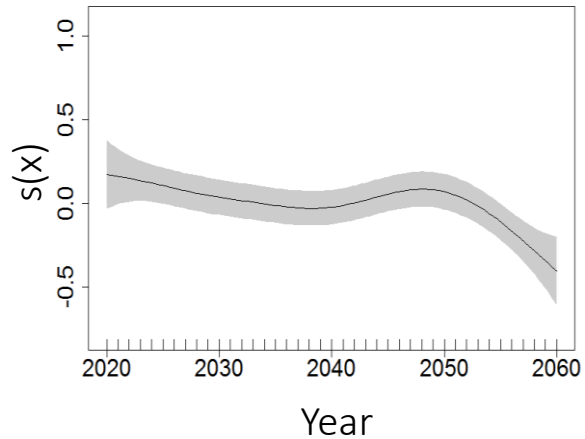 - Time

Subsidy decisions

Green

F

G5

G1

Thermal

F

G5

G1

9
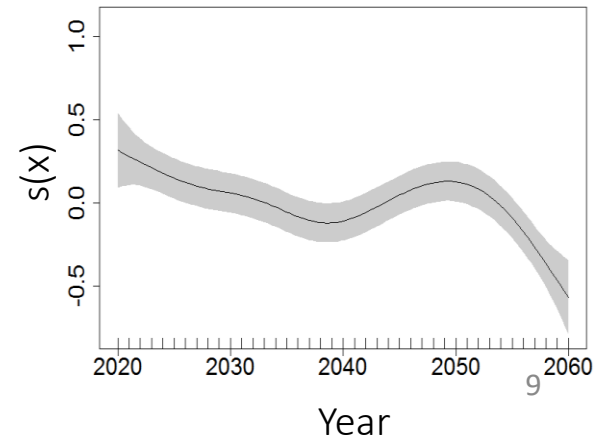
Market performance

Average subsidies per year in MW
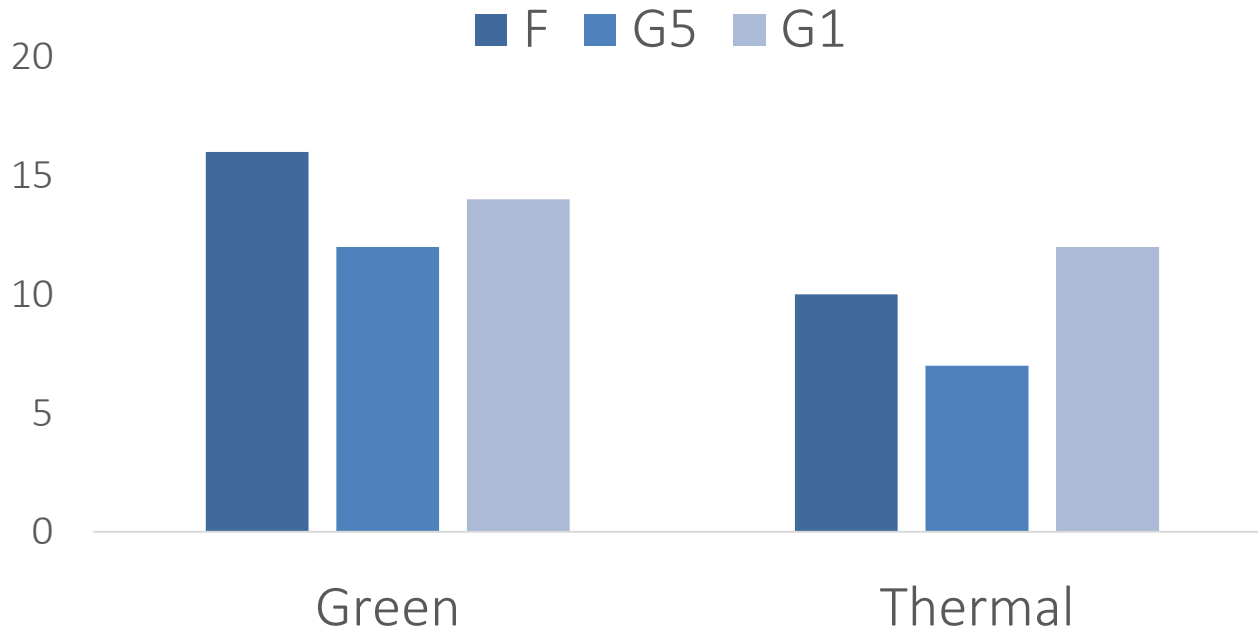
Cost of subsidies

F	1'697
G5	1'310
G1	1'638

Average price per year

F	G5	G1
50	46	48

Insights to Share

- Roadmaps influence regulatory decisions

- Multiple ways of reaching an environmental target

- **Future work:**
  - What drives the decisions?
  - More on market performance

Questions & feedback

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