ESI: Implications for public policy

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Background

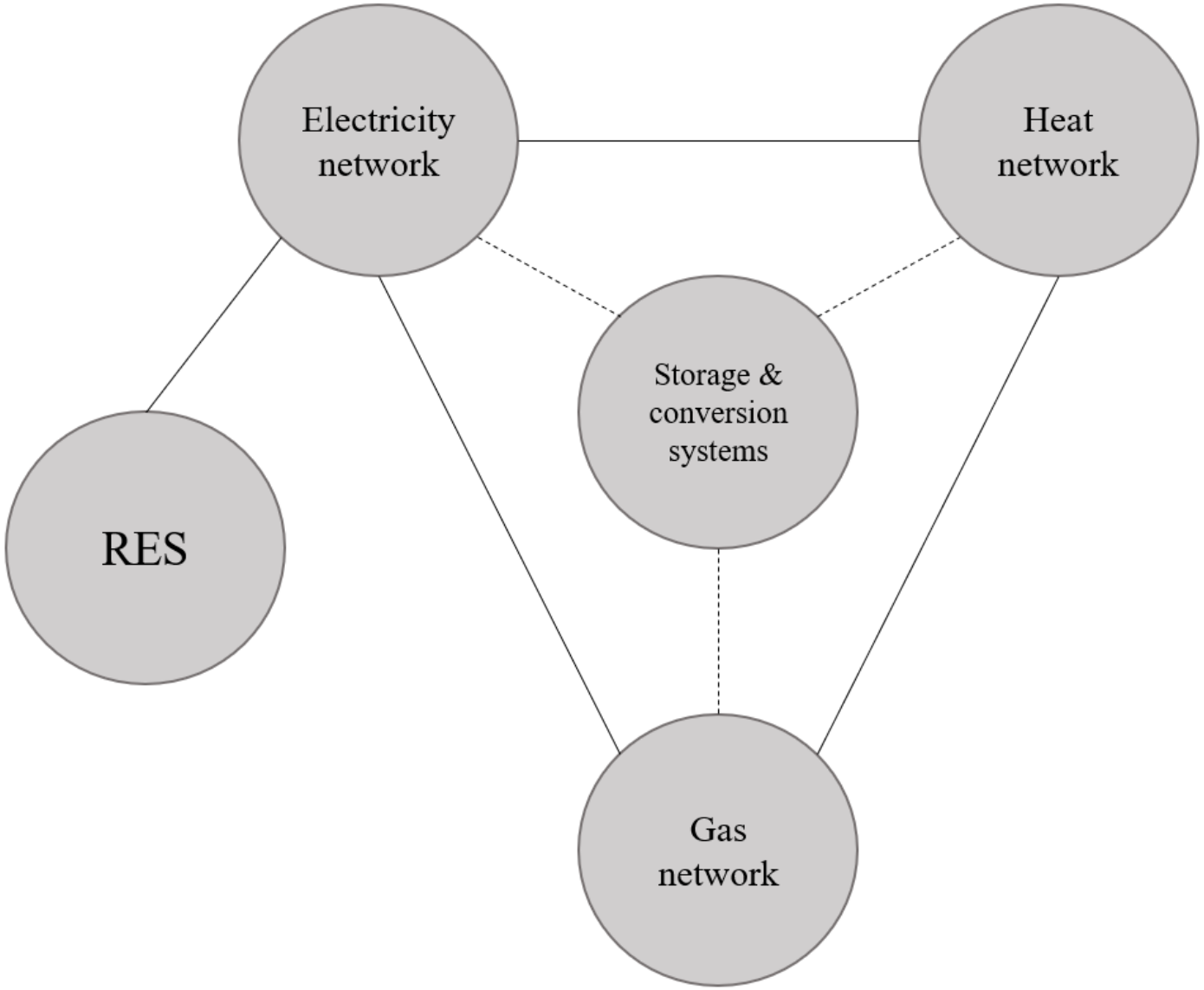
- Trade-off between affordability, environmental sustainability and reliability.
- Decarbonisation policies push towards further adoption of RES and DG.
- Problems: backup capacity, network expansion, curtailment...
- Need for clean, reliable and affordable system.

Energy systems integration (ESI)

- A holistic view of the energy systems to reduce total system costs.
- Exploits economies of scope and synergies within and between energy networks.
- Flexibility and reliability through ICTs, storage systems and conversion technologies.

Integration

- Organisational, operational, physical.
- Vertical and horizontal.



Our contribution

Part of the Horizon 2020 financed project PLANET.

Research question: what are the economic and policy barriers towards the implementation of an integrated energy system?

Research approach: analysis of economic literature on ESI-enabling techs, review of national regulatory frameworks, analysis of innovation spending at the country level.

Findings

- Economic and policy barriers are significant.
- Lack of investment.
- In addition to technical developments, implementing ESI will require a simultaneous development of policies and regulatory frameworks.

Regulation and ESI

- As cost of ESI enabling techs decreases, barrier to adoption becomes policy rather than cost.
- Standard regulatory approaches fail to encourage investments in innovative projects in the energy networks (Bauknecht, 2011).
- How are EU regulators addressing this?

Evidence from some EU countries

	United Kingdom	Germany	France	Italy
Type of regulation	Revenue cap with output, efficiency and innovation incentives.	Revenue cap with expansion incentives.	Hybrid: revenue cap with cost of service elements. Efficiency incentives.	Hybrid: revenue cap with cost of service elements. Efficiency incentives.
Regulatory period length	8 years.	5 years.	4 years.	8 years electricity; 4 years gas.
Innovation incentives	Innovation stimulus packages: adjustments to revenue allowance and competition for funding.	50% cost recovery for innovative projects that fall under ministerial funding programs.	Full cost recovery for innovative projects approved by the regulator.	WACC mark-up for innovative projects.
Costs added to the RAB	Capex and Opex.	Capex and Opex.	Capex	Capex
Innovation funding	Regulation-based	Government-based: grants given under ministerial funding programs.	Hybrid: regulation, government and EU-based.	Hybrid: regulation, government and EU-based.

UK's NIC and NIA projects

Above £1 million budget, from 2013 to September 2018

	Number of projects	Budget (£m)
Network Management	62	£325.4 million
Energy efficiency	7	£56.1 million
EV and hydrogen vehicles	5	£11 million
Smart Grid technologies	13	£65.5 million
Storage systems	2	£2.9 million
ESI	1	£5.4 million
Others	28	£85.9 million

Projects in Germany

From 2012 to 2018

Project category	Project	Incentive mechanism	Source of funding	Total budget	Main stakeholders
Smart Grids	SINTEG	Grants	National funds (up to €230 million) and private funds	€600 million	TSO and DSO
Storage	Energy Storage Funding Initiative - R&D and demonstration of storage technologies	Grants and privately matched funds	National and private funds	€200 million	TSO, DSO and consumers
	KfW Banks – loans for EBs	Low-interest loans	Government-owned development bank	€80 millions	Consumers
Conversion	CHP Act	Surcharge to electricity from CHP	Increase in network tariffs	Max annual fund of €1.5 billion	Generators

Economic and policy barriers

- Capital intensive technologies.
- Risky nature of innovative projects.
- Identification of innovation that should be incentivised through regulation.
- Coordination problems.
- Access to data.
- Challenges from the consumer side.

Policy implications

- Regulatory frameworks that incentivise innovation adoption.
- Drive consumer actions.
- Incentivise network operators' coordination and integration of techs.
- Increased investments in ICTs and data transparency rules.
- Coordinated development plans.

Remaining questions

- Which role for DSOs in the operation of conversion and storage systems?
  - Third parties operate them: mandatory connection plus remuneration based on number of connections.
  - DSOs operate them: unbundling rules might require revisions.

- How does technological progress impact on the boundary between market and regulation?

Thank you!

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