Energiesysteemintegratie

naar een toekomstbestendig, betaalbaar, en betrouwbaar energiesysteem (ESI-far)

TOPSECTOR ENERGIE
Empowering the new economy

NWO

Workshop

Werkconferentie Topsector Energie 31-10-2019

Programma

- Introductie (Mart van Bracht) 5-10 min
- Onderzoeksthema's Energiesysteemintegratie (Mart van Bracht) – 20 min
- Publiek-private samenwerking met NWO (Mark van Assem) – 20 min
- Rol van Netherlands eScience Center (Jason Maassen) – 20 min
- Postersessie met jonge onderzoekers – 20 min

Poster sessie

- Steph Johnson-Zawadzki:
  Incentives and algorithms for efficient, reliable, sustainable and socially acceptable energy system
  integration

- Laurens Stoop:
  Algorithmic Computing and Data-mining for Climate integrated Energy System Models

- Digvijay Gusain en Roland Saur:
  Heat and Power Systems at Industrial Sites and Harbours(HaPSISH)

- Cristina Zepeda en Henry Payne:
  Flexcrop: Energy management in greenhouses using crop flexibility

Energy System Integration

towards a Futureproof, Affordable, and Reliable energy system

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The energy system is being transformed

- New energy resources
- Technological change
- Institutional reforms
- New actors on the scene
- New business models
- New energy services
- etc

Profoundly changing the way energy systems are planned and operated, energy services are provided and energy is used

Engineering a future-proof energy system ...

- The energy system is a system-of-systems:
  - multi-carrier and multi-scale
- Constantly in flux
  - with subsystems residing in different regulatory regimes
- With many actors at their own steering wheel
  - not necessarily aware of the wider system consequences of their decisions

How to ensure that the aggregate outcome of local decisions leads us towards a clean and climate neutral energy system, providing affordable and reliable energy services to adequately support society in the future?

Themes of the call

A. Ensuring informed decision making and enabling energy system change

B. Long-term planning and maintenance of physical energy infrastructures

C. Management, flexibility, and digitization in operational energy systems

A:Ensuring informed decision making and enabling energy system change

- How to make fact based decisions to enable system change
  - Multi actor
  - Acting at different scales
  - Some actors are new
  - Different government regimes
  - Inclusiveness
  - Multi assessment criteria (economical, technical, environmental, social, ..)
  - No standardized decision making protocols (data, modelling tools, ..)

Theme A. Informing decision makers and enabling energy system change topics:

1. Multi-actor decision and policy making

   - Public/private, competition/cooperation, individual/community initiative, uncertainties, citizen participation, citizen empowerment

2. Combining social and technological perspectives in multi-carrier, multi-scale and cross-sector system analytics and modelling

   - Seeking an integrative modelling framework, which allows us to combine models from different disciplinary perspectives, differing in scope, scale and modelling paradigm; system transition simulations e.g., to examine path dependencies

3. New services and business models

   - Actors, data and technology platforms, consumer protection, politics/transparency of algorithms, data security and integrity

Theme A. Informing decision makers and enabling energy system change topics:

4. Analysis of institutional barriers and designing futureproof institutions for the integrated energy system

- Institutions (laws, regulations) and governance procedures vary across energy subsystems; how do they perform vis-à-vis the tight coupling in the future energy system; can they accommodate new energy infrastructure? Which values are crucial for social acceptability of the future energy system, and how can these values be embedded institutionally? Can an institutional framework be designed with intrinsic flexibility to accommodate the energy system transition process?

B: Long-term planning and maintenance of physical energy infrastructures

- How to invest in and maintain the physical energy infrastructures
  - Intermittent power sources (peaks)
  - Intensive uncertain demand (EVs)
  - Energy production at remote areas
  - Heat and hydrogen become an increasingly important energy carriers
  - Infrastructures for multiple energy carriers interconnected

B: Long-term planning and maintenance of physical energy infrastructures

- How to design, expanding and redesigning energy networks
  - About: Assets, topologies, cables, pipes, storages, capacities, etc.
  - Considering usage patterns, requirements, time scales, characteristics, environment, etc.
  - Models, investments, and optimization
  - For one upcoming energy carrier (hydrogen/heat) or multiple carriers (interdependences)

B: Long-term planning and maintenance of physical energy infrastructures

- How to maintain energy infrastructures
  - New policies dealing with reliability, wear out, stress points
  - Automation, for effective (pro-active) maintenance
  - Flexible usage affects wear out
  - Interdependencies (multiple carriers)

B: Long-term planning and maintenance of physical energy infrastructures topics:

1. methodologies for (re)design and expansion of energy infrastructures and systems
   - from upcoming single-carrier networks to multi-carrier infrastructures

2. (computational) optimization, analytical, and simulation techniques for (re)design and expansion of energy infrastructures and systems

3. methodologies and computational techniques for optimization of maintenance policies of energy infrastructures and systems

C: Management, flexibility, and digitization in operational energy systems

- How to operate future energy systems
  - Intermittent power generation (solar, wind)
  - Intensive uncertain demand (EV, heat pumps, industry, ..)
  - New energy carriers become important (heat, H2, ..)
  - Interdependences at various scales between systems
  - ICT be become indispensable in energy system management
  - New actors and energy services
  - Different levels of aggregation and separation in energy systems

C: Management, flexibility, and digitization in operational energy systems topics:

1. Knowledge, methodologies and (simulation) techniques for digitization and automated management of future energy systems

2. Knowledge, methodologies and (simulation) techniques for automated approaches enabling flexibility in future energy systems

3. Methodologies and techniques for dedicated knowledge, information and data systems for automated management of future energy systems.

Program Call authors

- Topsector Energy
  - System Integration team
  - Input: Roadmaps System integration 2018

- NWO
  - Han La Poutré
  - Margot Weijnen
  - Feedback and input from “Klankbordgroep” (scientists from various disciplines and universities)

Energiesysteemintegratie

Publiek-private samenwerking met NWO

Dr. Mark van Assem

NWO Exacte en Natuurwetenschappen

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