The Innovation Compass of East Netherlands

Smart Energy

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Smart Energy

Relevance: The energy transition requires smart innovations for sustainability, security of supply and reducing grid congestion. The East Netherlands is leading the way in this regard, moving from decentralised initiatives to integrated energy systems. Through system integration, we harmonise technology, energy sources, modalities and operational and social processes within the entire energy system, ensuring that it operates reliably, sustainably and economically efficiently.

Core technologies: Energy management systems and digital twins, battery storage and new-generation materials, hydrogen technology, green fuels, heat networks, charging infrastructure for heavy-duty transport and material innovations for grid components.

Ambition 2030: The East Netherlands is the demonstration region for system integration. We connect decentralised energy systems (e.g. Smart Energy Hubs) to each other to form controllable networks that make energy available, affordable and sustainable – thus laying the foundation for strategic autonomy in the Netherlands and Europe.
This strategic autonomy is important for security, robustness and self-healing capacity.

'From separate hubs to a single smart integrated energy system: the East Netherlands is building the energy system of the future.'

Result: The sustainable development, consolidation and upscaling of decentralised, robust and resilient energy systems and a focus on multi-commodity (different energy carriers).

Ecosystem and strengths: University of Twente (Centre for Energy Innovation (CEI) and Battery Centre Twente), Saxion University of Applied Sciences, Windesheim University of Applied Sciences, HAN University of Applied Sciences (Sustainable Electrical Energy Centre of Expertise (SEECE)), Radboud University, Wageningen University & Research, TECH.LAND, National

Expertise Centre for Grid Congestion. Battery Competence Cluster (BCC-NL), Connectr Energy Innovation, hydrogen clusters and cross-border cooperation with North Rhine-Westphalia.

Expected results:

- 60 Smart Energy Hubs realised in the East Netherlands (500 nationwide) (applies to 2030)
- ≥10 integrated energy system demonstrations
- 1 working digital twin for congestion management
- ≥200 SMEs involved in pilots and innovation projects
- ≥€250 million in public and private investments in 2025–2030 National Centre for Grid Congestion Management, Connectr

Appendix – Smart Energy

1. Ambition for 2030

The East Netherlands is the cradle for the integration of energy systems and, with that, the energy grid of the future. Having worked on the development of decentralised systems (Smart Energy Hubs) in recent years, we are now taking the next step: system integration.

In 2030, we will demonstrate how batteries, hydrogen, heat, charging infrastructure and digital systems can be intelligently combined in robust networks. This will enable us to resolve grid congestion, make energy available and affordable, and strengthen strategic autonomy and competitiveness. The East Netherlands provides solutions that can be applied locally and scaled up nationally and across Europe.

2. Challenges & transitions

The energy transition needs to be sped up:

- From grey to green (greening generation).
- From centralised to decentralised (local production and hubs).
- From scarce and expensive to available and affordable (energy affordability).
- From dependent to self-sufficient (autarkic networks).

Urgent challenges include grid congestion, rising energy costs, and geopolitical dependence on fossil fuels.

3. Impact & SDG's

Affordable and sustainable energy: accelerating the energy transition.

Industry, innovation & infrastructure: robust energy system.

Sustainable cities & communities: energy security and liveability.

Responsible consumption & production: circular energy chains.

Climate action: CO_2 reduction through smart integration.

Partnerships: ecosystem approach and public–private collaboration.

4. Sub-themes & example projects

- **Tackling grid congestio:** National Expertise Centre for Grid Congestion (Connectr, Arnhem).
- **Smart Energy Hubs:** started in the East Netherlands, now a national programme. We want to have 60 smart energy hubs in the East Netherlands by 2030.
- **Battery storage:** Twente Centre for Advanced Battery Technology (TCABT), affiliated with Fraunhofer and Münster.
- **Hydrogen:** H2EART project, green hydrogen ecosystem for the East Netherlands and Münsterland.
- **Advances GDSs:** Ecofactorij Apeldoorn (first closed distribution system with Liander).
- **FLECS initiative:** collaboration between UT, TenneT and Alliander on cyber-secure energy systems.

5. Contribution to the Netherlands & Europe

National: The East Netherlands provides scalable solutions for grid congestion, Smart Energy Hubs and system integration. This is in line with the **Multi-year Programme for Energy and Climate Infrastructure (MIEK).**

European: as a testing ground for integrated energy systems, we are strengthening energy security and affordability in Europe. Innovations from the East Netherlands are being scaled up through Interreg

projects and cross-border collaboration
Cross-border: collaboration with North Rhine-Westphalia, Fraunhofer and universities in Münster ensures knowledge exchange and joint scaling up.

6. Ecosystem

- **Knowledge institutions:** University of Twente (CEI, TCABT, EDGE Centre), Saxion, Windesheim, HAN/SEECE, RU, WUR.
- **Companies & clusters:** battery and hydrogen companies, engineering firms, SMEs in energy technology.
- **Networks:** Connectr, regional energy communities, business parks as living labs.
- **Cross-border partners:** H2EART, Interreg GEMS and STEPS.

7. Goals & indicators for 2030

- **60 Smart Energy Hubs** realised in the East Netherlands (500 nationwide).
- **≥10 integrated system demonstrations** operational.
- **Working digital twin** for congestion management.
- **Substantial CO_2 reduction** through electrification and flexibility.
- **Closed distribution systems (GDS)** applied and proven.

8. Investing in innovation

- **Government:** structural funding within nMIEK/pMIEK for decentralised infrastructure and recognition of the Network Congestion Centre.
- **Europe:** investments via ECF and Horizon Europe, with a focus on first ready-first served rather than first come-first served.
- **Region:** scaling up of Smart Energy Hubs, Battery Competence Cluster and business parks.

Cooperation via **NTS Smart Grids** and **NTS Batteries** is crucial. TEN partners are working on a joint action agenda with concrete projects and investment questions.