Energy Storage in The Netherlands

Guidelines to do business in the e-storage sector

Interreg
EUROPEAN UNION
North-West Europe
STEPS
European Regional Development Fund

E-Storage in the Netherlands

- Energy Market
- Grid Aspects
- Permitting and Standardisation
- Business Support
- Best Practices
- Top Talent
- Financial support

Energy market

Market designs, energy prices & capacity mechanisms

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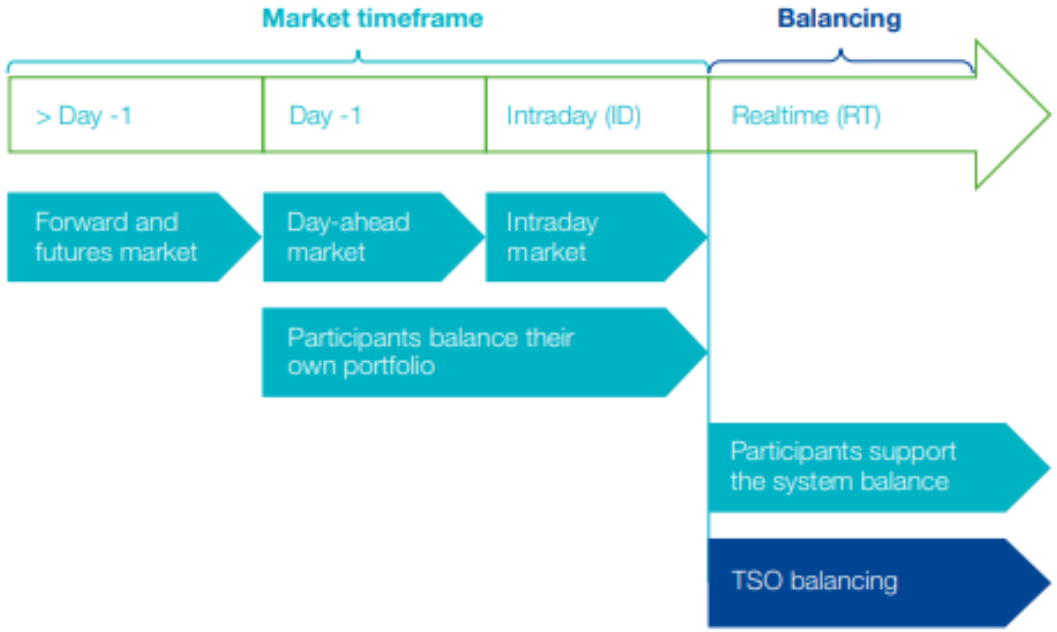
Market design

- **Forward & futures market:** In the forward market (OTC), sets of electricity are sold in advance, for a period varying in years, quarters or months. Less volatile than other markets.
- **Day-ahead market:** Participators must submit their bids (EPEX SPOT) one day in advance. Based on supply and demand, the hourly market price for the following day is calculated. This is an energy-only market: only traded electricity (MWh) is calculated and not the available electricity (MW).
- **Intraday market:** Allows continuous buying or selling of power on a power exchange (EPEX SPOT) that takes place on the same day as the power supply. Intraday has a larger price-volatility. The trade volume of this market will probably grow with the increasing number of renewable energy sources.

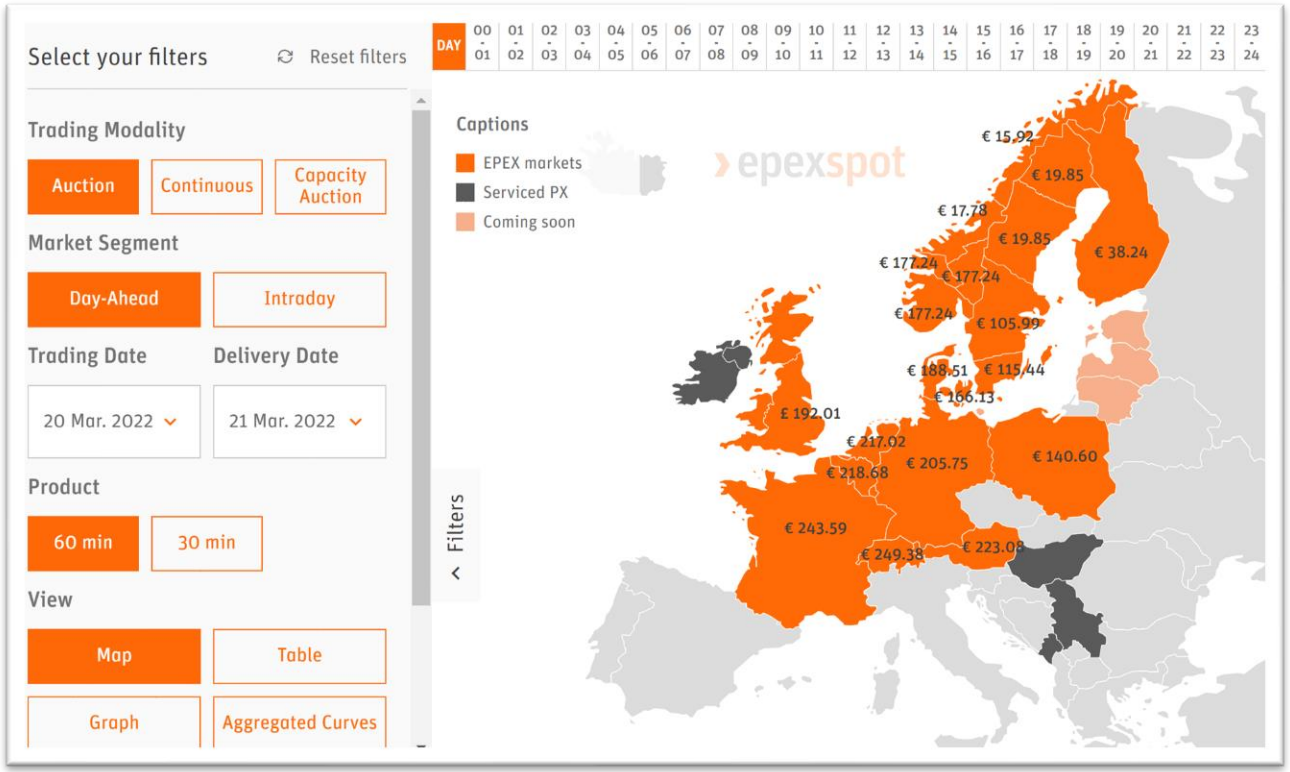


Energy market

- **APX-Group:** In 2015, the Amsterdam Power Exchange (APX) merged with the European Power Exchange (EPEX SPOT).
- **EPEX SPOT:** Today, energy is bought and sold via the online trading platform of the European Power Exchange (EPEX SPOT).
- **Participants:** Distributors, producers, traders and industrial end-users can buy and sell electricity for tomorrow or for the day itself.

Energy prices

- **Energy Prices:** Companies with large energy usage (larger than 3 x 80 Ampere) buy electricity from the EPEX SPOT. They can adjust their usage and revival accordantly. Since 1-1-2017, smaller companies can receive and deliver energy for flexible energy prices.
- **Dynamic prices:** Prices are dynamic. Changes in demand can cause producers to decide the amount of generated electricity. The EPEX is a spot market. A separate price is set for each hour of the day. Imbalance in electricity is therefore widely traded on this exchange.



Structure of the Dutch energy market

The value chain of the Dutch electricity market consists of several parties:

- **The producers of electricity**: They generate electricity.
- **TenneT TSO BV:** The operator of the national high-voltage grid for voltages of 110 kV and higher. The TSO is responsible for the balance between injection and offtake on the grid.
- **The distribution grid operators (DSO):** They manage high-voltage distribution grids (10 to 110 kV) and the distribution grid (e.g., Liander, Enexis, Stedin).
- **The energy suppliers**: They supply power to customers, both private and business.
- **The balance responsible party (BRP):** They buy the electricity for the supplier and have an obligation to supply the agreed amount per time-unit. Any party that puts electricity on or takes electricity off the grid must have a BRP.
- **The metering companies (MV-measuring responsible parties):** They measure the actual consumption in accordance with the Metering Code.
- **Consumer:** Uses electricity to power industrial processes, household appliances, etc., or to provide light and heat.

Capacity mechanism

- **Capacity Mechanism:** There is no Dutch capacity mechanism. It is currently based on market forces. Capacity mechanisms are not the norm and will only be introduced if it is demonstrated that the energy supply cannot be secured by improving the functioning of the market or by establishing a strategic reserve. However, aquifer thermal energy storage systems that can reduce both total and peak energy demand are already widely used. Strong growth is predicted, due to new energy saving obligations.

Grid Aspects

TSO's & DSO's

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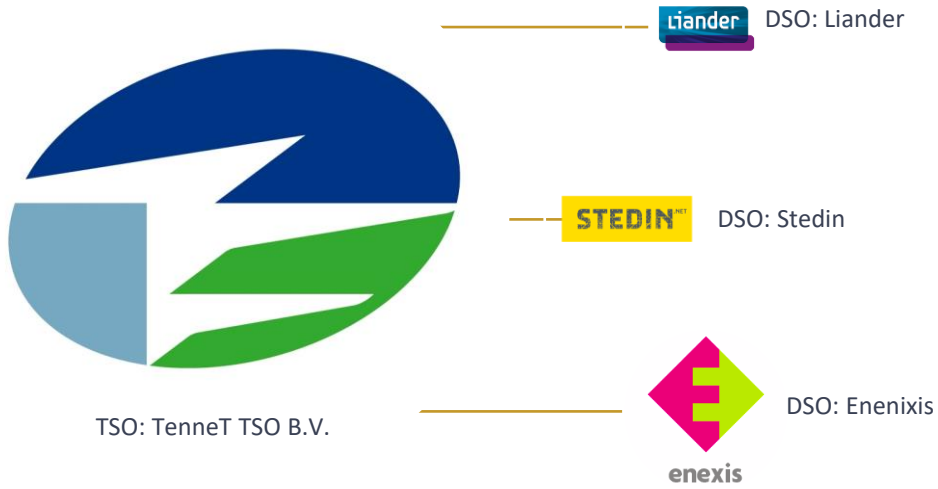
TSO & DSO Ecosystem

- Nationally-managed energy network, with a strong focus on interregional cooperation.
- **Transmission-System Operator (TSO):** TenneT TSO B.V. manages the entire national electricity grid of 110kV and higher.
- **Distribution System Operators (DSO's):** Several regional grid managers, who also act as DSOs. They work together with energy suppliers, often private parties, who buy or generate the actual power and energy. Grid managers are not allowed to buy energy on the market themselves in the Netherlands. Examples of regional grid managers are Liander and Stendin.
- The Dutch grid has a complex structure but offers opportunities for entrepreneurs who want to become active across borders.



Regional Grid Operators

Permitting and Standardisation

Rules and regulations in the e-storage sector

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European Regulations

- **EU Batteries Directive:** Energy storage solutions must comply with the European Batteries Directive, which:

1. Prohibits the placing on the market of certain batteries manufactured with mercury or cadmium.
2. Encourages the recycling of (parts of) batteries.
3. Supports the improvement of batteries and environmental performance of all actors involved in the life cycle of batteries and accumulators.

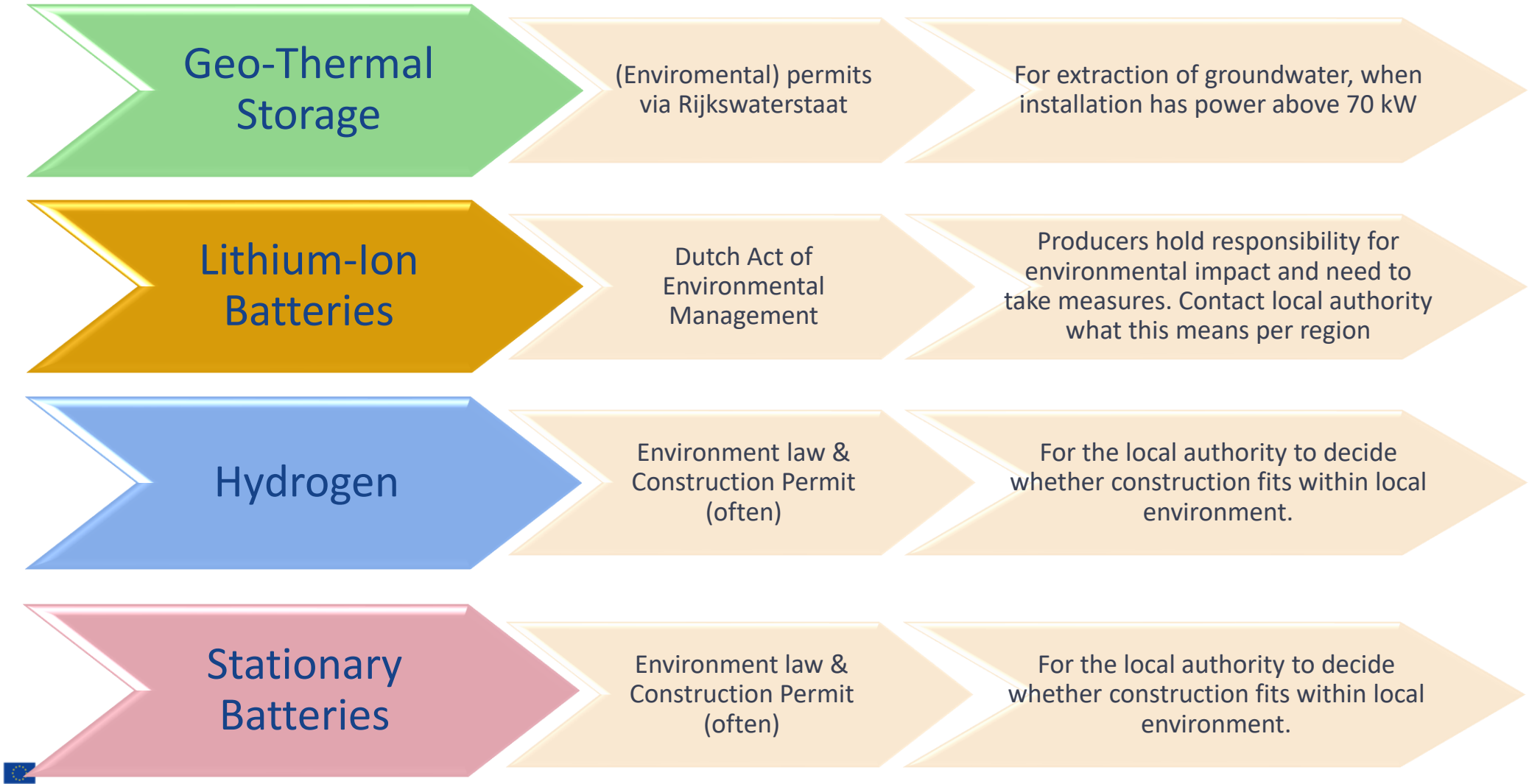
- Currently, the EU is working on a proposal for a regulation concerning batteries and waste batteries, which would replace the Batteries Directive (2006). This ‘new’ regulation would govern the entire battery lifecycle.
- It would establish mandatory requirements for sustainability (such as carbon footprint rules, minimum recycled content, performance and durability criteria), safety and labelling for the marketing and putting into service of batteries, and requirements for end-of-life management. It would also introduce due diligence obligations for economic operators sourcing raw materials.

Safety and health regulations

- **No specific laws & regulations:** In the Netherlands, energy storage is not described in Dutch laws and regulations as a specific item.
- **Standard requirements:** It has to meet standard requirements for production and consumption and some specific technologies that are part of the energy storage system must comply with standardisation.
- **Safety & health:** For some specific energy storage systems, however, there are regulations or guidelines regarding safety and health.

1. **Electrical Vehicle (EV)-batteries** -> EuroNCAP -> Series of crash, fire and safety tests to determine how safe electric vehicles and their batteries are.
2. **Hydrogen** -> PGS 35 -> Directive for the safe use of hydrogen supply installations for vehicles and equipment in terms of work safety, environmental safety and fire safety.
3. **Lithium-ion batteries and accumulators** -> PSG 37 (in progress) -> Directive for lithium-ion batteries and accumulators and Energy Storage Systems (EOS) in which large amounts of energy are stored with regard to safety and health of workers, safety of the environment and fire safety.

Environmental permits



Business Support

Policies and regulations regarding e-storage

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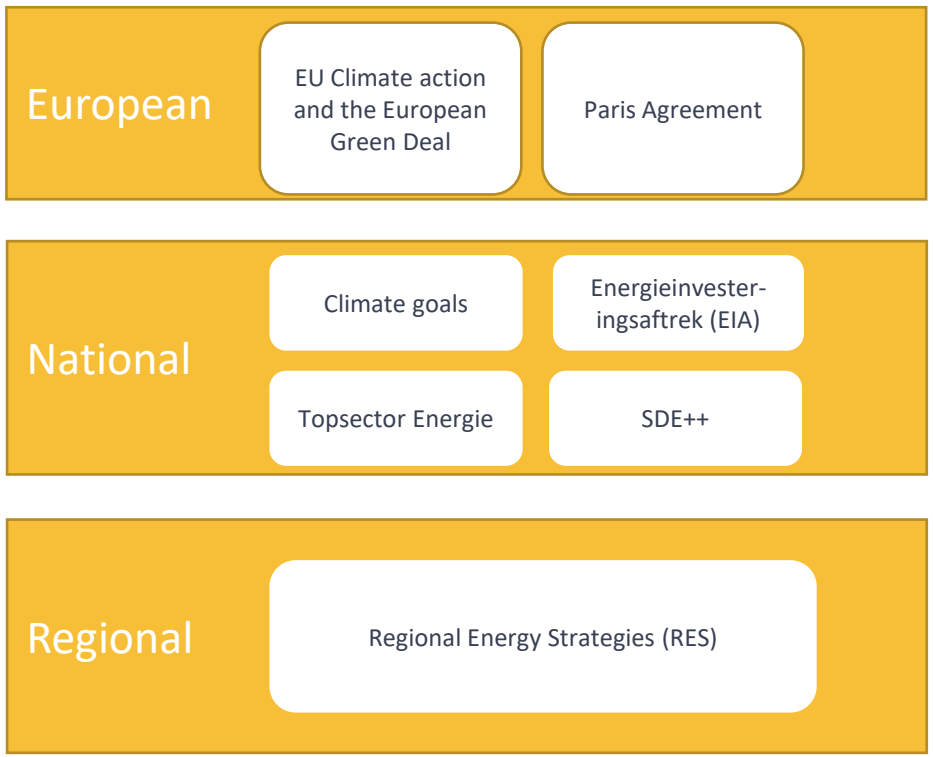
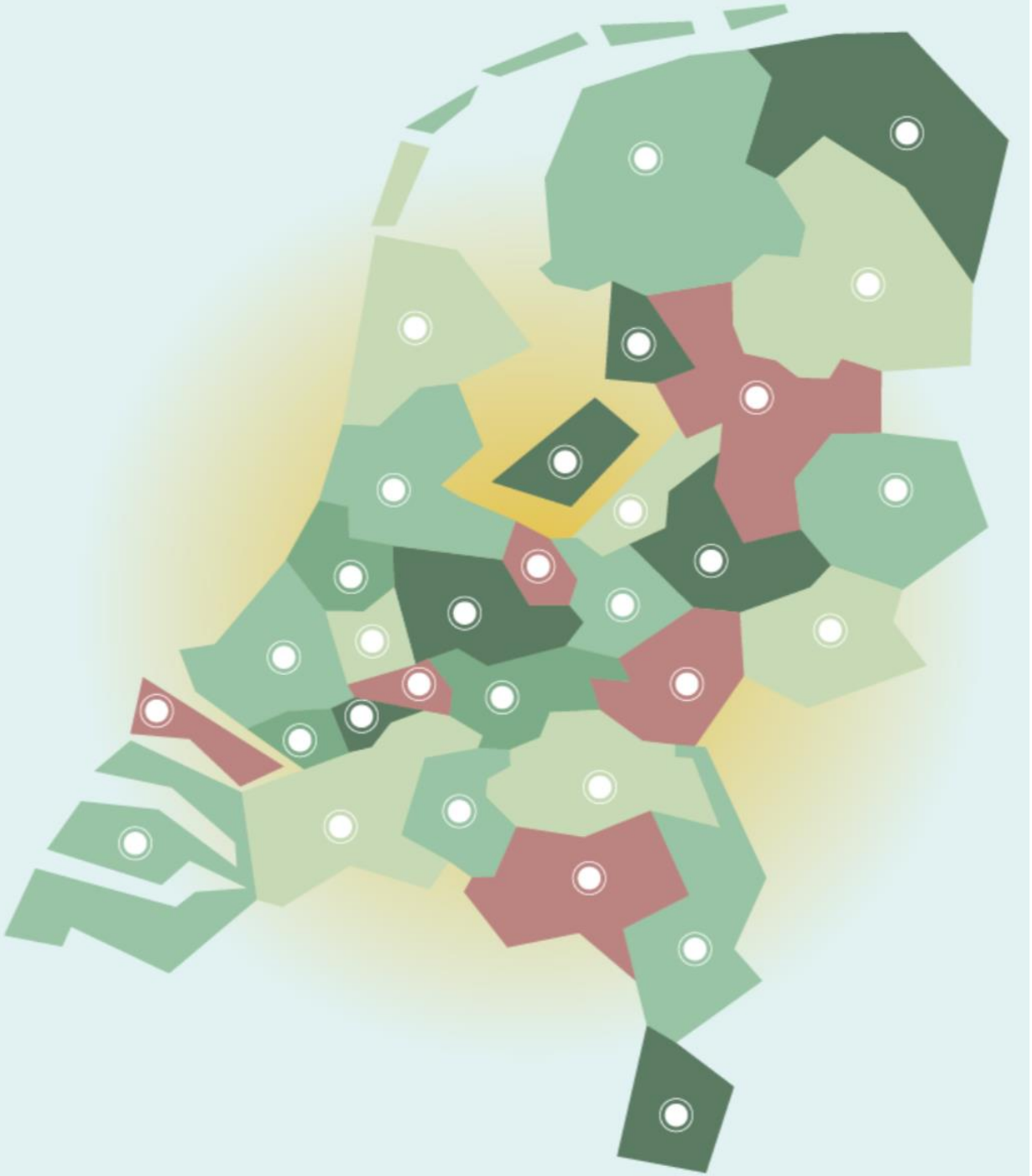
Policy instruments



As a facilitator for the energy transition, e-storage is stimulated by various policy measures (European, national & regional).

- **National Climate Goals:** interlinked with the international Climate Agreement. 50% less emission pertaining to 1995 in 2030
- **Top Sector Energy:** Programming, Knowledge dissemination and Public-Private Cooperation building to stimulate the national energy-transition
- **Regional Energy Strategies (RES):** Regional stategic action plans to support innovation in the energy sector. Various interpretations - financial support, tenders, demo-projects etc.



Regional Energy Strategies (RES)

- **National Mission:** National and local governments, businesses and civil society are jointly striving to achieve 49% CO2 reduction by 2030. They complement each other in terms of expertise, implementation capacity and knowledge.
- **Regional customisation for national purposes:** Customised regional approaches are needed to implement the national targets and agreements. This applies in particular to the spatial integration of generation, storage and infrastructure for heat and electricity.
- **RES:** Together with governments, residents, businesses, network operators and social organisations, choices are made that are supported regionally. This will enable the region to implement the agreements. The RES is also a framework for regions to decide their focus regarding the energy transition and sustainability.

Other tools to support innovation

SDE++

- For businesses in the Netherlands nationwide
- Subsidy for (innovative) low-emmission technologies.

Energy Investment Allowance (EIA)

- For businesses in the Netherlands
- Investments in e-storage systems can be deducted up up to 45% of the investment costs from the taxable profit.
- https://english.rvo.nl/subsidies-programmes/energy-investment-allowance-eia

TKI Urban Energy

- For companies, knowledge Institutions, social organizations and governments
- Consortium-building, advise, networking, linking to suitable funding.

Best Practices

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Connectr

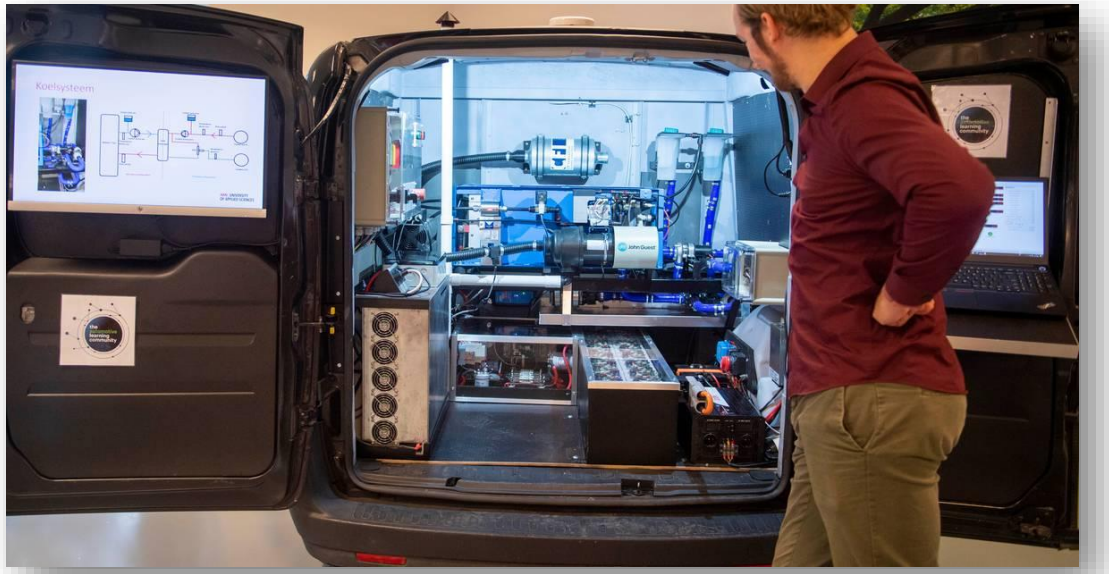
- Connectr is a company/knowledge institute that aims to contribute to the energy transition by accelerating and scaling up innovations.
- They do this by supporting companies with an innovation programme and by bringing entrepreneurs and knowledge together to jointly develop innovations (in an innovation lab).
- Focus on three key technologies that are already developing strongly in the east of the Netherlands: electrical energy engineering, electrochemical energy storage and sustainable drive systems.

Smart energy hub - Hessenpoort

- **Smart energy Hub:** Smart decentralised energy system that produces, stores and uses sustainable energy locally.
- **Hessenpoort Zwolle:** A business park in Zwolle where companies generate green energy, for example by using solar panels. The surplus energy they generate cannot be supplied to the grid because it is saturated.
- **Hydrogen:** The surplus energy is used to produce hydrogen, which can be used for the company's own energy needs or as fuel for heavy transport, such as trucks.

H2Hub Twente

- H2Hub is a place where the public sector, entrepreneurs and education collaborate on research, development and application of hydrogen technology
- Focus on three areas: production, storage and application of hydrogen
- Lab and test facilities are available to test green hydrogen (including the required permits), entrepreneurs and knowledge institutions can exchange ideas with each other, and the location has a hydrogen fuelling station.



Battery Safety Lab

- In the Battery Safety Lab, fire safety tests of batteries and battery storage systems are carried out to enhance the safety of battery technology.
- It is a collaboration between the Twente Safety Campus and the Norwegian company Det Norske Veritas (DNV).
- The Twente Safety Campus brings in its knowledge about fire safety and DNV its expertise in testing and certifying energy related issues.

Brainport Industries Campus (BIC) – Battery Competence Center

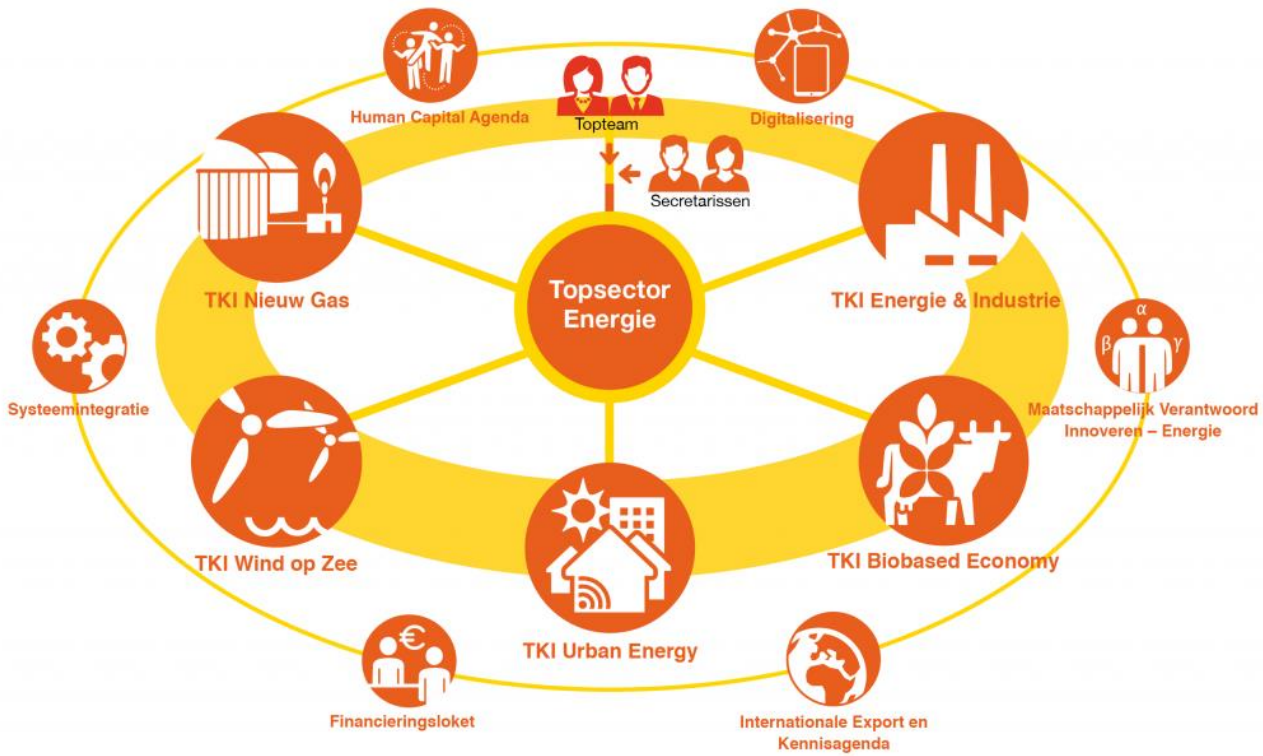
- Brainport Industries Campus is a location where several companies (such as ASML, VDL & Siemens) in the high-tech manufacturing industry, as well as educational and knowledge institutions are located.
- The building is constructed in a modular way, electricity, water and other necessities are purchased based on a 'pay-per-use' principle, and the building is fully supplied with renewable energy generated in-house.
- BIC also has a Battery Competence Center that focuses on the development of battery systems, new battery materials and production processes and recycling and second use.

Nationaal Actieplan Batterijen

- About 80 experts and stakeholders are currently working on a national battery strategy.
- The aim of this plan is to increase the competitive position of the Netherlands in the battery value chain.
- Topics include new cells and materials, grid support, circularity and safety.
- By cooperating not only at a national, but also at a European level, a targeted approach can be made to improve battery technology and related topics.

Topsector Energie

- Top Sector Energy tries to accelerate the energy transition by stimulating innovation, solving societal challenges, increasing human capital and investing in scientific research.
- It is a platform that helps entrepreneurs to find financing opportunities and the right partner. It tries to stimulate cooperation between entrepreneurs, knowledge institutions and governments.
- Top Sector Energy uses a broad approach and concentrates on several domains and themes that contribute to accelerating the energy transition, such as industry, agriculture, housing, mobility and a circular economy.



Top Talent

Knowledge Institutions, Students & Collaborations

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Profile of the Netherlands

- **Universities:** In 2021, 340 thousand students were registered in a bachelor's or master's programme. The Netherlands have 13 universities, of which 3 have a technological focus (Delft, Eindhoven, Twente).
- **Universities of Applied Sciences:** There are 36 universities of applied sciences with about 492 thousand students.
- **ROC's (practical education):** There are about 50 ROCs (practically oriented education) with about 500 thousand students.
- **Energy transition:** More and more knowledge institutions offer studies that specifically focus on the energy transition or a related theme

Knowledge institutions and students in East Netherlands

- A total of six universities including three Universities of Applied Sciences educate more than 120,000 multi-skilled talent for future challenges in the Energy Transition.
- Due to its advanced technology position in Europe, the east of the Netherlands attracts many international PhD students and researchers. All these universities contribute to the energy transition ecosystem by contributing to new developments and educating students to become top talent.

88,000
University of Applied Sciences Students

45,000
Research University Students

106,000
Students in Vocational Education

Financial support

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European battery storage funding

Battery storage, among other important key technologies and innovations, is one of the funding priorities within the European Union.

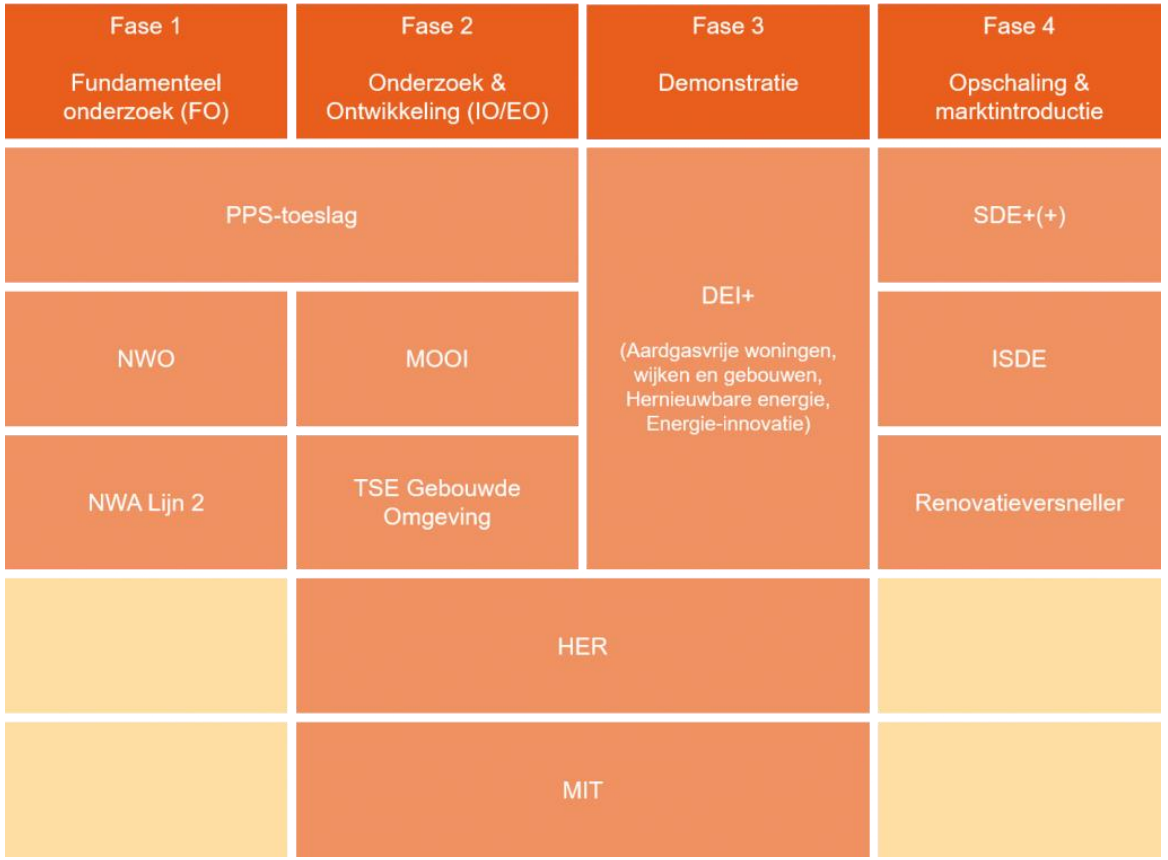
European funds are an important means to connect our energy transition ecosystem with other important hotspots in the EU, for example through cross-border cooperation and knowledge transfer.

Examples of European subsidies that SMEs and knowledge institutions in NWE are eligible for are:

- **M-ERA.NET:** Aims to strengthen the contribution of R&D in materials to energy-related applications.
- **Horizon Europe:** EU's key funding programme for research and innovation. It tackles climate change, helps to achieve the Sustainable Development Goals and boosts the EU's competitiveness and growth.

Dutch funding programs

- **Phase 1 & 2:** These subsidy opportunities focus mainly on public-private partnerships in consortia. For academic research, the instruments of the **NWO** and **NWA** are very useful. Examples are: **Perspectiefronde**, **ORC** & **Sleuteltechnologieën (KIC).**
- **Phase 2 & 3:** The **DEI+** offers opportunities for demonstration projects. The **MIT** offers opportunities to SMEs that want to innovate. The **HER** can be used especially for batteries in combination with sustainable energy production.
- **Phase 4: SDE++** offers opportunities for battery innovation, but mainly as part of - and therefore simultaneously realised with - a production installation for renewable energy.



Other Dutch funding programs

Other Dutch programs that can be used for energy storage are listed below, such as subsidies, loans and tax regulations. These include programs intended for innovation in general, not specifically for innovative energy storage.

- **Energie-investeringsaftrek (EIA):** For various energy-efficient and environmentally friendly techniques with tax benefits.
- **Investeringssubsidie duurzame energie (ISDE):** Subsidy for heat pumps and solar water heaters. Both for business users and private individuals.
- **Generation-E:** Provides participations or loans up to a maximum of € 275,000 for innovative cleantech start-ups and scale-ups.
- **Innovatiekrediet:** This loan is intended for the development of promising and challenging innovations with good market prospects.
- **WBSO:** The WBSO is a fiscal regulation through which costs for Research & Development (R&D) can be reduced. This results in a tax advantage.

SDE ++ – Example

Description

The Sustainable Energy Product Scheme (SDE++) is aimed at Dutch companies and (non-) profit institutions that (will) produce renewable energy or apply CO2 emission reducing techniques. The SDE++ is an extension of the former Sustainable Energy Production Incentives scheme (SDE+). This new scheme stimulates not only sustainable energy production, but also CO2 reduction.

Who's eligible?

The SDE ++ is intended for companies and (non-) profit institutions in sectors such as industry, mobility, electricity, agriculture and the built environment.

Applications

The SDE ++ works with certain application periods and certain budget.

During the opening rounds, you can apply for the SDE++ at mijn.rvo.nl. You will receive a subsidy decision within 13 weeks of submitting your application. If it is positive, it will state how much subsidy you will receive.

After the decision

Have you received a positive decision on your application for the SDE++? Then you can start implementing your project and will receive a monthly subsidy advance.

EIA Part I – Example

Description

Companies that invest in energy-saving installations may deduct 45% of the invested sum from their taxable profits. This deduction is on top of the usual depreciation. On average, the EIA gives an 11% tax advantage.

Conditions?

- The company is liable for income tax or corporation tax and conducts a business for own account in the Netherlands.
- The company invests in equipment that complies with the Energy List requirements;
- The minimum amount of energy-saving investment is € 2,500 per investment. The maximum investment amount for which a deduction is granted is € 124 million per company per calendar year;
- It concerns a new fixed asset;

The Energy List

The Energy List shows the assets that qualify for the EIA. The list is updated annually and contains about 160 energy efficient investments. Examples: heat pumps, cogeneration plants, energy-efficient lighting systems, and effective insulation systems.

EIA Part I – Example

Applications
The application should be filed electronically at Netherlands Enterprise Agency (RVO.nl):

www.rvo.nl/digitaal-indienen/eloket

There are different terms for purchase costs and production costs.

- RVO.nl must have received the application within 3 months after reaching a purchase agreement (in writing or verbally).
- RVO.nl must have received the application within 3 months from the end of the calendar quarter in which the production costs incurred.

RVO.nl assesses the application and issues a declaration when the investment is eligible for the EIA.

Oost NL

Development agency: Oost NL is a development agency that uses public funds to strengthen the economy of the eastern part of the Netherlands.

Several instruments: It possesses many instruments, such as subsidies and loans, which can be used, for example, by SMEs located in the eastern part of the Netherlands that are engaged in innovative energy storage.

Examples:

- **European funding:** Funding that can be used to accelerate research, expand the knowledge base or cooperate with research institutions. Examples: INTERREG, EFRO, Horizon Europe.
- **Possibilities for loans:** Oost NL has several investment possibilities for accelerating and strengthening the innovation power of companies in the East of the Netherlands that are facing important social challenges such as the energy transition. Examples: Perspectieffonds Gelderland (PFG), Innovatiefonds Overijssel, ION+.
- **Other financing possibilities:** There are other instruments that focus on strengthening companies themselves so that they can grow faster. Examples: the Startversneller, the Investor Readiness Programme and the Market Readiness Programme.

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