

Flanders

Smart Energy Region



FLANDERS
INNOVATION &
ENTREPRENEURSHIP

flux50

Clusters for Growth

Seize the innovation in 2021

10 May 2017 was not only the official start of Flux50. It was also the day on which the first call for feasibility studies was launched. A dozen consortia planted seeds for their energetic collaborations. Three years later, we are proud to see how a dozen projects flourish and show their first results.

Innovating is not easy. Germinating, growing, caring and blooming the projects requires patience, inspiration and time. Moreover, teaming up doesn't always come naturally and it requires consultation and empathy. It demands faith, enthusiasm and energy. Yet the results show that collaboration pays off. Many of the feasibility studies led to follow-up projects, going from further research (ICONS) on developments (testing ground) to first realizations. For other seeds, the soil was not yet fertile enough to germinate.



Seize the innovation, also in 2021

Just like in 2020, we want to see the first harvest of our activities in 2021. After some first launches in 2020, this year we will see several commercial concepts and start-ups sprout.

2020, a challenging COVID-19 year

2020 was announced to be a promising year for a network organization. Twelve months later, a virus appears to have severely thwarted these plans. Since then, we have been living in a digital cocoon where 'coming together' has taken on a different dimension and 'brainstorming' has turned out to be anything but obvious. Nevertheless, a number of consortia managed to continue to grow during this difficult period. Many results can therefore be found in this leaflet.

2021 also presents itself as a challenging year. Despite this, we continue to work diligently on our energetic ecosystem and we are pleased that you continue to place your confidence in us. Even in 2021, the challenge of the energy transition is more topical than ever with Flemish resilience plans, Belgian Bob De Bouwers and European Green Deals. With that growth, small and medium-sized enterprises get a chance and our Flemish assets and local economy get attention. Cooperation becomes a powerful nutrient for the revival of resilient Flemish Energy Innovation.

Triple gardening

Without cooperation, there would have been no harvest in prospect and the field would still be fallow. Gardening is not done alone, but with others. We do this in collaboration with the Flemish government that invested a whopping € 15,684,910 in 2020 in energy innovation. Flux50 also played a role at European level. For example, in the coming years, Interreg and EFRO invested in a Smart Multi Energy Lab with battery storage. These systems should allow us to further expand our garden. Through projects such as ConnectSME, CrossRoads 2 Sustainable Energy and STEPS, we also encourage cooperation across national borders.

Furthermore, the research community also cooperates. They plant new seeds and form fertile soil for innovation. New ideas develop through cross-fertilization between different centres and new strategic testing ground centres are launched. Besides, the Flemish industry is also drawing the map of innovation. They believe in further exploring the innovations, preparing it for the market and exporting it. Three indispensable parties that are needed in the transition. Although it is not that easy to get everyone on the same page, yet Flux50 is proud, grateful and excited to catalyse the joint energy mission.

Align all 4

Aligning all parties is important. After three years, it is time to reassess which stepping stones will be most likely to be successful. That's why in 2021, we are re-launching the call to choose a line together to avoid any sprawl. We want to close 2021 with one shared vision to speed up the progress. If we want to offer our harvest on the market from 2021, then the wishes and expectations of a fourth party will become important: the end-user and citizen. The triple helix will then become a quadruple helix.

Hopefully we can plough fields of the energy transition in Flanders together. Let's be confident that in 2021, we will be able to put on our boots again to work together on Flemish innovation and that sustainable energy ideas further get fertile breeding ground, oxygen, and water for a thriving green energy economy.



Frederik Loeckx
Managing Director Flux50

De Zaat te Temse, het Cordeel Business Park 4.0

Consortium 'Usage Driven Power Station': Imtech, Eoluz, i.leco and Smart Software Development
Consortium 'Hydro Energy Power Station': Cordeel, Imtech, Ecosource, Eoluz, i.leco and Turbulent
Consortium 'Optibids': VUB, Blueways International, Powerdale, Imtech, Scholt Energy Control and VDL Bus Roeselare

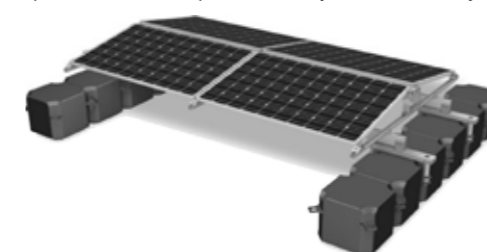
Budget: € 16,554,411
Grant: € 6,862,608

The business premises of construction company Cordeel in De Zaat Temse is an integrated ecosystem built on three pillars.

The first pillar is the development project 'Usage Driven Power Station' (budget € 3,152,002; grant € 1,339,178) where the needs of the users from different buildings and the profiles of energy production are identified and coordinated. By 'deep learning', data of building occupancy, production processes, the need for energy and sustainable generation systems are logged and processed. Energy consumption is predicted, visualized and optimally tuned.

The second pillar is the development project 'Hydro Energy Power Station' (budget € 8,899,005; grant € 2,521,720) where innovative energy production processes and storage installations are designed, implemented and tested for further application on other sites.

- A tidal power station is placed at the beginning of the Schelde dock. An innovative 'robot vacuum cleaner' will soak up obstructions due to sand and sludge and return it to the Schelde. A large turbine with additional production of 20% compared to two small turbines (from 500 to 600 MWh) will be designed. This design will be implemented and thoroughly tested in real conditions.
- The 'energy hill' provides a water basin at height to which water will be inflated with the surplus of renewable energy and supply electricity via a turbine in case of a shortage of renewable energy.
- Awaiting the definitive design and installation, simulations are carried out on a small-scale turbine to demonstrate the innovative aspect. A variable version of the turbine delivers maximum flexibility which is important for the return and the economic valorization.
- For interoperability, different used building management systems were converted into a building management platform. To improve the system stability and the quality



of the data, an intermediate



communication layer was installed for further data transport to the cloud.

- The 'floating solar panels' on the dock have many applications worldwide. Innovative solutions for the floats, which are usually large in volume, and solutions for the anchorages, with which many incidents happen, will be demonstrated on the Zaat site.

The third pillar is the electro-mobility where the extended vehicle fleet, the charging infrastructure and the renewable energy applications will serve as one of the three pilot sites of the ICON project 'Optibids' (budget € 4,503,404; grant € 3,000,608).

Current results exceed all the objectives:

- The self-consumption rate now stands at 68%. The tidal power plant will probably have a negative impact, but the energy hill can largely compensate for this so that the objective of 65% is most certainly achievable.
- The reduction of the ecological footprint (predetermined 10%) already stands at 23.5% due to the integration of external Renewable Energy Sources and storage opportunities.
- Energy costs have been greatly reduced by 14.6% compared to the intended 8%.

Results:

Moreover, the EU H2020 Creators project was initiated to roll out the concept with demonstrations in 10 different sites spread over 7 countries and involving 500 SMEs. The focus is on standardization, forms of financing, setting up energy communities and making the social context of the applications economically feasible. As one of the final objectives, De Zaat in Temse wants to achieve the 'CO₂ certification'.

XMPL / Snowball living lab

Consortium: Smappee, Amplifino and Yuso

Budget: € 2,897,729
Grant: € 1,291,492

Today, buildings are responsible for approximately 40% of energy consumption and 36% of CO₂ emissions in the European Union.



The consortium of the testing ground XMPL at Snowball, a collaboration between software developer Amplifino, Home Energy Management System developer Smappee and energy supplier Yuso assisted by UGent and Howest and with the support of the Spearhead Cluster Flux50 and VLAIO (Agency Flanders Innovation & Entrepreneurship), wants to structurally reduce this figure.

The consortium is building a brand new and future-oriented energy management system based on artificial intelligence on Snowball's testing ground. On this site, all kinds of new energy techniques are installed. This is how the Snowball site is cooled and heated with a 300,000 litre ice buffer, there is a solar park of 180 kWp, a battery of 2.5 MWh to store the surplus of solar energy and an AC- and DC charging square for 50 electric vehicles. Furthermore, Snowball is equipped with a series of IoT sensors, from which 12 million data points are collected daily. These datasets are used to build forecasting models and algorithms.



Based on this, the entire site is checked and controlled without loss of comfort, resulting in significant savings in energy costs. The new energy management system goes even further: it is also a source of revenue by using its flexibility on the energy market. An additional stimulus for the end-user, thus implementing the state-of-the-art energy management system becomes a matter of course.

Today, the consortium is working hard to validate and optimize the models. A duplicable product must be ready by September 2021. As a brand new Cleantech hub, Snowball wants to facilitate and promote sustainable entrepreneurship. "Lead by example" is Snowball's adagium. The XMPL testing ground fits perfectly in this picture.



RE/SOURCED at Transfo in Zwevegem



Consortium: Leiedal, municipality Zwevegem, the Province of West-Flanders, University of Ghent, Flux50 and REScoop.eu

Budget: € 4,998,435
Grant: € 3,998,044

RE/SOURCED stands for Renewable Energy Solutions for Urban communities based on Circular Economy policies and DC backbones. The project covers three current themes:

1. renewable energy,
2. circular economy and
3. the conversion of heritage.

RE/SOURCED envisages the realization of a medium-sized and self-sufficient energy system at Transfo, a multifunctional heritage site of 10 hectares in Zwevegem (West-Flanders). The Intercommunal Leiedal leads the project which is supported by Urban Innovation Actions, an initiative of the European Union to face urban challenges with new and unproven solutions.

RE/SOURCED is realized at Transfo, a former power station from 1912. The 10-hectare site has been protected as a monument for 20 years and is exceptional due to its scale, the state of the industrial heritage and the opportunities offered by the site. The three structural partners – Zwevegem, the Province West-Flanders and Leiedal – work together to give the site its earned repurposing: a reconversion of industrial heritage with a regional, national and even international look. Meanwhile, Transfo has developed as a multifunctional site including (social) homes, offices, a microbrewery, leisure and sports facilities and event spaces. Transfo is the perfect setting for RE/SOURCED due to the mix of energy profiles and the historical link with electricity production.

The goal of RE/SOURCED is the realization of a Citizen Energy Community (CEC) at Transfo. The basis is a medium-sized and self-sufficient energy system.

- The backbone of the system is a local power grid on direct current that saves both energy and material (more capacity with the same amount of metals/materials). The direct current network connects a set of renewable sources (solar panels and medium-sized wind turbine) and energy storage (batteries, hydroelectric storage and vehicle-to-grid). The optimally integrated network is designed and developed with minimum losses. The power, capacity and location of the cables are identified and the renewable energy sources and storage systems are selected and dimensioned.
- An energy community of citizens, in which all users on Transfo will participate, will manage the shared infrastructure and cooperation. The establishment of a legal entity that fits into the definition of Europe's targeted energy communities is supervised and the results will be spread to the network of energy communities and EU policymakers.
- Models are developed in which circularity is also applied to the renewable energy sector. This sector is, after all, very material-intensive.

RE/SOURCED also realizes an educational course for citizens, schools and local authorities, along with a training package for professionals.



Realization of the Sustainable Vlaamse Staak in Opwijk

A Rolecs' demonstration site

This pilot project, supported by the Flemish Region, in collaboration with POM Vlaams-Brabant, the municipality of Opwijk, Haviland, Th!nk E, Powerdale and Wattson aims to realize a sustainable energy concept for the SME business parks "De Vlaamse Staak". Due to the high cost to extend the natural gas network to the business park, alternative sustainable energy concepts were sought.



The feasibility of various alternatives was studied by Wattson, Th!nk E, Boydens Engineering and Fieldfisher. A geothermal-based grid was not eligible due to the excessive investment cost. Heating the buildings based on heat pumps and solar panels was the alternative put forward as a sustainable solution. Awaiting the possible establishment of a Renewable Energy Community, an ESCO-light approach will be provided that optimizes the energy concept for each SME. It is important that Wattson gives advice on the realization of the heat pumps/solar panels concept starting from the design phase of the building and that the sizing of the concept elements can be done based on the specific energy needs of each SME.

Wattson finances and manages the heat pumps through monitoring, control of energy performance and maintenance. The monitoring system is developed along with Powerdale and Th!nk E and aims to optimize the energy consumption of every SME. By monitoring, Wattson gets a much better view of SMEs effective energy profiles, which in itself is an important fact to be able to transform De Vlaamse Staak into a Renewable Energy Community (REC).

If this potential exists, combined with more clarity on the fare structures and modalities, the business case will be reviewed to finally decide or not to decide for a "REC De Vlaamse Staak".

At this very moment, in economically uncertain Corona times, 5 SMEs have started the construction of their business



premises on De Vlaamse Staak. In the meantime, an agreement could be concluded with these SMEs for an energy concept based on heat pumps and solar panels. The first heat pumps are expected in early 2021



Thor Park



EnergyVille: company and technology park

Thor Park is a business and technology park specializing in smart energy and smart manufacturing industry at the old coal mine site in Genk. Thanks to SALK (Strategisch Actie Plan Limburg Kwadraat), EnergyVille and T2-Campus have been given a place here, alongside IncubaThor and Thor Central.



Thor Park was recently recognized as the first minimal regulatory sandbox in Flanders to exchange electricity between buildings without a supplier's license. EnergyVille, a collaboration between research partners VITO, KU Leuven, IMEC and University of Hasselt, develops technology and knowledge to support public and private stakeholders in the transition to an energy-efficient, carbon-free and sustainable built environment. Sustainable energy and intelligent energy systems are key here.



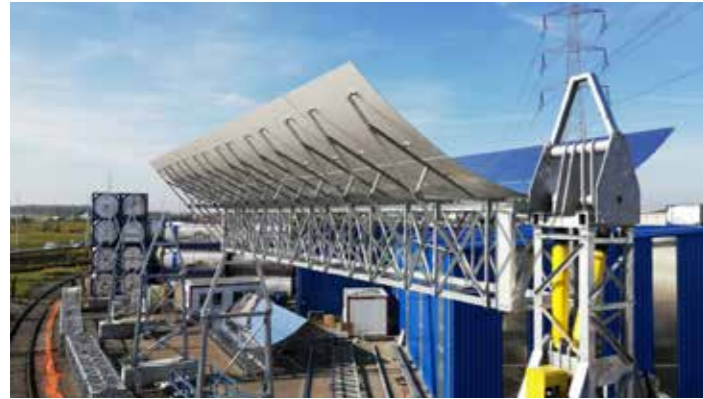
At EnergyVille on Thor Park, in addition to many (inter)national and European initiatives, various research projects are carried out with the support of Flux50. For each of these projects, intensive cooperation is carried out between the knowledge institutions and companies.

The focus is on different disciplines:

- Direct current (DC): projects with KU Leuven, VITO, Imtech, ABB, Th!nk E, Flanders Make, BASF, Blueways, Bekaert
- Solar energy: projects with IMEC, KU Leuven, UHasselt, UGent, VITO, Azteq, Borealis, Soltech, Laborelec
- Digital substation: projects with KU Leuven, VITO, BASF, Tractebel, ABB, Siemens
- Privacy and servitization of energy data: projects with KU Leuven, Smappee, Centrica, AE, NXP, Calculus, WTCB, VITO, June, BaoLiving
- Energy communities and microgrids: projects with VITO, KU Leuven, IMEC, Ghent University, VUB, Th!nk E, ABB, Wattson, ThermoVault, KBC, Energent, 3E, Ducoop, Farys Solar, Ingenium, Electrabel, Quares, Laborelec, Openmotics, Metha Advocaten, Blixt, Magenta Tree, 70GigaWatt, Fieldfisher, Powerdale, Antea, Aspiravi, C-Valley, Fluvius
- Renovation: projects with VITO, IMEC, UGent, AGC Mirodan, Avineon, June Energy, Zero Emission Solutions
- Sustainable, smart buildings and cities: projects with VVSG, Flux50, Agoria Smart Cities, Ahrend, EcoSource, Junovation, Camp C, Th!nk E, VITO
- Energy flexibility in the industry: project with VITO, KU Leuven, Ghent University



The Concentrated Solar Power installation (CSP)



Feasibility study
Consortium: Azteq, Tractebel and Port of Antwerp
Budget: € 112,491
Grant: € 49,996

ICON Project
Consortium: IMEC, EnergyVille (KU Leuven and VITO), Borealis, Soltech and Laborelec
Budget: € 1,656,408
Grant: € 1,219,506

Concentrated solar energy that produces industrial process heat up to 400 °C, seems to make little sense at first sight in Flanders. Azteq made this assumption in cooperation with Tractebel and Port of Antwerp, refuted in a feasibility study facilitated by Flux50. There are sufficient full load hours in Flanders (950 hours) to potentially provide this technology.

Azteq's solar thermal installation bundles the sunlight in the focal point of parabolic mirrors where oil is heated. Through a heat exchanger, this heat is transferred to industrial processes or temporarily stored in a buffer vessel. To absorb the sunlight as much as possible, the mirrors follow the sun during the day.

Thanks to the feasibility study supported by Flux50, three pilot installations were mapped out and financially supported by the Flemish government. Two installations are now operational. In Kallo at ADPO, the installation ensures the storage of heated

liquids at temperatures above 140 °C. In Ostend, it provides heat of 180°C for chemical company Proviron. Later, the test setup in Genk at EnergyVille will follow for further research about heat networks and ORC installations.

Technology is constantly evolving. Together with IMEC (EnergyVille), further thought was given to take full advantage of the used surface. Due to the combination of these solar thermal mirrors with solar cells, not only can heat be produced but electricity can be generated as well. This is currently being investigated by both parties in cooperation with Borealis, Soltech, Laborelec and VITO (EnergyVille) in an interdisciplinary cooperative research project supported by Flux50 and Catalisti (the cluster organization for the chemical sector in Flanders). This research will provide expertise to the companies which they can also apply in other domains such as glass-free or building-integrated solar panels.



Green Energy Park in Zellik

Project MAMÛET
Consortium: VUB, SDM Projects, PowerPulse, Priva Building Intelligence and ABB
Budget: € 4,985,984
Grant: € 3,470,471

Project Optibids
Consortium: VUB, Blueways International, Powerdale, Imtech, Scholt Energy Control and VDL Bus Roeselare
Budget: € 4,503,404
Grant: € 3,000,608

Green Energy Park is located in the research park in Zellik. It hosts a living lab, under construction, for Energy and Mobility, Smart Regions, The hospital of the future and Bio-tech. The business park is a local energy system including an electric microgrid and a heat grid that is powered from a data centre.

As part of Energy and Mobility, the EVERGi team of the VUB-MOBI partner in two interdisciplinary and cooperative research projects that resulted from the intense feasibility study phase.

The first ICON (interdisciplinary cooperative research) project MAMÛET (Machine learning for real-time Advanced Multi Energy Trading) investigates the intelligent management of the local energy system (LES) with energy vectors such as electricity, thermie, HVAC, mobility by a renewable energy community (REC).

The MAMÛET research themes are self-learning algorithms for status estimations and predictions, optimal management and steering strategies, business and operating models. One of the first achievements is the 'Smart Digital Table Top'. This is an interactive simulator that allows new energy models and algorithms to be tested and visualized in an interactive scale model of the Research Park. The partners are SDM, PowerPulse, Priva Building Intelligence, ABB and VUB.

The second ICON project Optibids (Optimized bi-directional & smart vehicle charging in LES) aims to integrate electromobility into local energy systems. Smart and bi-directional loading strategies are designed, as well as direct current (DC) charging systems in and outside the vehicle in combination with the local DC storage system.

The first results of the hardware concepts are tested and the V2G approach is planned. Furthermore, the socio-economic aspects are taken into account by analysing the answers to the questions of the 'smart charging EV-drivers'. The smart charging systems will be integrated into three pilot sites including Green Energy Park so that the valorisation and creation of services may happen in real circumstances.

The partners are Blueways International, Powerdale, Imtech, Scholt Energy Control, VDL Roeselare and VUB. Green Energy Park is also a partner in the ICON project ROLECS where the rollout of energy communities is being studied.

The first large-scale living lab is in full development. The Smart Village Lab where "the smart home" in the "smart residential area" is central, makes it possible to develop and test intelligent systems for the smart and sustainable management of various flexible homes.

In the Smart Home Lab, communication between the digital meter and the various smart home systems is put into practice. Electric and thermal energy can also be exchanged between different smart homes or with a smart energy grid with collective energy systems such as neighbourhood batteries and collective charging infrastructure for electric vehicles.

The Interreg RegEnergy project ensures the installation of the electrical storage infrastructure and the European Regional Development Fund (EFRD) project Smart Multi Energy Lab (SMEL) ensures the expansion of the electricity distribution network and the electrical installations of residences (the indoor installations, the meters, a control centre, the installation components of homes such as heat pumps, sanitary hot water vessel, thermal buffer, home batteries, ICT part, security, etc.) The Green Energy Park is also part of the EU Interreg project ConnectSME where the unique living lab offers development and testing opportunities to companies, knowledge institutions, governments and end-users.



Smart Business Area of the Future

Consortium: Engie Electrabel, Quares, Intervest and Continental

Budget: € 5,044,033
Grant: € 1,979,841

A feasibility study in 2018 answered two key questions positively:

- Can the consortium of 4 partners set up a Renewable Energy Community (REC) in the business park Mechelen Noord and guarantee a more stable distribution network?
- Can the storage capacity of electric vehicles in combination with local energy storage be used as a reliable peak power plant?

Early December 2019, the living lab was launched to show that sharing and valorising green energy can increase the penetration of renewable energy sources and electrical storage at a lower social cost and that the network congestion on the distribution network can be avoided. The business park Mechelen Noord (8.5 ha) has 20 medium voltage cabs, a peak power of 5.2 MW, a consumption of 23 GWh on an annual basis and 3200 parking spaces.

The consortium is aware of the need for integrated commitment and approval by the 200 users who will participate in the energy community. A specific communication plan – taking into account the COVID-19 measures - was



designed to help network users to become 'active customers' within the energy community. In the first phase, an agreement about sharing the necessary data is an important aspect and secondly the approval of the future legal entity

The installation of the hardware components (digital meters and sensors, PV installations, EV charging points, fixed and mobile storage) is currently being finalized and data capture and processing have just started.

At a later stage, the energy management system and the offset system will be tested and implemented, as well as the business model.



Mobile Green Energy system (MGES)



Consortium: S2ENSO, Creamo, ACT Research, Karybel, Cast4all and KBC (without aid)

Budget: € 293,120
Grant: € 146,561

A green energy system could offer an alternative -and more sustainable- solution to the use of noisy and smelly diesel groups for events. Equally it could support municipalities in their pursuit of the electrification of the urban fleet and the storage of renewable energy. Cities and municipalities need support and solutions in the energy transition. A mobile battery system can be used by the city for different applications such as temporary charging stations, energy supply on festivals, energy storage of solar energy surplus and the supply of network support services.

The consortium has joined forces to build up the necessary knowledge and insights with a feasibility study. Technological exploration gives both the design conditions on electric and mechanical plans. A market survey shows who the customers are, how these customers can be reached, what their needs and requirements are and what business model and which business case can be identified. A first system design of the MGES shows that it is technically possible to meet the requirements as identified in market exploration. Also important is the research of the regulatory framework: what standards and rules should be complied? Are there no regulatory restrictions that makes it impossible to release into the market?

Discussions with the cities of Ghent and Antwerp clarify that no positive business case is possible due to the small number of times the MGES would be used. The priority is given to the use of the distribution network.

Based on the climate and environmental objectives, low emission zones and the need to avoid odour and noise pollution in diesel the consortium sought for alternative sectors. Construction companies and event organisers were interested in reports on the carbon footprint, the cost of electricity supply, the submetering of the for irregularities and the permanent alarm about temperature, water flow and diesel consumption. Since the knowledge about 'electricity' proved to be insufficient for



further analysis, measurement campaigns on construction sites and events were carried out by implementing a specific MGES visualization platform.

The acquired knowledge showed that a tower crane of a construction site would be an ideal testing ground for the MGES battery. For further development and demonstration of Green Box' mobile city battery, 'Near grid Solutions' was founded with focus on measuring, monitoring, predicting, reporting and alarming for an electric battery power supply of the tower crane, emission-free and without noise pollution.

The first mobile city battery was presented to the press and the public at the Vandebussche yard in Stekene on 10 September 2020.



Hydrogen Import in Flanders

Consortium: DEME, Engie, Exmar, Fluxys, Port of Antwerp, Port of Zeebrugge and WaterstofNet

Budget: € 359,801
Grant: € 179,902

Achieving a climate-neutral economy by 2050 is unfeasible if solely based on the local potential of renewable energy. The import of renewable energy in the form of molecules will also be necessary to achieve these goals and to ensure the preservation of the current competitiveness and prosperity. The analysis of multiple scenarios shows that Europe will have to import a significant amount of energy, including from overseas territories. A large part of this energy import will be in a molecule form (including a number of hydrogen-based energy carriers). The international context also evolves very quickly. The EU Commission and several member states such as Germany and the Netherlands are strongly committed to hydrogen and the cross-border approach.



The main focus is on the integration of the various components, the industrial feasibility and the economic implications. The analysis also detects any barriers to technological or regulatory nature.

Generation facilities such as wind and (hybrid) solar installations including electrolysis and hydrogen conversion plants, mobile and fixed storage facilities, terminal facilities, special ship design for the transportation of carrier molecules and pipeline installations are possible components for innovation.

The next steps are yet to be identified, limitations in terms of regulations will be made clear and the 'step stone projects' will be presented. Results are published in 2021.



The consortium consists of partners who want to actively focus on the future 'supply chain' to establish renewable energy carriers in Flanders. Partners DEME, Engie, Exmar, Fluxys, Port of Antwerp, Port of Zeebrugge and WaterstofNet have the skills and business strength to implement the whole chain and have joined forces within the hydrogen-import coalition.

This joint study focused on acquiring the necessary insights to set its shoulder to the wheel and to give shape to concrete projects that produce, transport and use hydrogen or alternative carriers. The collaboration with Procura investigates the further integration into the entire energy system and defines policy recommendations. The consortium builds up knowledge and integrates this new knowledge across the entire value chain ranging from renewable energy production based on hybrid wind and solar installations, electrolysis and hydrogen conversion installations, storage facilities, terminal facilities, specialized vessels and pipeline installations for transport from carrier molecules to industrial end-user.

Power Data Backbone for Digital City Poles



Consortium: Tres, Crescent, Imtech Belgium, Safety-Product and Powerdale

Technology supporting partners: Nokia, Arco Information, Citymesh, Fluvius and KBC

Budget: € 2,885,621
Grant: € 1,352,344

The development project 'Digital City Poles' is a co-creation model in which 4 social evolutions come together:

- electromobility with the need for charging points and V2G possibilities
- fibre network is necessary for the expansion of 5G and self-driving vehicles
- energy transition to decentralised production and DC networks
- digitisation with the availability of big data to enable new business models and P2P transactions.

This vision of co-creation is supported by Tres and the many collaborating partners: E2E IoT integrator Crescent, Imtech Belgium for the management of complex technical projects, Arco Information for the information acquisition for digital workflows, Safety-Product for mechanical aspects of the stations and Powerdale for the EV charging points and platforms. In addition, there is Nokia for the 5G input, Citymesh for the installation of 5G and applications, Fluvius as grid operator and KBC for reliable financial transactions.

There are powerful drivers for this 'Digital City Pole' infrastructure. The digital city pole infrastructure allows cities and municipalities to generate income for their public lighting which currently entails heavy maintenance costs. Notwithstanding the substitution of LED-lights of the public lighting, 40% of the maintenance costs will remain. Allowing services and applications on these public lighting can generate income that surpasses maintenance costs. Many city centres such as Leuven, Kortrijk and Antwerp strive for smart cities where new applications with big data can be tested and where citizen participation can develop in an open network to support the citizens' needs.

The development of 5G cells is made possible by integration into the Digital City Poles. A strategy was developed with Nokia about 'small cells' in an urban environment where these cells will be placed every 150m and therefore need a small radiation capacity. For 70% of city dwellers without a driveway or garage, a solution will be offered to the need for inconspicuous charging points in the public domain for E-vehicles, E-bikes and E-steps. A charging station hidden in the ground is connected to the city pole and is controlled from there.

The sustainable solution therefore consists of combining the city pole concept with an integrated electricity and fibre network. This is the Power-Data backbone. The use of energy and data is included per application. The payment for this usage is done by an energy and data usage package that takes into account the type and usage time of the application.

The certification of hardware and applications is necessary because of the processing of confidential data and the asset management that must be done. This is why payment transactions are developed by a financial institution that uses 'Blockchain' technology. For standardisation and user-friendliness, setting up an 'Energy Ledger' for all charging operators can be a solution.

A growth path to a roll-out and commercialisation was mapped out starting with a demo setup on Arenberg Science Park followed by a first implementation on a business park of 24 digital smart DC poles of which 4 poles 5G-prepared. Next is the installation of 20 digital 5G prepared poles at Arenberg Science Park. One of the project's ambitions is to create a testing ground in the tangent that includes the area of Gasthuisberg, Science Park Arenberg, Computer and Engineering faculty, and up to OHL where all kinds of applications of tomorrow can be tested. An example of future-oriented applications are the autonomous shuttles.



Sociale Energiesprong

Consortium: Enervalis, BAM Belgium, Cordium, Energinvest and KBC (without financial support)

Budget: € 1,506,992
Grant: € 644,115

With its climate targets 2050, the Flemish Government sets the bar high. To achieve these objectives, almost all existing buildings should undergo an energetic renovation. A part of the heritage is formed by social housing where we estimate that more than 100,000 homes will be renovated.

The project 'De Sociale Energiesprong' wants to renovate older units of public housing in one go to let them meet the 2050 climate objectives. This is done by a combination of interventions, while still aiming for energy neutrality at the end of the day and thus aiming for a balance of energy generation and energy consumption at home level.

This whole procedure only lasts 7 days in which the residents can stay in their homes. Initially, the house will be equipped with an insulating envelope with a prefabricated façade and roof. That roof is immediately equipped with solar panels for energy generation. Lastly, the house will be equipped with new

techniques integrated into an "energy module". That energy module works exclusively with electrical techniques (heat pump, D+ ventilation, inverter, etc...), so that the house does not produce any CO₂ emissions.

After 7 days, the residents can enjoy increased comfort. Throughout the journey, the residents are informed and involved, for instance through information sessions and training on how to live in an energy-neutral house.

This testing ground wants to be a pilot for renovation with the latest building concepts, the integration of smart energy solutions, ensuring residents' maximum comfort during and after the renovation work, assessing new financial models to support investment and testing new market roles in support of the massive rollout of these concepts in Flemish Social Housing.

The project will renovate four homes in 2021 to show that a massive renovation rollout for this type of public homes is possible.



Hydrogen panels

Demonstration site Rolecs 'Oud-Heverlee'

Last year, professor Johan Martens of the KU Leuven and his fellow researchers Tom Bosserez and Jan Rongé made headlines all over the world. This hydrogen panel converts sunlight and water vapour from the air directly into hydrogen gas.

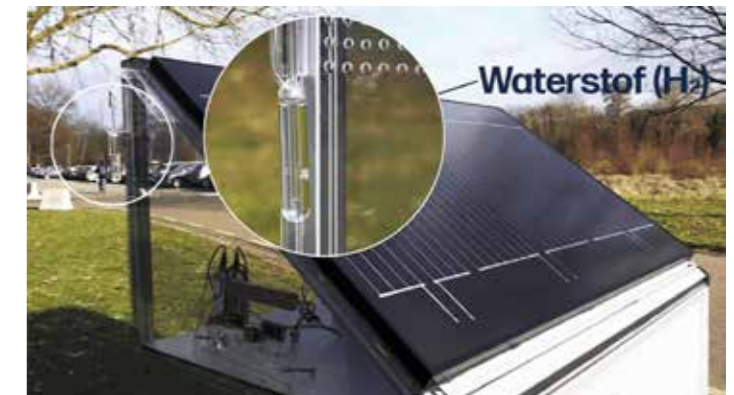


Hydrogen gas is considered one of the sustainable energy carriers of the future, mainly if it is produced from green energy sources. It can be stored and transported. Green hydrogen will, without a doubt, be intensively used in industrial processes. The use of green hydrogen will significantly reduce CO₂ emissions.



The researchers do not use a normal electrolyser for their hydrogen panel, but they compactly combine the absorption of the water from the air, splitting water and capturing sunlight with electricity production. It, therefore, looks like a solar panel, but produces green hydrogen and is thus called "hydrogen panel".

"We get a return of up to 15 per cent which means that 15 per cent of the solar energy that the panel receives, is converted into chemical energy stored in hydrogen gas", explains prof. Martens.



Flux50 played a role in the further development of the hydrogen panel by supporting the first demonstration in a home in interdisciplinary cooperative research project ROLECS. A panel of 1.6 meters by 1 meter was placed to produce hydrogen gas during the summer. That fuel could then be used for heating and electricity production in the winter. The house also has solar panels to generate electricity and a solar water heater to produce hot water. The three techniques together should be sufficient on paper to provide sufficient energy all year round.

Flux50, alongside Catalisti, also follows the further steps towards industrialisation in the 'later stage innovation' project HyPPr in the context of the innovation programme 'Moonshot'. The HyPPr project aims to create a pilot line & living lab that supports the design, upscaling of production and the integration of innovative hydrogen panels. Both projects are financially supported by VLAIO.



Flanders Smart Energy Region

Since 2017 Flux50 supports innovative projects for the energy transition in Flanders. As the spearhead cluster for energy Flux50 facilitates cross-sector collaboration between energy, I(o)T and building companies to enhance sustainable solutions that are economically viable.

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Innovation thrives through (international) cooperation. Get in touch if you want to work with us and our Flanders energy ecosystem.

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