



CLEANTECH IN FLANDERS **2017**

More in-depth information per domain

INVESTING IN OFFSHORE WIND

In the following years Belgium's offshore wind capacity will increase steeply. In order to deliver the policy objectives, companies too are investing in new technologies.

DEME for example will soon be starting to install undersea cables for a so-called "plug socket at sea" that connects four wind parks. Undersea cables will connect this plug socket to a converter platform in Belgium where the produced wind energy will be injected in the Belgian power grid onshore. The cables are being installed by the multifunctional vessel "Living Stone", equipped with dual fuel engines with LNG being its prime fuel. "Living Stone" has a cable capacity of 5,000 tons and can transport and install over 200 kilometres of cable in one single journey.



RUNNING AN ENTIRE COMPANY ON CLEAN ENERGY

Not just economically, but also ecologically Colruyt Group is making an important contribution. Eoly, the clean energy producer and supplier of Colruyt Group, is already producing 28 percent of the total energy need through its own wind turbines, solar panels and cogeneration.

On top of that Colruyt Group has invested additionally in the further industrial research and development of hydrogen. At this point already 17 forklifts can refuel at the installation in Halle. And five hydrogen cars are being tested. In this way Colruyt Group is learning from its own activities how this technology can be used in the future. The remaining 72 percent of the required energy is being purchases on the wholesale market.



RECYCLING RARE EARTH METALS

The demand for special microchips keeps on growing. These materials however, consist of expensive metals that are becoming increasingly scarcer. Umicore commits to technology that is capable of recycling these metals from used electronics.

Nowadays, exhaust gases of cars contain a lot of harmful substances such as NO_x or SO₂, which cause acid rain. These substances can be broken down by the catalytic converter in a car so that they aren't released into the environment as much. By using recycled rare earth metals in automotive catalytic converters the efficiency of this process can be maximised. In addition, rare earth metals are used in batteries, a growing market owing to the rise of the electric car.



AROUND THE WORLD ON SOLAR POWER

The Solar Impulse is the very first airplane to circumnavigate the globe powered only by the sun. The Belgian company Solvay has been a partner in this project since 2004. Solvay provided 15 innovative products which are applied in more than 6,000 parts of the plane:

- Ultra-strong and ultra-light materials, minimising the weight of the plane
- Special coatings to protect the solar cells
- Batteries that enable to fly at night

All these materials are not only used in this plane, but they are also part of our daily lives.



CLEANTECH ACHIEVEMENTS
IN FLANDERS



CLEANTECH AWARDS IN VLAANDEREN

2016



RED CROSS
Most Sustainable
Building



ArcelorMittal
Best Supplier
Award



OVAM
The Circulars
Award

2017



Enervalis
Global Cleantech
Cluster Award



Snappee
Innovation
Award



JBC
Sustainability
Award

2018



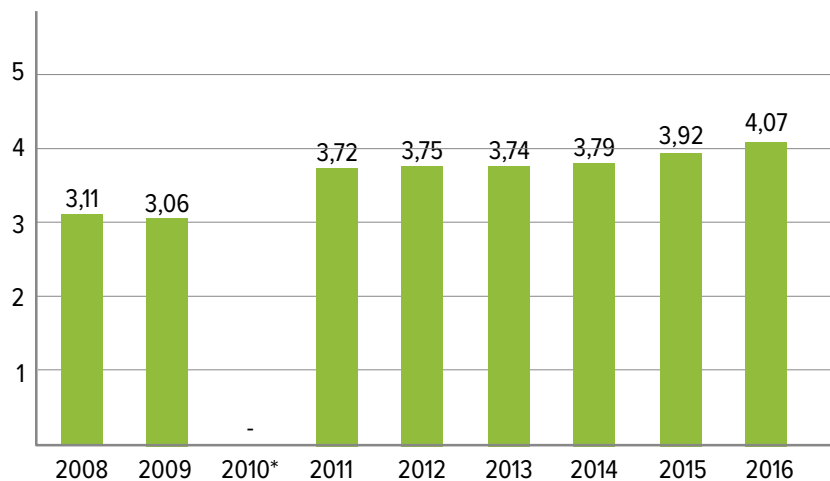
Louvain
Green Leaf
Award

ECONOMICAL IMPACT CLEANTECH

4 billion euro

added value

(in billions of euros)

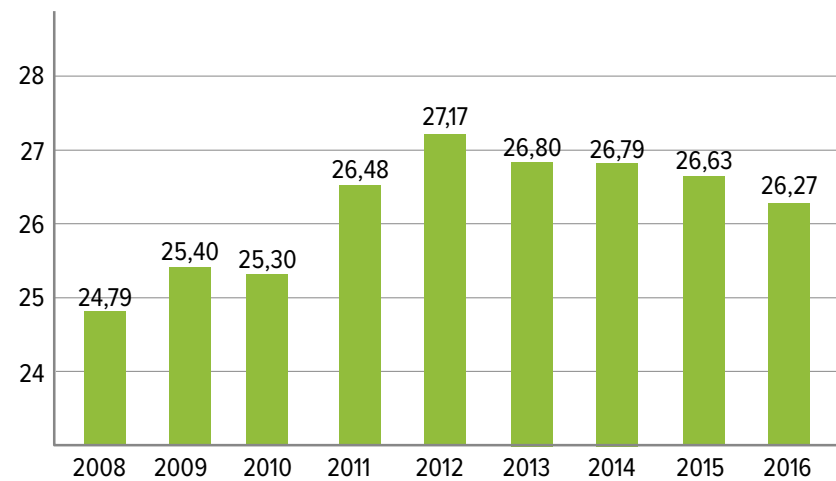


The cleantech industry grows steadier (12.5%) than in the overall industry (0.75%) between 2008 and 2016.

26.626

jobs

(number x 1,000)

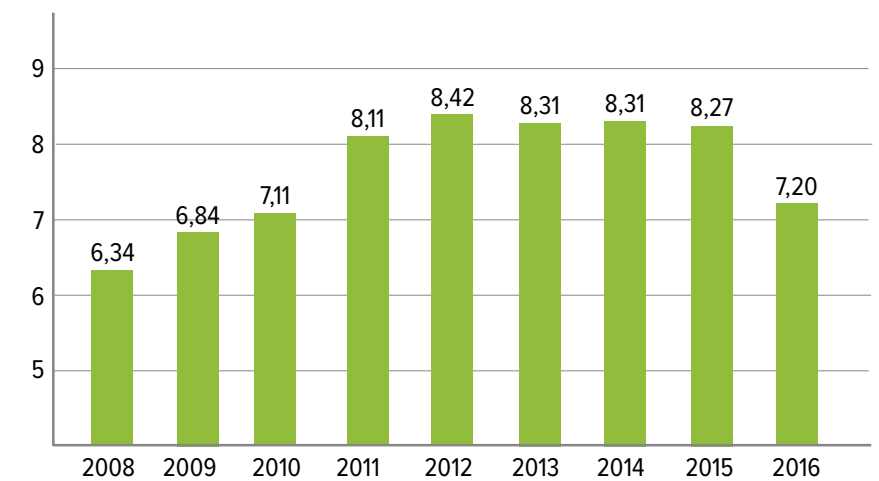


The number of jobs in cleantech grows faster (5.9%) than in the overall industry (2.3%) between 2008 and 2016.

7.198

jobs at SMEs

(number x 1,000)



In SMEs, employment numbers witnessed an even faster increase (13.5% compared to 5.9%) between 2008 and 2016.

*The figures for 2010 aren't known.

RESEARCH

EnergyVille

Flemish research institute in sustainable energy. Provides expertise to industry and public authorities.

InnoEnergy

Investment company in sustainable innovation in energy. Brings together education, research and valorisation.

OWI Lab and IBN Offshore Energie

Lab facility in the Port of Antwerp to anchor Flanders' pioneering position in offshore wind energy.

MOBI

Mobility, Logistics and Automotive Technology Research Centre: development and implementation of sustainable mobility and logistics.

CES&T

Centre Environmental Science & Technology: central research platform with a strong focus on sustainable water technology.

Belgian Membrane Group

Innovation alliance between research centres and industry for membrane technology, with a focal point on water treatment.

ETC/WMGE

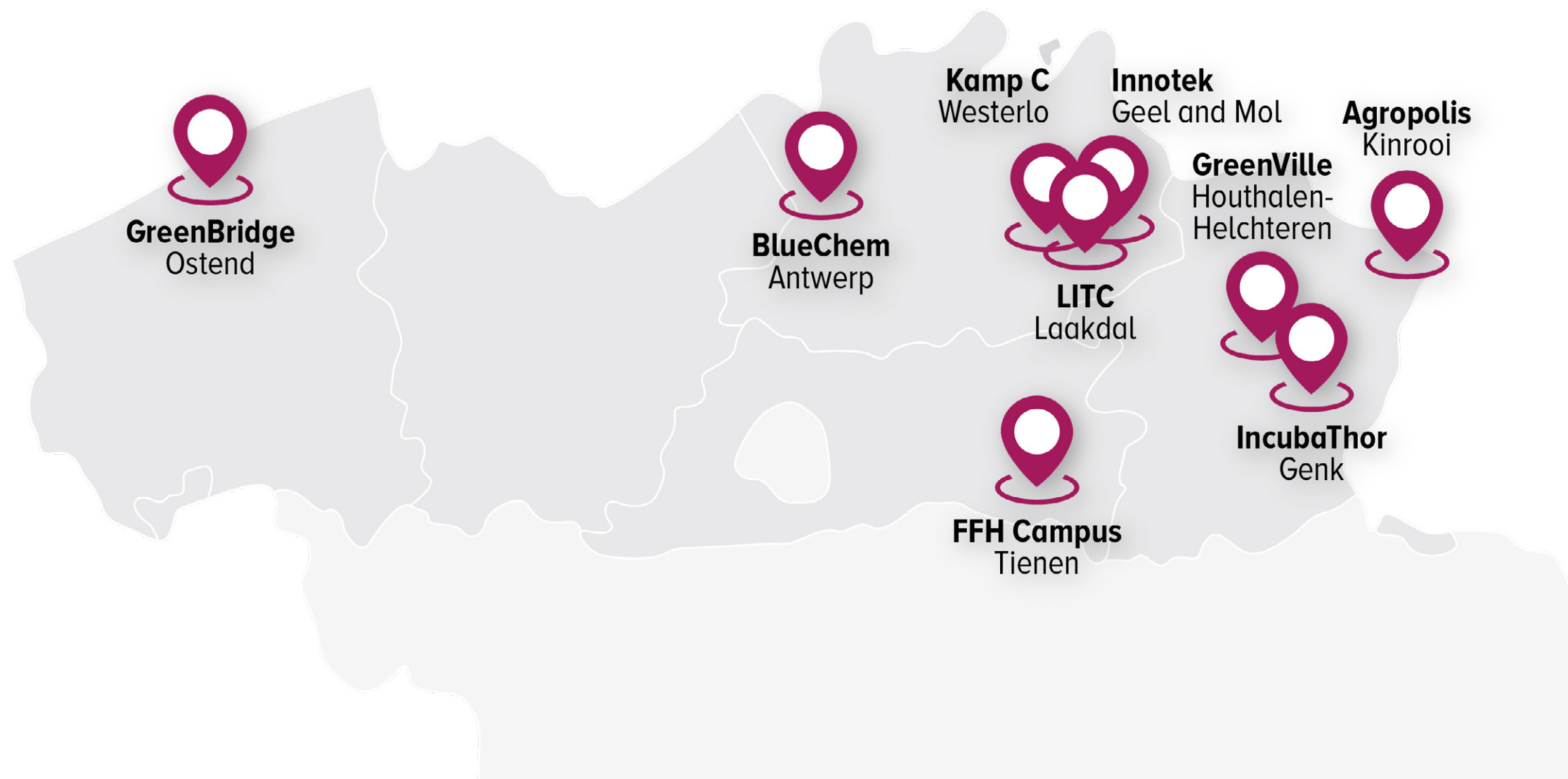
European Topic Centre on Waste and Materials in a Green Economy: information and expertise in circular economy.

SOLVOMET

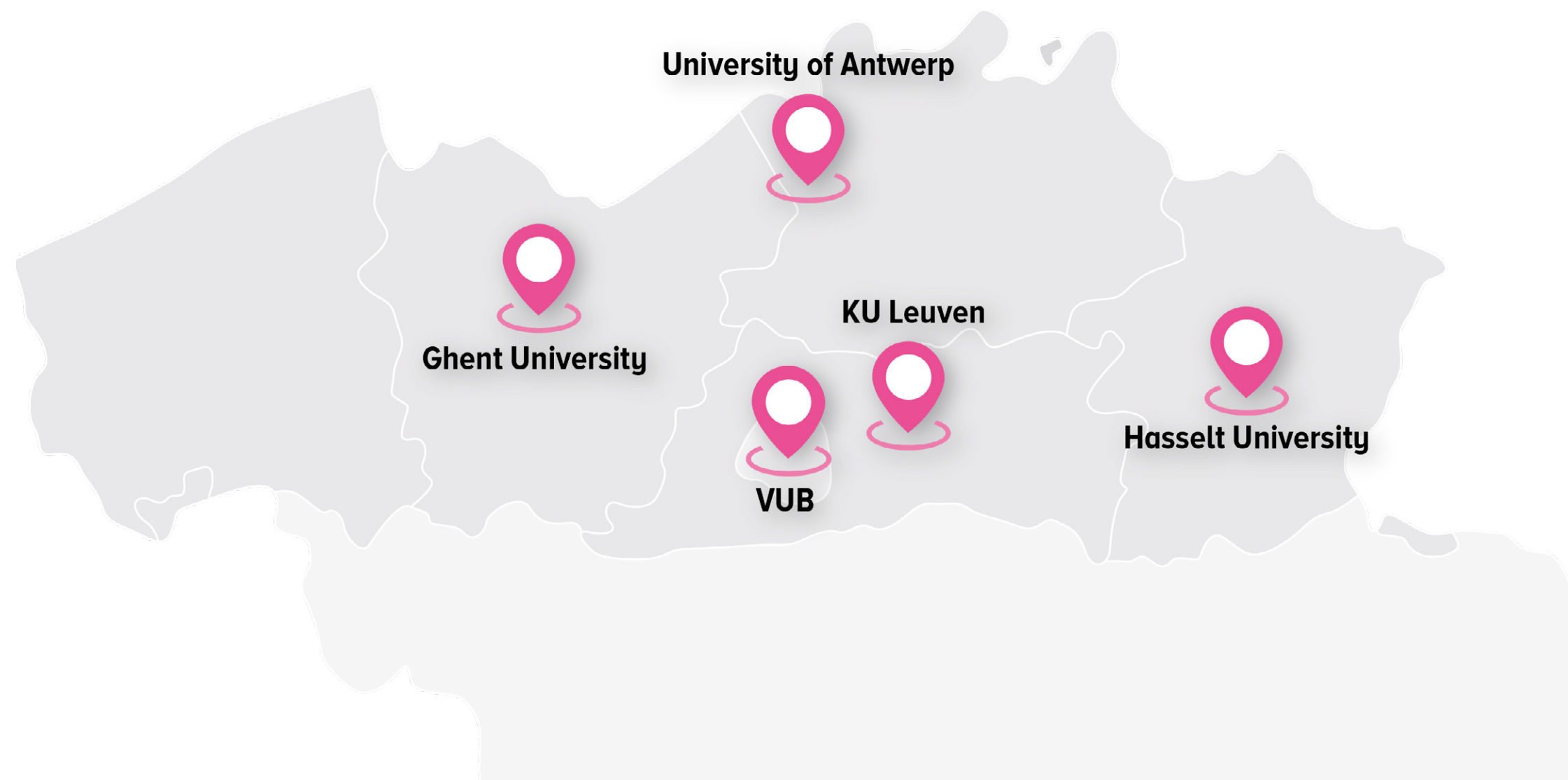
KU Leuven's Centre for Solvometallurgy: innovative technologies to recycle critical and economically important metals.

[More in-depth information per domain](#)

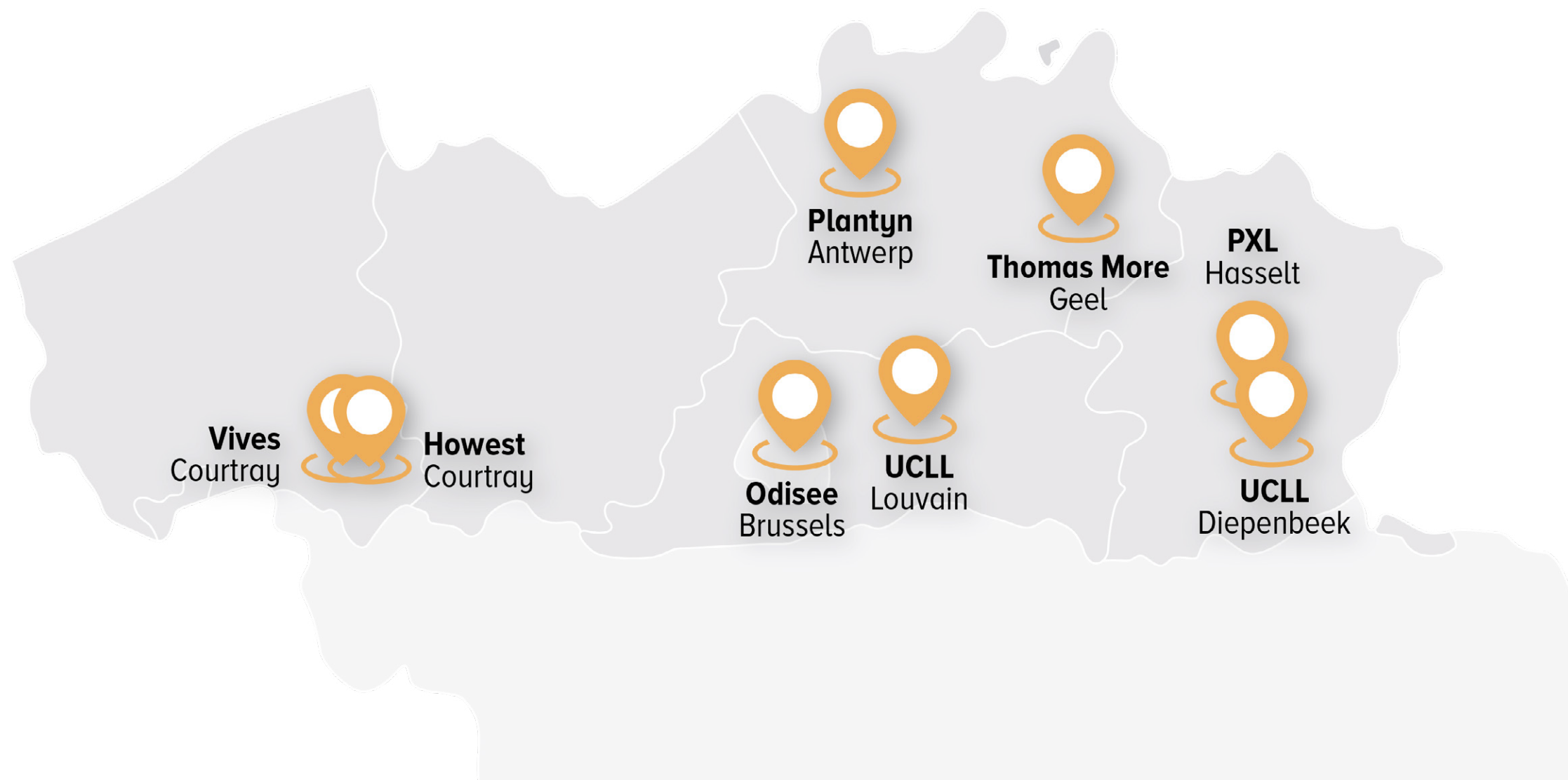
CLEANTECH ECOSYSTEM OF FLANDERS



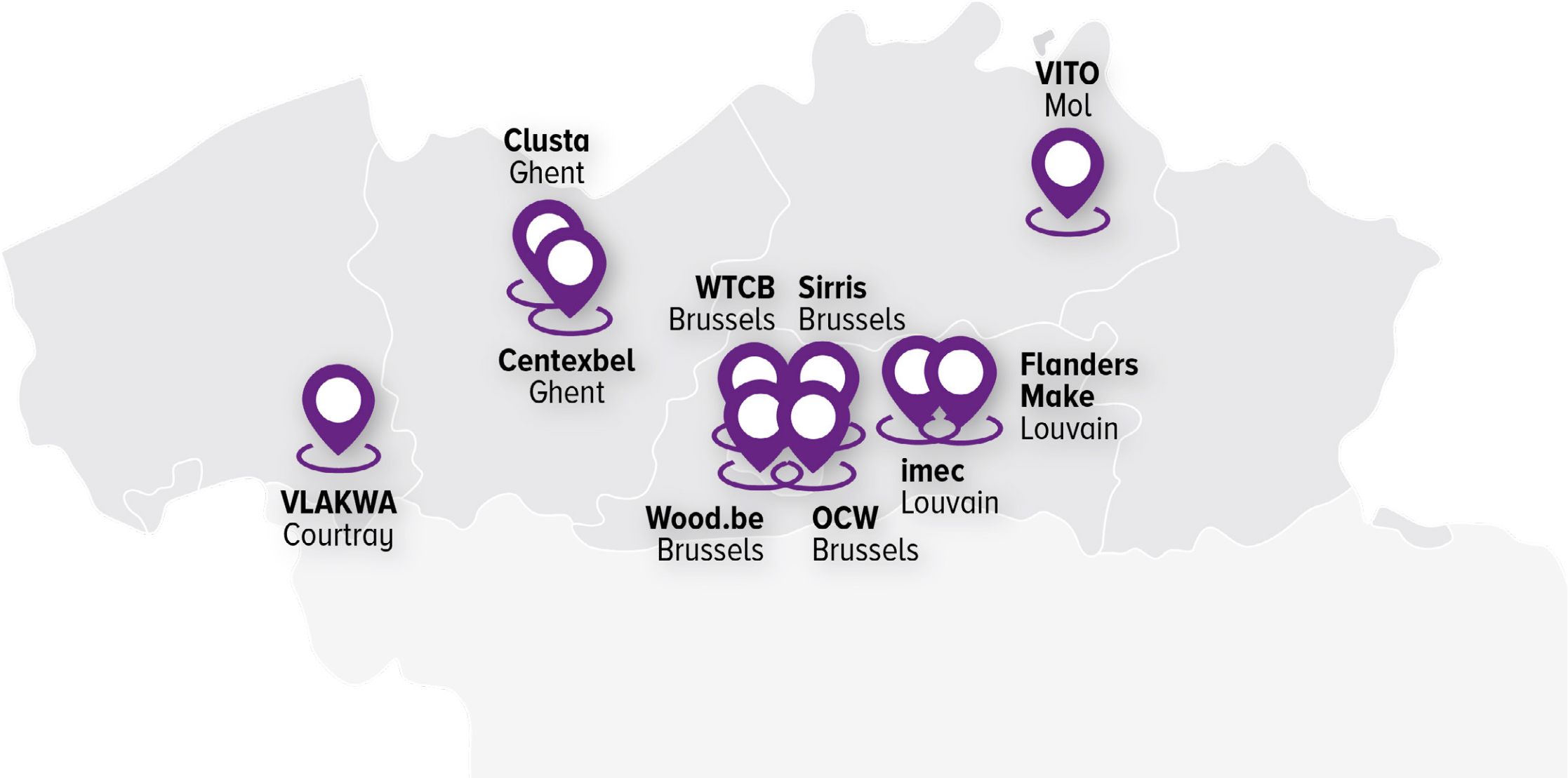
CLEANTECH ECOSYSTEM OF FLANDERS



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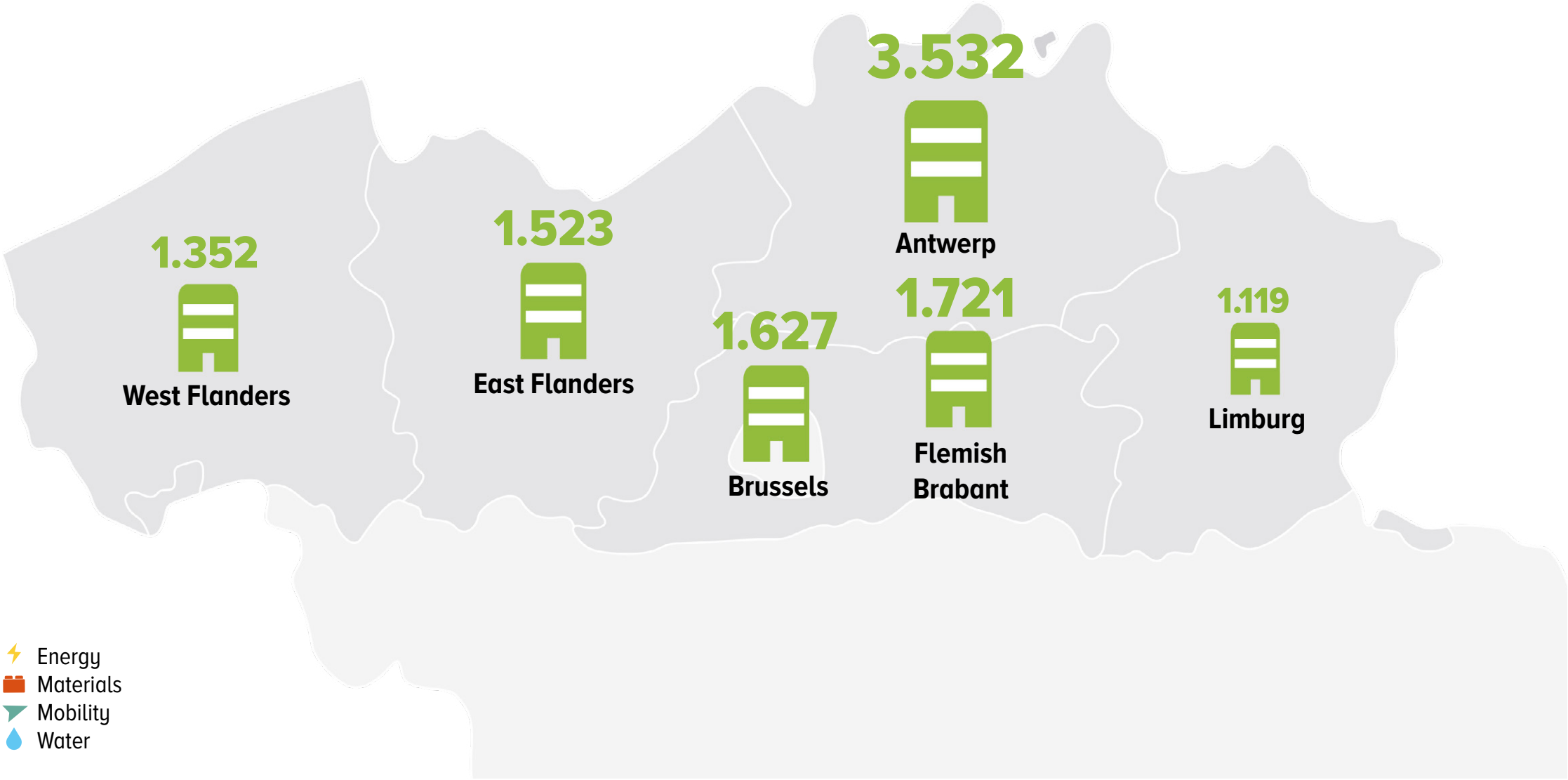
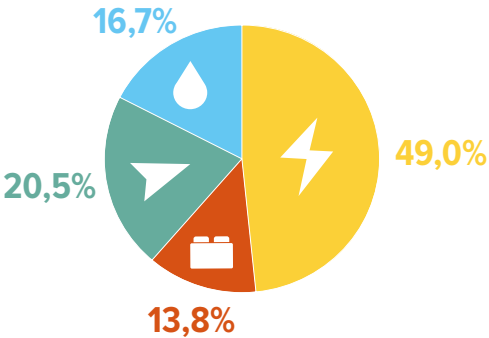


CLEANTECH ECOSYSTEM OF FLANDERS



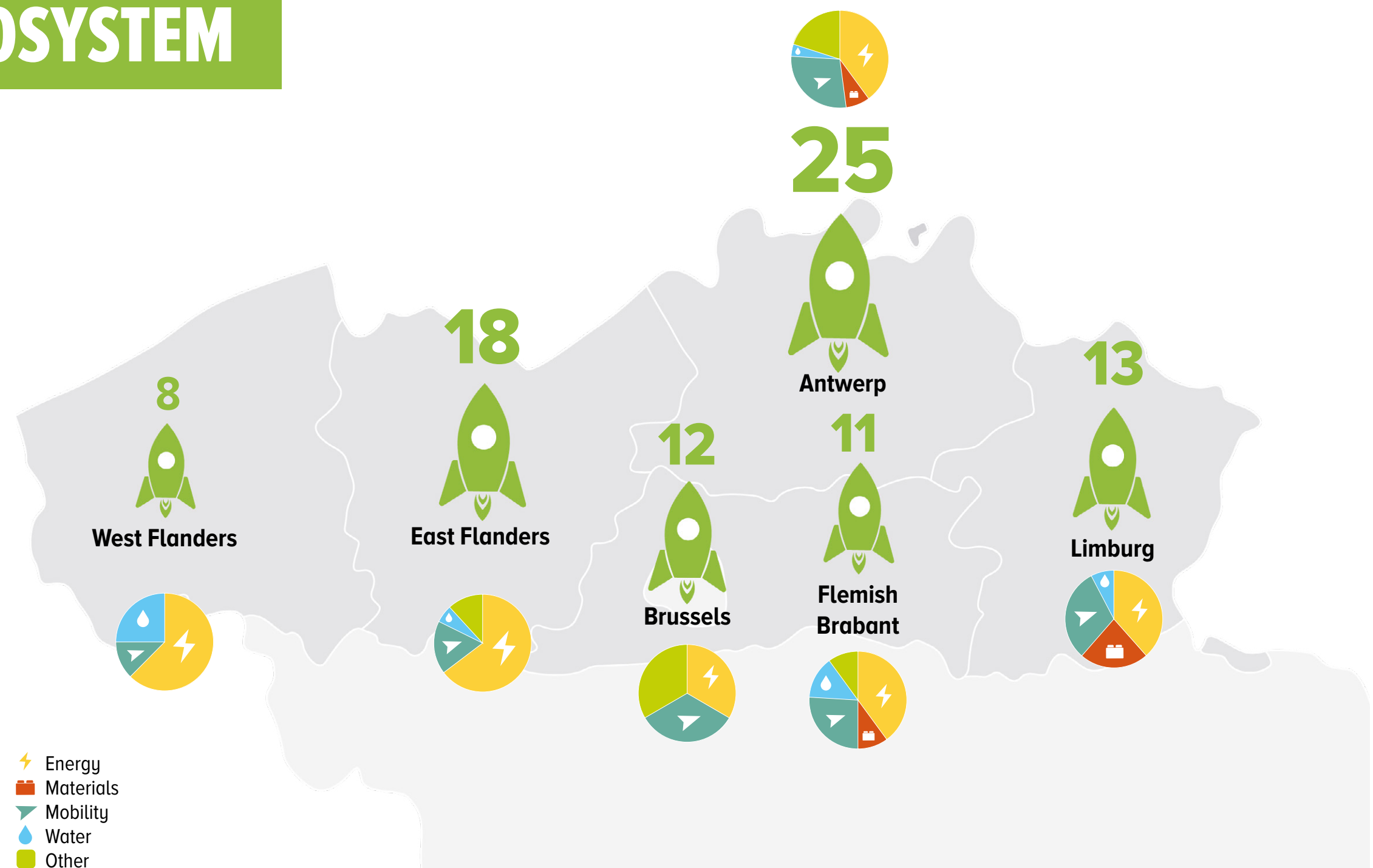
CLEANTECH ECOSYSTEM OF FLANDERS

10.874
Flanders



- ⚡ Energy
- 📦 Materials
- 🚗 Mobility
- 💧 Water

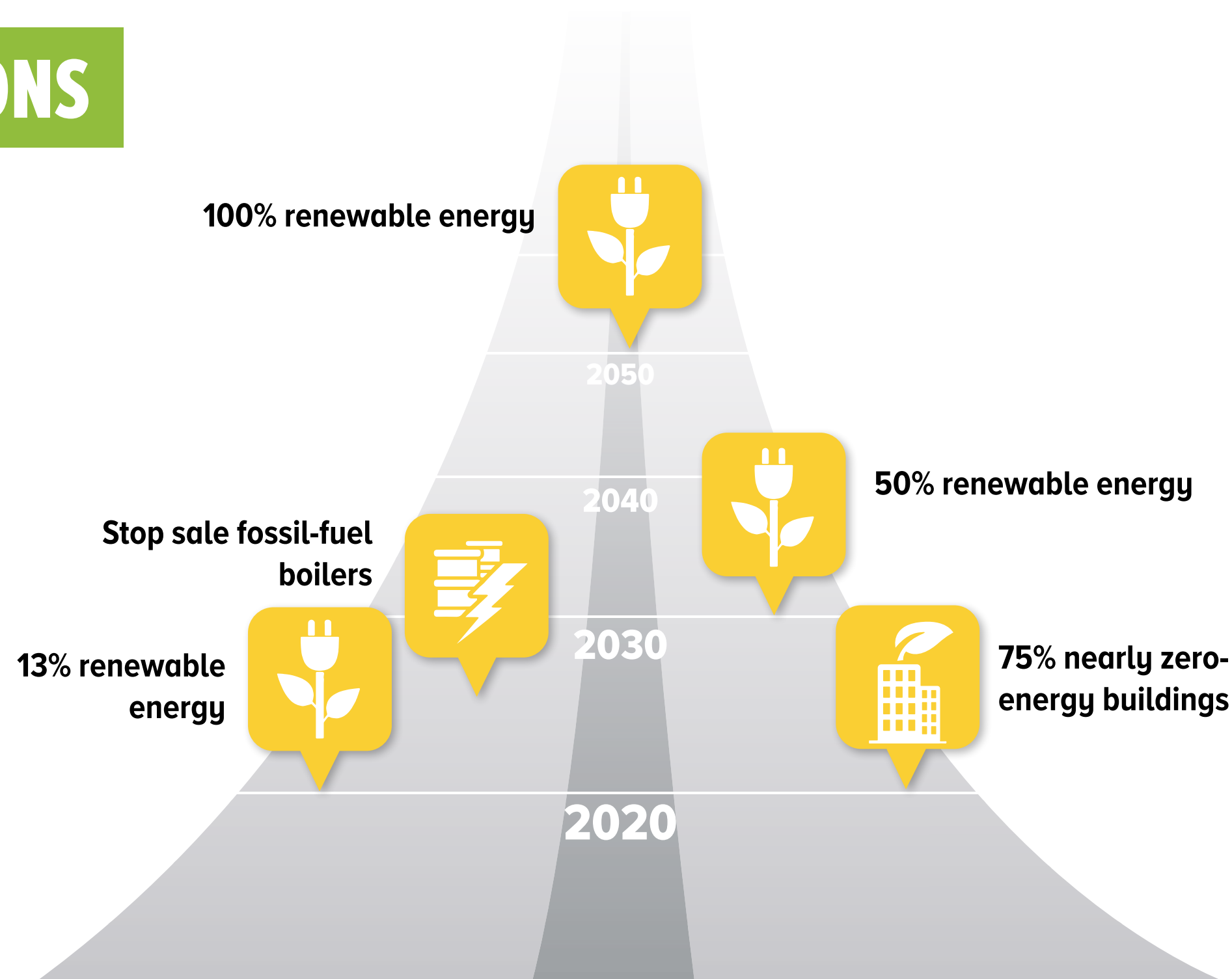
CLEANTECH ECOSYSTEM OF FLANDERS



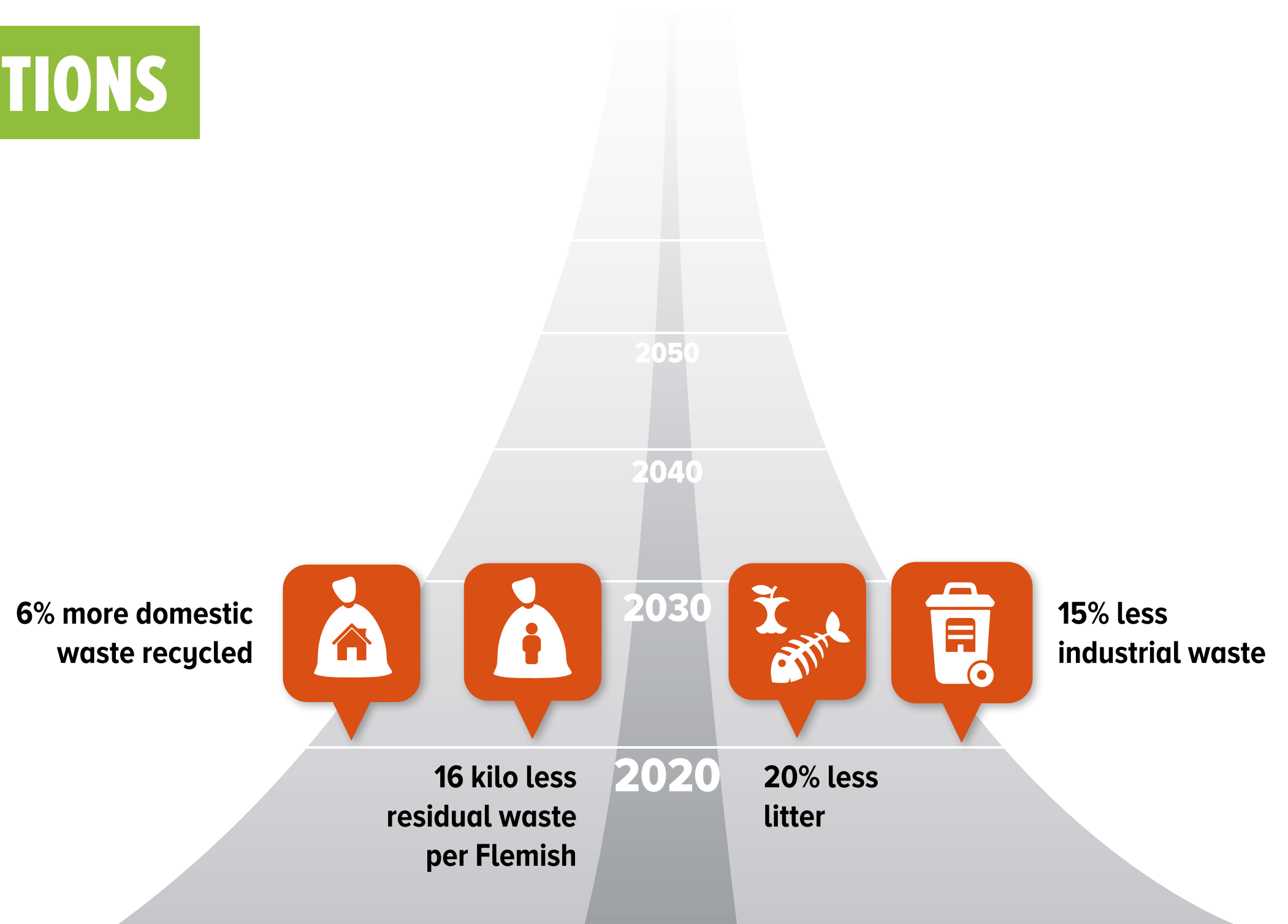
CLEANTECH ECOSYSTEM OF FLANDERS



CLEANTECH AMBITIONS OF FLANDERS



CLEANTECH AMBITIONS OF FLANDERS



Ambitions relative to 2014

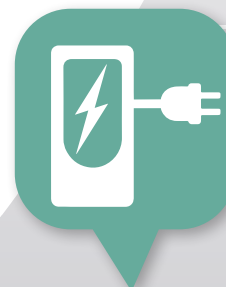
CLEANTECH AMBITIONS OF FLANDERS

**40% of all commuting is sustainable
(public transport, on foot or by bike)**



**100% of all new cars
are electric**

**7,400 charging stations
for electric cars**



**7.5% of all new cars
are electric**

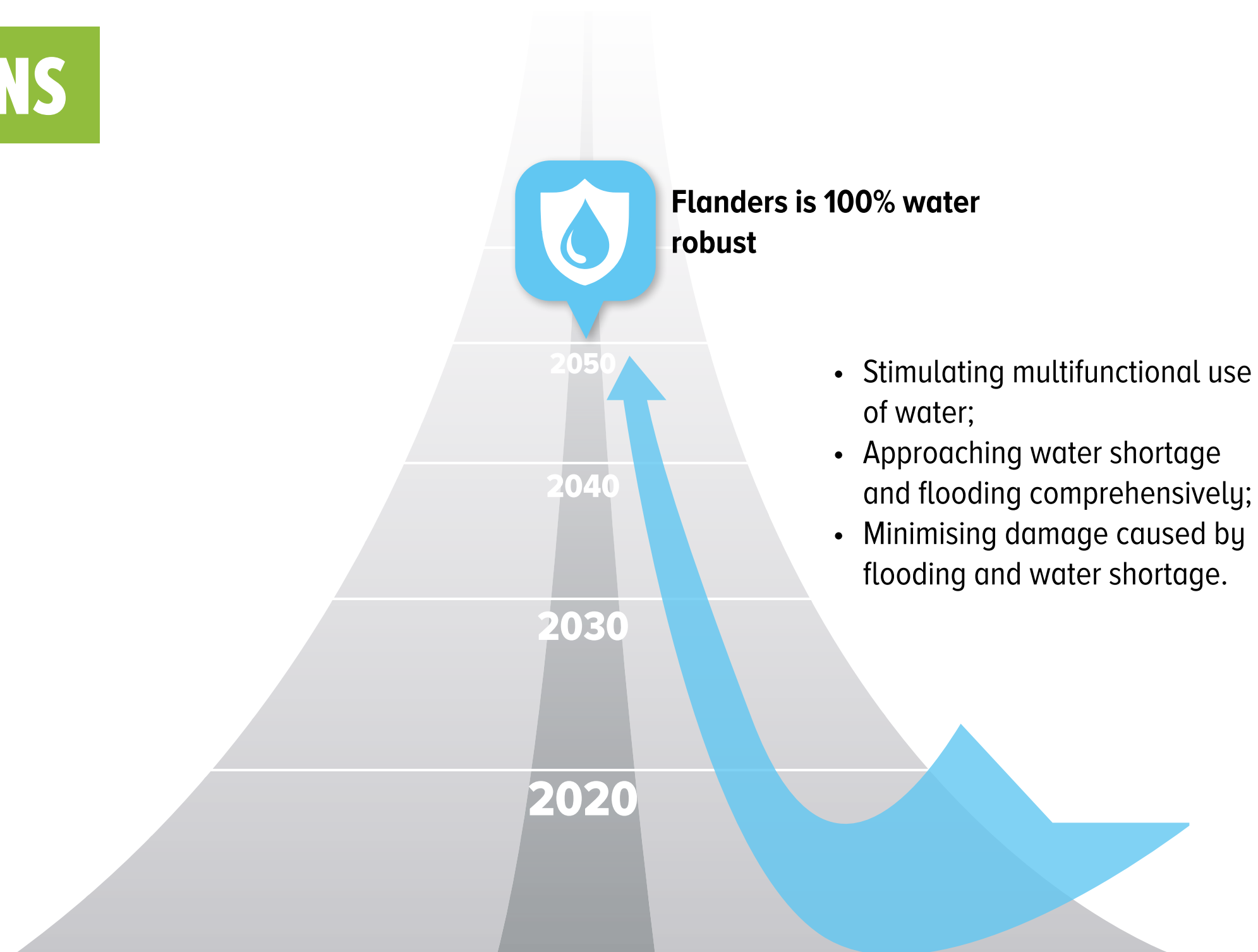
2050

2040

2030

2020

CLEANTECH AMBITIONS OF FLANDERS





ENERGY

CASES

ACHIEVEMENTS

TRENDS

RESEARCH

ECOSYSTEM


AMBITION

MOBILE WIND TURBINES

The wind turbines of Xant, which provide up to 500kW, can be placed in remote off grid locations. The wind turbine is designed in a way that minimises the maintenance and maximises its production time.

All parts fit together into a standard 12-metre container and can be transported on a truck.

Because of its smart design, the turbine and the stand-alone pole don't require a crane to be erected.



Can be placed
everywhere, even in off-
grid areas



All parts fit into a standard
12-metre container



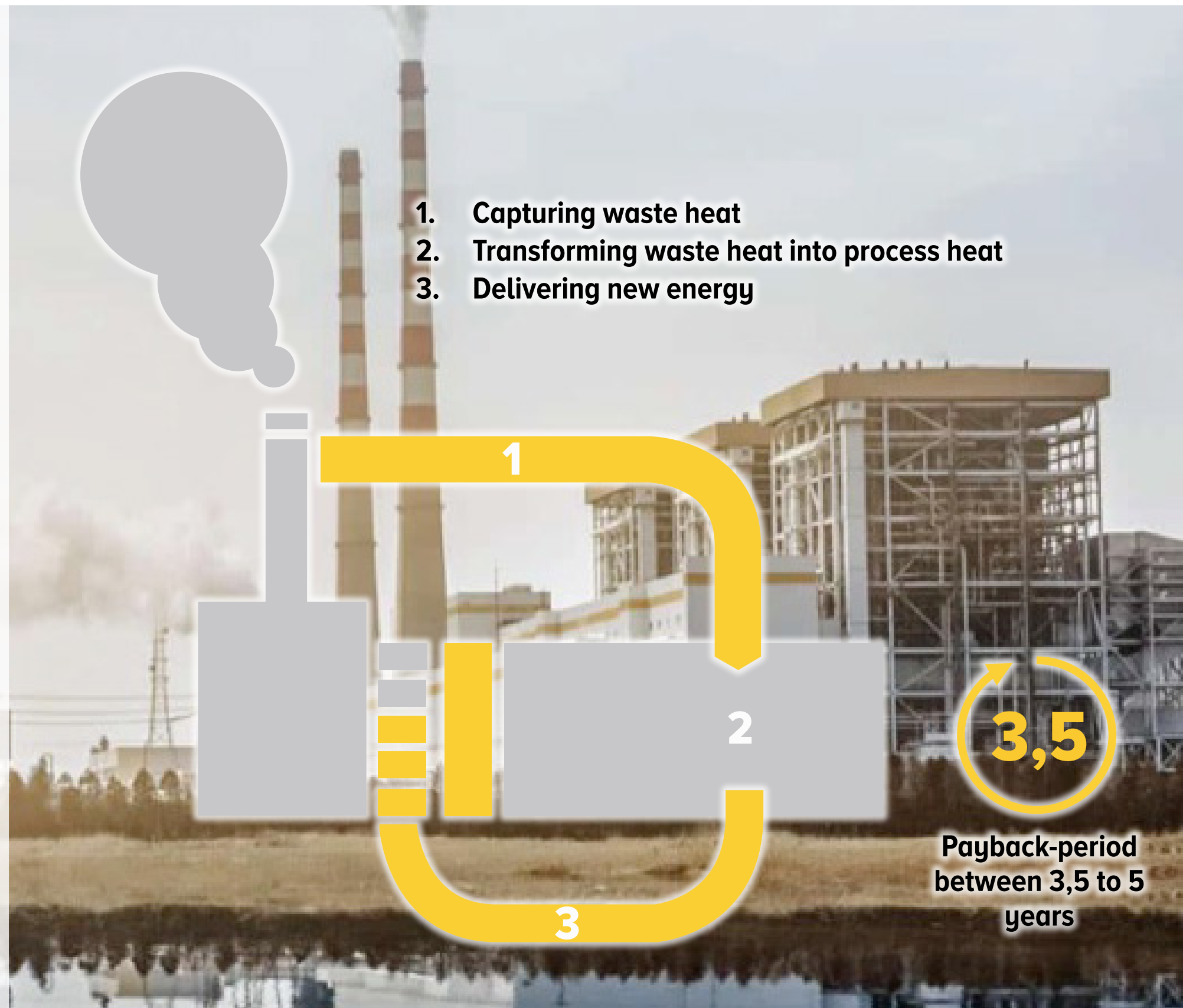
No crane required to be
erected

RECYCLING WASTE HEAT

In the port of Antwerp Qpinch produces hundreds of MW of steam from the available waste heat. This represents annual savings of tens of millions of euros and hundreds of thousands of tonnes of CO₂.

Qpinch's innovative chemical heat pump uses residual heat from 40° C to produce process heat. In the petrochemical industry, residual heat mostly has temperatures between 90 and 140° C. 50% of this heat is now transformed into steam up to 230° C.

The heat pump, applicable across all process industries, requires hardly any operational costs and has payback-periods of 3.5 to 5 years.



STABILISING SUPPLY AND DEMAND

REstore developed a platform with used car batteries to stabilise Elia's network.

With 140 large batteries, having a power of 18MW, Restore will be helping to control Elia's primary reserve as from spring 2018. Industrial machines as well domestic appliances are connected to the platform. In times of large peak energy demands, REstore can reduce the energy demand of companies, connected to the platform.



INVESTMENTS IN WIND ENERGY: BELGIUM RANKS 3RD

Belgium is investing strongly in wind energy and occupies the third place after the UK and Germany. In 2016 a total of 2.3 billion euro was invested. This makes Belgium a very interesting location for companies with a focus on (offshore) wind.

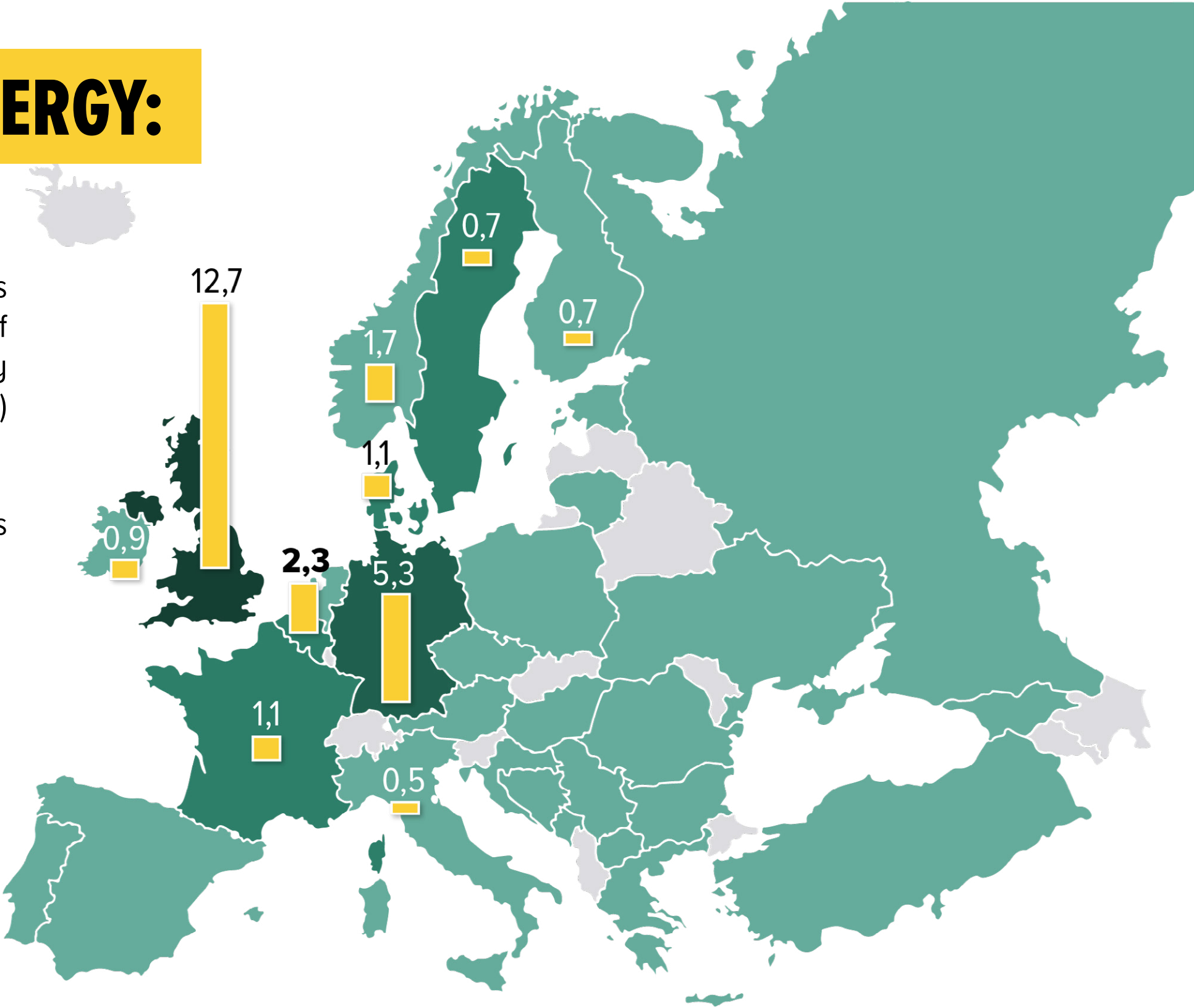
The map on this page shows an overview of Europe's investments in wind energy.

Source: European Wind Energy Association

Investments, made in **2016** (billion euro)

Cumulative investments per country since **2010** (billion euro)

- > €40
- €30-40
- €5-10
- €0-5





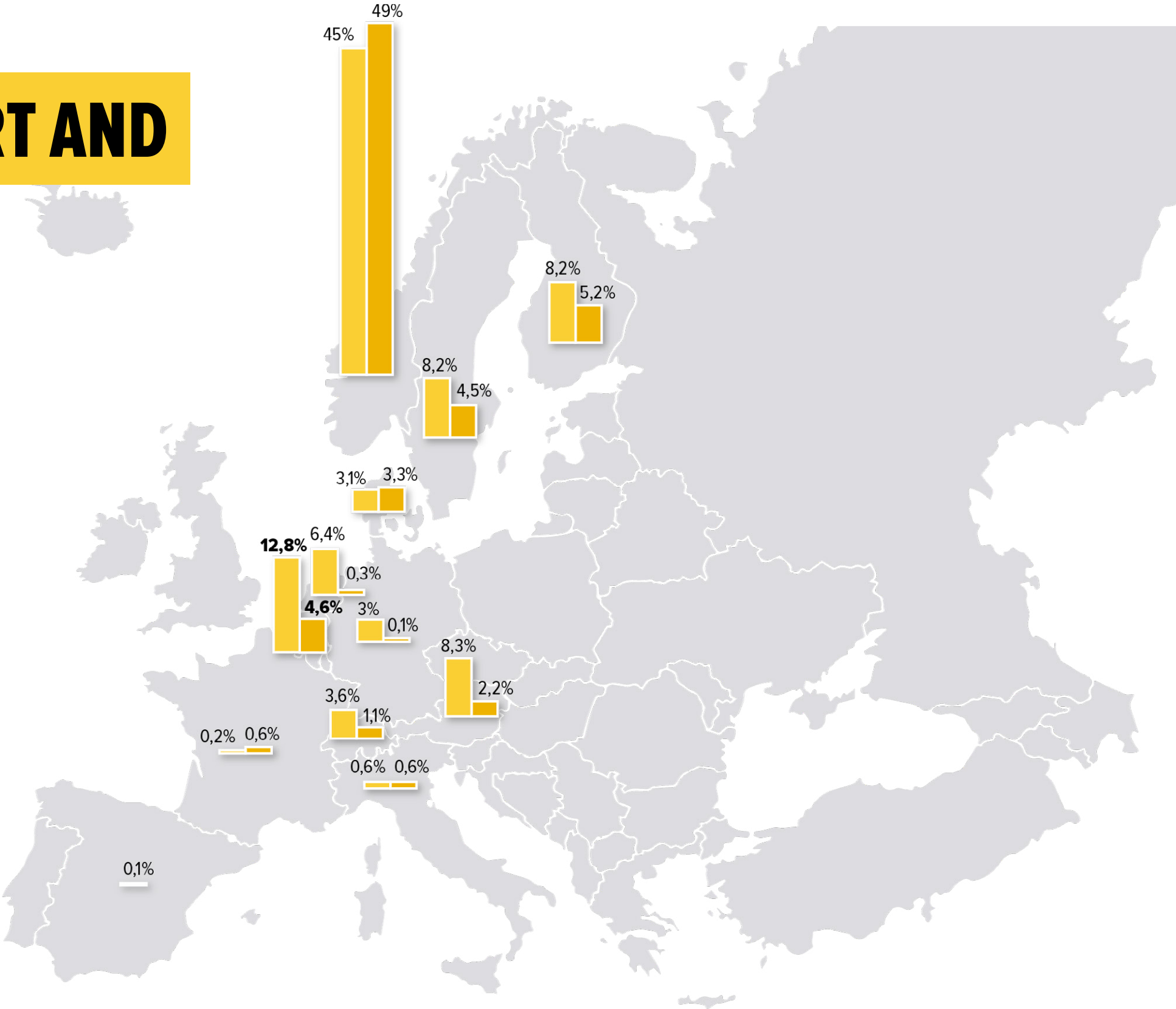
TOP POSITION FOR IMPORT AND EXPORT CLEAN ENERGY

Belgium is among Europe's leading countries with regard to import and export of clean energy. Belgium is ranked second for importing clean energy, and third for exporting clean energy.

The map shows the import and export-figures of clean energy for Europe's top 10 countries.

Source: AIB annual report 2016

-  % imported clean energy per capita in 2016
-  % exported clean energy per capita in 2016

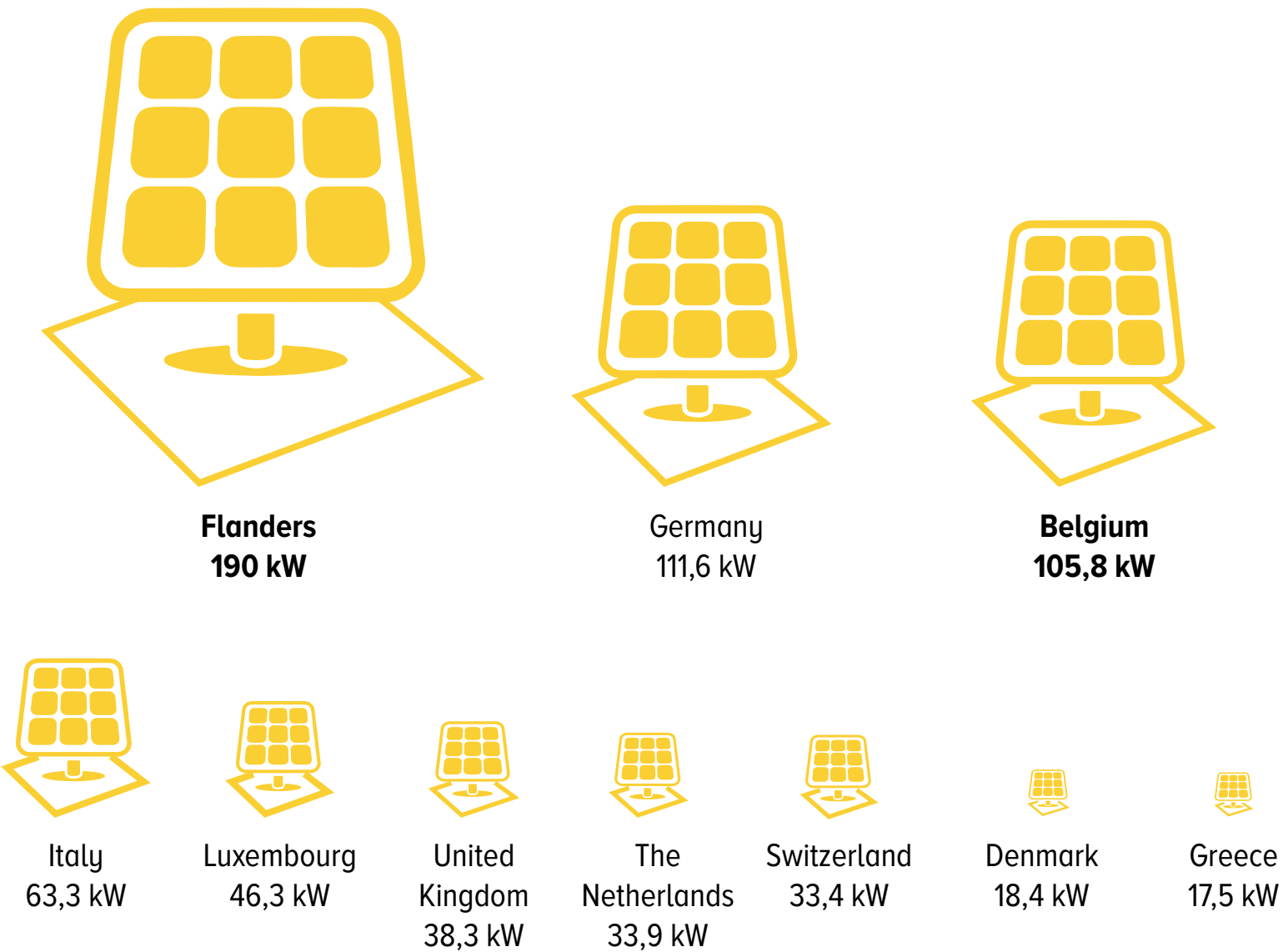


MOST SOLAR CELLS 1,000 KM² IN FLANDERS

Flanders is in the number one position for solar power in Europe per 1,000 square kilometre. If we compare the number of solar cells per 100 inhabitants, Belgium comes second, behind Germany.

The figures show the exact numbers for Flanders and Belgium and the rest of Europe's top 10 countries.

Source: Vlaamse Regulator van de Elektriciteits- en Gasmarkt

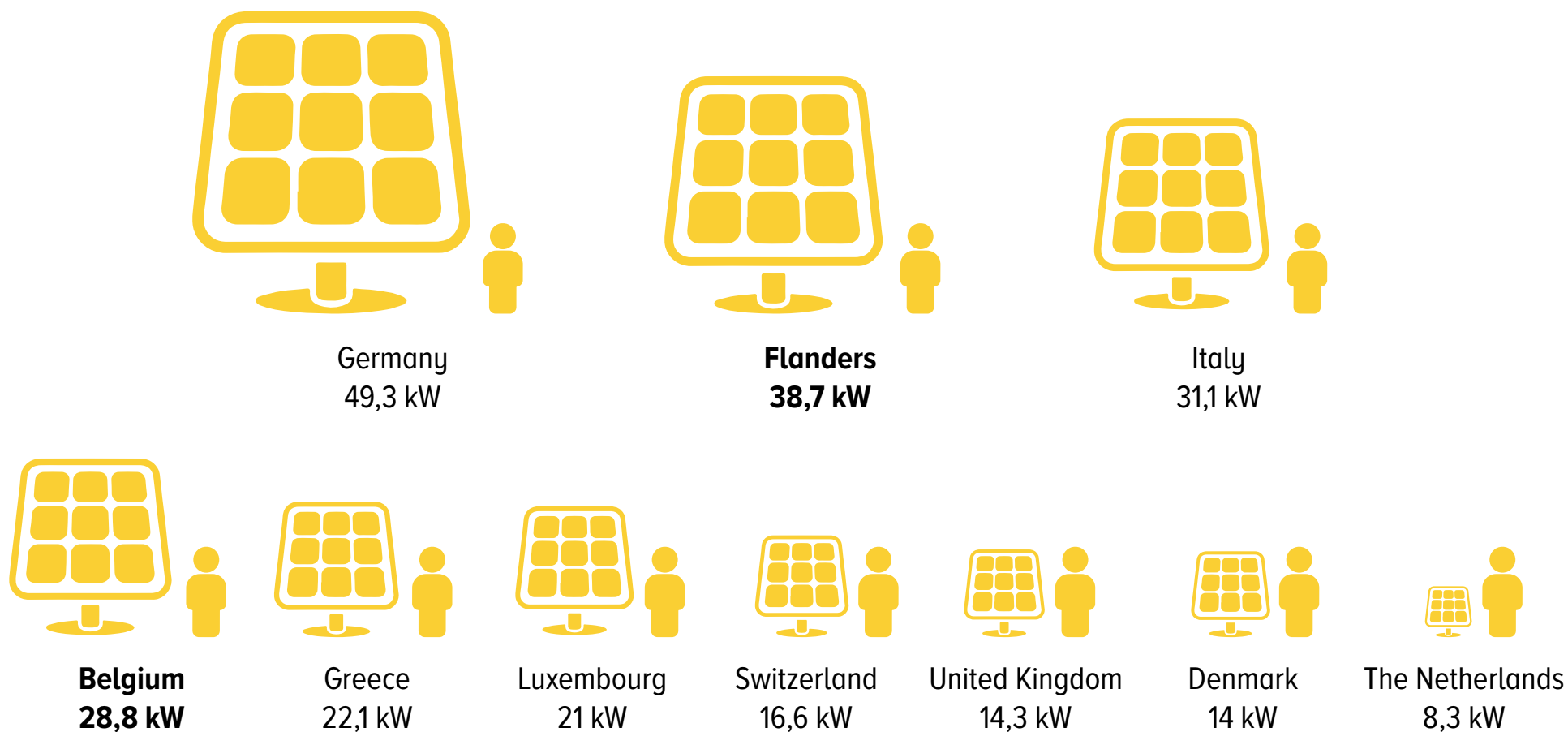


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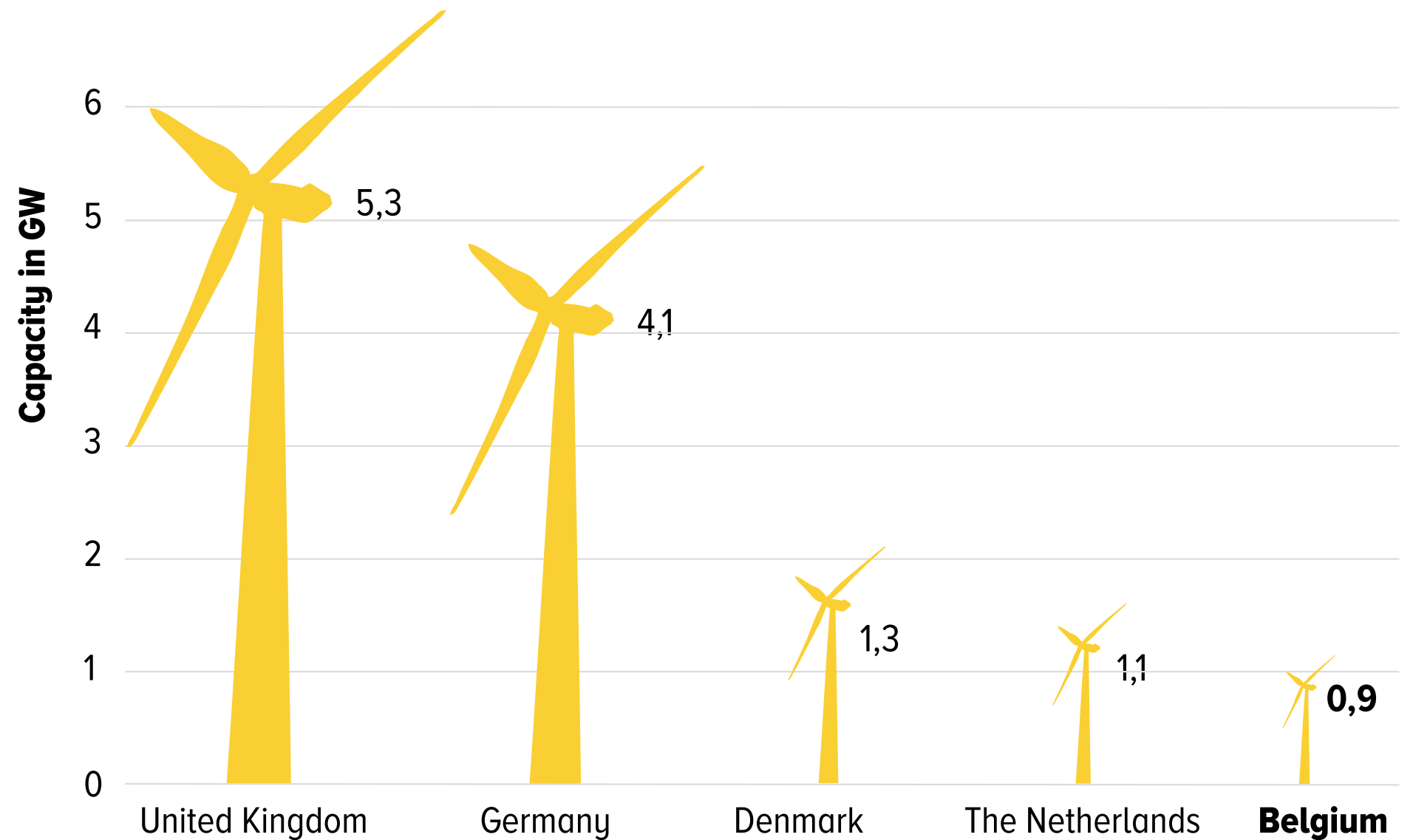


TOP 5 POSITION IN OFFSHORE WIND

Today, Belgium's offshore wind capacity is 0.9 GW putting Belgium in fifth position in Europe for offshore wind capacity.

The illustrated figures give an overview of Europe's five front-runners.

Source: Bloomberg New Energy Finance

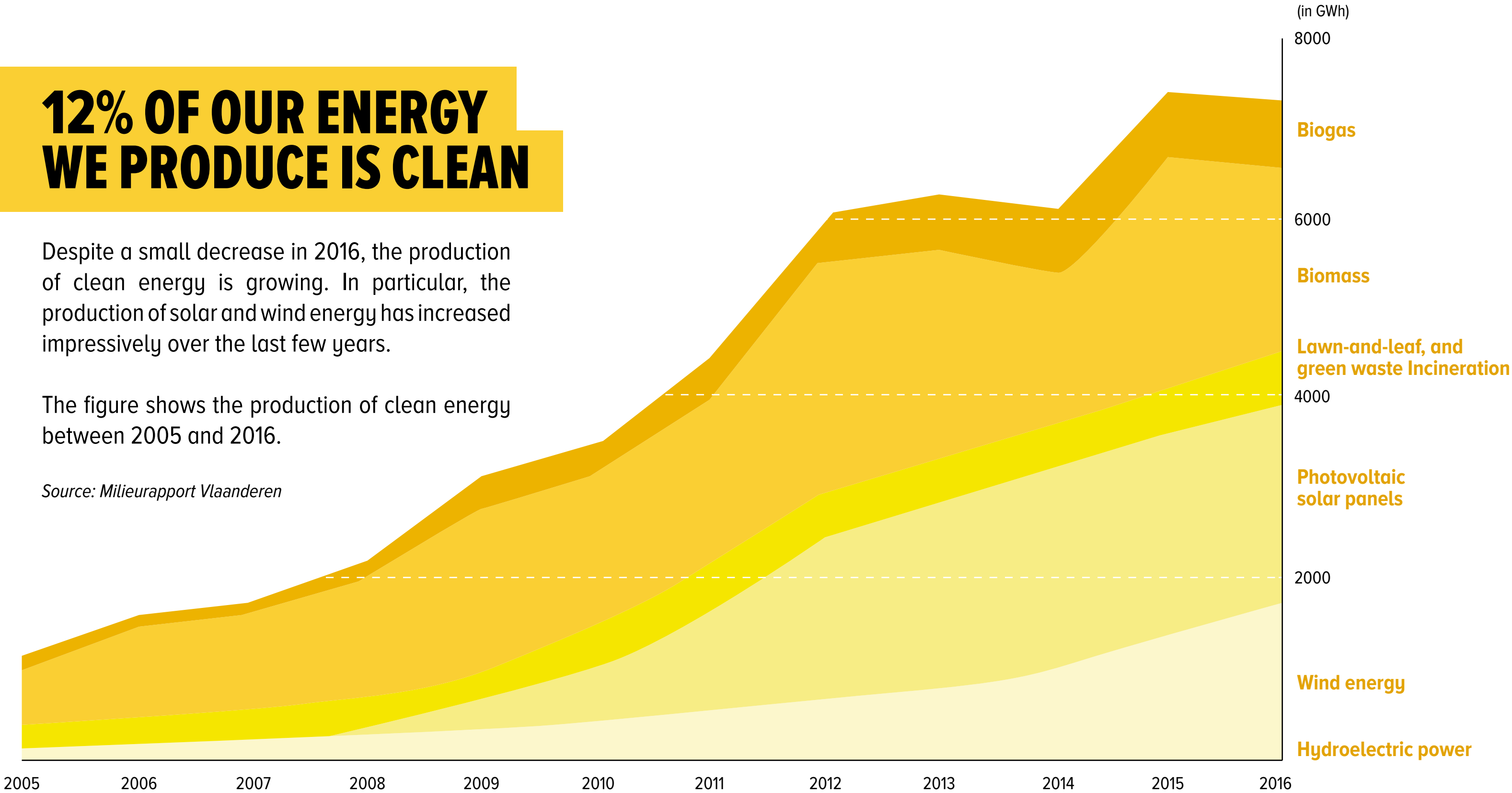


12% OF OUR ENERGY WE PRODUCE IS CLEAN





Despite a small decrease in 2016, the production of clean energy is growing. In particular, the production of solar and wind energy has increased impressively over the last few years.





The figure shows the production of clean energy between 2005 and 2016.





Source: Milieurapport Vlaanderen



ONDERZOEK

OWI Lab and IBN Offshore Energie	
	Pioneering lab in the Port of Antwerp for wind energy, with measure and test campaigns
	State-of-the-art climatic chamber with temperatures from -60 to +60 degrees Celsius
	40 companies (ZF Wind Power, Parkwind, CG Power Systems, DEME GeoSeo, Jan de Nul Group, Nexans, Engie, C-Power,...) and knowledge institutes (Sirris, VUB, UGent, UAntwerpen, ...)
	

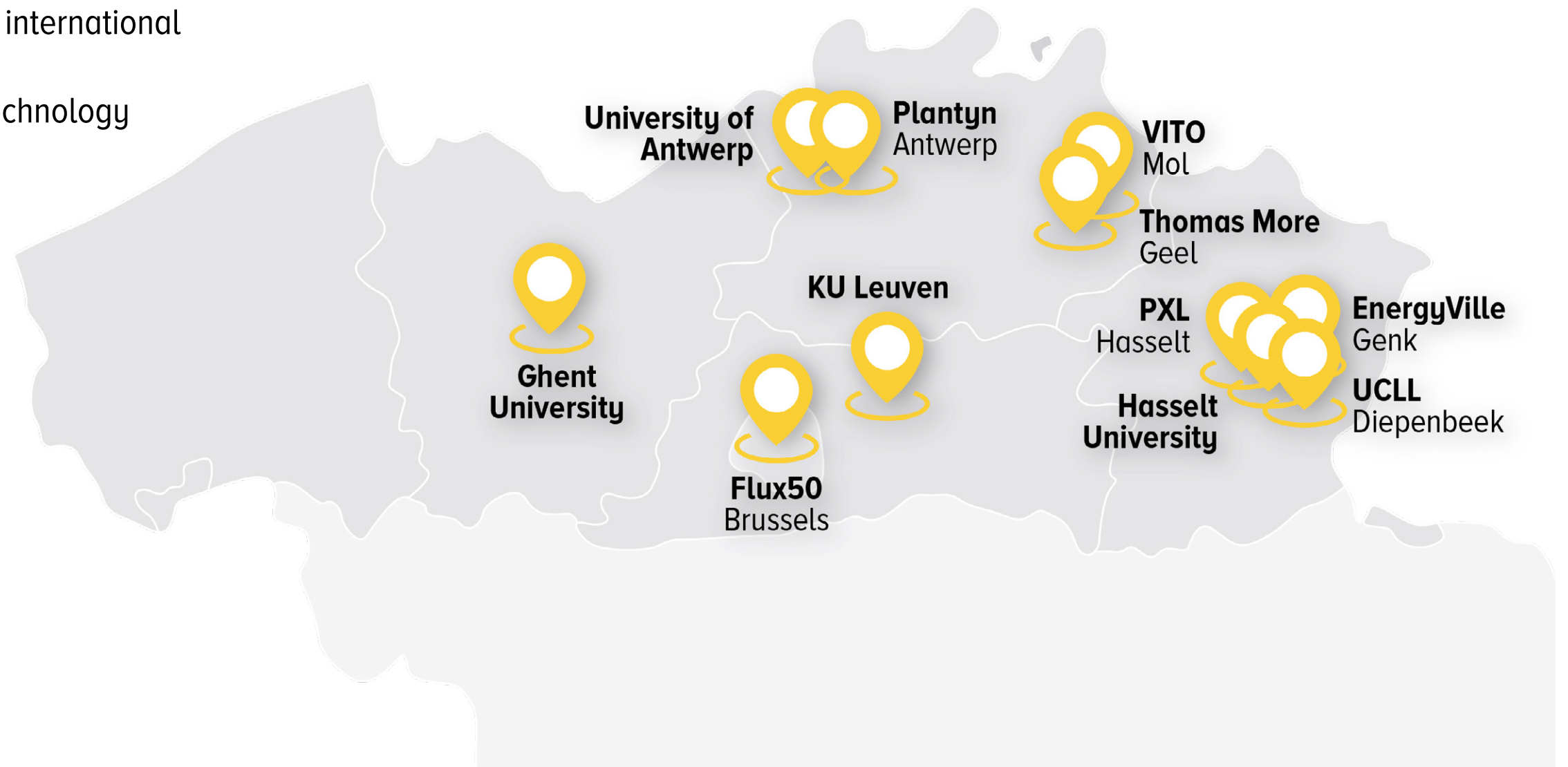
InnoEnergy	
	Investment company in sustainable innovation in energy. Brings together education, research and valorisation
	<ul style="list-style-type: none">• Renewable energy• Smart grids• Smart and energy efficient buildings• Energy storage
	Clusters top organisations from 8 countries: Belgium, Germany, France, the Netherlands, Poland, Portugal, Spain and Sweden
	

EnergyVille	
	Flemish research institute in sustainable energy. Provides expertise to industry and public authorities
	<ul style="list-style-type: none">• Energy storage• Smart and energy-efficient buildings• Smart grids• Renewable energy
	4 knowledge institutes: KU Leuven, VITO, imec, UHasselt
	

KNOWLEDGE VALORISATION

Belgium's expertise is valuable for international valorisation, in particular for:

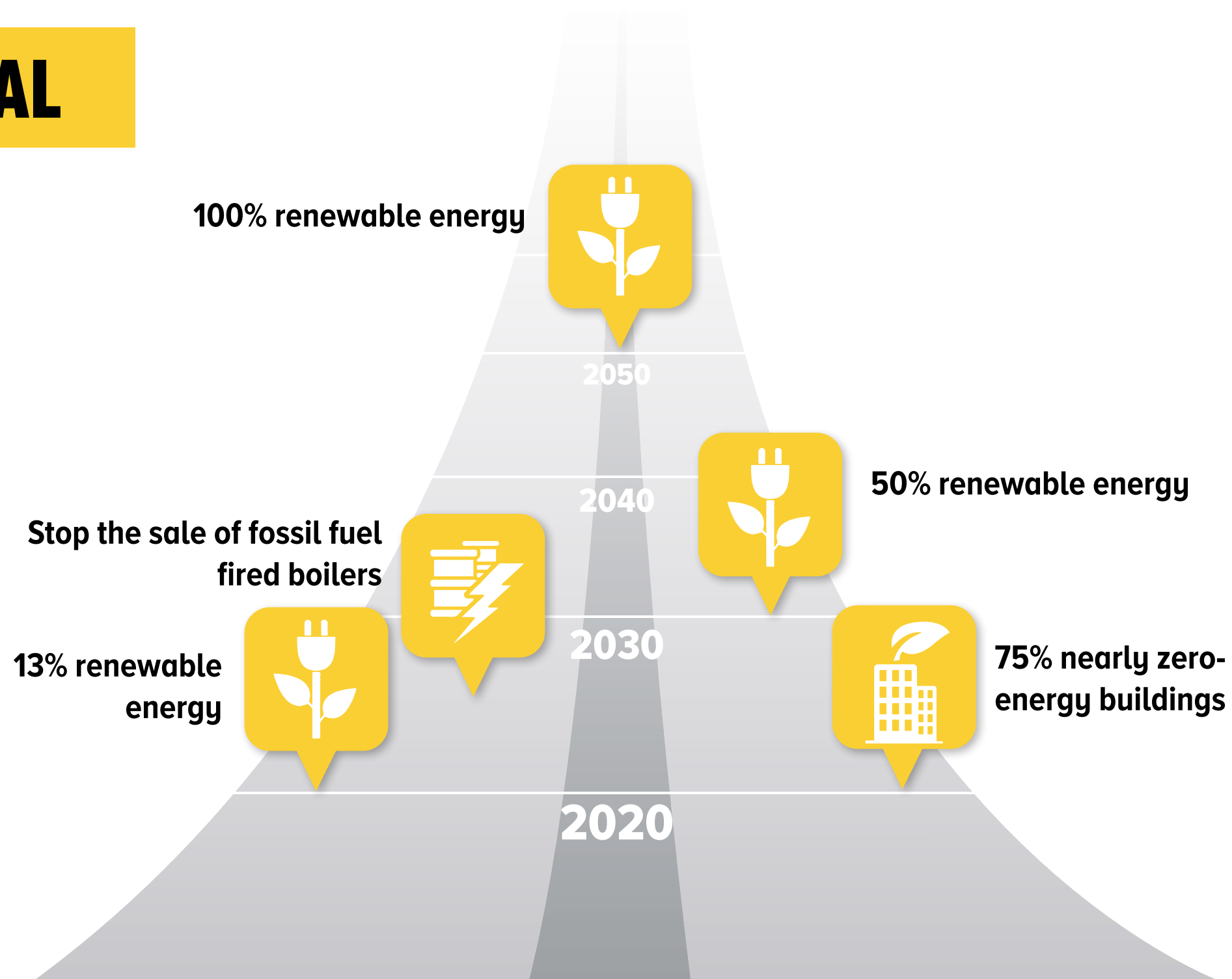
- Storage of energy and battery technology
- Energy efficiency in construction
- Smart grids
- Renewable energy



100% ENERGY NEUTRAL IN 2050

Flanders' ambition is clear. In order to achieve zero carbon energy by 2050, also short-term targets are set.

Source: 3de Vlaams Actieplan Energie





MATERIALS

CASES

ACHIEVEMENTS

TRENDS

RESEARCH

ECOSYSTEM

AMBITION

RECYCLING 800,000 TONS OF PVC IN 2020

Deceuninck designs sustainable building materials for innovative building solutions for, inter alia, windows, doors, exterior applications, roofline & cladding, and interior design applications.

It's about low-maintenance materials that save energy during a service life of more than 50 years and are recycled at the end of the cycle. In this way Deceuninck's solutions achieve the lowest possible ecological footprint.

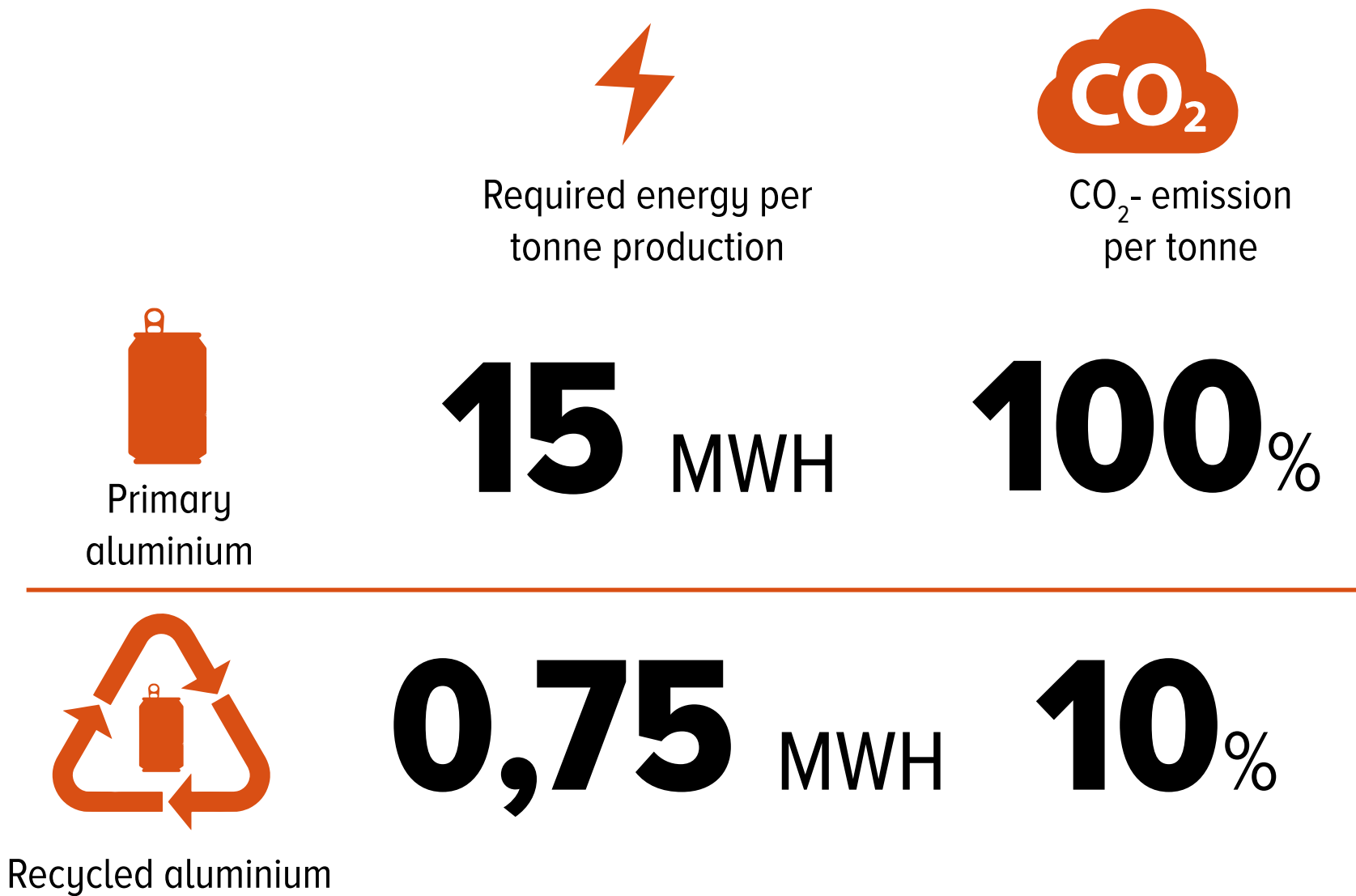
In 2020 the entire PVC-producing industry in Europe will be processing 800,000 tons of PVC annually.



CLOSED-LOOP SYSTEM FOR ALUMINIUM

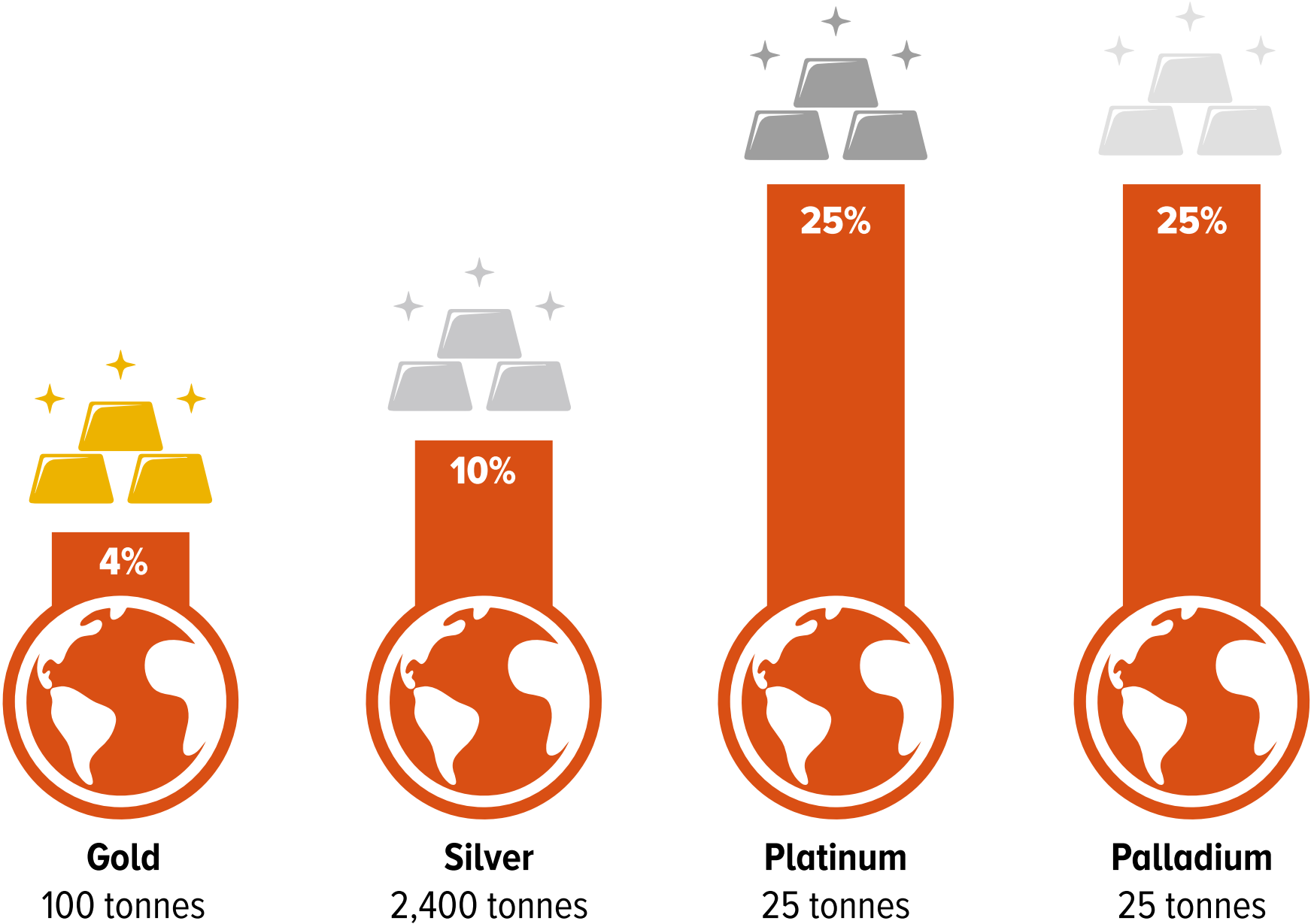
E-MAX strives to be the leader in processing recycled aluminium in Western Europe.

Usually the exploitation of aluminium requires a lot of energy. Moreover, it causes severe environmental stress. E-MAX consciously decided to choose recycled aluminium that is qualitatively equivalent to primary aluminium.



50% OF CHEMICAL ELEMENTS ARE BEING RECYCLED

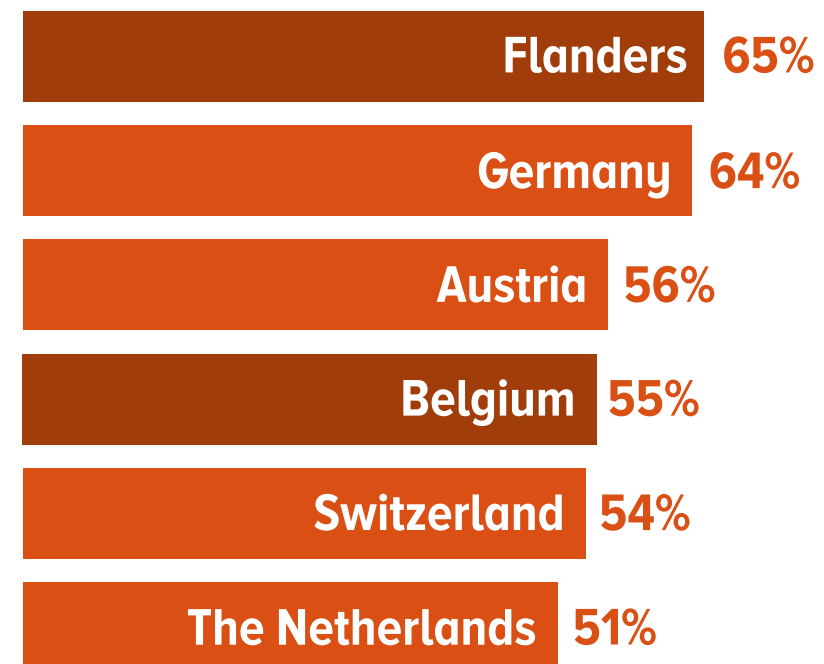
In Flanders, companies recycle 50% of the 118 chemical elements of the periodic table. Flanders is front-runner in recycling precious metals, such as gold, silver, platinum and palladium. No less than 25% of the global production of platinum and palladium is being recycled in Belgium. For gold and silver that is 4% and 10%, respectively.



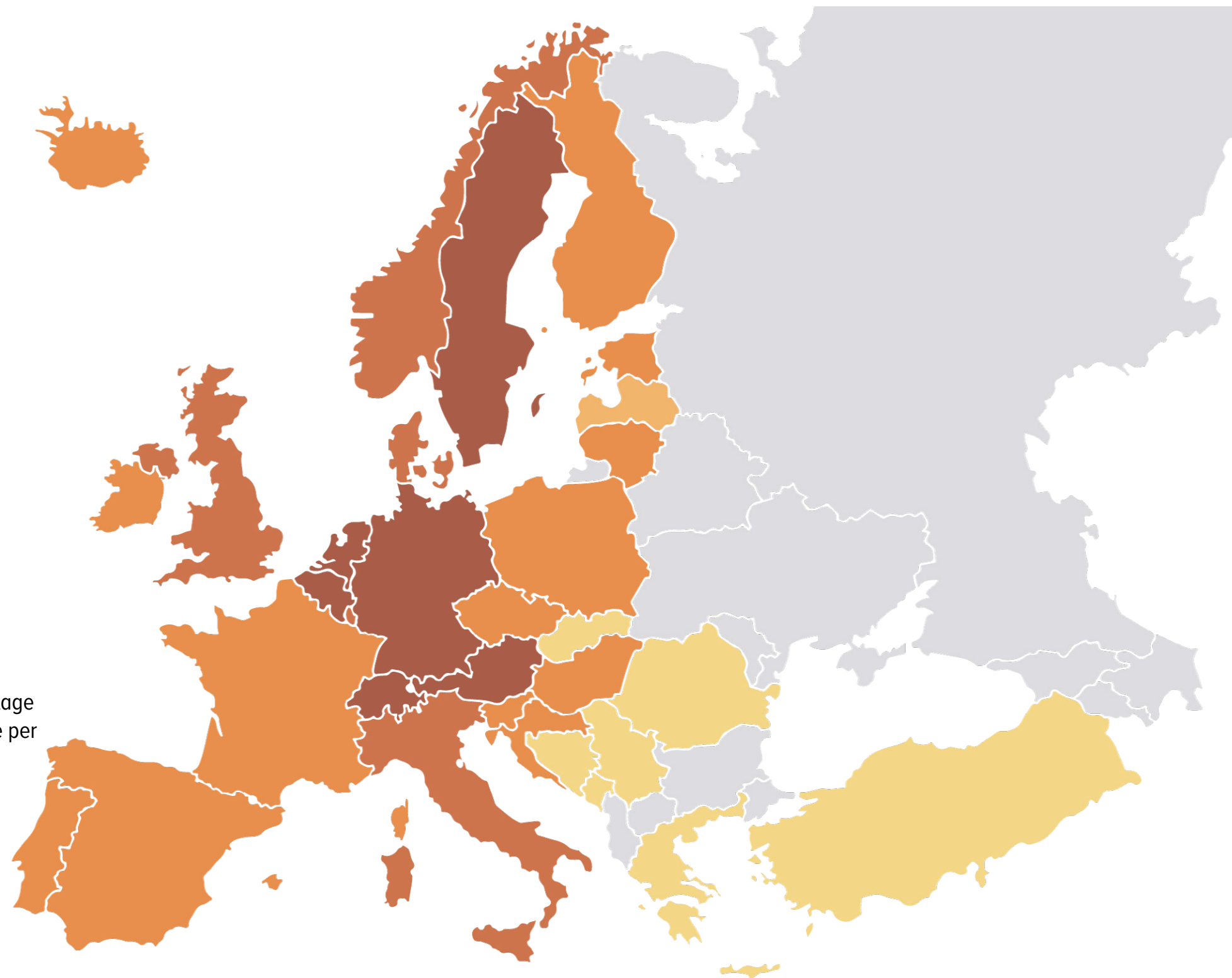
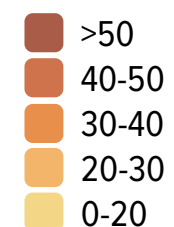
RECYCLING CHAMPION DOMESTIC WASTE

With a recycling percentage of 65%, Flanders is the absolute European recycling champion in domestic waste.

Source: European Environmental Agency



Recycling percentage
of domestic waste per
country



WASTE IN FLANDERS

In Flanders, on average 468 kilos of domestic waste per capita is produced annually.



3,029,728 tonnes
domestic waste

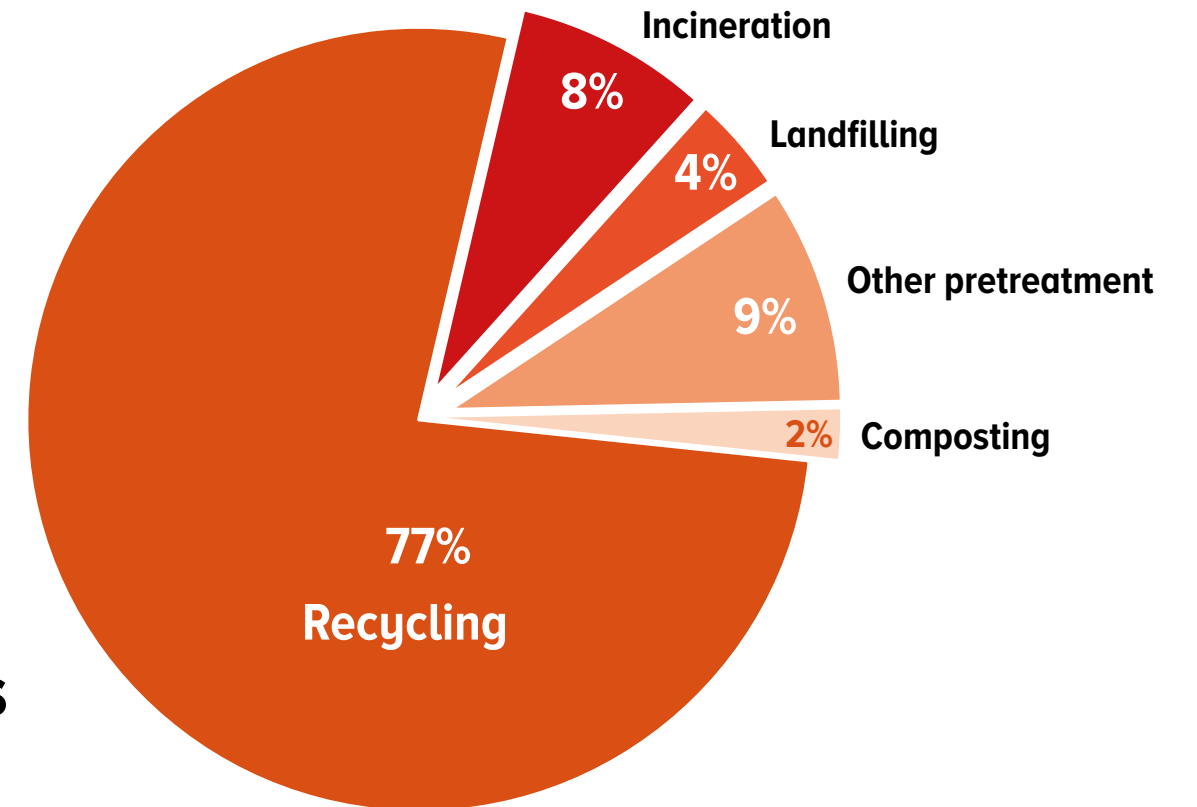


468 kilos
domestic waste
per capita











13,911,000 tonnes
industrial waste

77% of the **industrial waste is being recycled**. What happens with the waste?



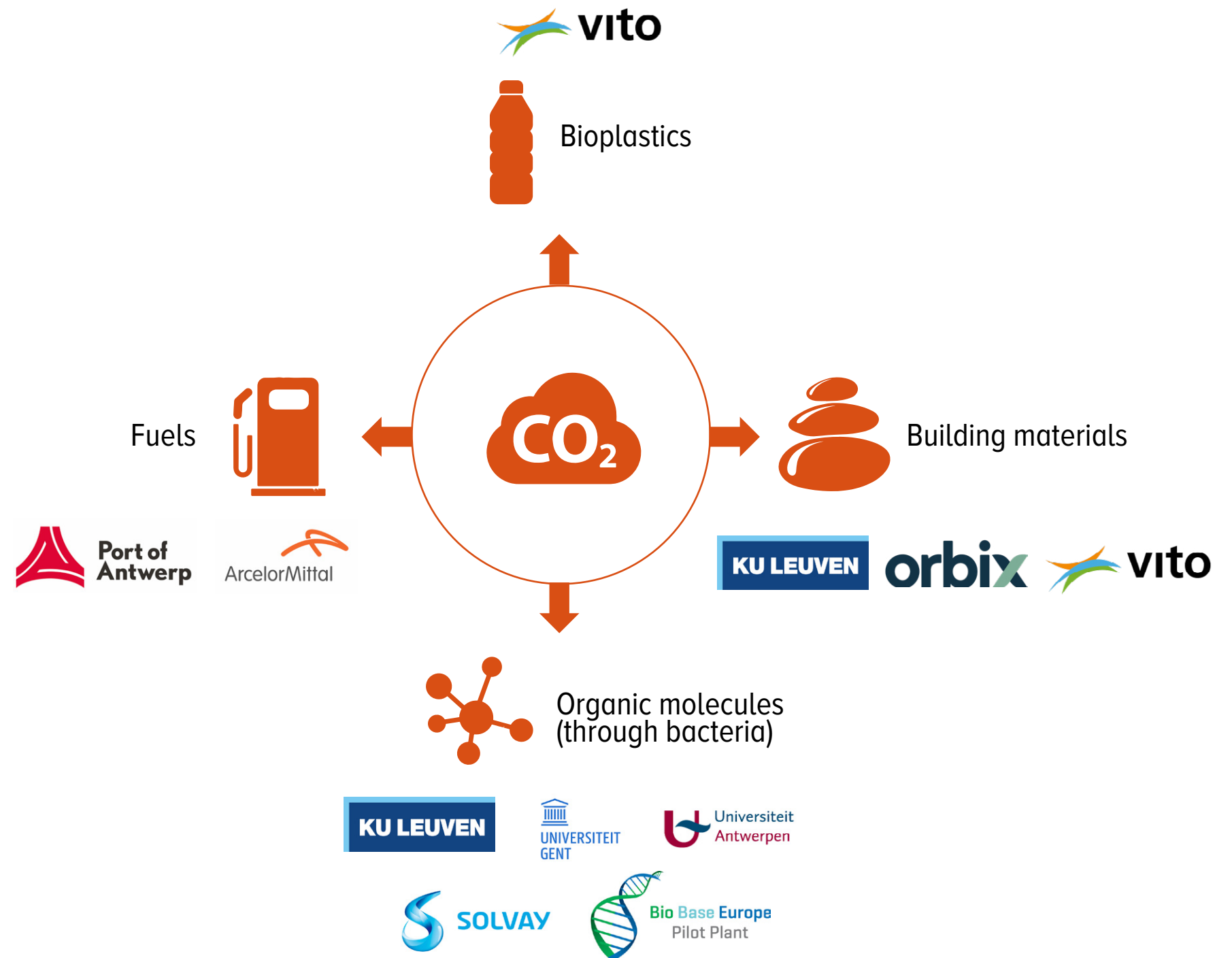
RESEARCH

ETC/WMGE		SOLVOMET	
	European Topic Centre on Waste and Materials in a Green Economy: information and expertise in circular economy		KU Leuven's Centre for Solvometallurgy: innovative technologies to recycle critical and economically important metals
	<ul style="list-style-type: none">• Waste management• Sustainable economy• Efficient transition to a European circular economy		<ul style="list-style-type: none">• Solvometallurgical recovery of metals from mining waste, ores, processing residues, and electronical waste• Recovery of metals from liquid waste streams• Solvent extraction processes
	VITO (Belgium), OVAM (Belgium), CENIA (Czech Republic), CSCP (Germany), IRCrES (Italy), SEEDS (Italy), VTT (Finland), World Spotlight (United Kingdom) and Wuppertal Institut (Germany)		Partner in 10 European projects in, amongst others, Germany, England, Italy, Norway, Slovenia, Spain, Sweden and Switzerland
			

CO₂ VALORISATION

CO₂ is a greenhouse gas that is released in the atmosphere, amongst others, by the burning of fuels. The greenhouse gas plays an important role in global warming and climate change. Since a few years, various techniques have been developed to transform CO₂ as a raw material into building materials, fuels and different chemicals. In this way the CO₂ circle is closed.

Source: Departement Leefmilieu, Natuur & Energie

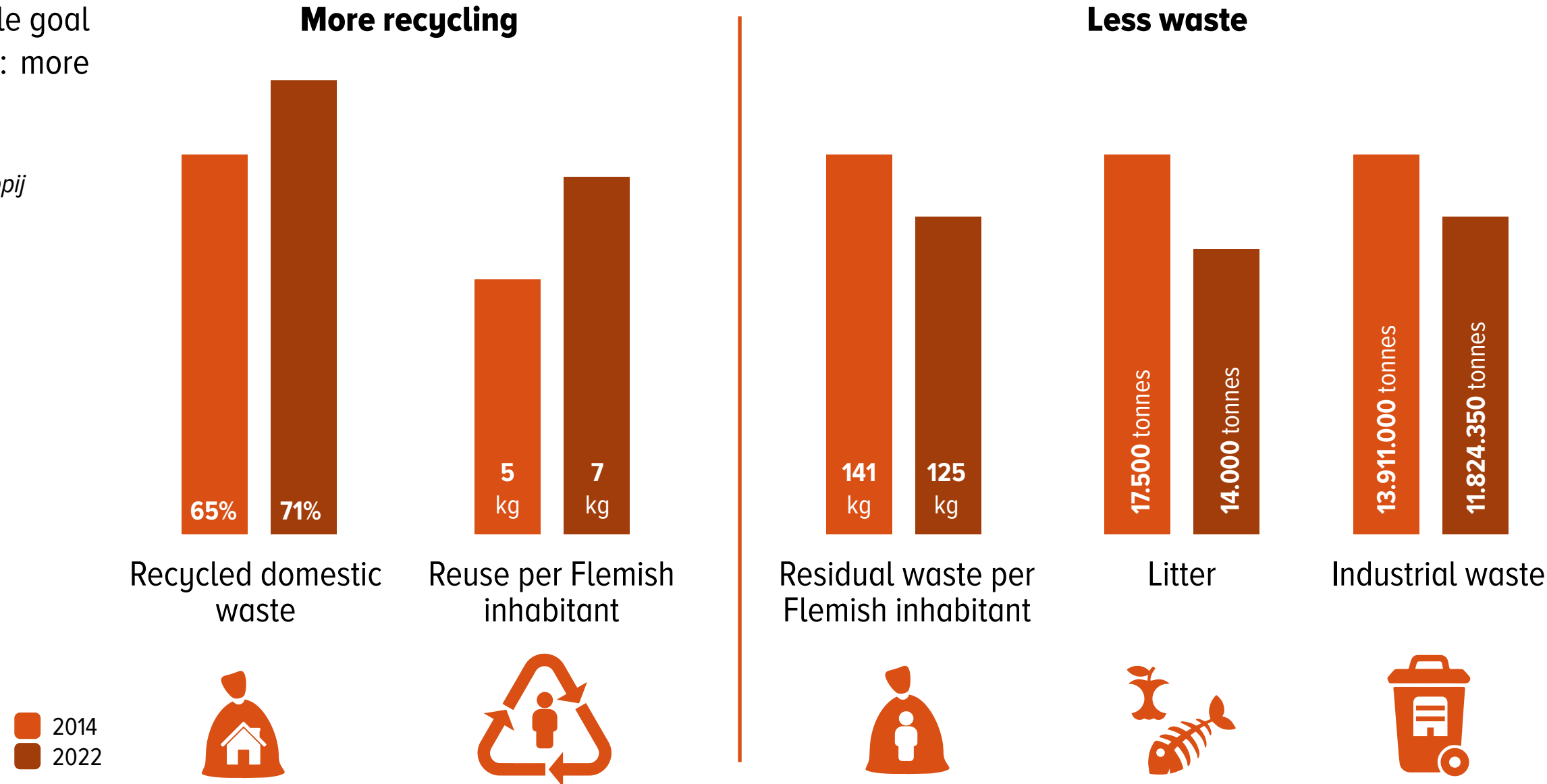




MORE RECYCLING AND LESS WASTE

Flanders is committed to a double goal to reduce the amount of waste: more recycling and less waste.

Source: Openbare Vlaamse Afvalmaatschappij





MOBILITY

CASES

ACHIEVEMENTS

TRENDS

RESEARCH

ECOSYSTEM

AMBITION

HYDROGEN-POWERED TRUCKS

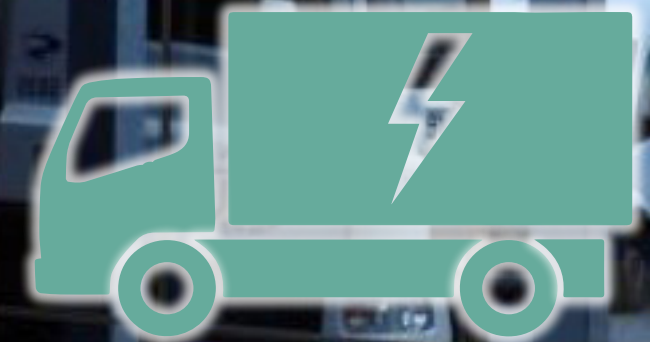
E-Trucks Europe, a company producing electric trucks, is building a factory in Lommel for the production of hydrogen-powered trucks. Four billion euro is being invested, and will lead – in the long term – to dozens of new jobs. The new factory, unique in Europe, will produce, at full capacity, about 50 hydrogen-powered trucks a year.

Hydrogen-powered trucks are a very tiny slice of the clean vehicle market, due to its price tag which is still three times higher than that of a conventional truck. Nevertheless, it is a very interesting niche product for organisations, public administrations and companies wanting to play a leading role in ecological mobility.



4

million investments



50

hydrogen-powered trucks a year

SMART CHARGING OF ELECTRIC VEHICLES

Enervalis' smart technology makes it possible to provide 100% renewable and locally produced energy to cars, without putting extra stress on the power grid. The software brings the charging behaviour of the electric vehicle closely into line with the availability of renewable energy.

Furthermore, this technology makes it possible to meet the target to get more electric vehicles on the road. A cross-sectoral cooperation between cars, charging stations and energy generation.



The charging of electric vehicles is brought closely into line with the consumer's behaviour and the availability of renewable energy.

SUSTAINABLE LEASING

Athlon, one of the biggest players in car leasing, is contributing to a more sustainable leasing market. In Belgium, Athlon was the first leasing company to offer a full-service vehicle leasing contract to its clients.

For FlexDrive, Athlon won the “International Fleet Industry Award” in 2014. In this concept clients who choose a more sustainable car are offered various additional options such as a removal van, the installation of a bike rack or a rental car awaiting them at the airport when travelling abroad.

With Car2Use, Athlon offers employees business car sharing. Thanks to the Car2Use mobile app they can easily book and open the car.

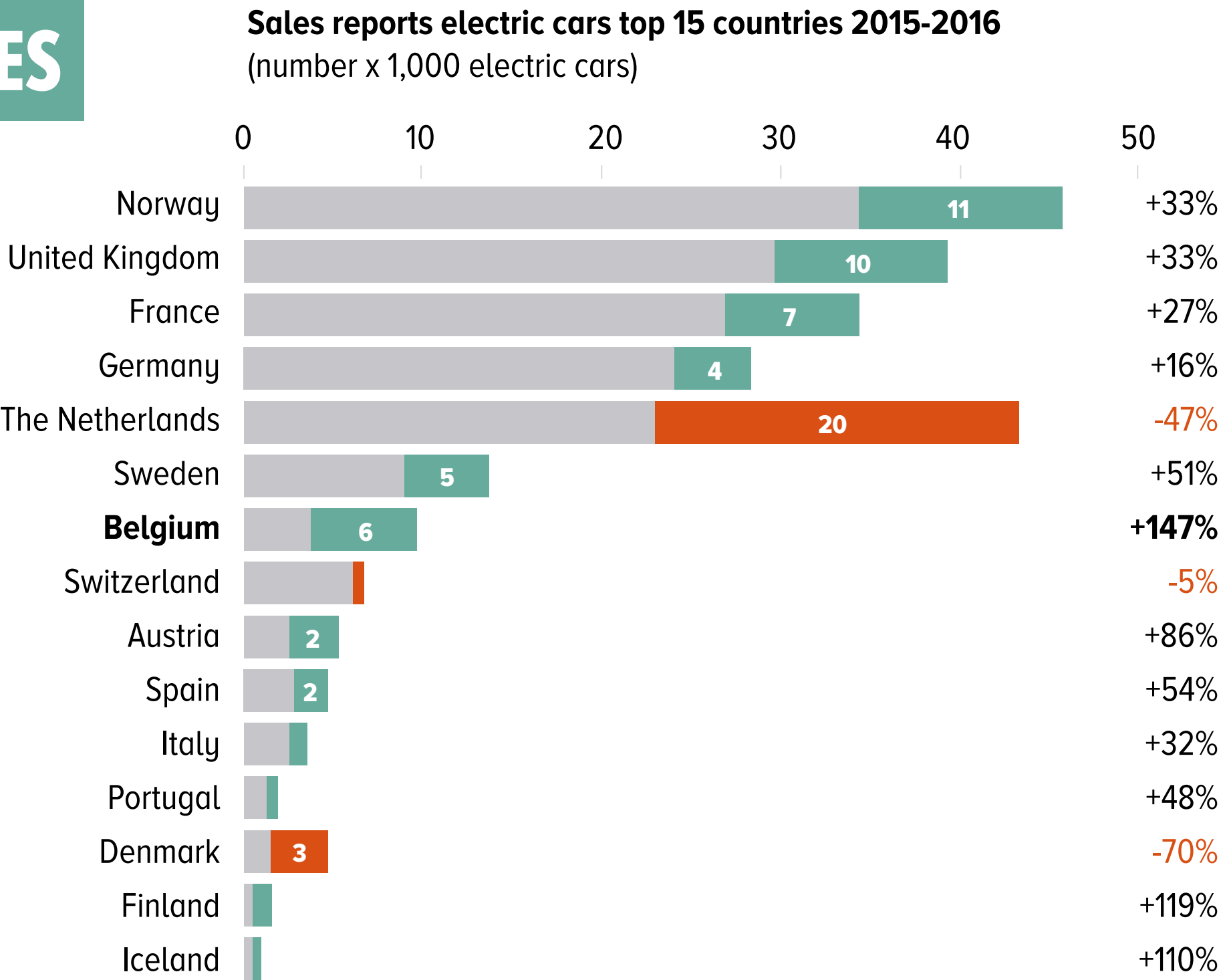
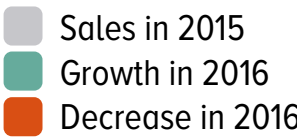


GROWTH CHAMPION SALES ELECTRIC CARS

The sales of electric cars in Belgium increased in 2016 by 147% compared to 2015. That makes Belgium percentage-wise the biggest climber in Europe's top 15. In total 10,000 electric cars have been sold. Norway tops the European sales of electric cars with 46,000 cars.

Electric cars in Belgium accounted for 1.6% of the total vehicle fleet. That puts Belgium in sixth position in Europe, behind Norway (24%), the Netherlands (5%), Iceland (4.2%), Sweden (3.2%) and Switzerland (1.8%).

Source: EVvolumes.com

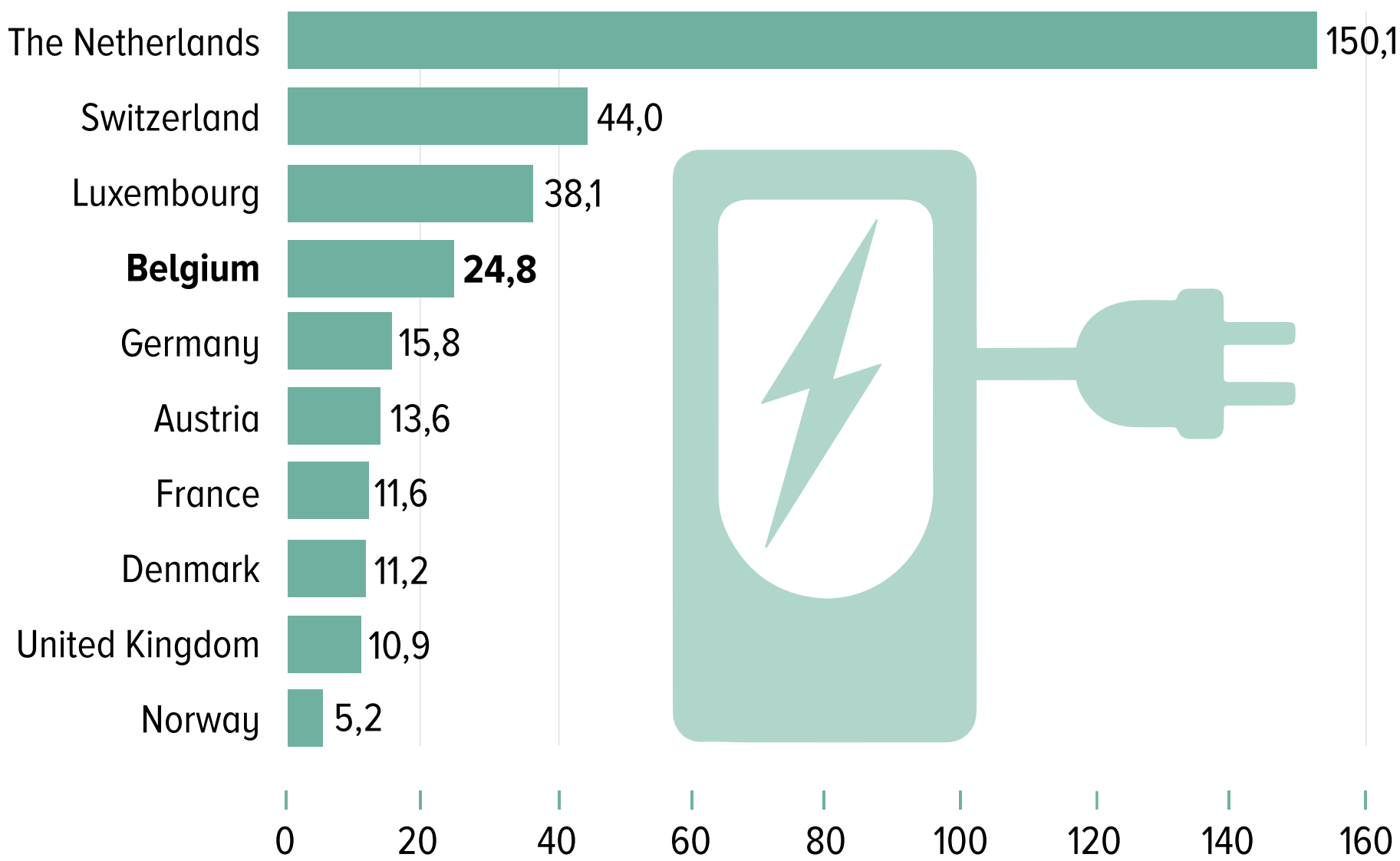


OVER 20 CHARGING STATIONS PER 1,000 SQUARE KILOMETRES

Belgium is investing strongly in future mobility. The construction of a dense charging infrastructure will make it very easy for electric cars to cross the country. Belgium already has 20 charging stations for electric cars per 1,000 square kilometres, putting our country in fourth position in Europe.

Source: EVvolumes.com

Top 10 charging stations per 1,000 square kilometres in Europe



MAKING INLAND WATERWAYS MORE SUSTAINABLE

Shipping emissions have a negative impact on the environment in urban areas around inland waterways. Within the project Clean Inland Shipping (Clinsh) Dutch, Belgian, German and English governments are working together with knowledge institutes and companies to make inland waterway transport greener.

The main objective of the project is to verify whether the alternative fuels and techniques tested on 30 ships emit less harmful substances. 15 vessels already have an emission-reducing technology installed. In the other 15 vessels an emissions-reducing technology will be installed, or they will be converted to run on an alternative fuel.







EXTENDED BATTERY RANGE

An electric bus has set a new world record by driving 1,772.2 kilometres on a single charge. This was announced by the American company Proterra, specialised in the development of electric vehicles, in September this year. It concerns one of their Catalyst E2 Max buses. The bus was equipped with a battery of 660 kWh and didn't require recharging.

This is a very promising development for vehicles like buses, removal vans and vans, covering mostly small distances in and around cities. Their batteries could easily be recharged at the end of the working day.

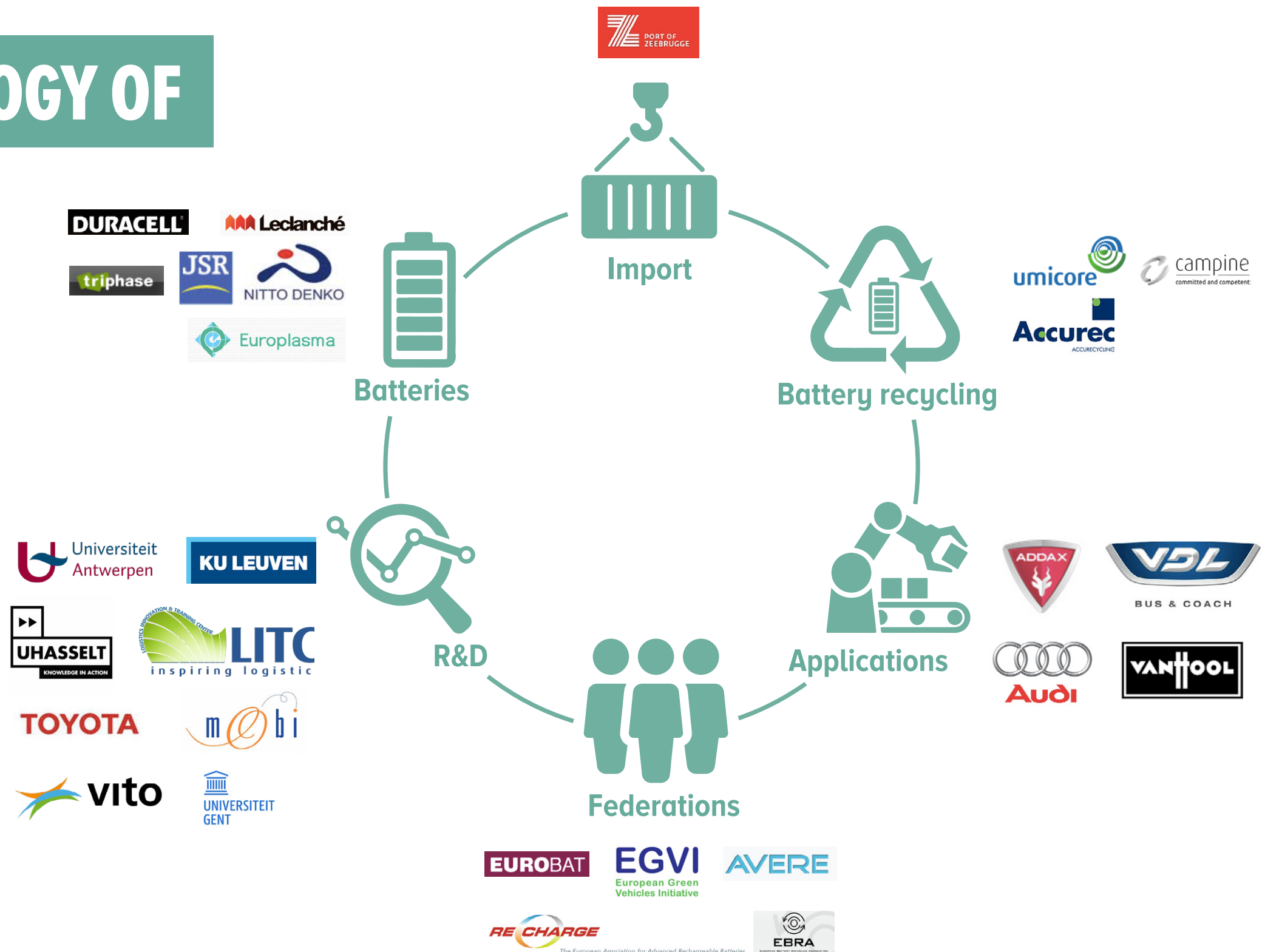


RESEARCH

MOBI	
	Mobility, Logistics and Automotive Technology Research Centre: development and implementation of sustainable mobility and logistics
	<ul style="list-style-type: none">• Electric and hybrid vehicles and drivetrains• Sustainable logistics• Storage of energy through batteries• Mobility choices at the level of individuals and groups
	Multidisciplinary research group of nearly 100 employers
	

BATTERY TECHNOLOGY OF FLANDERS

Creating an ecosystem for sustainable mobility requires a 360° approach, covering the complete chain. From production or import until the dismantling of the batteries. In Flanders, all key players are present for the development of the battery of the future, ranging from the storage capacity and the recycling of rare-earth metals to the use in electric cars.

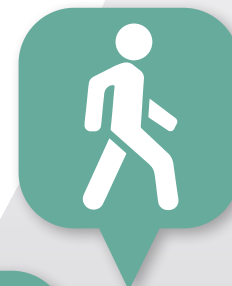


FUTURE MOBILITY

Flanders has set various goals to ensure that the future of mobility is sustainable. By 2030, for example, all new cars should be electric.

Source: Mobiliteitsplan Vlaanderen

40% sustainable commuting (public transport, on foot or by bike)

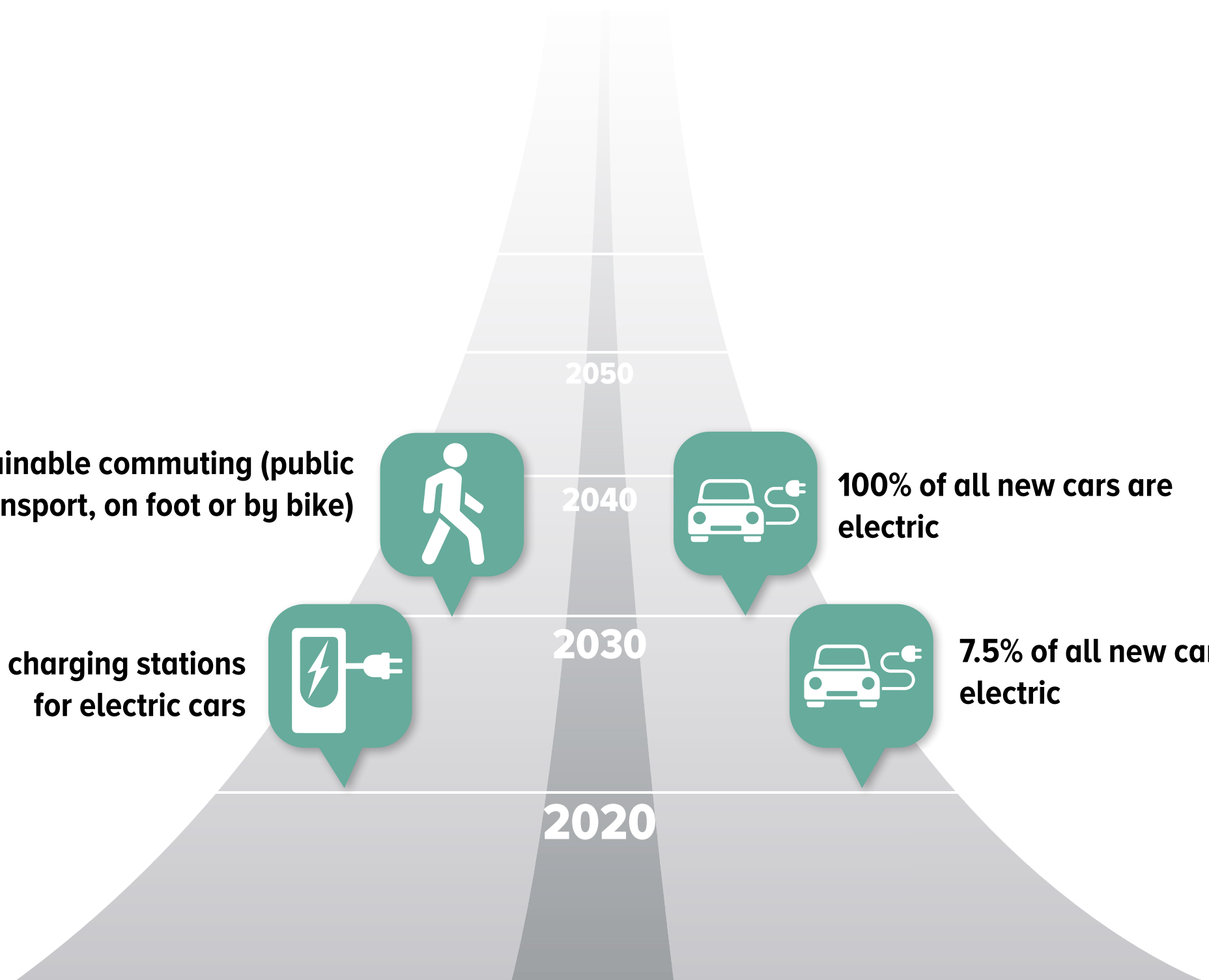


100% of all new cars are electric

7,400 charging stations for electric cars



7.5% of all new cars are electric





WATER

CASES

ACHIEVEMENTS

TRENDS

RESEARCH

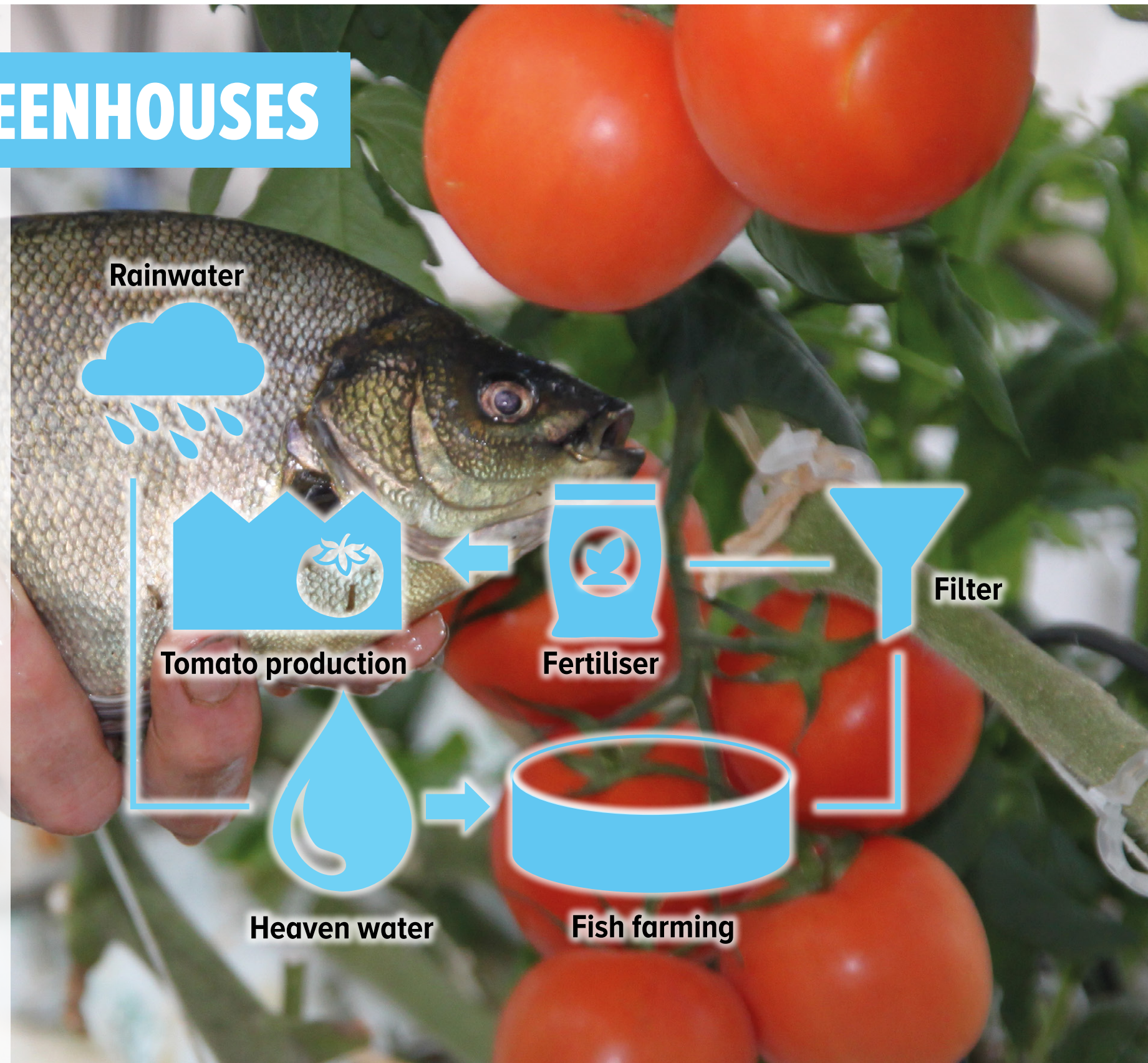
ECOSYSTEM

AMBITION

WASTE HEAT OF TOMATO GREENHOUSES FOR SUSTAINABLE FISH

On the Stokstorne site in Kruishoutem Aqua4C and Tomato Masters exchange water, nutrients and energy in a unique recirculation system. The omega perches of Aqua4C are being farmed in the rainwater that is being intercepted by the greenhouses of Tomato Masters. The waste heat of the tomato greenhouses is then used again to heat the water of the fish farm. On top of that, the nutrient rich water, leaving the fish tanks with the fish faeces, is used as organic fertiliser for the tomato plants.

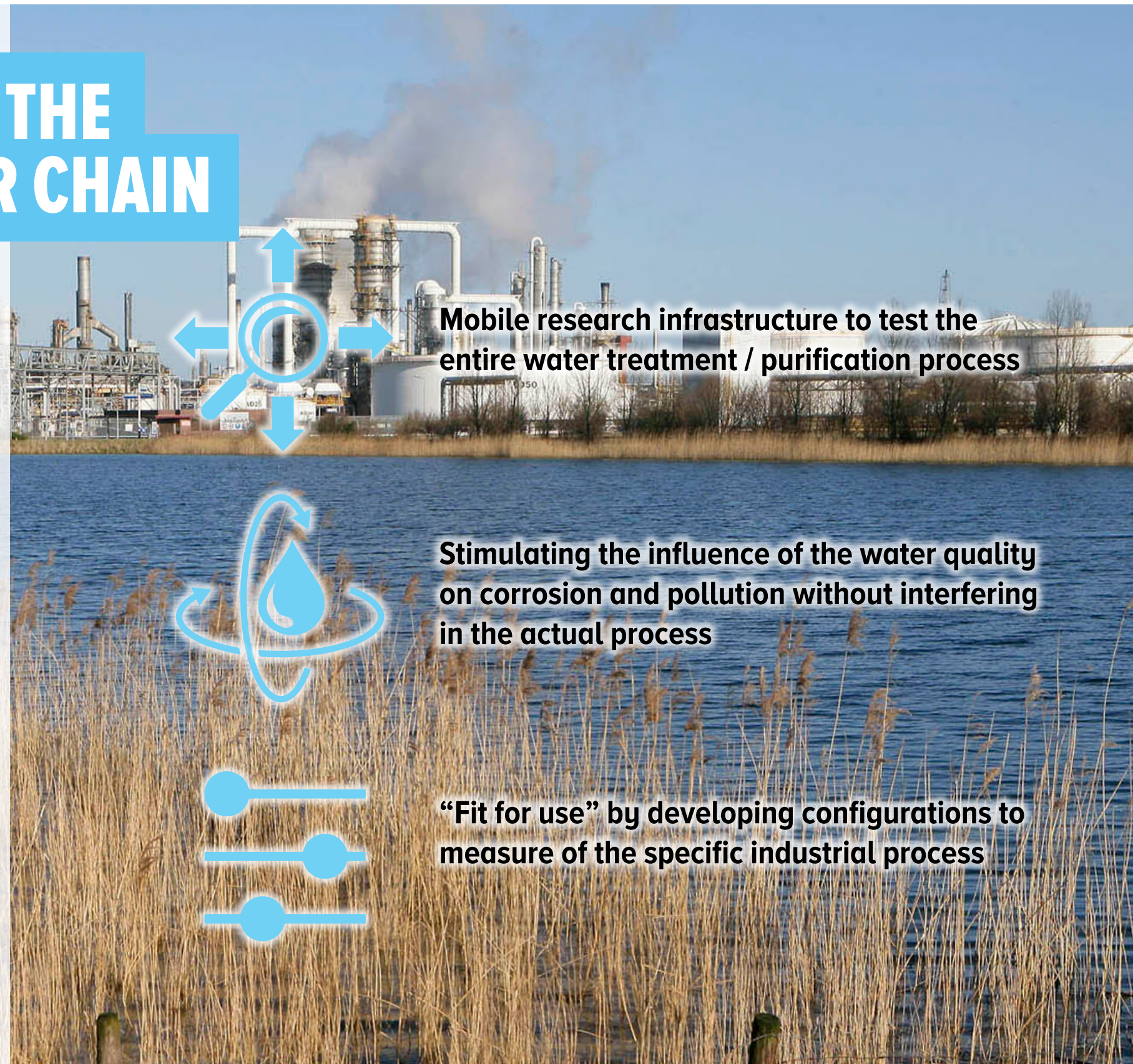
When the final tests prove to be successful, the waste water of the fish farms will be directly added to the tomatoes and the cycle will be completed. At that point, this will be the very first aquaponics installation on a commercial scale in Belgium.



SUSTAINABLE APPROACH TO THE INDUSTRIAL PROCESS WATER CHAIN

IMPROVED stands for Integral Mobile PROcess water supply for an Economic Delta and targets the building and testing of an easily transportable research installation.

Process water is, until now, often made of groundwater or (sweet) surface water. This project explores whether it is possible to also upgrade other types of water, like brackish water and waste water, to process water of the right quality. When this research is successful, the closure of the water cycle will be improved and the industrial sweet water demand will diminish. To meet this goal, a new mobile infrastructure is being designed, built and applied/tested by various big industrial water users such as DOW, Yara and BASF.



Mobile research infrastructure to test the entire water treatment / purification process

Stimulating the influence of the water quality on corrosion and pollution without interfering in the actual process

“Fit for use” by developing configurations to measure of the specific industrial process

FROM WASTE TO ENERGY, FERTILISER AND CLEAN WATER

Redeveloping brownfield as modern residential areas, compliant to 21st century requirements, is no sinecure. Project developer Re-Vive invests fully in the redeveloping of abandoned industrial sites into futureproof urban neighbourhoods, led by two key values: innovation and sustainability.

On the Nieuwe Dokken site, the residents' waste water and fruit and vegetable waste will be used to produce biogas, fertilisers, heat and process water. The polluter is not only paying here, he also gets paid.

Residents can, through a sustainability cooperation, invest in and earn from the new urban development.

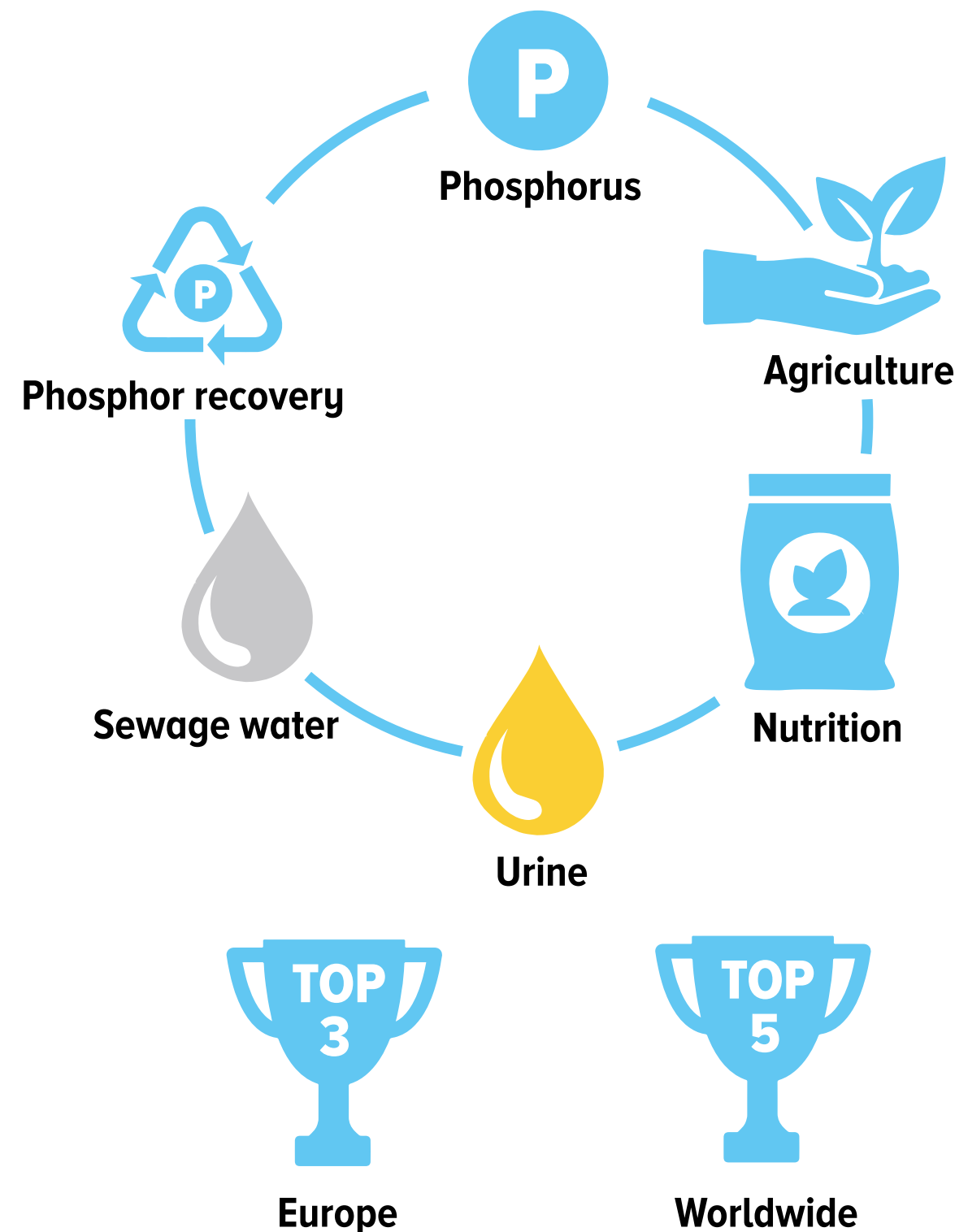


FLANDERS IN TOP 5 PHOSPHORUS RECOVERY

Through fertilisers in crops phosphorus ends up in human nutrition. People are releasing the nutrient into the urine and in this way, every day phosphorus flows in waste water treatment plants. Phosphorus plays a vital role in the nutrition of all plants.

Phosphate rock reserves are non-renewable and the demand is still increasing. This threatens to cause a phosphorus shortage in the short term, which will have big consequences for food production. Moreover, 90% of all phosphate rock reserves are controlled by only 5 countries (mainly the U.S.A., China and Morocco). This urges the necessity to reuse the valuable phosphorus as much as possible.

Belgium has 6 installations, of which 5 are located in Flanders. Thus featuring in Europe's top 3 and the world's top 5 ranking.



WATER SCARCITY IN FLANDERS

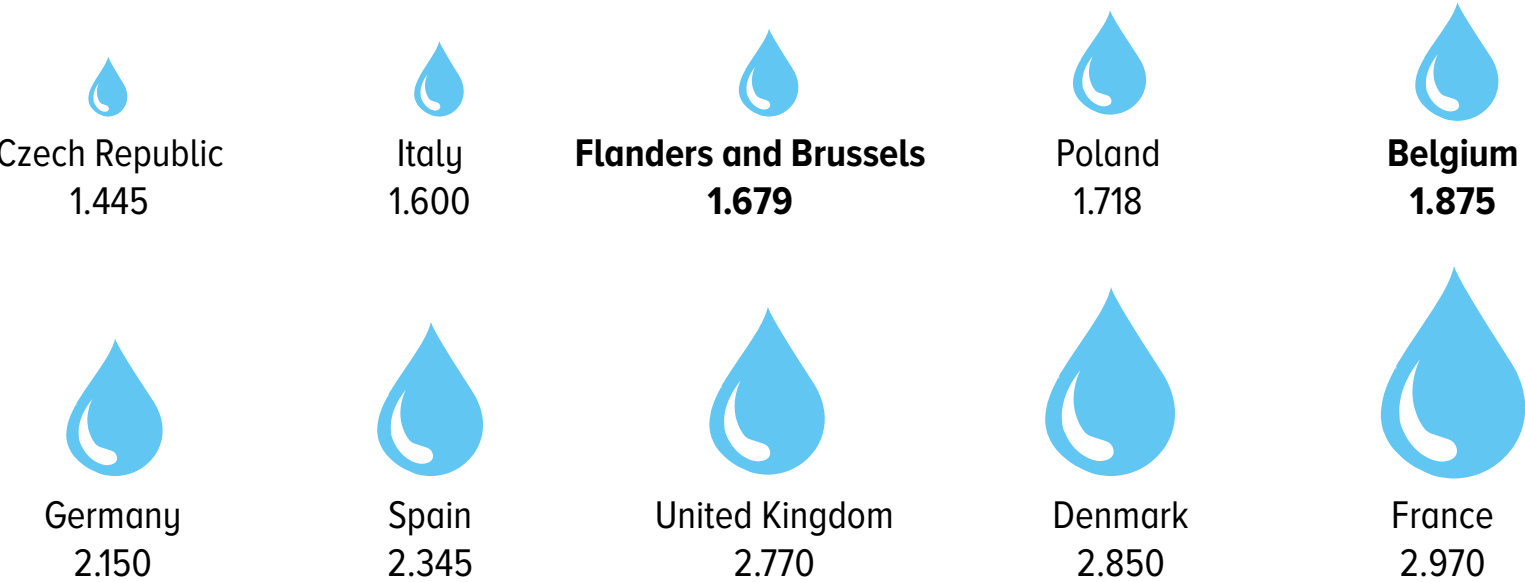
Today, Flanders is already one of Europe's regions with a high water scarcity. Despite the shortage of water availability, the water demand will increase by 50% by 2050. If we don't intervene, 1.4 million people won't have access to drinkable water. Also industry and companies will struggle more and more to gain access to water.

That is why Flanders is strongly investing in a robust water system that is capable of arming our region against (climate) shocks. At the same time, it calls for investments in smart technologies, accurate prediction models and alert systems.

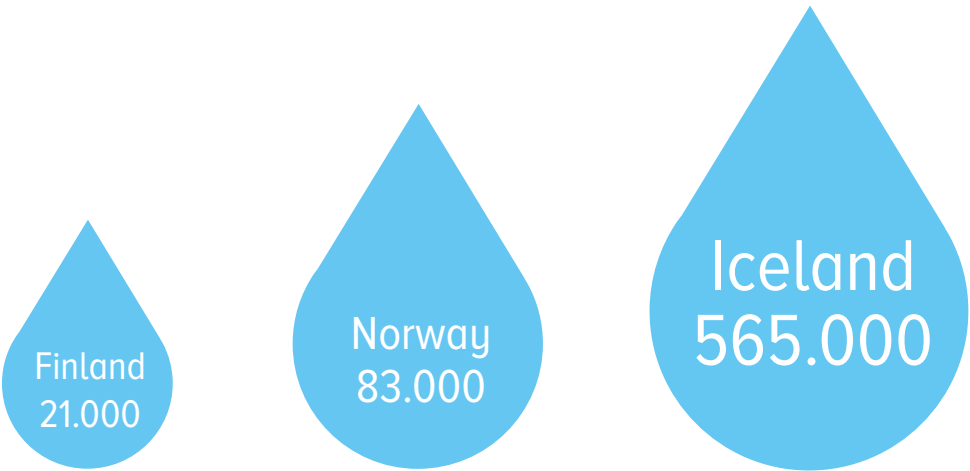
Source: OESO

Availability of water in Europe per cubic metre per inhabitant

10 countries with the lowest water availability in Europe







3 countries with the highest water availability in Europe



RESEARCH

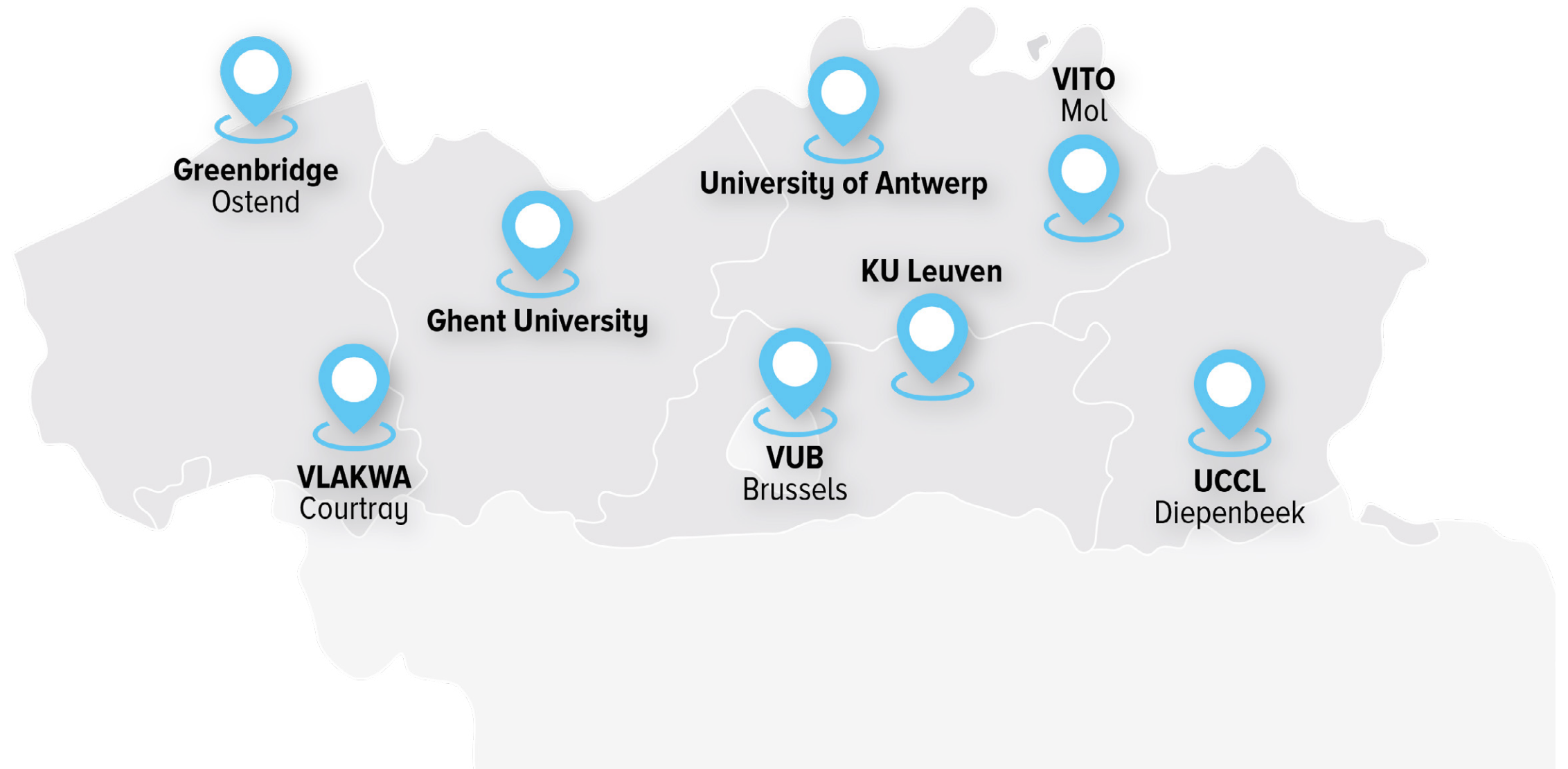
CES&T	
	Centre Environmental Science & Technology: central research platform with a strong focus on sustainable water technology.
	<ul style="list-style-type: none">• Production and treatment of process water and waste water for SMEs and NGOs• Multidisciplinary integration of research initiatives linked to industrial and political demands in the field of circular economy• Water treatment technology for development countries• Micropollutants in water
	Cooperation of various UGent research groups
	

Belgian Membrane Group	
	Innovation alliance between research centres and industry focussing on the development of membrane technology, with a strong focal point on water sanitation.
	<p>Development of ceramic and polymer membranes</p> <ul style="list-style-type: none">• Membrane development for:<ul style="list-style-type: none">• Nanofiltration• Reversed osmosis• Membrane distillation• Membrane filtration• Fast membrane screening
	Established by KU Leuven, VITO and TNAV
	

KNOWLEDGE VALORISATION

Belgians expertise can lead to international valorisation, in particular in the fields of:

- Water purification
- Smart (water) grids
- Prediction models and alert systems
- Water treatment, conditioning and reuse
- Urban development



TOWARDS A ROBUST WATER SYSTEM

Flanders is on its way to a 100% robust water system by:

- Stimulating multifunctional use of water
- Adopting an integral approach to water shortage and flooding
- Minimising damage of water scarcity and flooding

Source: Vlakwa Visie 2050 – Een langetermijnstrategie voor Vlaanderen

