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Co-Creating Smart & Sustainable Cities

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Making urban environments **better places for citizens** and the **planet**

Who we are

A collective of cities working to make being sustainable an easy choice... for everyone

What we do

We test innovative solutions, mainstream viable technologies and explore the products, policies and social engagement to achieve this

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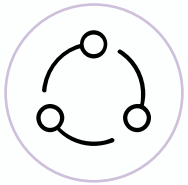
An European funded project fostering **excellence in research & innovation**



Developing **user-demand driven energy** and **mobility services**

Encouraging more **collaborative, effective urban planning and governance**

Validating **business models** and **technical innovations**

Anchored in **3 lighthouse** and **4 fellow cities**

Lighthouse cities:

Utrecht (NL)

Gothenburg (SE)

Nice (FR)

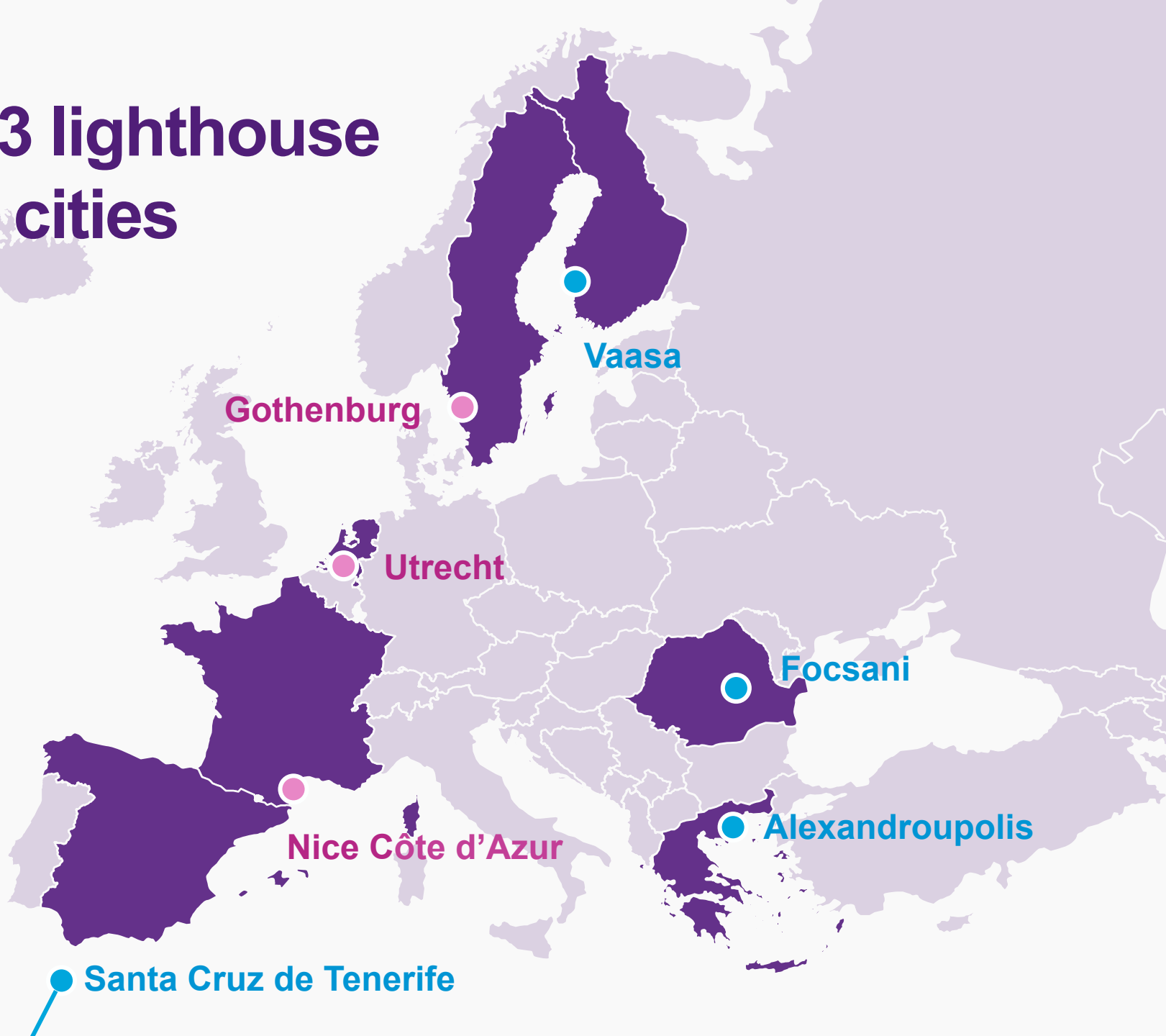
Follower cities:

Vaasa (FI)

Focsani (RO)

Alexandroupolis (GR)

Santa Cruz de Tenerife (ES)



An international collective **set to grow**

Lighthouse cities:

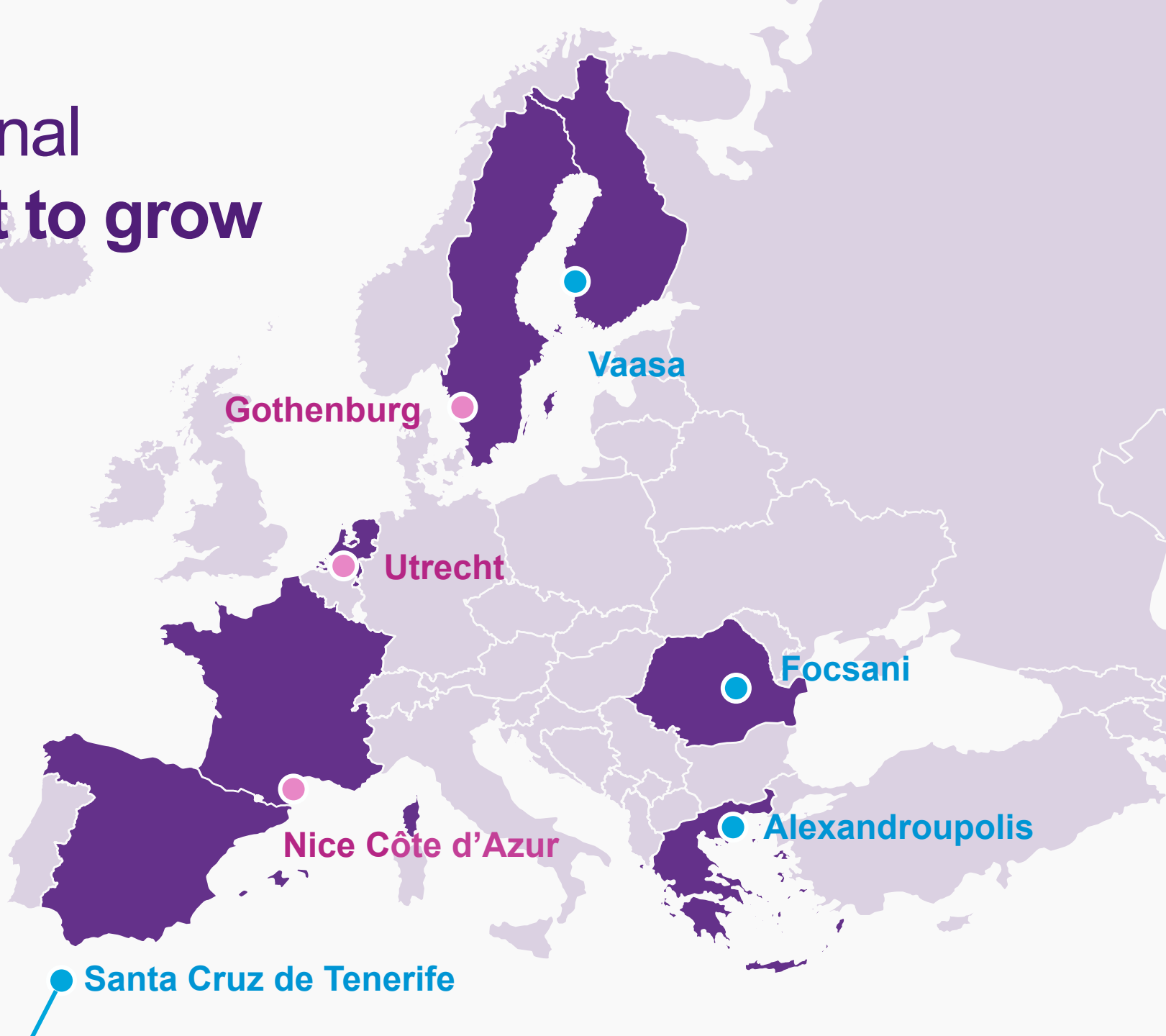
Frontrunners that pilot valuable innovations

Fellow cities :

Learn, mix & match solutions, develop roadmap to implement

Observer cities

Privileged partners accelerating smart city solutions



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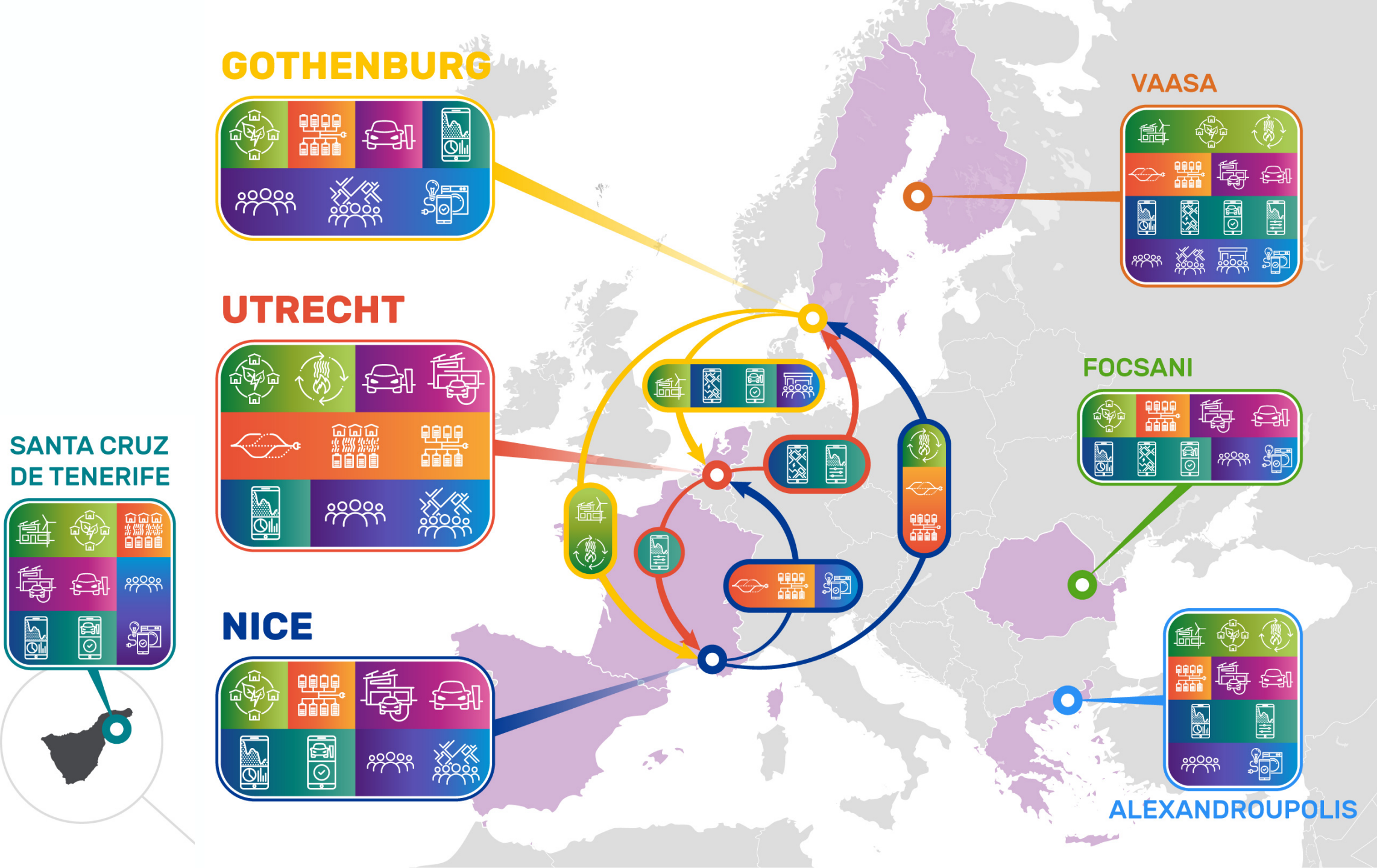

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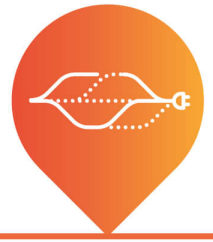
Transition track #1 :
Renewables and energy positive districts


Positive energy buildings

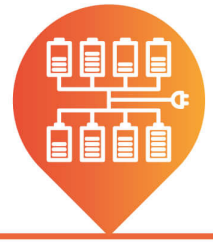

Near zero energy districts


Symbiotic waste heat

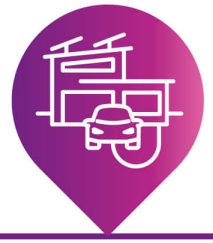
Transition track #2 :
Flexible energy management and storage


Flexible electricity grids


Multi-sourced district heating

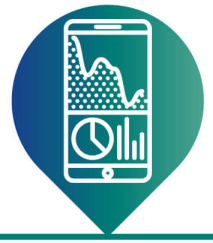

2nd life batteries

Transition track #3 :
Intelligent mobility solutions

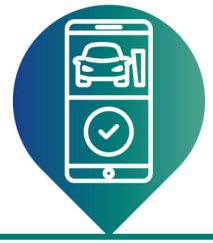

Vehicle-to-grid and smart solar charging

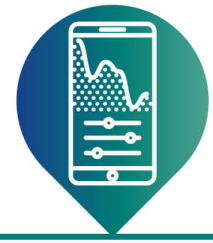

Innovative mobility services

Transition track #4 :
Digital transformation and services


Urban monitoring


City management and planning


Mobility services

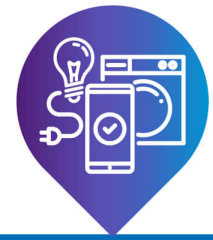

Energy managemer

Transition track #5 :
Citizen engagement & co-creation


Changing everyday energy use


Participatory city modeling


Living Labs


Behaviour changing information

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Transition track #1 :
Renewables and energy positive districts

Transition track #2 :
Flexible energy management and storage

Transition track #3 :
Intelligent mobility solutions

Transition track #4 :
Digital transformation and services

Transition track #5 :
Citizen engagement & co-creation

Smoothing the transition to **smart & sustainable**

- **5 key areas of transition**
- **Bankable** solutions
- **Reducing** technical and financial **risks**
- Giving **confidence** to investors
- **Accelerating successful take** up by society as a whole

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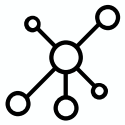
Delivering on **a vision** for **#EUSmartCities**

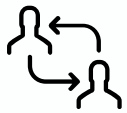
EIP-SCC
European Innovation Partnership on Smart Cities and Communities

Demonstrating innovative smart city solutions to scale that are:



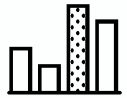
INTELLIGENT

harnessing power of city-wide collected data, IoT and digital literacy



USER-DRIVEN

created with and for citizens



DEMAND-ORIENTED

grow innovation friendly markets based on societal demand

ITC ENABLED

to improve city infrastructure and services

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SMART CITIES AND COMMUNITIES LIGHTHOUSE PROJECTS

H2020 Lighthouse programme: Europe's largest smart city initiative

36 Lighthouse cities

42 Follower cities

78 Cities

386 Partners

88 Public partners

91 Academic partners

207 Private partners

MARKET SHAPING

191M€ uncommited

500M€

309M€ commited

SMART SOLUTION TEST-BEDS

530 Demonstrators

137 Energy

23 Infrastructures

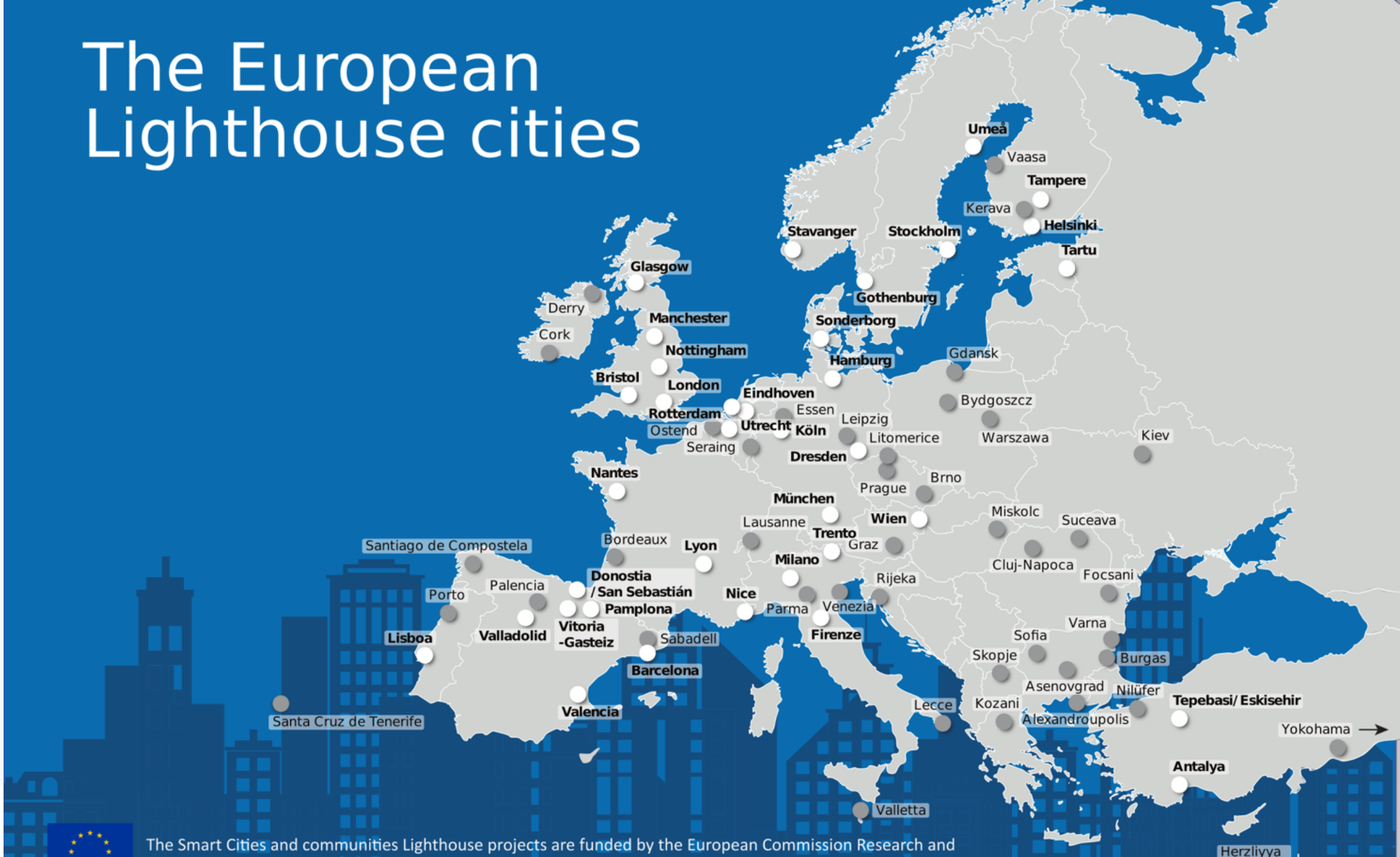
128 Mobility

100 ICT

24 Housing

The Smart Cities and Communities lighthouse projects are funded by the European Commission Research and Innovation Framework Horizon 2020 and managed by the Innovation and Networks Executive Agency INEA.

The European Lighthouse cities



The Smart Cities and communities Lighthouse projects are funded by the European Commission Research and

Innovative solutions tackling **key areas of transition** in our cities

Transition Track #1	Transition Track #2	Transition Track #3
Renewables and energy positive districts	**Flexible energy management and storage**	**Intelligent mobility solutions**

Innovative solutions tackling **key areas of transition** in our cities

Transition Track #4	Transition Track #5
Digital transformation and services	**Citizen engagement & co-creation**

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Put some POSITIVE ENERGY IN YOUR LIFE !

Transition track #1 :

Renewables and energy positive districts

Mission

Increased energy demand, fossil fuel depletion and new expectations in sustainability are **accelerating the need for renewables and energy positive districts**

IRIS Smart Cities are at the forefront of integrating **locally produced and consumed renewable energy**, exceptional levels of **energy efficiency and reuse**.

Energy positive districts are part of a shift to a circular economy that respects and reuses precious resources:

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What's in it for me?

Energy positive districts are part of a shift to a circular economy that respects and reuses precious resources. It comes with significant environmental and business benefits but not only...

Reduced energy use and costs
for industry and consumers

Increased home **comfort**
with **fewer resources** consumed

Better air quality
inside and out

Future proofing our energy supply

Positive energy buildings Making renewables easier to integrate for everyone provides energy savings, environmental benefits and diversifies our energy sources

Near zero energy retrofit Decreasing energy consumption, CO2 emissions and improving quality of life with smart grid technologies and easy to control home energy management systems

Symbiotic waste heat network Using waste heat streams and biofuels as an energy carrier provides environmentally friendly business opportunities and by-products in a circular economy

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Positive Energy Districts

Positive Footprint Housing

Innovative sustainable housing and urban development

A holistic approach: housing authority, public transport operator, mobility services and information providers **embedded into the buildings**

- 2nd life batteries
- Extensive renewables
- Physical & digital mobility councilors
- Shared electric vehicle fleet

Brf Viva Housing | Gothenburg

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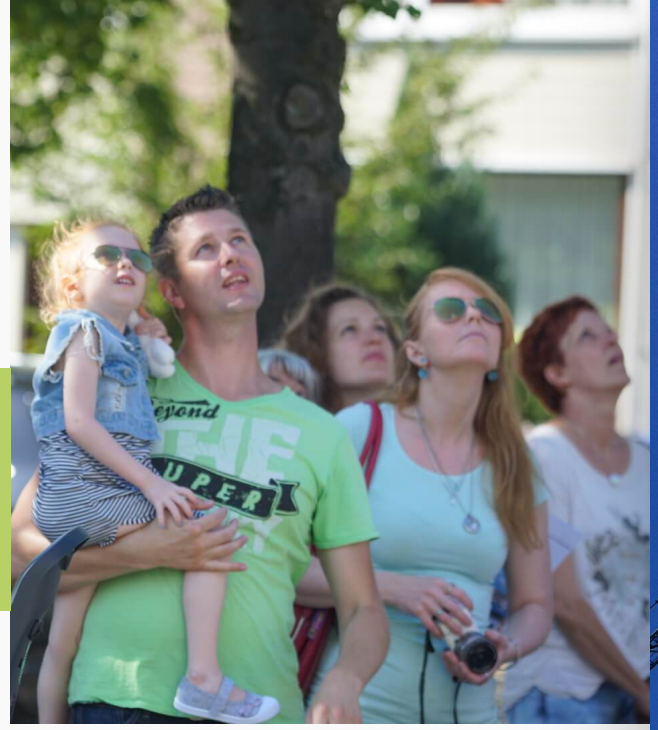
Positive Energy Districts

Pre-pilot Near Zero Energy District in Utrecht



- Installations and PV panels integrated in facades
- **Integration of PV panels and wind energy into rooftop**
- PV Panels integrated into balconies and parapet
- Horizontal installations from face and parapet
- Heat pump boilers and heat storage
- Residents in the driver's seat
- **Smart grid with storage and Vehicle 2 Grid technology**
- Decentralised heat recovery exchanger in facade
- Deep insulation

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Positive Energy Districts

Nexity Palazzo Meridia | Nice

A unique construction

The highest wooden office building in France, using 900 tons of bio-sourced French wood

35 meters high, 9 stories, 7,800m2

Connected to smart grid **and 80% renewable powered geothermal loop**

500m2 of photovoltaic rooftop panels

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Positive Energy Districts

“Sun houses” in Gardsten area in Gothenburg

- Computerized control system
- Connected to wind power generation (WG)
- Roof-integrated solar panels (PV)
- Individual smart metering (electricity, heating, water)
- Additional insulation on roofs
- Renovated windows with new inner panes
- New washing machines and dryers connected to District Heating
- Glazed balconies

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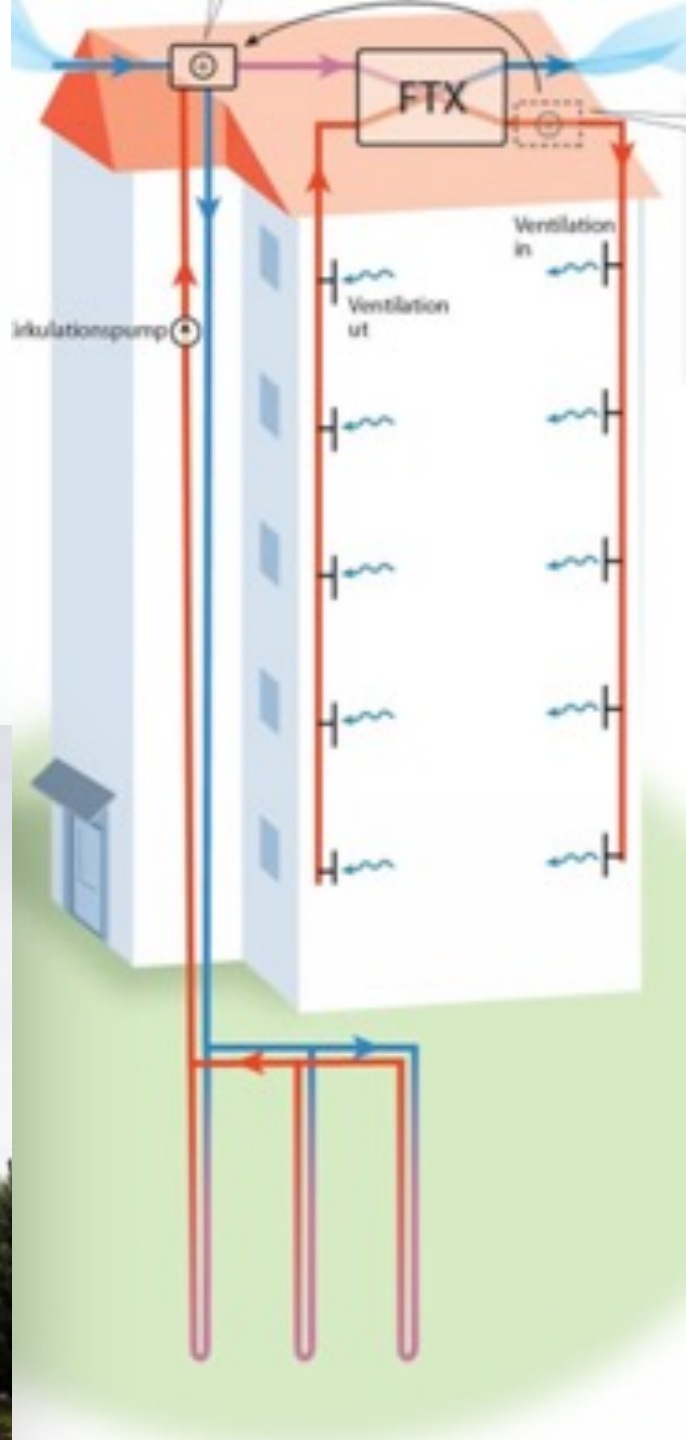
Positive Energy Districts

HSB FTX system in Gothenburg

Preheating incoming **ventilation** during winter using **geothermal energy** collected from **boreholes**



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Positive Energy Districts

Smart Street Lighting in Utrecht

- Existing lampposts retrofitted with innovative control system for dynamic lighting and remote monitoring
- Self-sufficient lampposts powered by PV cells via DC network
- LED Luminaires
- Energy Consumption of 2.700 kWh – a **50% reduction** compared to conventional street lighting

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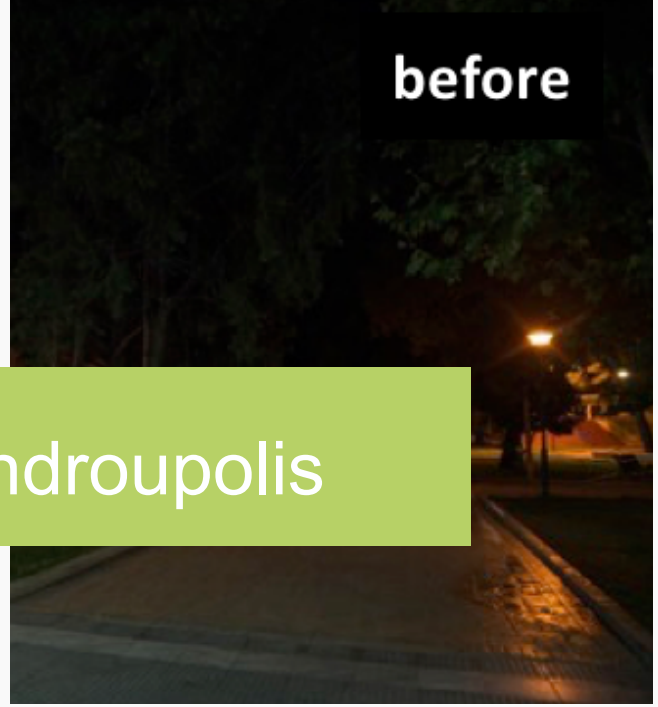
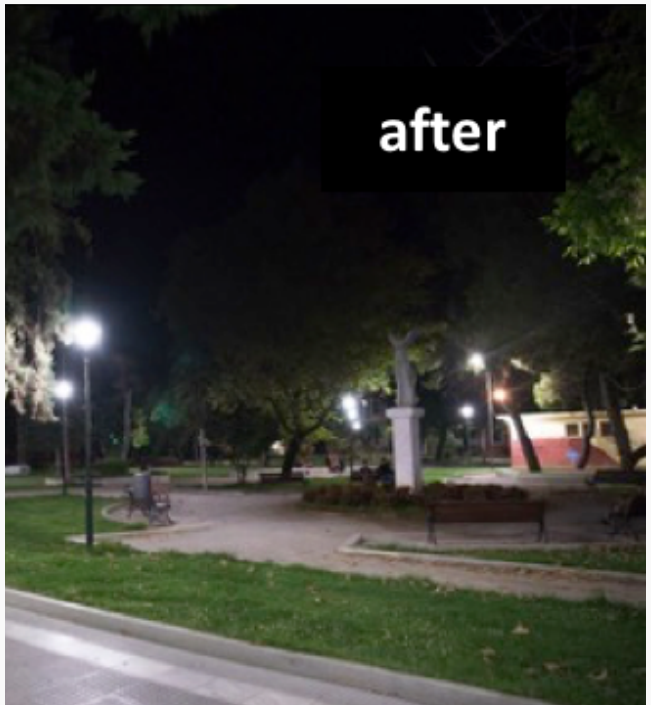
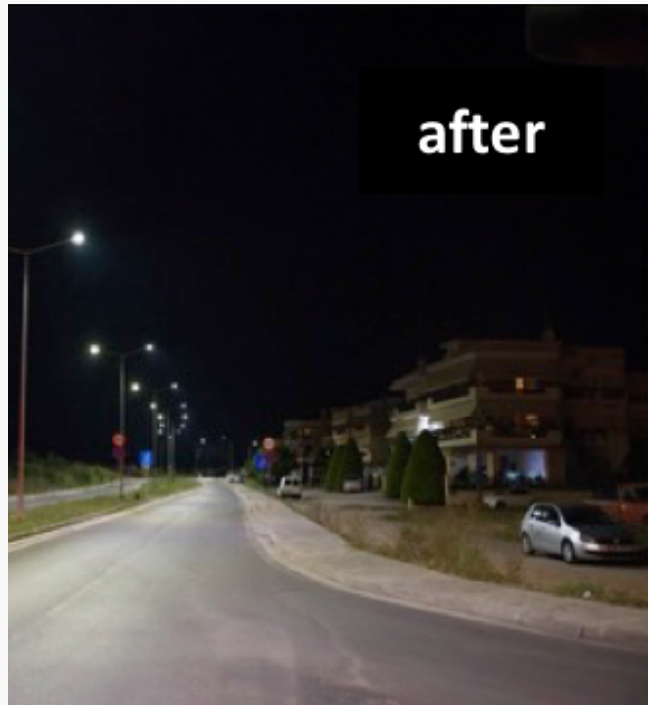
Positive Energy Districts

Smart Street Lighting | Alexandroupolis

- **70% reduction of energy consumption**
- Reduction of road lighting cost €750.000/yr
- Replacement of total of municipal street lighting
- Saving electricity from replacing luminaires and lamps 4.377 MWh/yr







FUTURE PROOFING our ENERGY SUPPLY

Transition track #2 :

Flexible energy management and storage

Mission

As **we use more energy than ever before**, our electricity, heating and cooling infrastructure is struggling to keep up – especially at peak hours

IRIS Smart Cities explores ways to meet needs at reasonable costs with **smart energy management systems**, **new storage techniques** and **connecting renewables**

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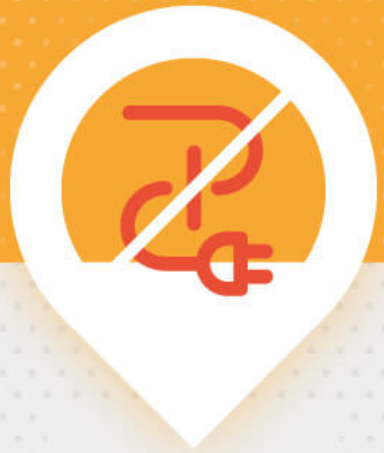
What's in it for me?

A world of wonderful new appliances and electric vehicles is only possible with smarter and more flexible energy management. Replacing major infrastructure is extremely costly – and often passed onto the consumer.

Unlocking **new opportunities** for **renewable energy use**



Avoiding power cuts, waste and shortages

Cost savings for utilities and consumers

Future proofing our energy supply

Flexible electricity grid networks Achieving more…with less! Energy management tools and new storage solutions make installation and use of renewables stress-free and more stable than ever before

Multi-sourced district heating Low temperature district heating benefits from excess heat and consumes far less energy than traditional systems. Reduces carbon emissions and integrates well with renewable energy sources

2nd life batteries Batteries are reconditioned rather than disposed of. Using them in buildings boosts electricity grid flexibility promoting circular economy solutions with and a low environmental footprint

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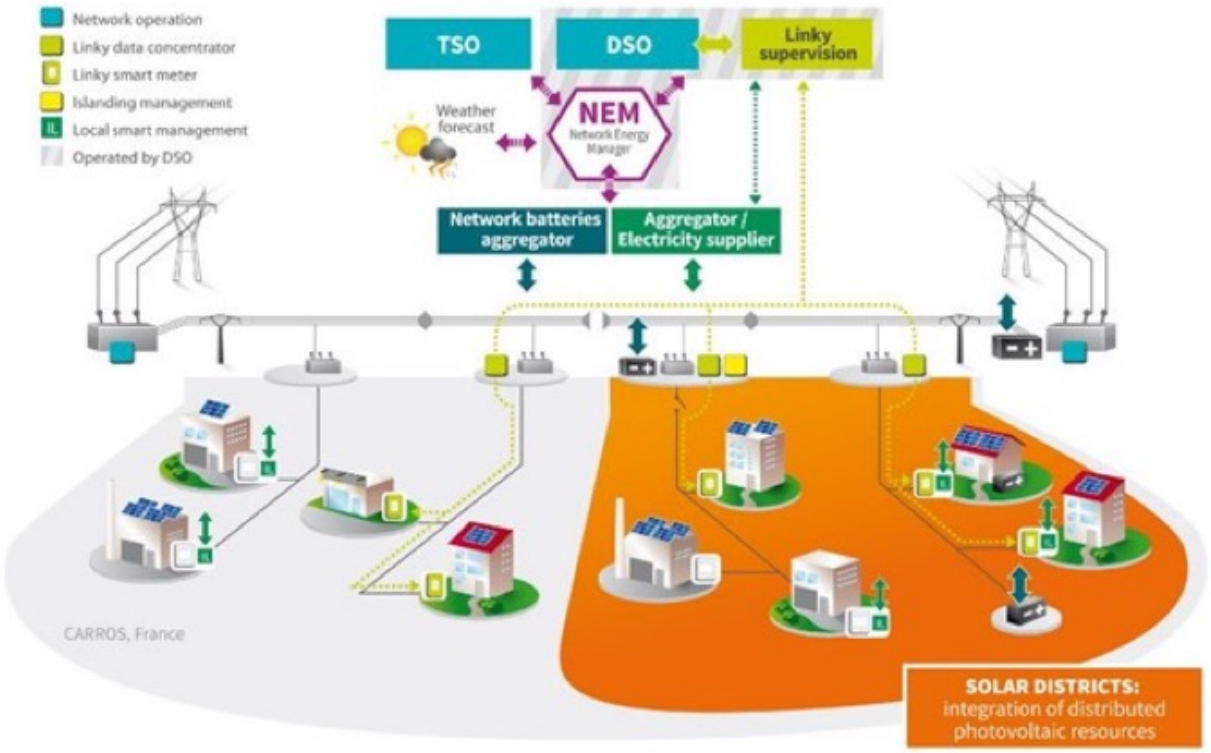
Flexible Energy Management

Nice Eco Valley | Smart Grid

Distribution of 3 hierarchical zones for **Grid Flexibility:**

- Electricity peak consumption reduction (peak shaving)
- Management of PV injection into the grid
- Grid-islanding
- Testing techno-economical interest of batteries



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Flexible Energy Management

2nd life batteries

Recuperated from ElectriCity bus lines, batteries retain 80% of their original capacity

Re-purposed to store solar energy captured on rooftop PVs

A new **business opportunity and lowered costs** for residents

Brf Viva Housing | Gothenburg

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Flexible Energy Management

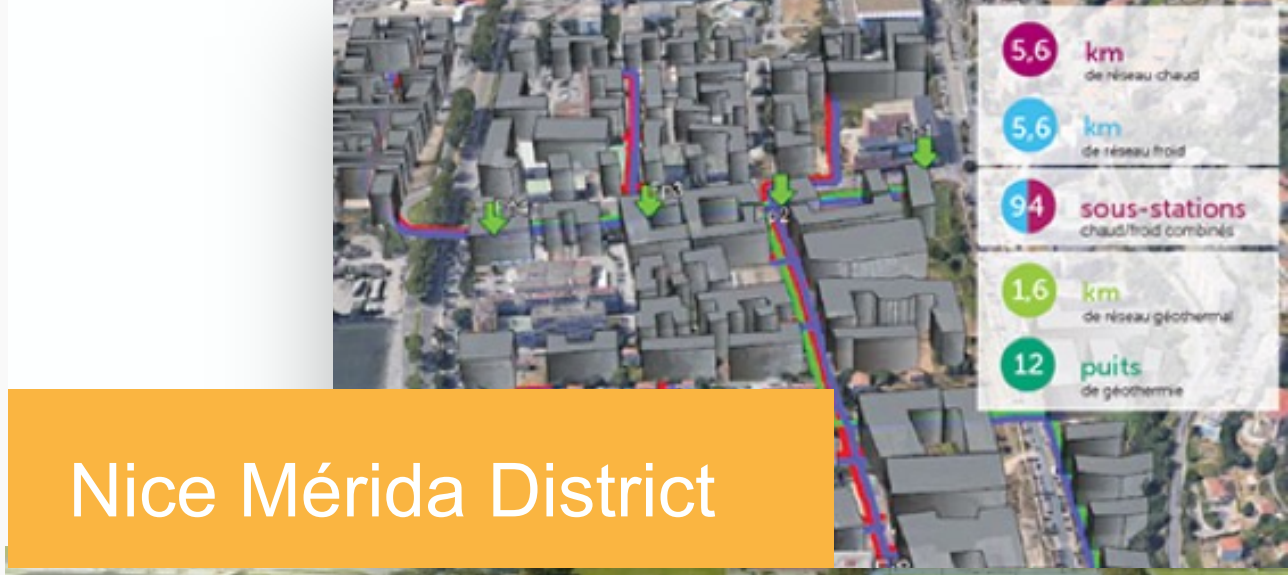
Geothermal heating & cooling innovations

A multi-energy smart grid system providing **30GWh of heating and cooling with 80% of renewables**

4 dewatering & 8 reinjection wells

District will eventually be 537,00m2 with

187,000m2 of housing



Nice Mérida District

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Flexible Energy Management

Geo storage with Low Temperature District Heating in Gothenburg

Geo-storage:

- Rock cooled in winter to provide cooling in the summer
- Heat stored from summer cooling can be extracted for heating in winter

Low temperature return from the District Heating in an adjacent building

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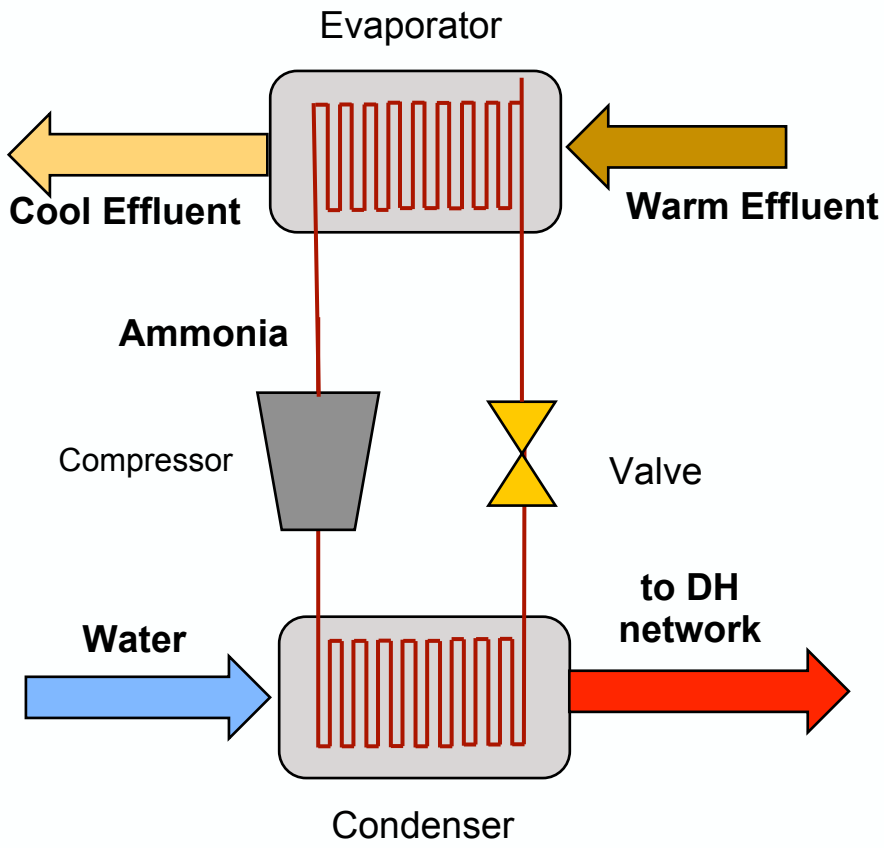
Flexible Energy Management

Utrecht Waste Water Treatment (WWTP) Plant and heat pump district heating

Multi-sourced medium temperature district heating using:

- A cogeneration plant
- Industrial heat pumps
- 3 back up boilers
- 3 Buffer tanks for storage



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Flexible Energy Management

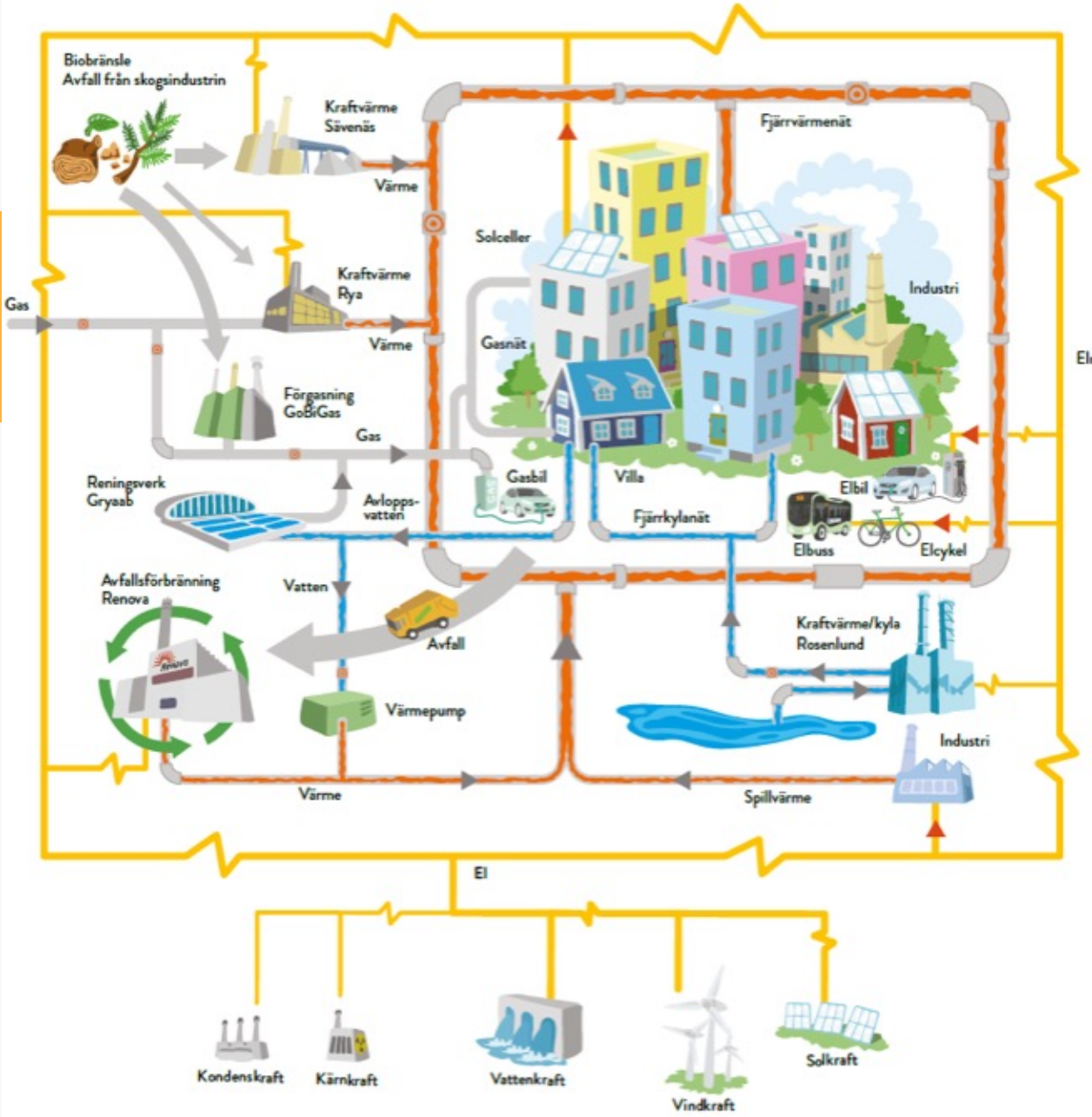
Gothenburg district heating & biogas system

District heating

Based on waste heat and bio energy, less than 20% fossils. 1400 MW

Biogas infrastructure

Biogas from sewage, household waste and forest residuals used manly as fuel for cars, buses and trucks



KEEPING US ON THE MOVE

Transition track #3 :

Intelligent mobility solutions

Mission

Stressful traffic and air pollution caused by transport are urgent issues in urban areas.

Congestion **costs the European economy over €100 Billion a year and nearly 500,000 premature deaths a year** associated to poor air quality

IRIS Smart Cities advocate a **well-connected mix of mobility solutions and services**. From solar power charged electric vehicles to digital services making choices and connections easy

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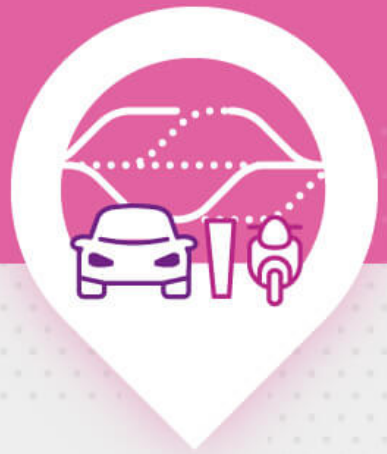
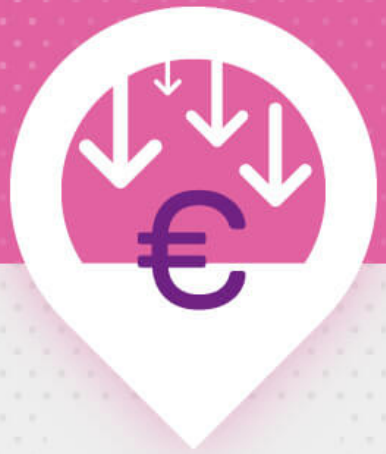
What's in it for me?

Car ownership today can be an expensive burden for many city dwellers with median annual costs estimated at €7500 a year[3]. New 'Mobility-as-a-Service' solutions give maximum convenience more sustainable door-to-door options.



Increased **flexibility**



Reduced expenses

Zero emission mobility
and improved urban environment

Intelligent mobility solutions

Vehicle-to-Grid and smart solar charging Accommodating charging needs and energy consumption of a growing number electric vehicles using flexible grid technology and harnessing the power of the sun – even overnight!

Innovative mobility services Shared vehicles and Mobility-as-a-Service are a real breakthrough, providing a range of genuine alternatives to individual car ownership and a range of attractive and convenient choices for moving around

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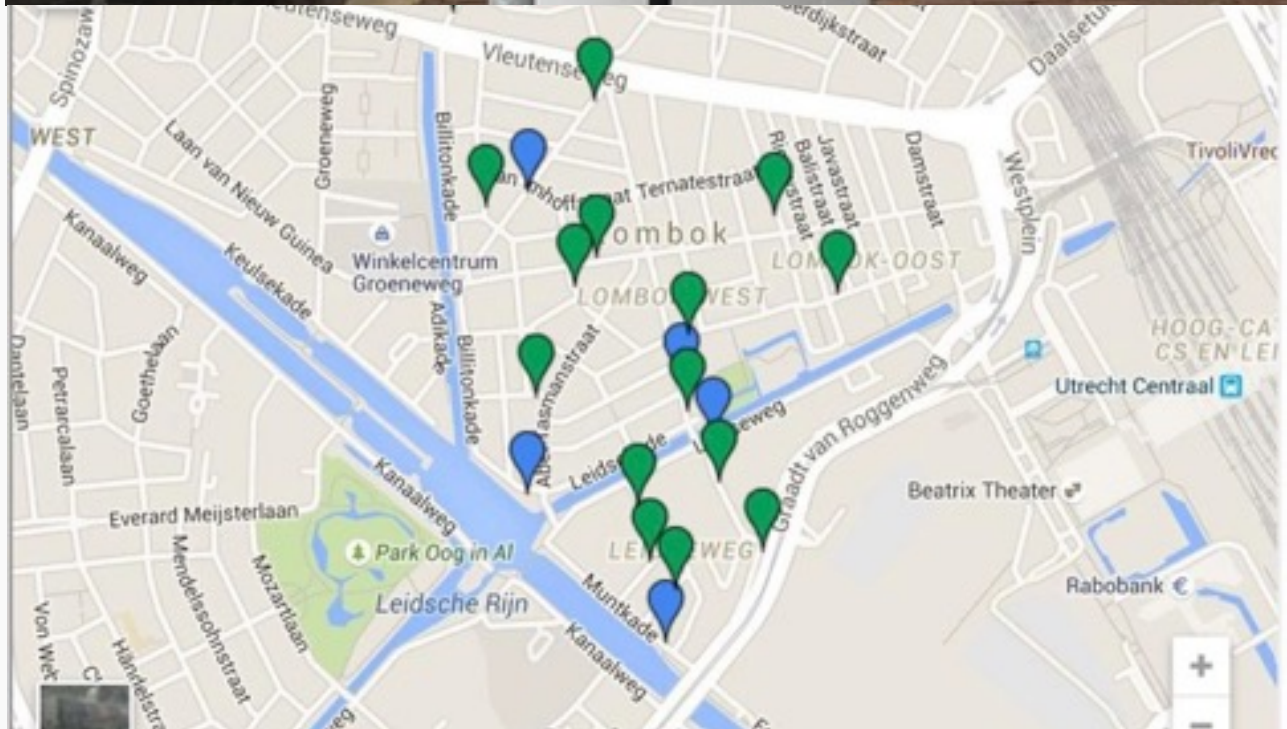
Intelligent Mobility

Solar powered V2G car charger in Utrecht

- **22 solar V2G charging systems** installed & interconnected in a residential district
- **Increase self-consumption** of **electricity produced by PV panels**
- A Smart Solar Charging station with **200 solar panels and a 1MWh battery**, generating enough power to charge twenty full electric cars simultaneously with stored solar energy



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Intelligent Mobility

Auto Bleue Charging points in Nice

140 vehicles

68 stations

8100 members

3 Fast Charging stations

- Cagnes sur Mer
- **Nice : Downtown**
- Utelle

Bi standard:

- 50kVA DC type 4 Chademo
- 43kVA AC type 2

Reload 80% in 30-45 min

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Intelligent Mobility

ElectriCity (collaborative, cross-functional partnership) | Gothenburg

- **3-6 minute recharge**
- Vehicles run 10km between charges
- Maximum run up to 30km
- **Geo-fencing low speed & emission zones**
- Free Wi-Fi & USB charging

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Intelligent Mobility

EC2B Mobility-as-a-Service Gothenburg

Facilitating **access over ownership to a range of on-demand mobility solutions**

Integrates access to sustainable mobility directly into the home

Applied in conjunction with major housing owners & developers

Meaningful data WHEN and WHERE its NEEDED

Transition track #4 :

Digital transformation and services

Mission

A flood of digital data, sensors and IT systems have hit cities over the last decade… with varying degrees of success and impact on services and citizens' quality of life

IRIS Smart Cities is part of wave of administrations **committed to open, reusable and reliable platforms** for sharing data, accelerating innovation, providing citizen-centric applications and lowering costs

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What's in it for me?

Delivered at the right time in the right way, data can transform everything from how cities deploy services to when we leave the house, saving time, money and resources. The principal can be applied equality to managing energy, water, waste, air quality, transport or even home appliances.

Better delivery and more **efficient public services**

Saving time and money

A marketplace for **Innovative new applications and businesses**

Meaningful data when & where its needed

Urban monitoring Networks of micro sensors collect air quality, noise, water and energy, waste management data and more; processing it to improve living standards and optimise services to citizens

City management and planning Open data collaboration platforms allow city workers, construction companies, transport providers and more the power to consult, collaborate and plan interventions together,minimising disruptions and reducing costs

Meaningful data when & where its needed

Mobility services A new generation of real time data services integrating multiple modes and opportunities to travel provide a real alternative to the car and promote access over ownership

Energy management Multiple applications and real time analysis of energy production and consumption from monitoring grid flexibility to smart street lighting systems and visual displays for consumers fighting energy poverty

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Digital Transformation

3D district modeling

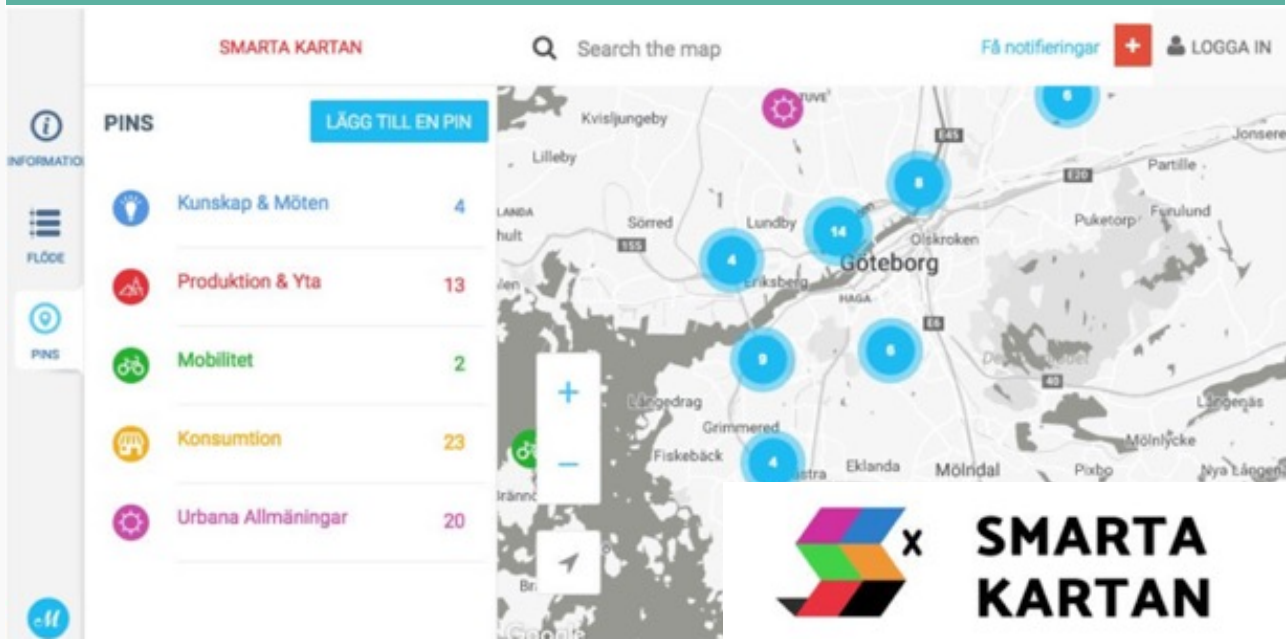
Smart street lighting with multi-sensors

Long range (LoRa) IoT networks

e-Mobility monitoring

Peer-2peer service exchange

Multiple solutions & locations



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Digital Transformation

3D district modeling

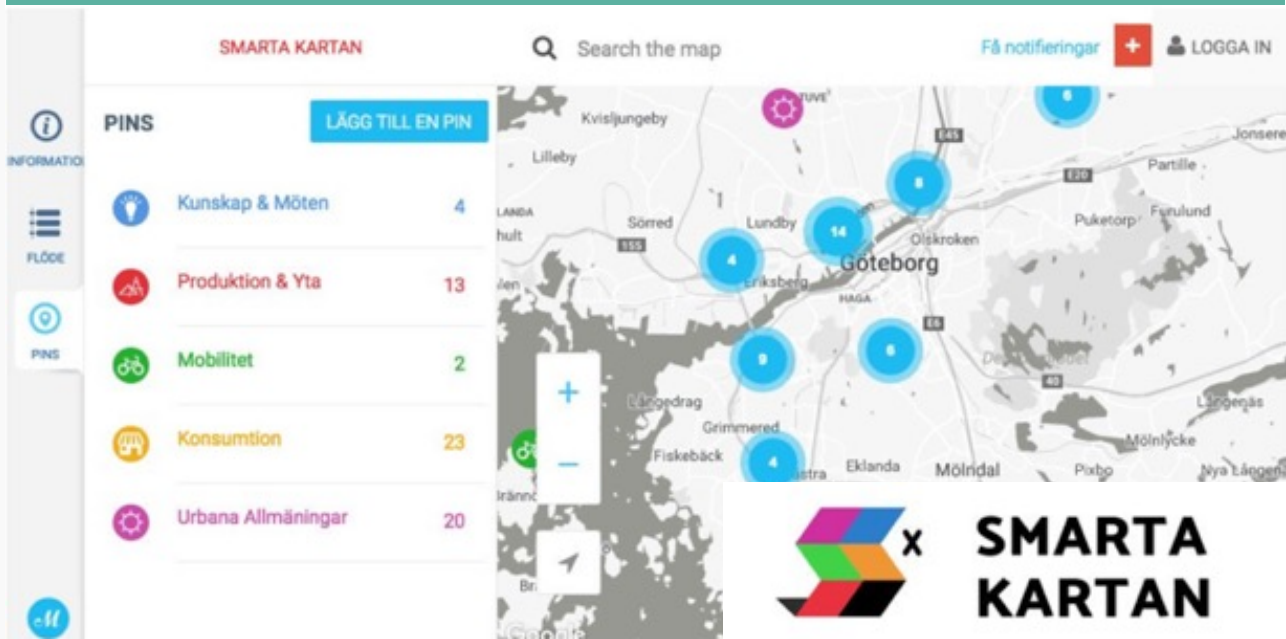
Smart street lighting with multi-sensors

Long range (LoRa) IoT networks

e-Mobility monitoring

Peer-2peer service exchange

Multiple solutions & locations



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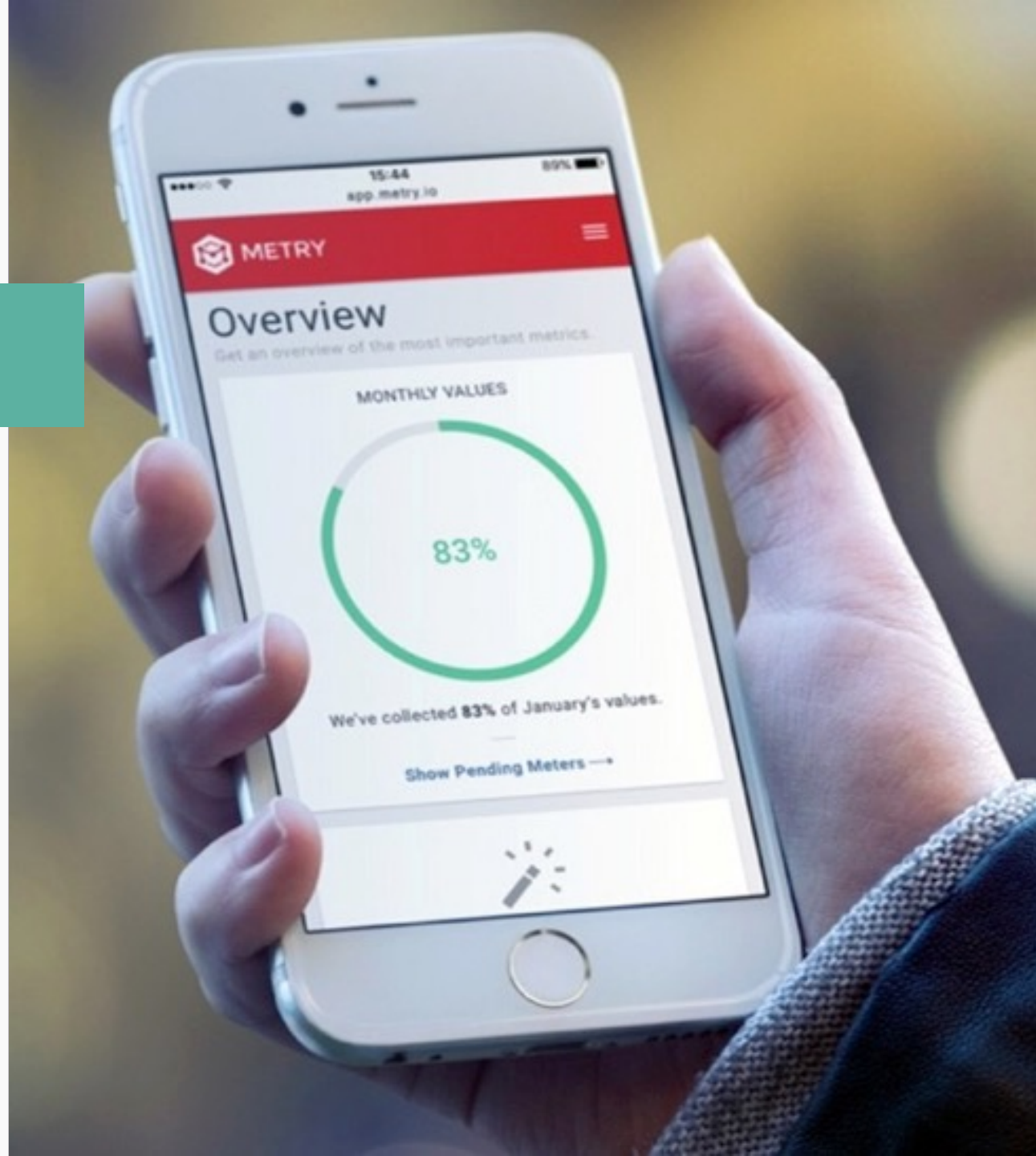
Digital Transformation

Multiple solutions & locations

Increasing grid flexibility and behaviour change with:

- Gamification
- Visualisations
- Real time ‘energy cloud’ data



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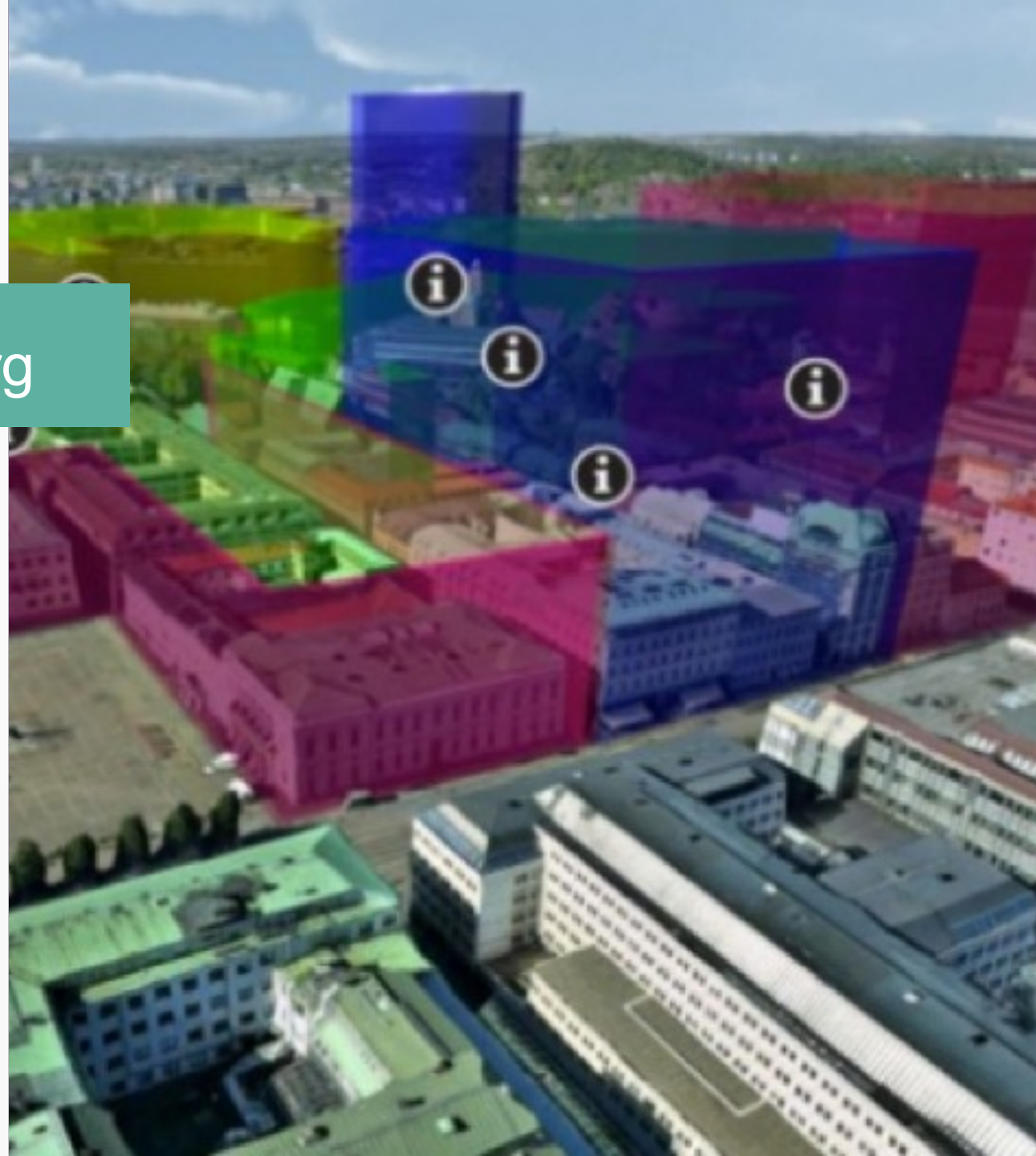
Digital Transformation

Energy mapping in Gothenburg

- Raising awareness about **30-80% potential energy savings**
- Identifying the right technology faster
- **Motivating building owners** to invest in green technology



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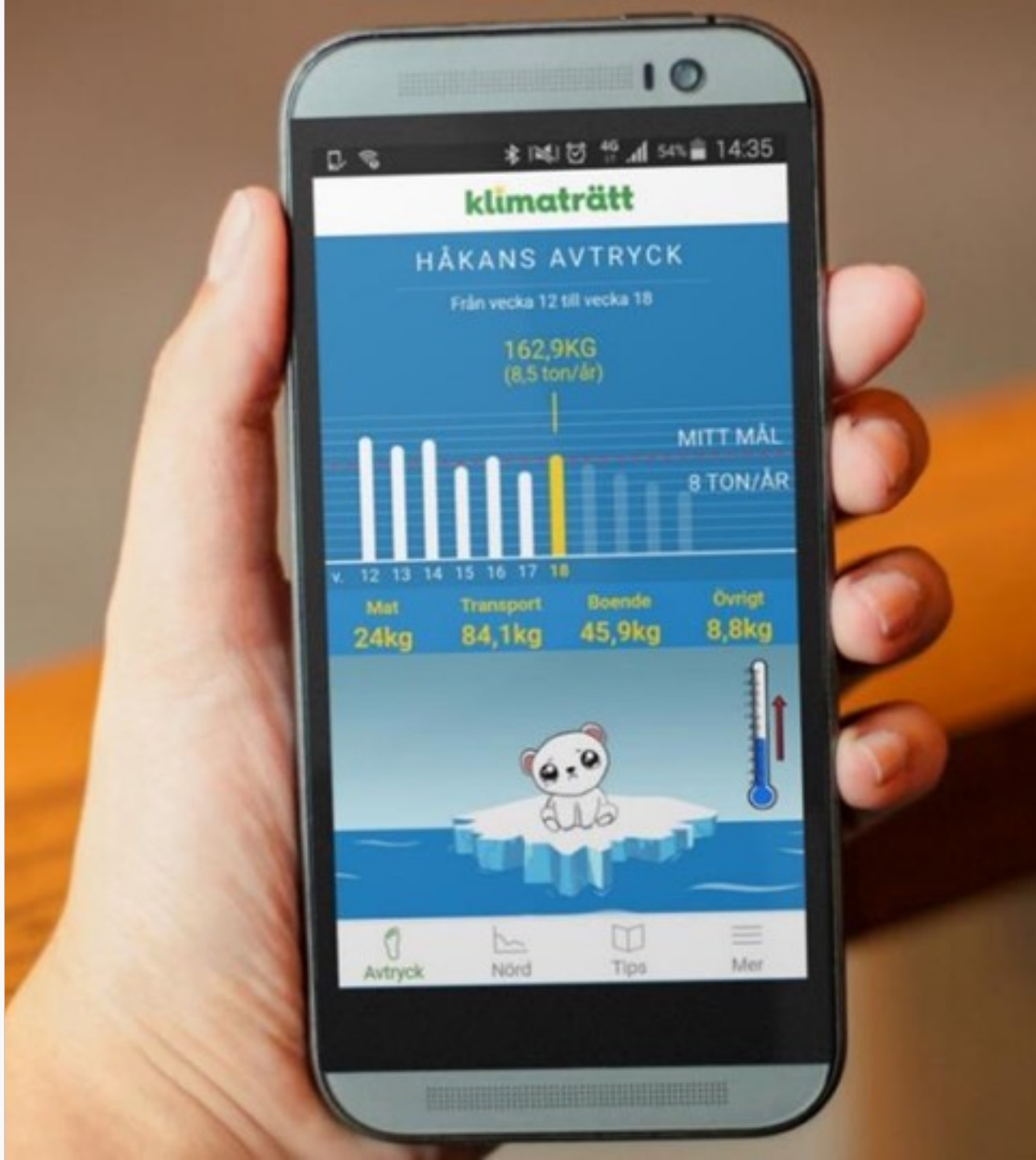
Digital Transformation

Gothenburg Initiative

Kimaträtt (Climate Right) application:

- 31% reduced carbon footprint
- Tracks your energy, travels and meal consumption
- Automated weekly feedback and assessment



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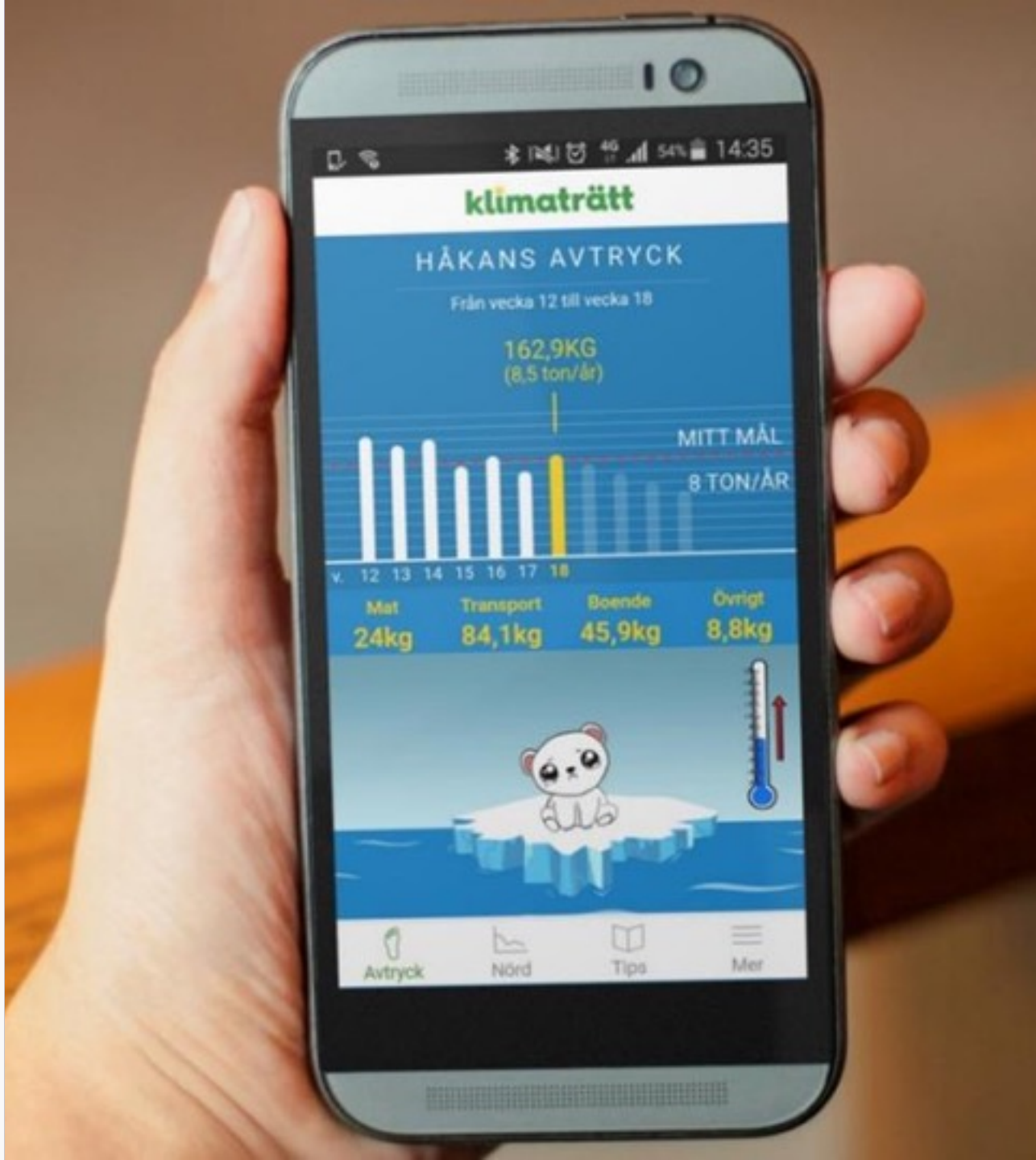

Defining THE FUTURE… TOGETHER !

Transition track #5 :

Citizen Engagement and co-creation

Mission

Citizens often feel left out and powerless in the developments and decisions that shape their lives. Allowing people to be informed, involved and co-create helps gain trust and increase implication

IRIS Smart Cities believes **transparency** and **shared decision-making** helps develop more effective solutions and increases potential for long term behaviour change

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What's in it for me?

Citizens with a sense of ownership and initiative are a powerful force for good. Unlock your local knowledge and insight to help design solutions and spaces that meet real needs.

Be part of the solution
& shape your own city

A positive impact
on people and the planet

Connect with others
and nurture new skills

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Defining the future… together!

Changing everyday energy use A set of effective citizen engagement approaches mapped onto each different context to help adoption of smart city solutions and move towards sustainable behaviour change

Participatory city modelling

Diverse stakeholder groups brought together using design-thinking approaches to seek the most effective way to tackle often complex problems

Defining the future… together!

Living labs

User-centered, open-innovation spaces to shape social, technical and political innovation and dialogue

Behaviour changing information

Apps and interfaces giving information at identified key touch points where citizens interact with smart city solutions

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Engagement & Co-creation

Creating cities and services with & for citizens

- Identifying change agents
- Creating local innovation hubs
- Game design interaction
- Participatory urbanism

Utrecht, Nice & Gothenburg

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Engagement & Co-creation

HSB Living Lab

A 3rd generation living lab where **residents are a committed part of researching and designing the housing of the future**

Modular construction to adapt, or replace materials, installations and technologies being tested by residents

Defining the next generation of housing

Gothenburg

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Engagement & Co-creation

“Min Stad”

- A digital bulletin board – and much more – welcoming lively and open debate
- Interactive map of culture, recreation, cycling, socialising and beyond
- Used as inspiration for city of Gothenburg to build a green and sustainable metropolis

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Engagement & Co-creation

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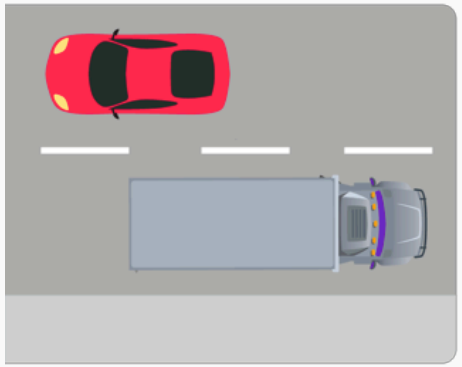
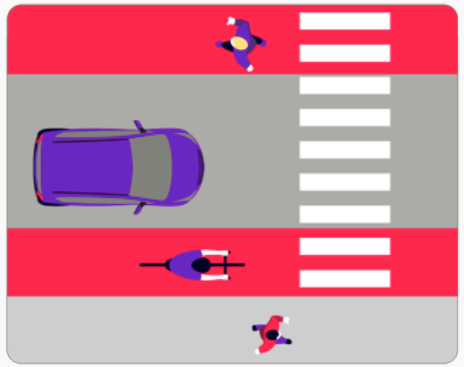
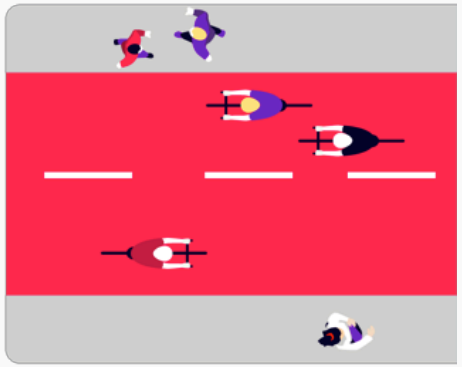
Utrecht

Co-creating smart & sustainable cities

A pioneer of healthy urban living







Utrecht City Centre

43%

Journeys under 7.5km taken by bicycle

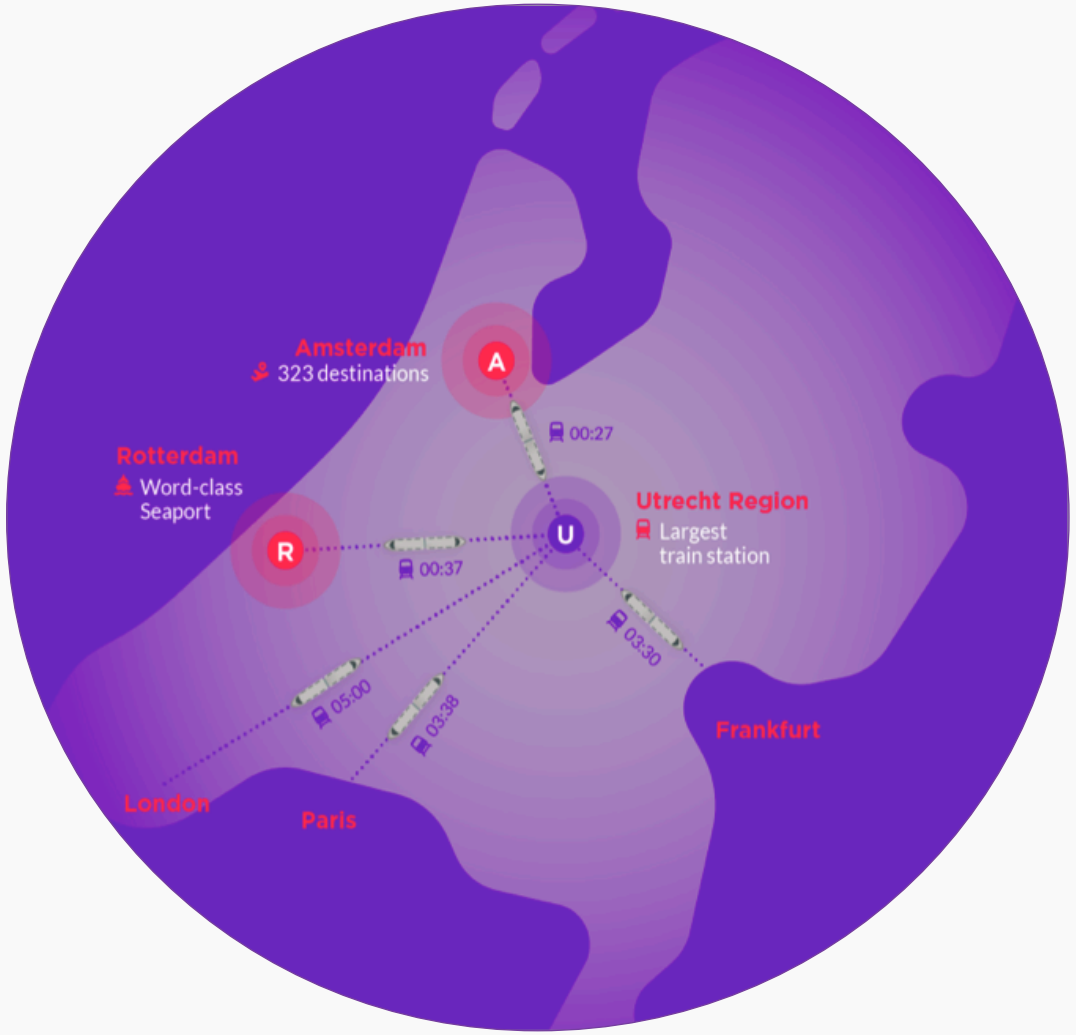
30%

Less cars

20%

More cyclists

A pioneer of healthy urban living



2nd

Most competitive region of Europe

2nd

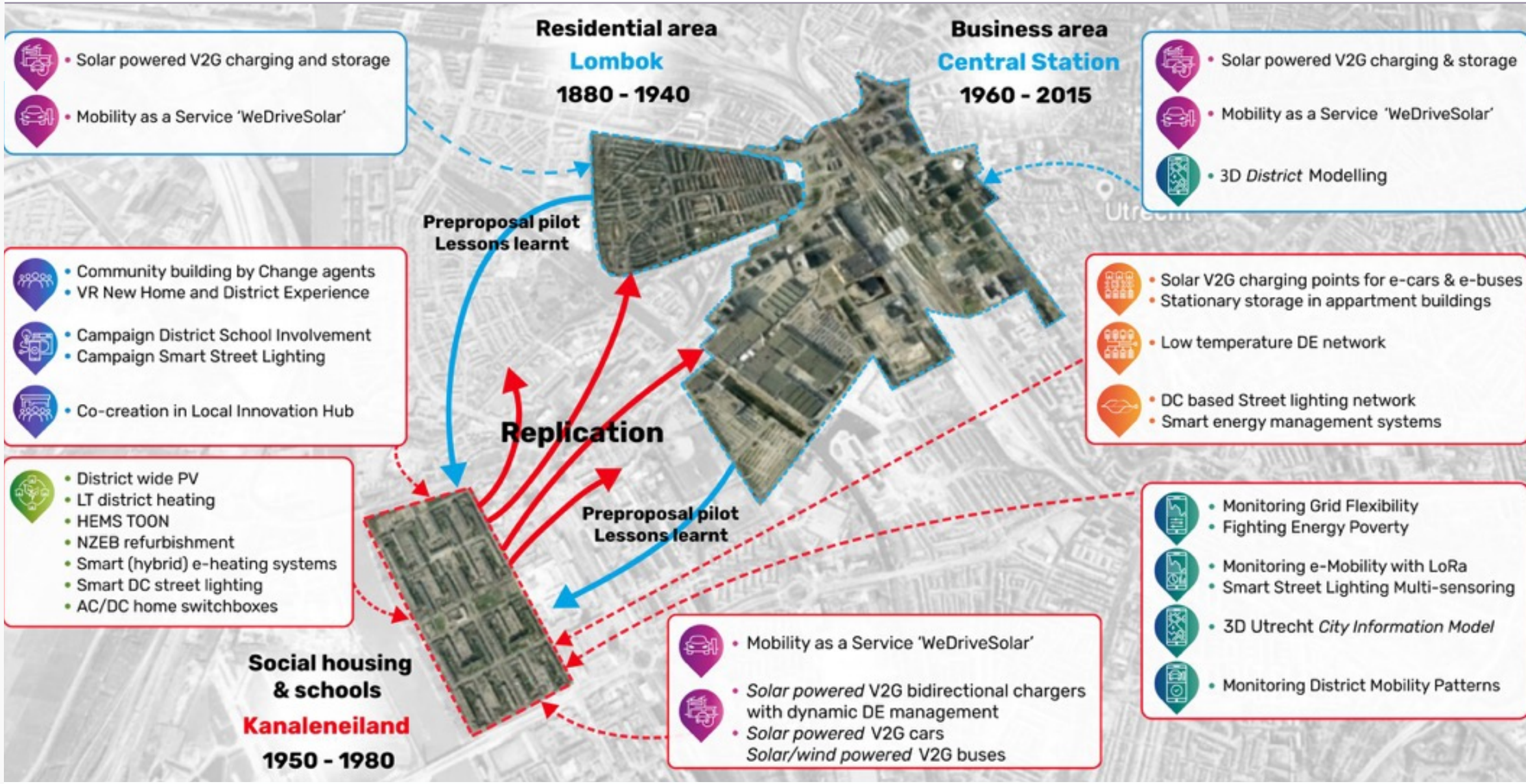
Bicycle city in the world

IRIS
Utrecht

Utrecht
Lighthouse City

"In the Utrecht district Kanaleneiland-Zuid we combine **solar energy, affordable social housing** and **broad access to electric mobility**.

These solutions are **developed together with citizens** and built on open data to accelerate change"

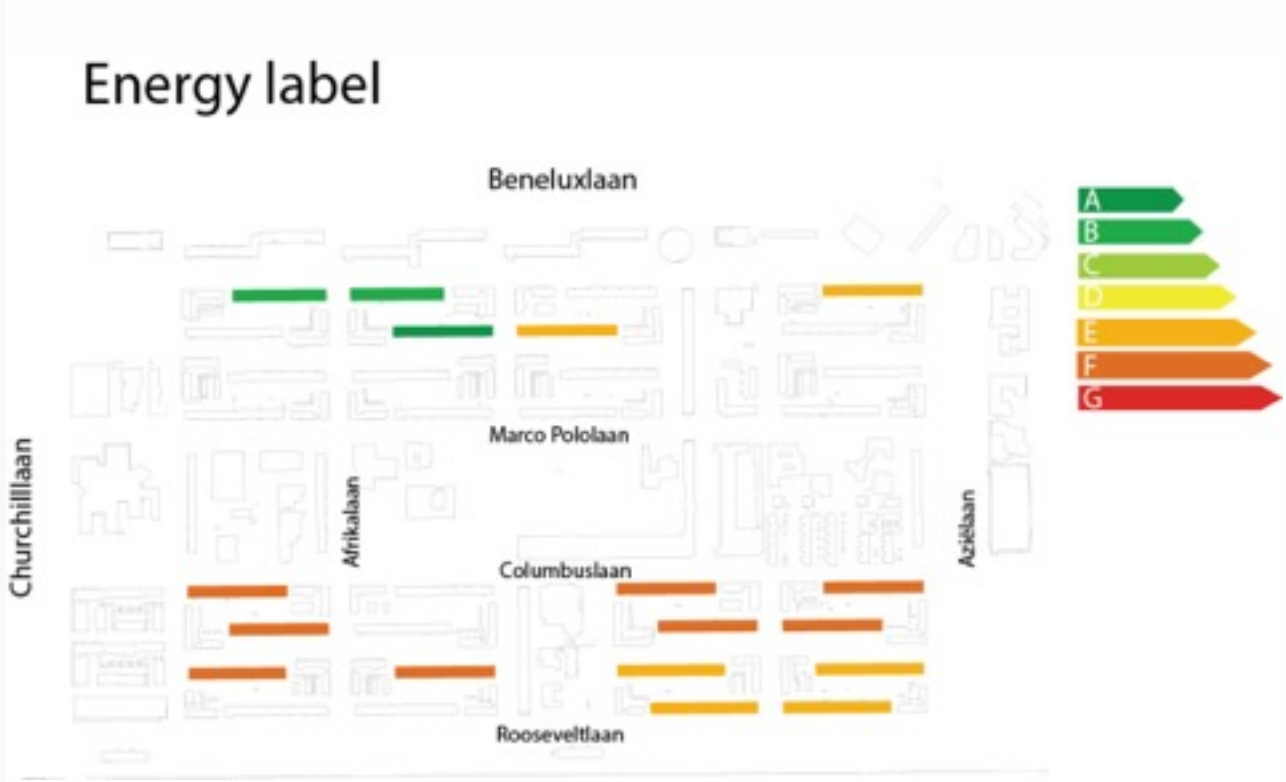

Residential area
Lombok
1880 - 1940
Business area
Central Station
1960 - 2015
Solar powered V2G charging and storage
Mobility as a Service 'WeDriveSolar'
Solar powered V2G charging & storage
Mobility as a Service 'WeDriveSolar'
3D District Modelling
Preproposal pilot
Lessons learnt
Community building by Change agents
VR New Home and District Experience
Campaign District School Involvement
Campaign Smart Street Lighting
Co-creation in Local Innovation Hub
Solar V2G charging points for e-cars & e-buses
Stationary storage in appartment buildings
Low temperature DE network
DC based Street lighting network
Smart energy management systems
Replication
District wide PV
LT district heating
HEMS TOON
NZEB refurbishment
Smart (hybrid) e-heating systems
Smart DC street lighting
AC/DC home switchboxes
Preproposal pilot
Lessons learnt
Monitoring Grid Flexibility
Fighting Energy Poverty
Monitoring e-Mobility with LoRa
Smart Street Lighting Multi-sensoring
3D Utrecht City Information Model
Monitoring District Mobility Patterns
Social housing
& schools
Kanaleneiland
1950 - 1980
Mobility as a Service 'WeDriveSolar'
Solar powered V2G bidirectional chargers with dynamic DE management
Solar powered V2G cars
Solar/wind powered V2G buses

Kanaleneiland demonstration site profile

- **Social housing** apartment buildings (built 1960-1975)
- Schools, shops & services
- Lively multi-cultural district
- Surface 64 Ha
- **4.800 inhabitants**, mainly low-income households

Key challenges to address

- **Poor energy profile**
  deep retrofit a necessity
- **Emissions**
  need for clean mobility
- **Mixed energy infrastructure**
  need for grid flexibility
- **Low incomes**
  need for stable energy & mobility costs
- **Social inclusion**
  need for citizen engagement



IRIS Utrecht

The Utrecht **partnership**

de kunst van HKU

LomboXnet

Eneco

Qbuzz

STEDIN.NET

Gemeente Utrecht

UTRECHT SUSTAINABILITY INSTITUTE

bo-ex

kpn

Civity

Universiteit Utrecht

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Gothenburg

Co-creating smart & sustainable cities

iCapital 2018
FINALIST

EUROPEAN CAPITAL
OF INNOVATION

European Commission

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Gothenburg

Gothenburg Lighthouse city

An evolving city of the future

City of Gothenburg

533.300

Residents – 23 % born outside Sweden

1,1M

Residents in the Gothenburg labour market region today

150 000 more

residents by 2035

1,75M

Residents in the Gothenburg labour market region 2030

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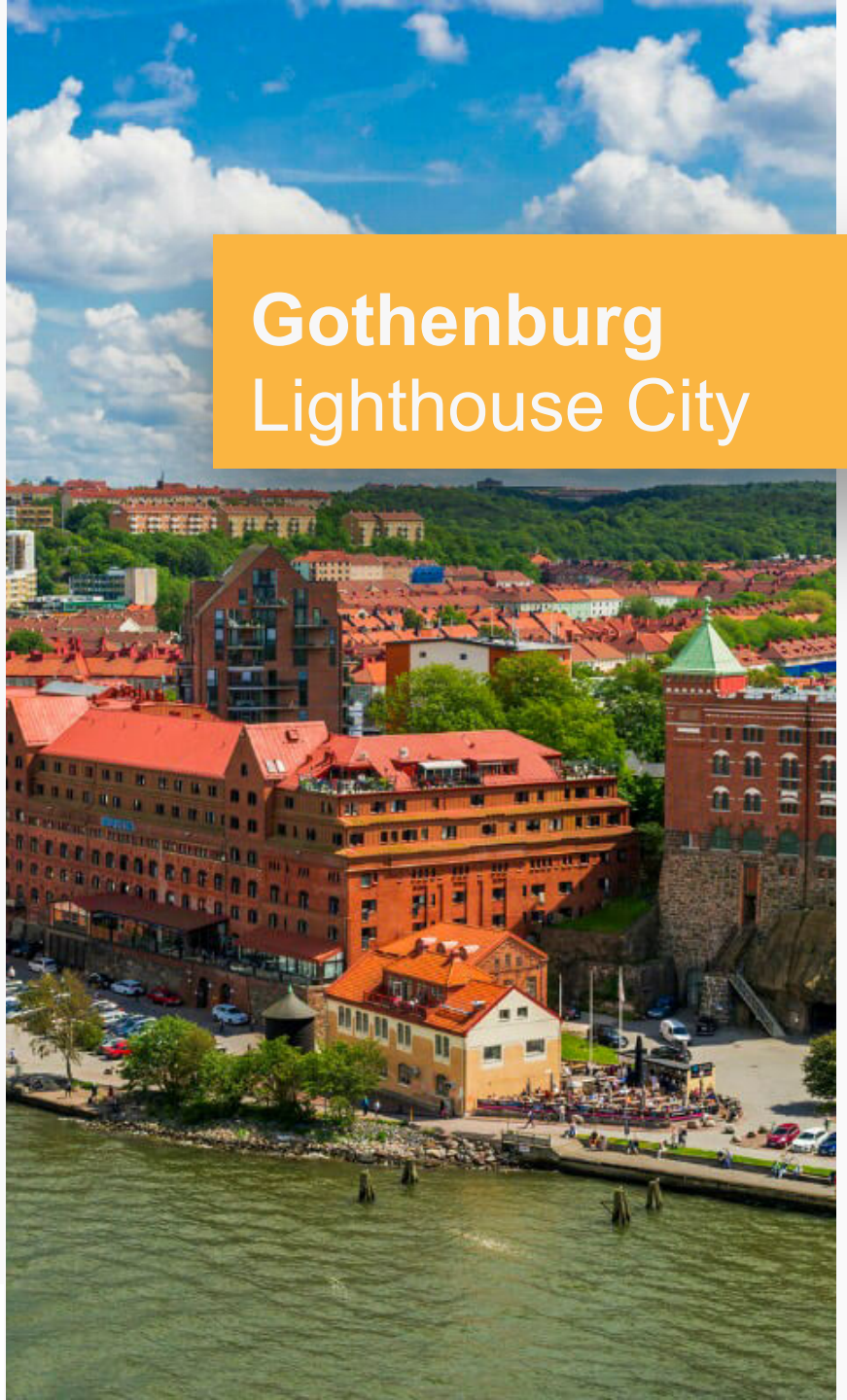
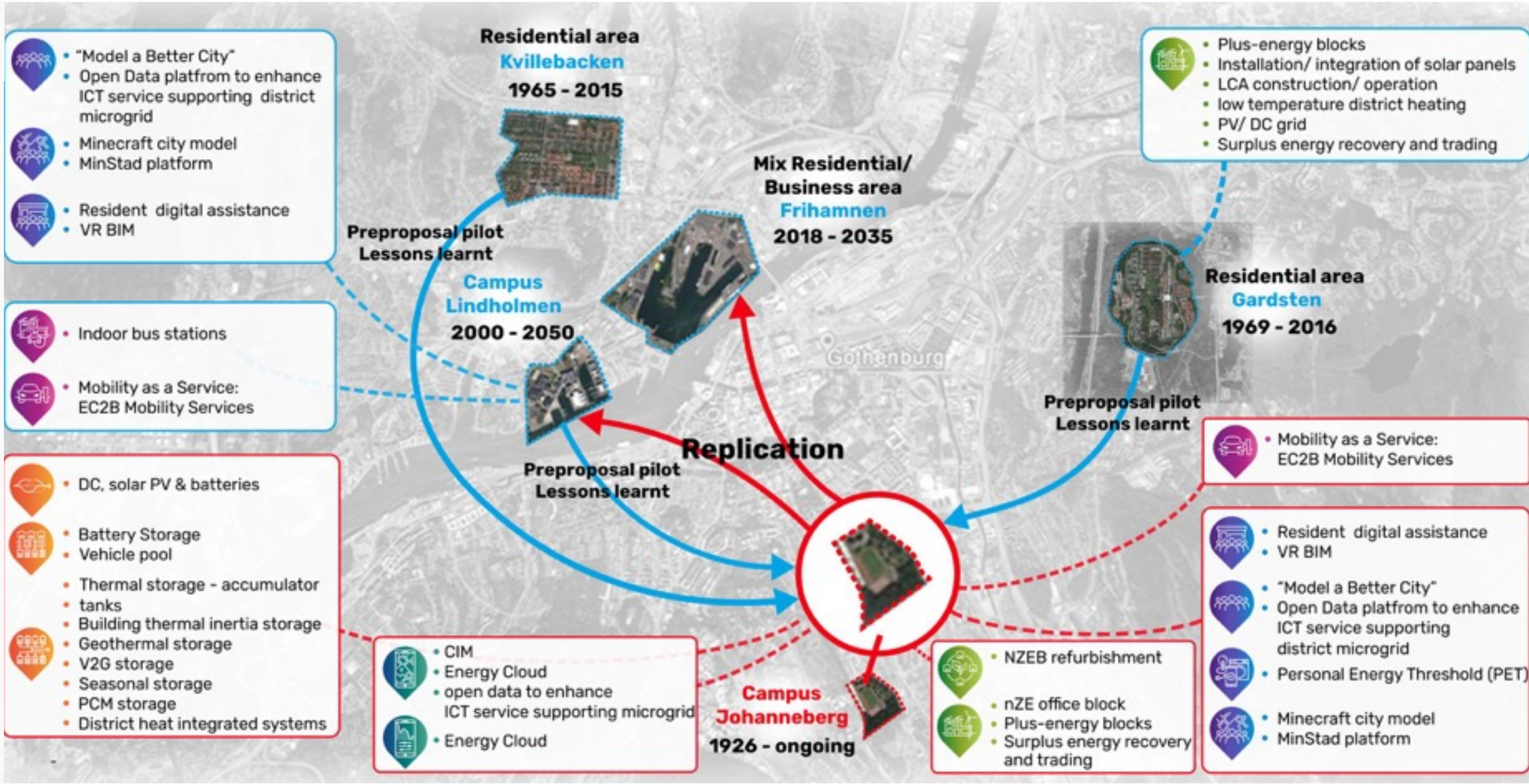


Gothenburg
Lighthouse City

“In Gothenburg service providers, citizens and administrations work together to overcome urban sustainability challenges through a mix of **open data, open innovation and public dialogue**.

Our IRIS solutions focus on testing **innovative energy management and storage** to achieve energy positive districts”

IRIS
Gothenburg



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Demonstration site profile

- Mainly **Campus** & **Residential area**
- Chalmers University of Technology
- **55 buildings**
- 2014: **420** new office spaces
- 2016: **HSB Living Lab**
- 2018: **132 apartments**/six new buildings
- 2019: 400 new office spaces building dedicated to innovation and collaboration

IRIS
Gothenburg

The Gothenburg **partnership**

TYRÉNS

CHALMERS
UNIVERSITY OF TECHNOLOGY

AKADEMISKA HUS

Göteborgs Stad

Johanneberg Science Park

Riksbyggen
Rum för hela livet

Trivector

HSB – där möjligheterna bor

METRY

IRIS
smart cities

IRIS
Nice Côte d'Azur

Co-creating smart & sustainable cities

EUROPEAN CAPITAL OF INNOVATION
2017 FINALIST

European Commission

IRIS
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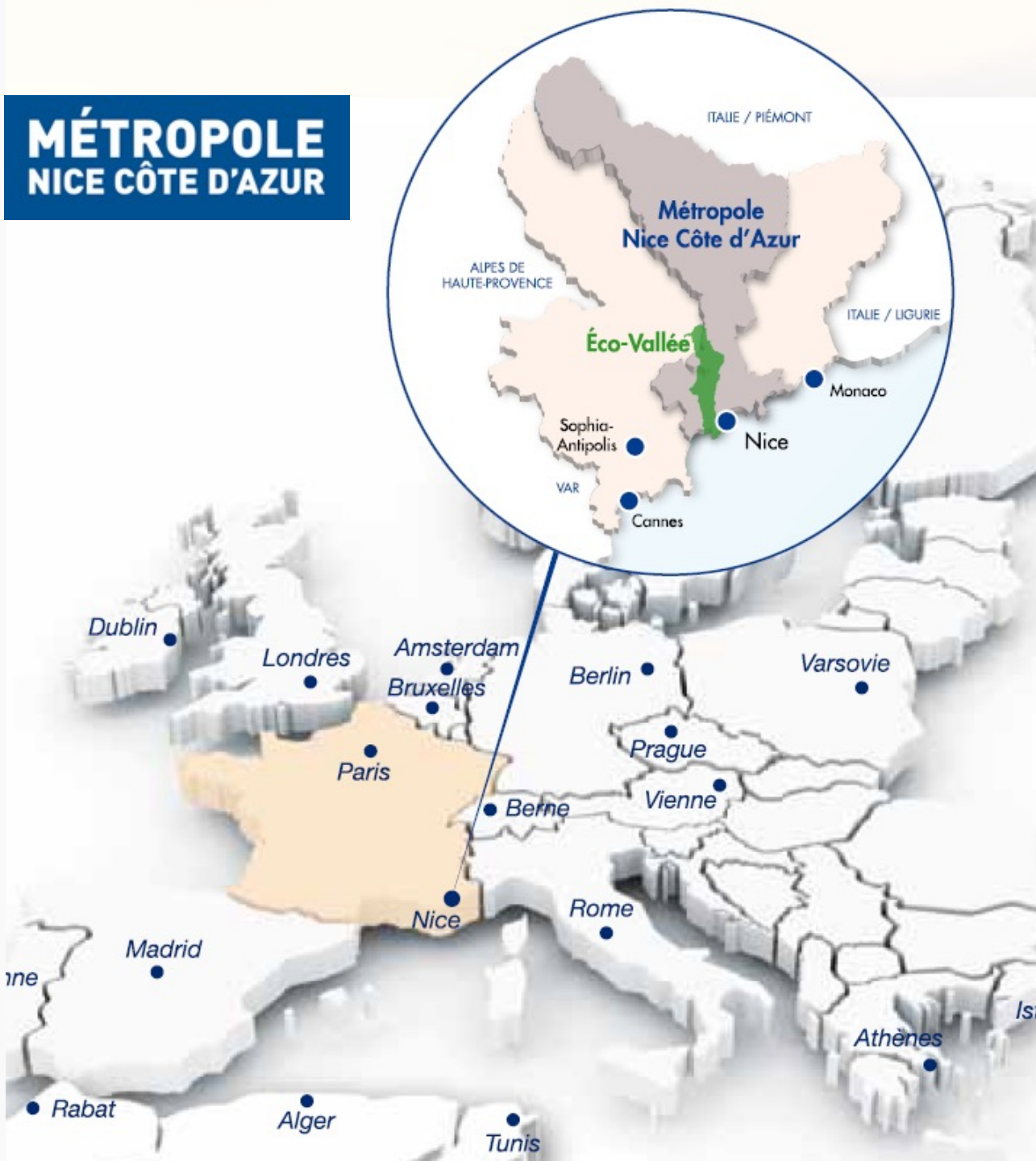
Innovation: **driving regional development**

Digital innovation central to economic development

- Develop the entrepreneurial local fabric (SMEs, start-ups)
- Stimulate industry-research partnerships
- Make the Metropole a benchmark for new sectors of excellence



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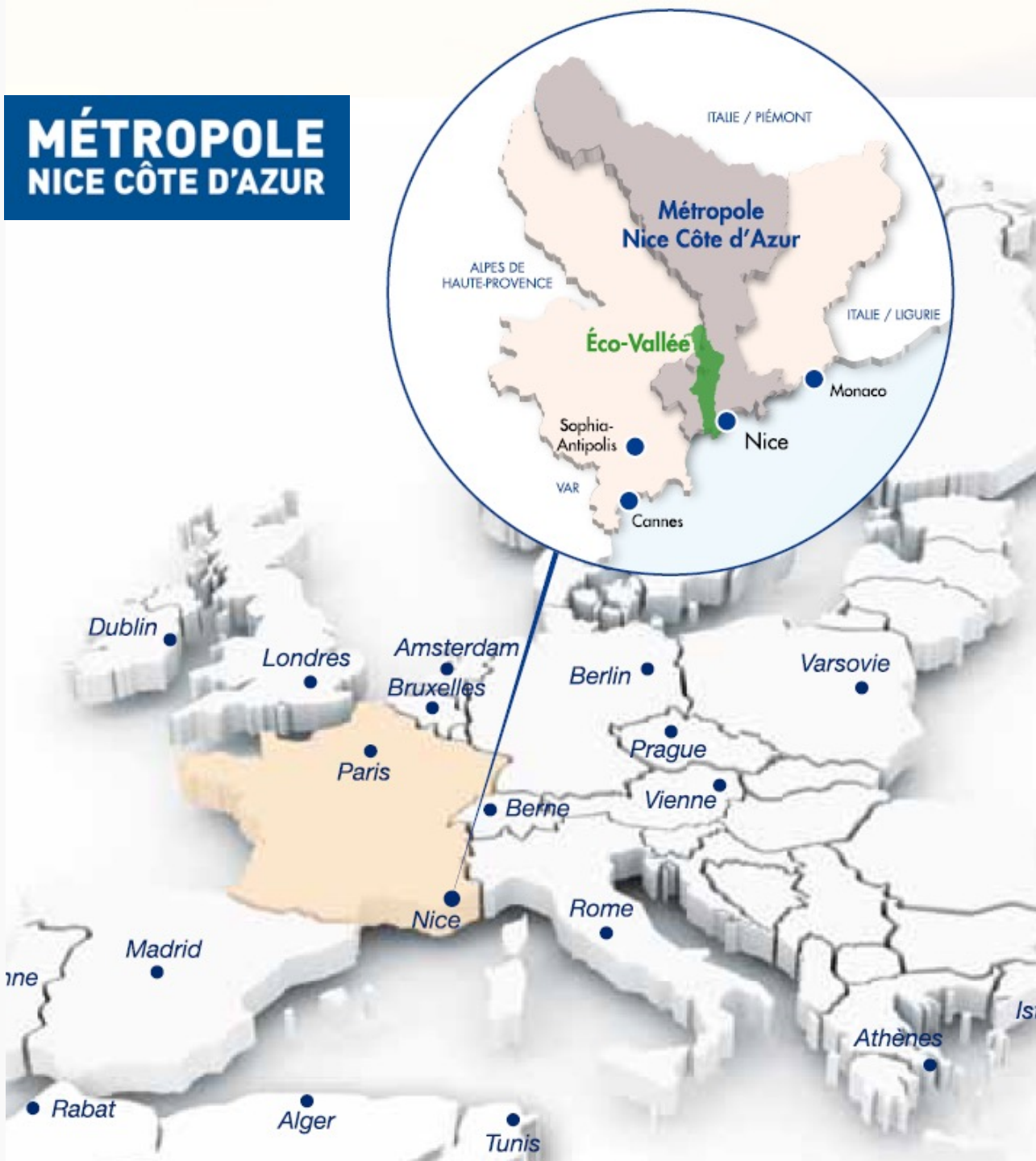
Innovation: **driving regional development**

Improve quality of services for citizens

- Personalized services
- Guarantee of territorial equity
- Citizen engagement and co-creation



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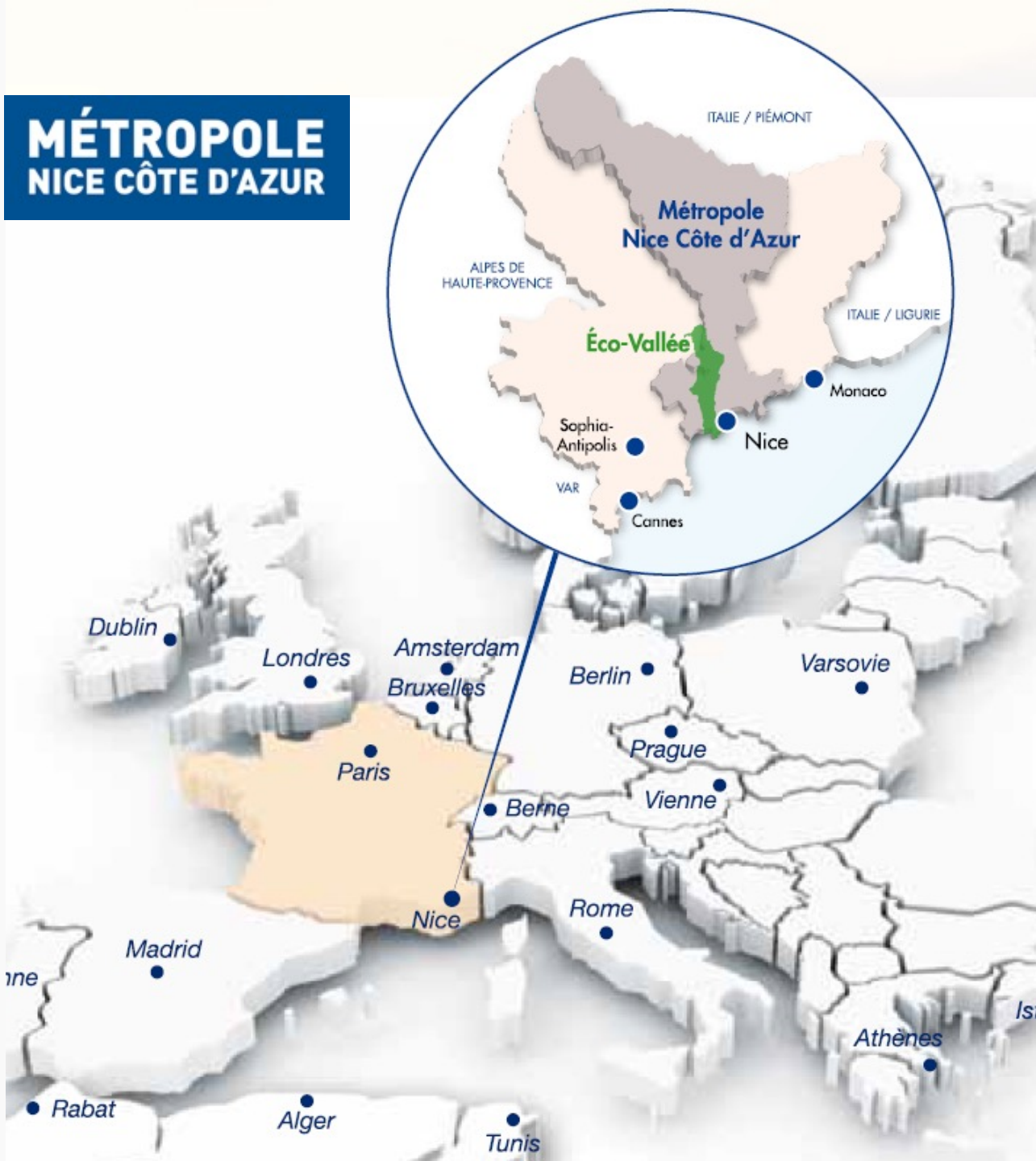
Innovation: **driving regional development**

Increase efficiency of city operations

- Do better with less
- Shared resources between city works
- City infrastructure expense reduction



IRIS
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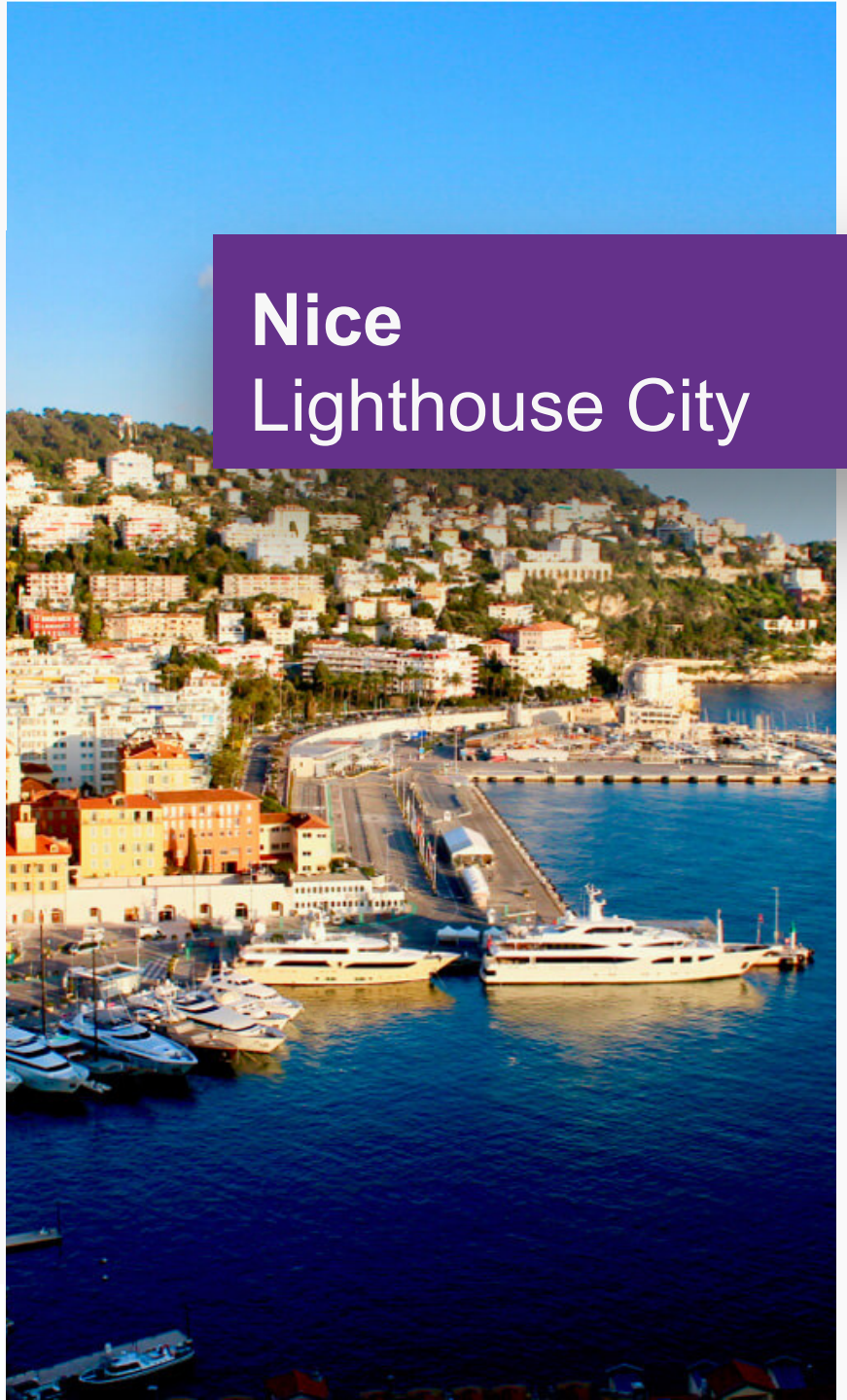
Nice
Lighthouse City



"In Nice, we **develop energy neutral districts** deploying renewables and electric mobility solutions.

A digital marketplace for mobility, energy and environmental data fosters innovative applications and empowers suppliers and citizens to be proactive about their sustainability"

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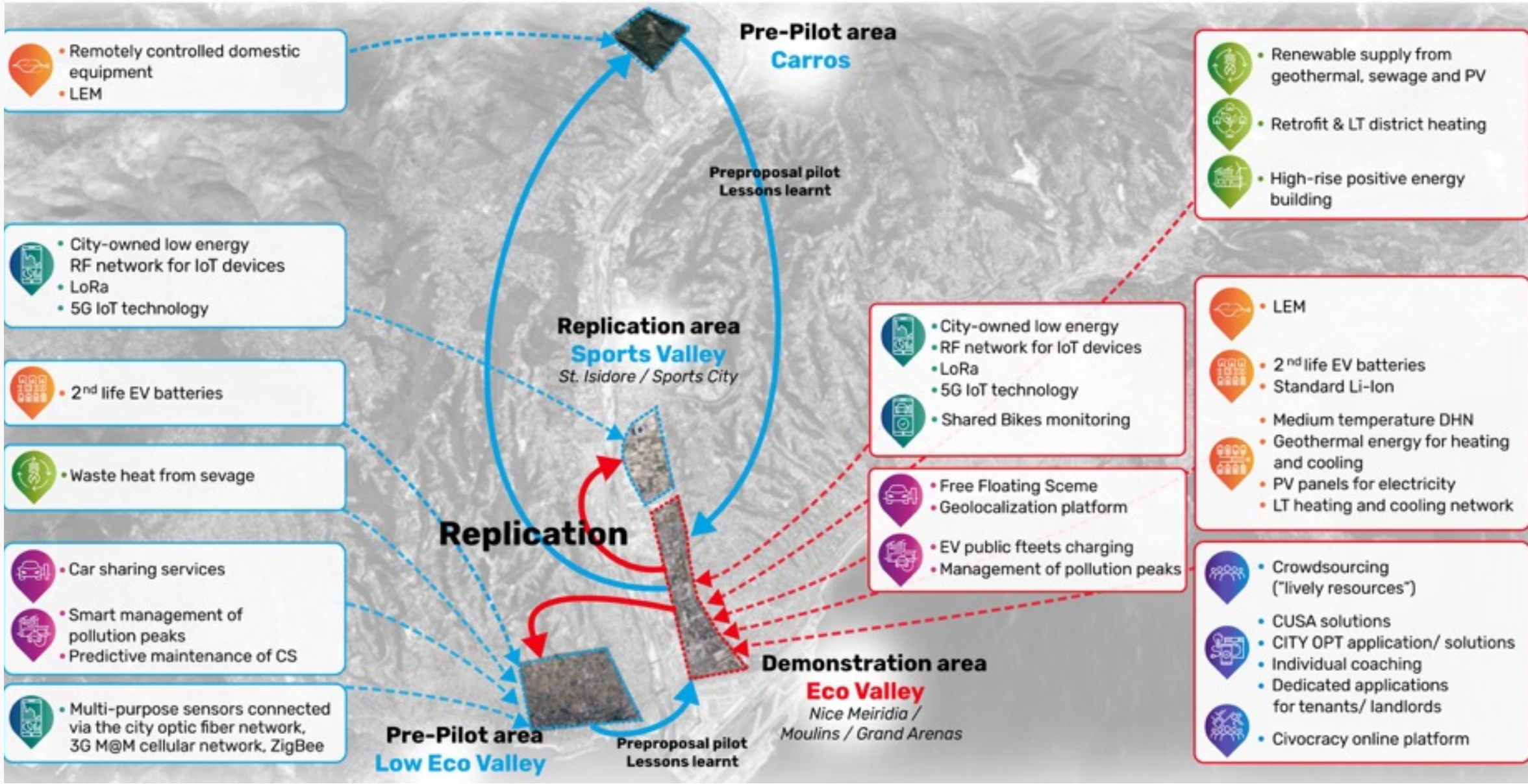

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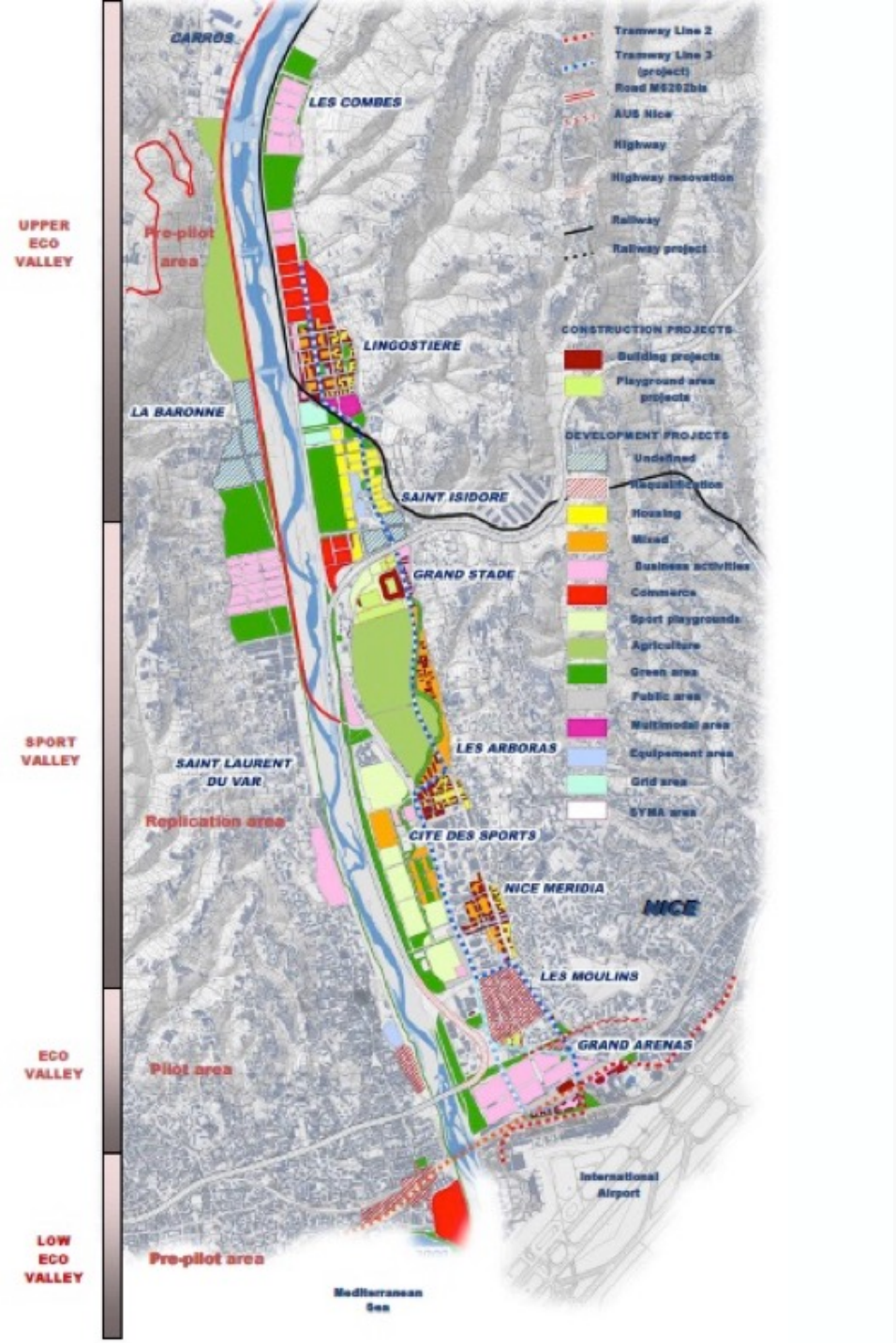

Demonstration areas profile : **Nice Eco Valley**

IRIS
Nice Côte d'Azur

Nice Méridia

An urban technopolis

- 24 hectares
- **350,000 m² high-tech, low emission mixed space district**
- 2,500 housing units
- **5,000 potential jobs identified** with facilities for R&D, retail and services
- up to 4,000 students

IRIS
Nice Côte d'Azur

Les Moulins

Social housing district

- 12,000 inhabitants
- **2,500 dwellings**
- Outdated buildings (60's)
- Multicultural and mainly low incomes population

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Grand Arénas

the new international business district

- 49 hectares
- 750,000 m² buildable land
- 2,000 housing units
- **22,000 potential jobs identified**
- international airport Nice-Côte d'Azur
- **500,000 m² Convention and Exhibition Centre**
- Multimodal transport hub

IRIS
Nice Côte d'Azur

The Métropole Nice Côte d'Azur **partnership**

CSTB le futur en construction

nexity

Université Nice Sophia Antipolis

EDF

ENEDIS L'ELECTRICITE EN RESEAU

evulog CARSHARING TECHNOLOGIES

MÉTROPOLE NICE CÔTE D'AZUR

VEOLIA

côte d'azur habitat

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