



ENERGY TRANSITION

URBAN DEVELOPMENT INITIATIVE
BRAINPORT EINDHOVEN

UDI

ACCELERATING URBAN SOLUTIONS

Urbanization is a global challenge accompanying population growth. While the world's urban areas are highly varied, all cities and towns face the environmental and social consequences of urbanization. They struggle with challenges that require smart combinations of innovative technologies, attractive and functional design and applied knowledge in order to get scalable solutions that add sustainable value with social impact.

The Urban Development Initiative (UDI) provides answers through continuous innovation in ecosystems for urban development & the building industry in order to solve the complex urban challenges of the 21st century. By quickly anticipating the worldwide changes and continuously forming new connections, we create new opportunities for everyone. This attracts talent and companies from all over the world. In the unique business climate of Brainport Eindhoven, we work together in finding solutions for societal challenges concerning health, mobility, energy, food, housing, special quality and safety. An international leading region should be a top-quality place to work, live and visit.

Brainport Eindhoven has become the world's smartest region because of the ability to cooperate within the Quadruple Helix: government, business, research and society. The region has the unique power and position to function as one large Living Lab by continuously creating, evaluating, validating, producing and scaling up innovative solutions for and with citizens and civil society in the 21st urban century. Thereby, making Brainport Eindhoven one of the global leaders in solving the challenges addressed in the urban agenda.

URBAN DEVELOPMENT INITIATIVE

The Urban Development Initiative (UDI) is an organization that aims to solve complex urban challenges. In collaboration we research and develop strategies on building-innovation, energy transition and digitalization in the built environment.

UDI consists of an innovation ecosystem that brings together an ingenious portfolio of living labs that collaborate to scale innovation. Founders of the UDI are City of Eindhoven, City of Helmond, Eindhoven University of Technology (TU/e), Brainport Development and the Fraunhofer Research Institute. Building this ecosystem, we are looking forward to expanding our network with your expertise!

The UDI community will represent the entire Quadruple Helix and stimulate collaboration and citizen involvement by setting up innovation partnerships through network activities, cutting-edge projects and business- and user impact labs. Together we will set the agenda, work on innovative challenges and help to put them into practice. UDI combines existing and new knowledge, testing and living labs, EU funding programs and upscaling possibilities.

UDI is a partner within the network of the European Digital Innovation Hubs and provides you with the opportunity to get connected to a relevant European network of experts in your field of work.

The Urban Development Initiative (UDI) addresses the complex urban challenges of the 21st century through the development of the following lines of focus:

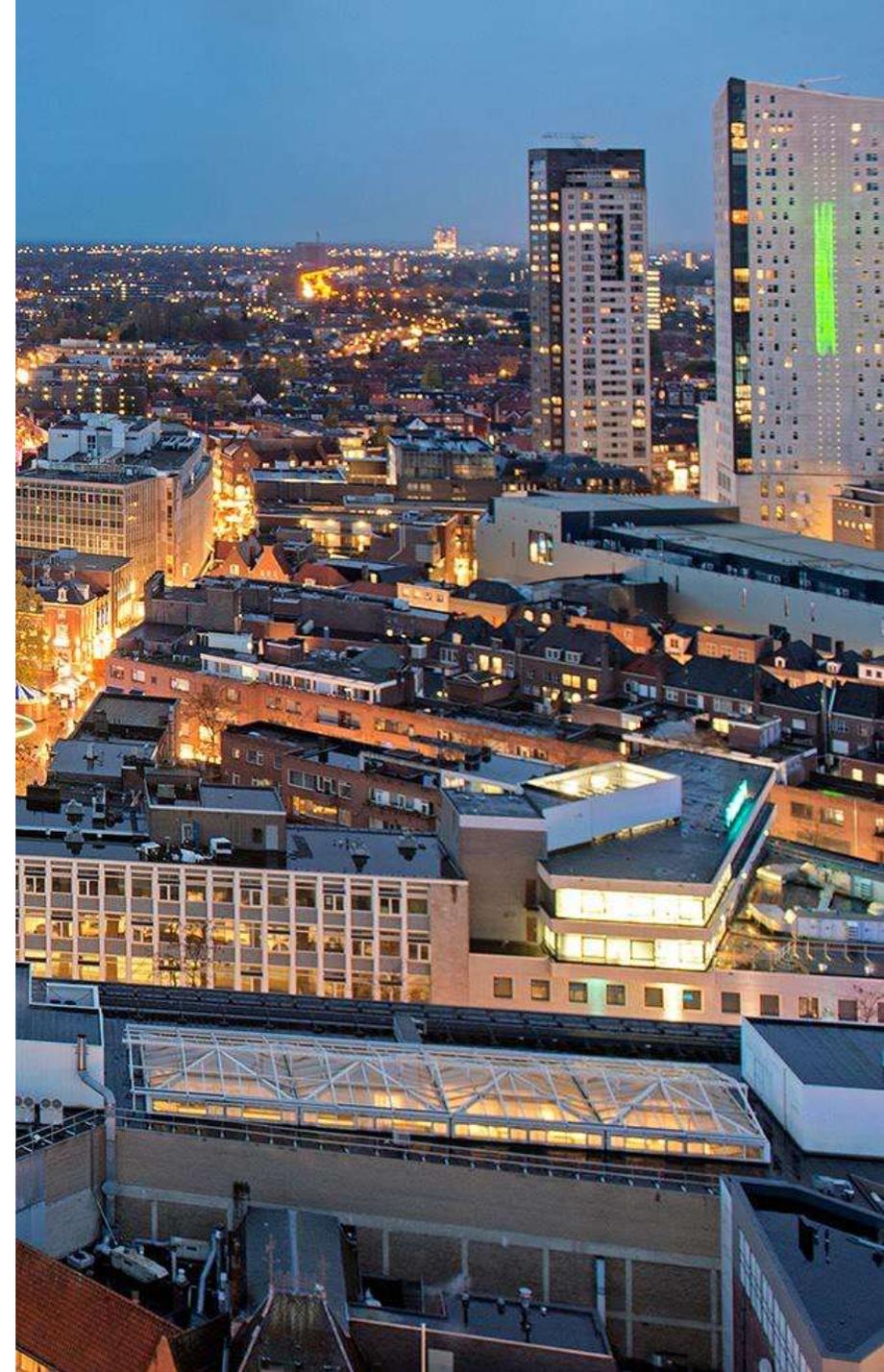
- Digital City
- Energy Transition
- Building Industry 4.0

ENERGY TRANSITION

The complexity of the energy transition is enormous. Different scales (building, district, city, region, ...) are related to different aspects of everyday life in the city (industry, mobility, housing, etc), requiring the expertise of as many different expertises each in their own silo, to deal with this challenge. This in turn is related to different forms (heat, electricity, ...) that are made and treated in different ways (production, conversion, storage, distribution, ...). The built environment is one of the places where this complexity comes together. The lack of clarity about the right direction, costs and public support mean that major breakthroughs have not yet taken place.

There is a need for more clarity and direction around decision support systems, system engineering and financial support, also in terms of motivation. Governments could play a role in this, but knowledge and resources are not sufficiently available. A regional eco-system of parties that looks together at the complete picture offers a solution here. With models it ensures that predictions can be proactively based on an integrated vision, ensures that models can build in the right flexibility and can ensure that the "power to the people" comes through smart systems. The importance of participation is also endorsed by the Committee Brenninkmeijer, who researched on behalf of the National government how citizens can be involved in the transition.

“The energy transition has too many facets to be approached in a single way. Cooperation to an integrated approach can lead to better (accepted) and affordable solutions for sustainable energy in the built environment.”





ENERGY TRANSITION IN THE BUILT ENVIRONMENT

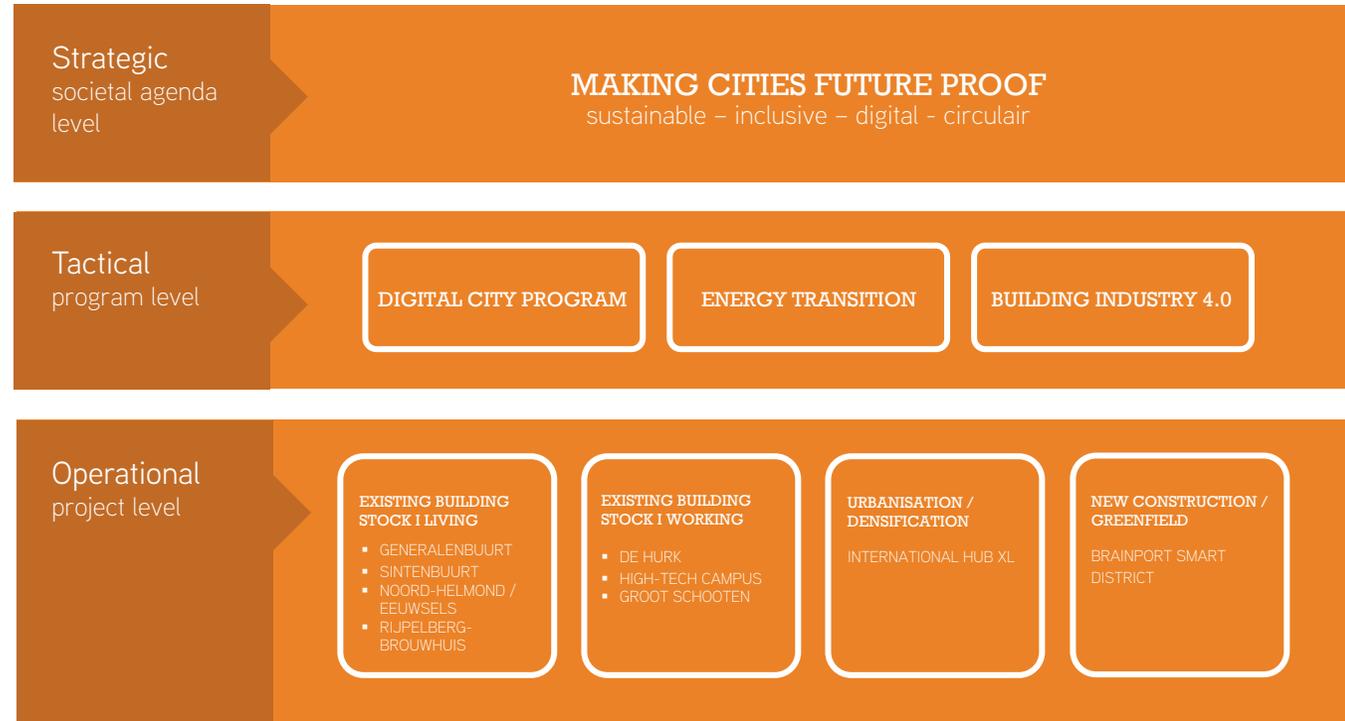
- 1** EXISTING BUILDING STOCK
Living Working
Renovation existing building stock and neighbourhoods. Making existing buildings (homes and utilities) and the energy system more sustainable.
- 2** URBANISATION / DENSIFICATION -
City Centre
Densification Central Business Districts. Task to combine existing with new. More pressure on the system in the city center.
- 3** NEW CONSTRUCTION / GREENFIELD
New building in city extensions. Ability to design and build totally new energy system and buildings.

ENERGY TRANSITION PROGRAM

UDI Energy Transition, a program for the built environment, aims to make the energy transition affordable for businesses and residents of the city. The program offers the possibility to work with parties towards concrete solutions and enable implementation. It focusses on thinking through scenarios, designing future system optimization and decision support, whilst taking into account: implementation & pathways, laws & regulations, and societal support & acceptance.

The program:

1. Offers models to gain insight into the diverse energy transition issues.
2. Builds an ecosystem of stakeholders that continuously generates solutions in the built environment.
3. Brings insights to professionally involved organisations and private individuals and provides cases to implement.
4. Provides social and economic benefits.



Energy Transition as part of UDI Framework



OPEN SOURCE MODELLING AND ENGINEERING

Accelerating the energy transition in the built environment requires an open-source model for municipalities and other stakeholders. This will help to promote and support the decision-making of the integrated future energy system at building, district and city level.

Important building blocks in this approach are:

MODELLING

Develop advanced models to forecast, plan and assess scenarios for the energy transition of the built environment.

ENGINEERING

Collaborate with industry partners to tackle engineering challenges of renewable energy technologies and accelerate their research & development efforts.

KEY ENABLING METHODOLOGIES

A paradigm shift requires a shift in system thinking to drive innovation, decision making and stakeholder engagement.

Modelling and engineering are key methodologies to:

- *Gain insights:* understanding the challenges on system level and building level, identify bottlenecks.
- *Create foresights:* create future directions, compare energy system scenario's and chart optimal transition pathways).
- *Enable application:* implementation of solutions, connecting companies, utilizing existing existing and new competences, and bottom-up evaluation of technological innovations.

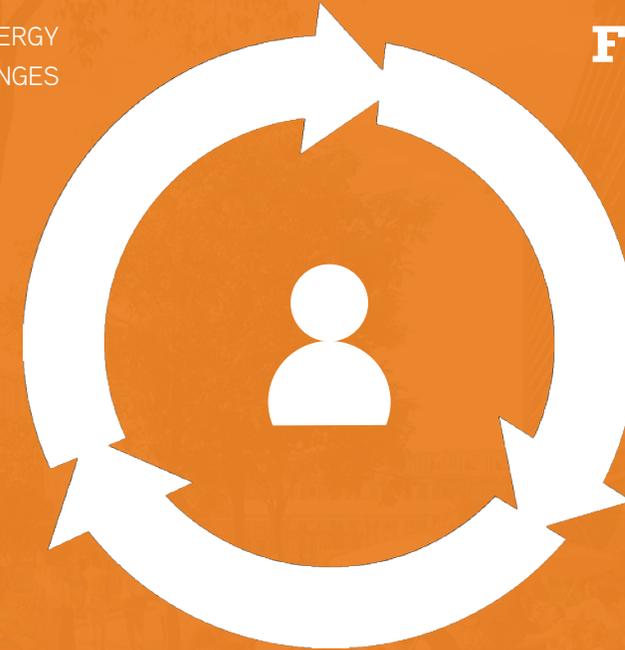
The Energy Transition program is set up to build an ecosystem that works on addressing the innovation and engineering challenges, and provide answers by applying key enabling methodologies. Working in short cycles: insight, foresight and application to leverage shifts in the way we innovate for the right implementation.

INSIGHT

ADDRESSING AND
UNDERSTANDING ENERGY
TRANSITION CHALLENGES
(Modelling)

FORESIGHT

SHARED VISIONING
TRANSITION PATHWAYS
FUTURE SCENARIO'S
(Modelling)



APPLICATION

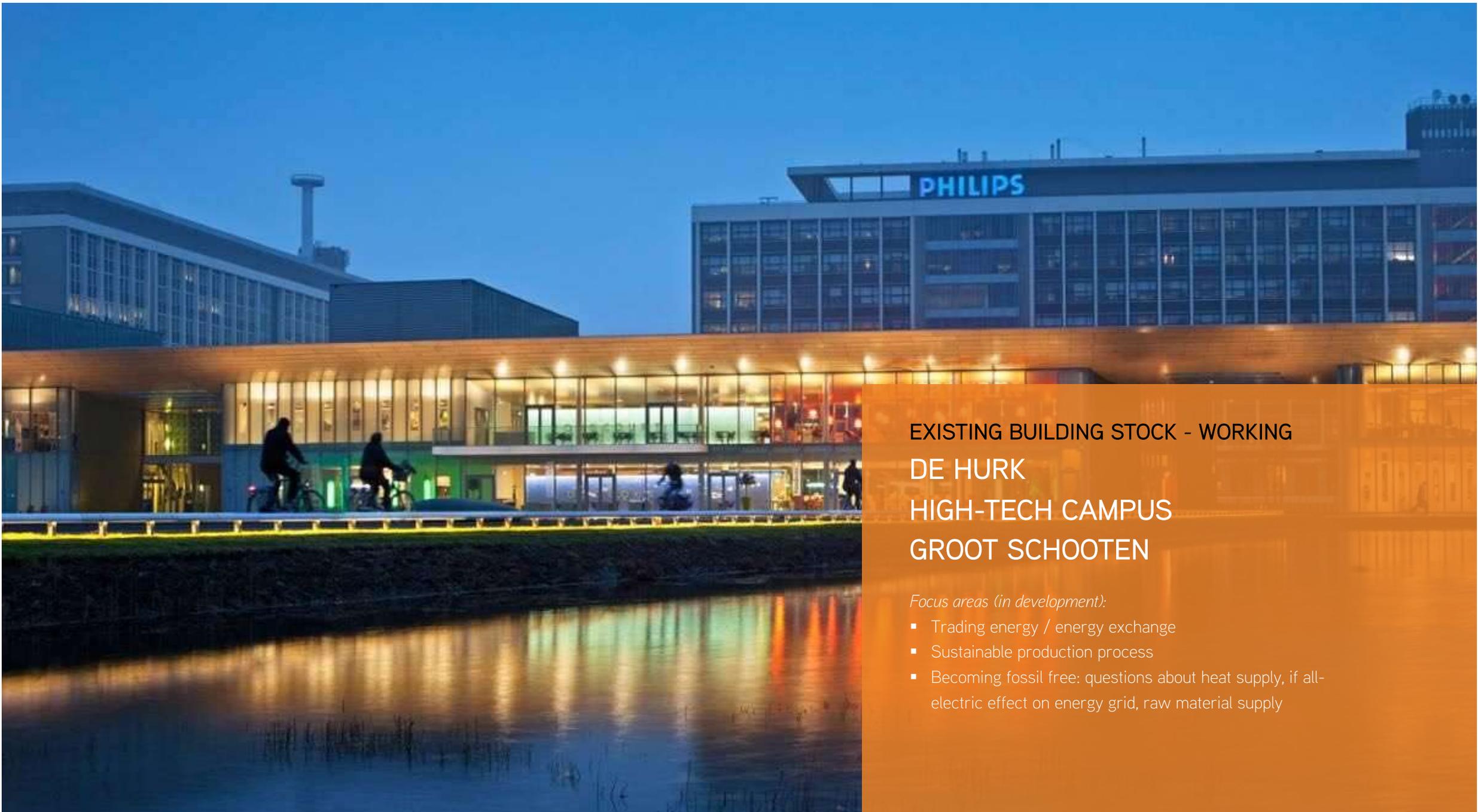
BUILDING ECOSYSTEMS
EXPERIMENTATION, EVALUATING IMPACT
SCALING UP
(engineering)



**EXISTING BUILDING STOCK - LIVING
GENERALENBUURT
SINTENBUURT
NOORD-HELMOND / EEUWSELS
RIJPELBERG-BROUWHUIS**

Focus areas:

- Possibilities of linking treatment plant (heat)
- Comparison of scenarios of different types of heat networks
- Combined evaluation of infrastructure scenarios and associated sustainability of the housing stock
- All Electric neighbourhood: consequences for the electric grid



EXISTING BUILDING STOCK - WORKING
DE HURK
HIGH-TECH CAMPUS
GROOT SCHOOTEN

Focus areas (in development):

- Trading energy / energy exchange
- Sustainable production process
- Becoming fossil free: questions about heat supply, if all-electric effect on energy grid, raw material supply

NEW CONSTRUCTION / GREENFIELD BRAINPORT SMART DISTRICT

Focus areas:

- How do we realize a backbone that is flexible and adaptive?
- How do we keep room for innovation during the total duration of the development?
- How could we add 50 homes on a horizontal infrastructure every time and still keep room for innovation?
- How can we develop a basis that depends on initial corporate collectives?
- Is a heat network a viable solution for the total development?

1.500 Houses
4.500 Residents

27.000 m² Bio-intensive farming
120.000 m² Business Park
125.000 m² Park

300 Autonomous Vehicles
1.5 km Smart Mobility Loop
73.000 Solar Panels



URBANISATION / DENSIFICATION

INTERNATIONAL HUB XL

Focus areas:

- Carry out an in-depth investigation of the energy system, including the roll of sewer and surface water, method of storage and filling in auxiliary heating.
- How could mobility positively impact the total energy demand and system?
- What is the role of mobility in the total energy demand and system?
- Issues surrounding ownership and the role of the government.

35% extra trainpassengers
45% extra bus passengers
75% decrease in cars

7.000 extra housing units
More space for water and park
700.000 m² Extra floor space
250.000 m² Transformation



INNOVATION PARTNERSHIP

A network diagram consisting of numerous small, dark, spherical nodes connected by thin, multi-colored lines (red, orange, yellow, purple). The nodes are arranged in a complex, interconnected pattern, representing a network or partnership structure. The background is a light, neutral color.

The UDI Digital City Program offers an innovation partnership with cities, academia, industries and citizens. By participating in UDI Energy Transition, one can:

- Strengthen and accelerate their own R&D portfolio
- Participate in projects and living labs
- Validate energy transition solutions and technologies through living labs in Brainport Eindhoven and use learnings for replicable models and verifying new product-market combinations in practice
- Develop standards, enhance frameworks and guidelines for disruptive technologies
- Get connected to a relevant European network of experts in your field of work

TIMELINE

Aim is to have this manifest signed in June 2021 for commitment with the ecosystem partners to develop the program in depth throughout 2021



ENERGY TRANSITION TEAM

The Energy Transition team consists of representatives from the City of Eindhoven, City of Helmond, Eindhoven University of Technology (TU/e), Brainport Development and the Fraunhofer Research Institute.

For more information feel free to reach out to:

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An aerial night view of a city with various buildings and a large white box in the center containing the text 'UDI'. The background shows a cityscape with illuminated windows and a tall chimney stack on the right. The sky is dark with some clouds.

UDI