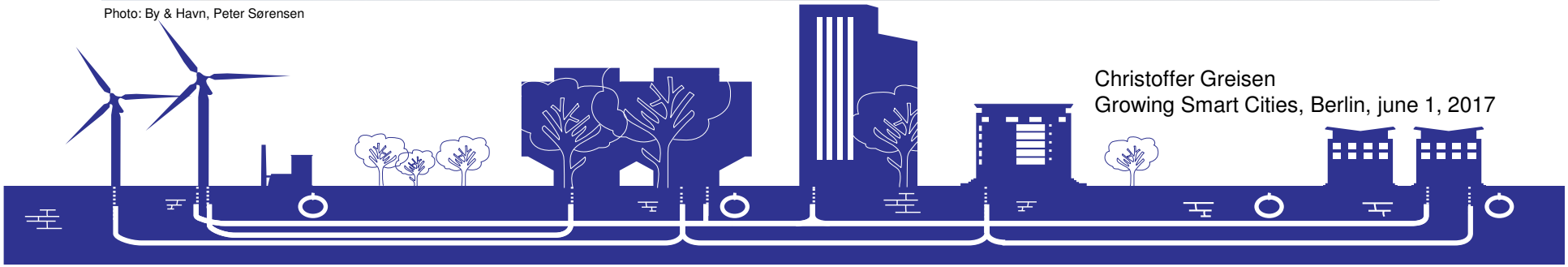
EnergyLab Nordhavn

Integrated Energy Infrastructures and Smart Components

Photo: By & Havn, Peter Sørensen



Christoffer Greisen
Growing Smart Cities, Berlin, june 1, 2017

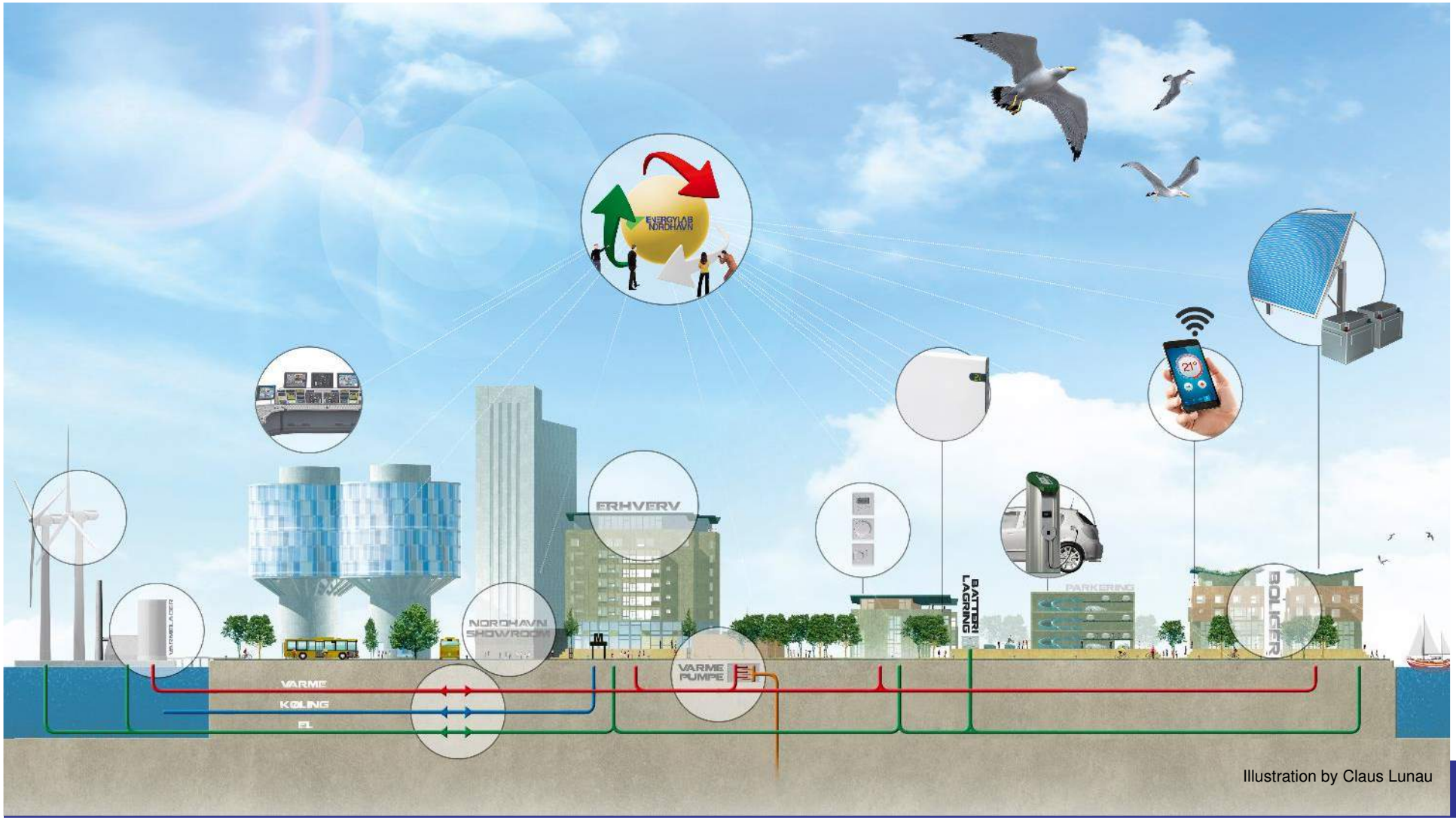
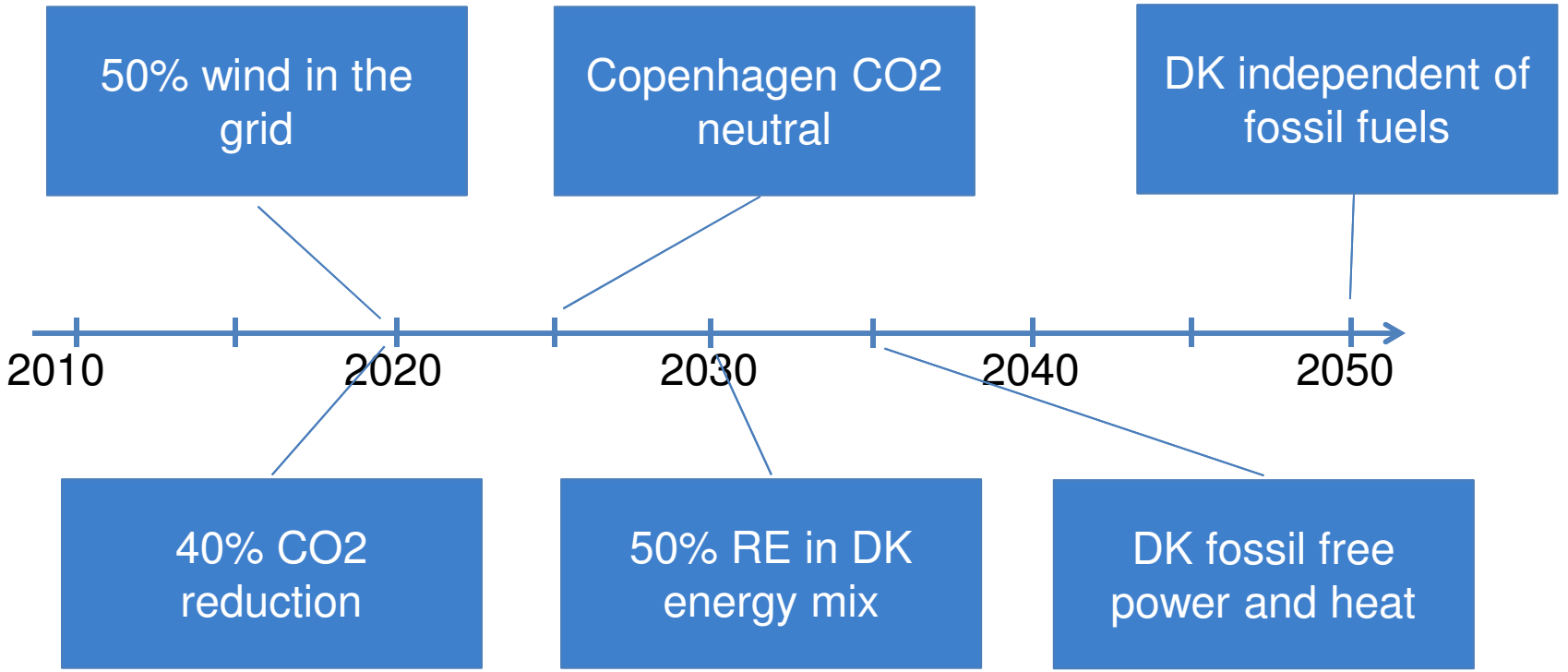
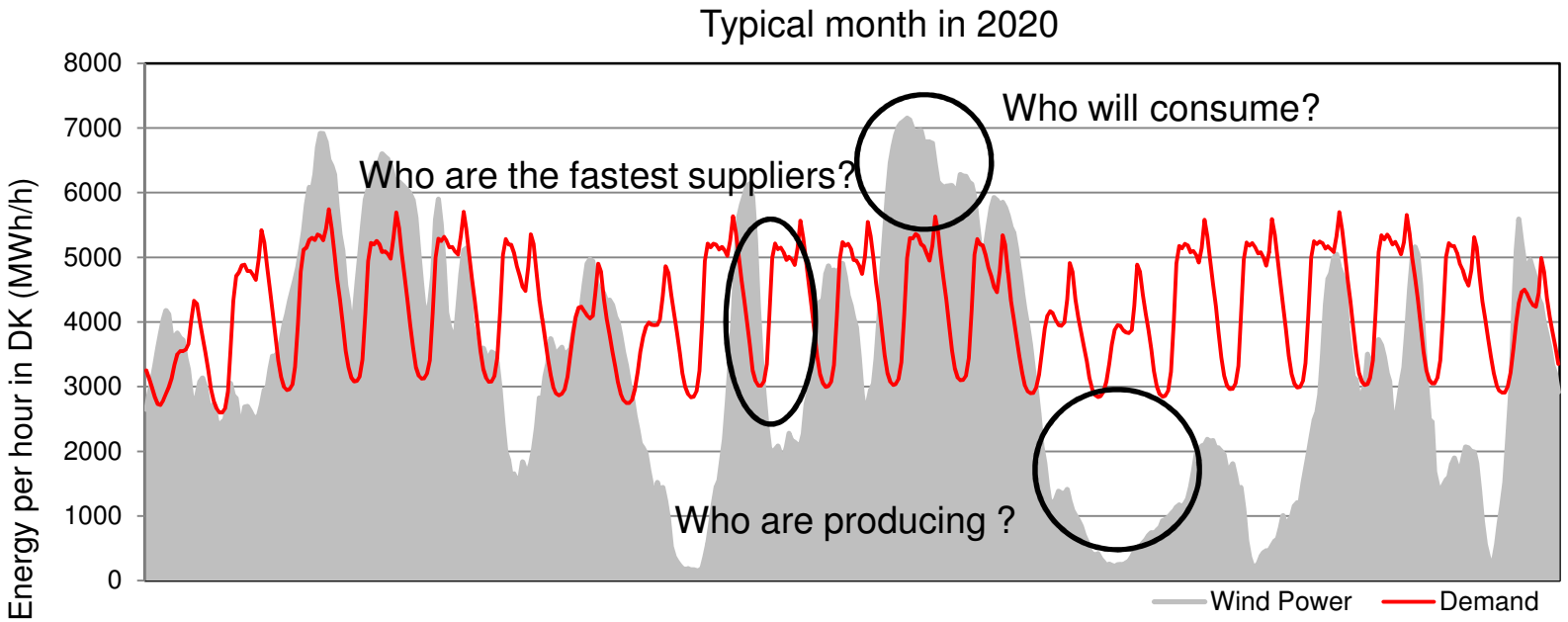


Illustration by Claus Lunau

Long term goals supported



50% wind already in 2020



Courtesy of Københavns Kommune

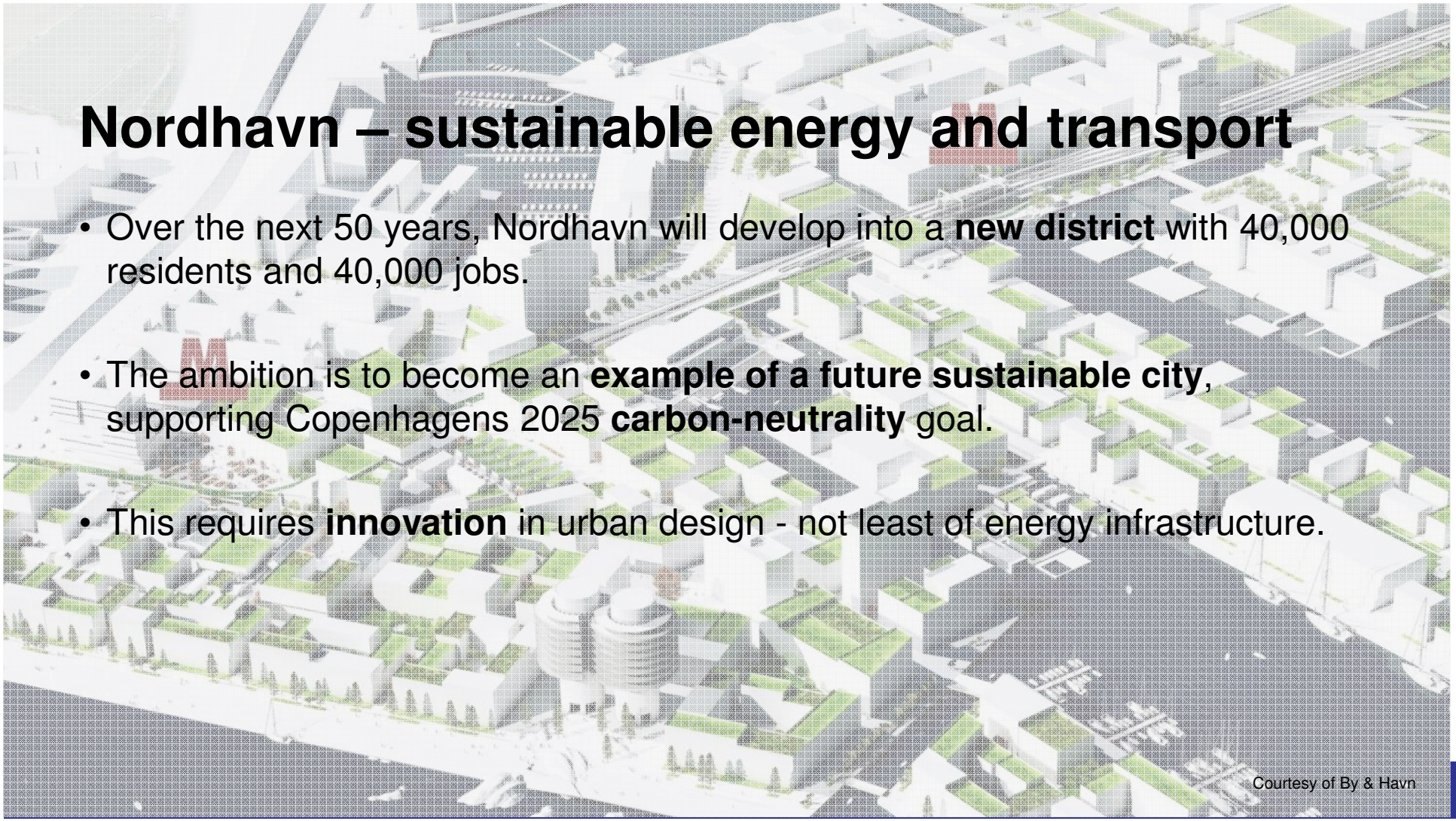
Courtesy of Københavns Kommune

Nordhavn – sustainable energy and transport

- Over the next 50 years, Nordhavn will develop into a **new district** with 40,000 residents and 40,000 jobs.

- The ambition is to become an **example of a future sustainable city**, supporting Copenhagens 2025 **carbon-neutrality** goal.

- This requires **innovation** in urban design - not least of energy infrastructure.



Courtesy of By & Havn

DGNB Certification at district level
Result : 81,4 % = platin

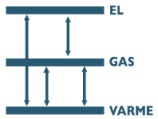
- Environmental quality: 66,7 %
- Economy: 92,6 %
- Social and functional quality: 85,7 %
- Technical quality: 81,4 %
- Process: 79,6 %

Courtesy of By & Havn

RD&D Inspired by Smart Energy Networks

1. Commercial technologies in new contexts
2. Extended integration of the energy sectors
3. The right load at the right time
4. Planning and operation of smart energy systems
5. Markets and business models for smart energy

Extended integration of the energy sector



4. Efficient and flexible energy conversion and storage technologies

5. Access to data across sectors and actors

6. Large scale energy lab for smart and integrated energy solutions

Objective

To develop

new methods and solutions

for design and operation of the future

cost-effective integrated energy system

based on Nordhavn as a

globally visible real-life laboratory.

Photo: Kontraframe

Partners from multiple sectors

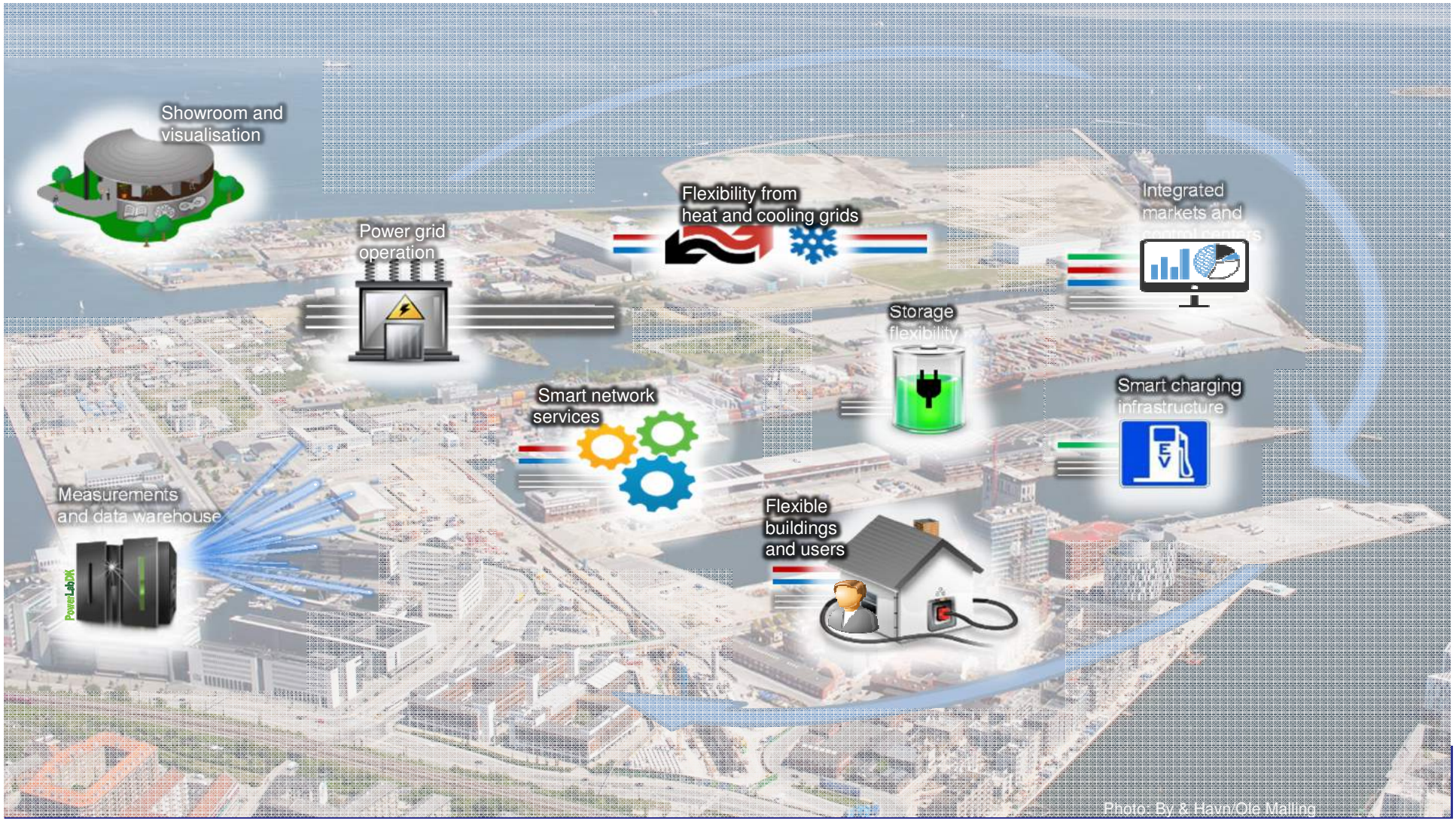
Authority and city development

Energy Infrastructure

Industry and consulting engineers

University and data infrastructure

2015-2019, Budget 19 M€, Public funding 11 M€ from EUDP


Showroom and visualisation
Power grid operation
Flexibility from heat and cooling grids
Integrated markets and
Storage flexibility
Smart network services
Smart charging infrastructure
Measurements and data warehouse
Flexible buildings and users
PowerLabDK
Photo: By & Havn/Ole Malling

Frihavnstårnet

- 12 appartments with building automation
- Q4 2016

P-hus Lüders

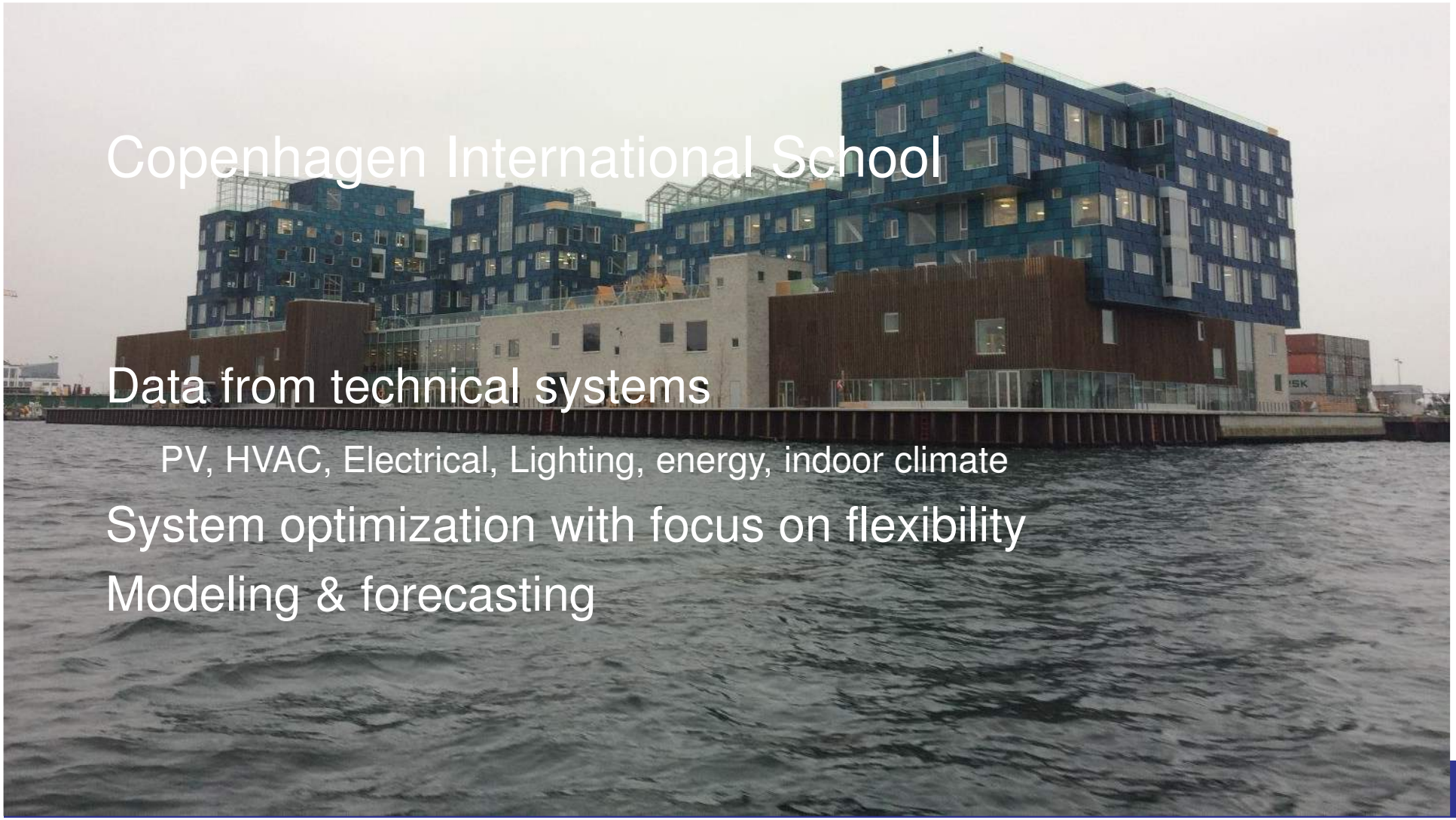
- Grid connected Li-ion battery
- 460 kWh (60 homes for one day)
- Integrated with 10 kV grid
- Technology: ABB
- Operation: Radius
- Q1 2017

Havnehuset

- Demonstration of flexible district heating and low temperature district heating
- Q4 2016

Terra Nova

- 10 appartments with smart control of heating systems
- Measuring of thermal capacity in four apparments
- Q4 2016


Copenhagen International School
Data from technical systems
PV, HVAC, Electrical, Lighting, energy, indoor climate
System optimization with focus on flexibility
Modeling & forecasting

The grid connected battery

Purpose

Inspire innovation at Radius – and with other actors in the market – in the field of battery applications

630 kW, 460 kWh

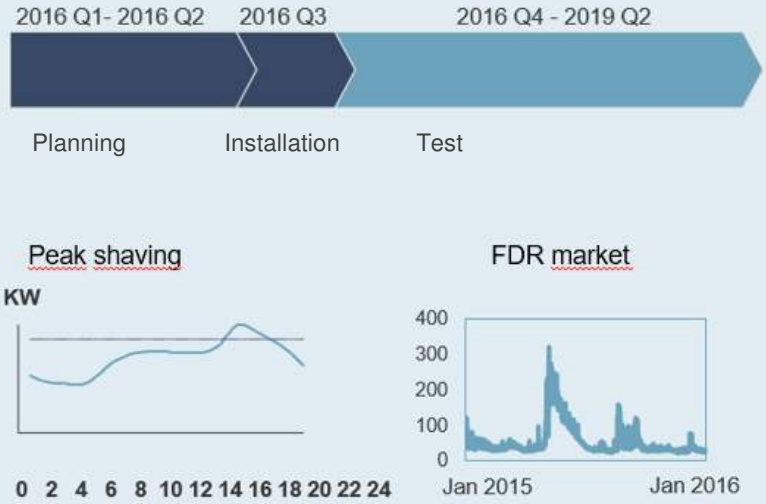
Goals

Demonstrate how batteries can create value for various market players

- Through the deferral of grid reinforcement
- Through the use on the frequency regulation market

Develop cost efficient technical operation of stationary batteries

- Development of algorithms for battery operation
- Evaluation of battery performance and lifetime



Perspectives and learning

- Strengthened participation in the necessary transformation of the electricity distribution sector, through cooperation with national and international partners
- Demonstrate – through cooperation with project partners - how the future challenges of the distribution network can be handled
- Understand the potential of energy storage in a DSO perspective
- Understand opportunities and limitations for various actors in a flexibility market
- Contribute to the landscaping of optimal business models
- Establish a foundation for a revising relevant regulation.

Trend - sharing is caring

- Sharing
  - is part of human nature and a source of happiness
  - is a basis for the development of new business models (‘access economy’ and ‘collaborative commons’): crowdfunding crowdsourcing, car pooling, shared property, etc.
  - Entering also the energy sector
- Why not develop “truly” consumer-centric and community-driven management approaches?

[Adapted from Pierre Pinson et al, 2016]

Inspiration

- Learning by doing
- Show it.
- Physical demonstration > provoke thought – also on regulation
- Dissolve traditional divides
- It's not always for the money…

[From www.tvindkraft.dk]

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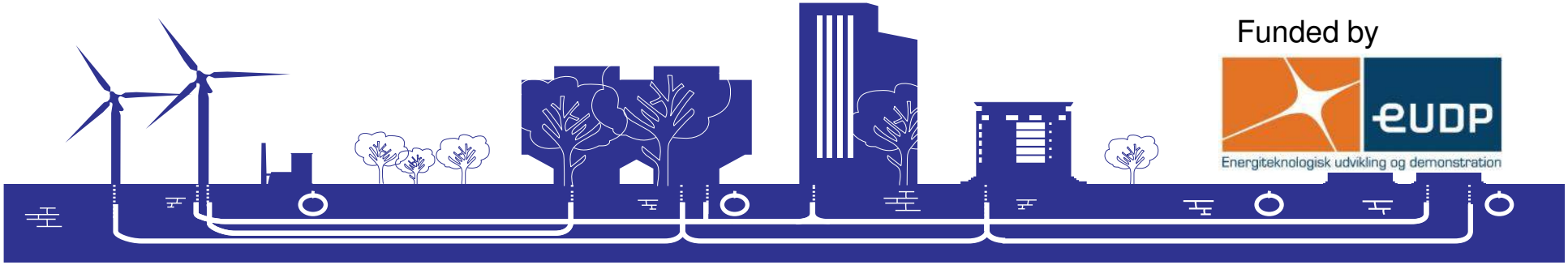

Funded by

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