

# EnergyLab Nordhavn for CITIES'ens

PhD & PostDoc event in CITIES  
22. April 2015

(AI)Fred Heller



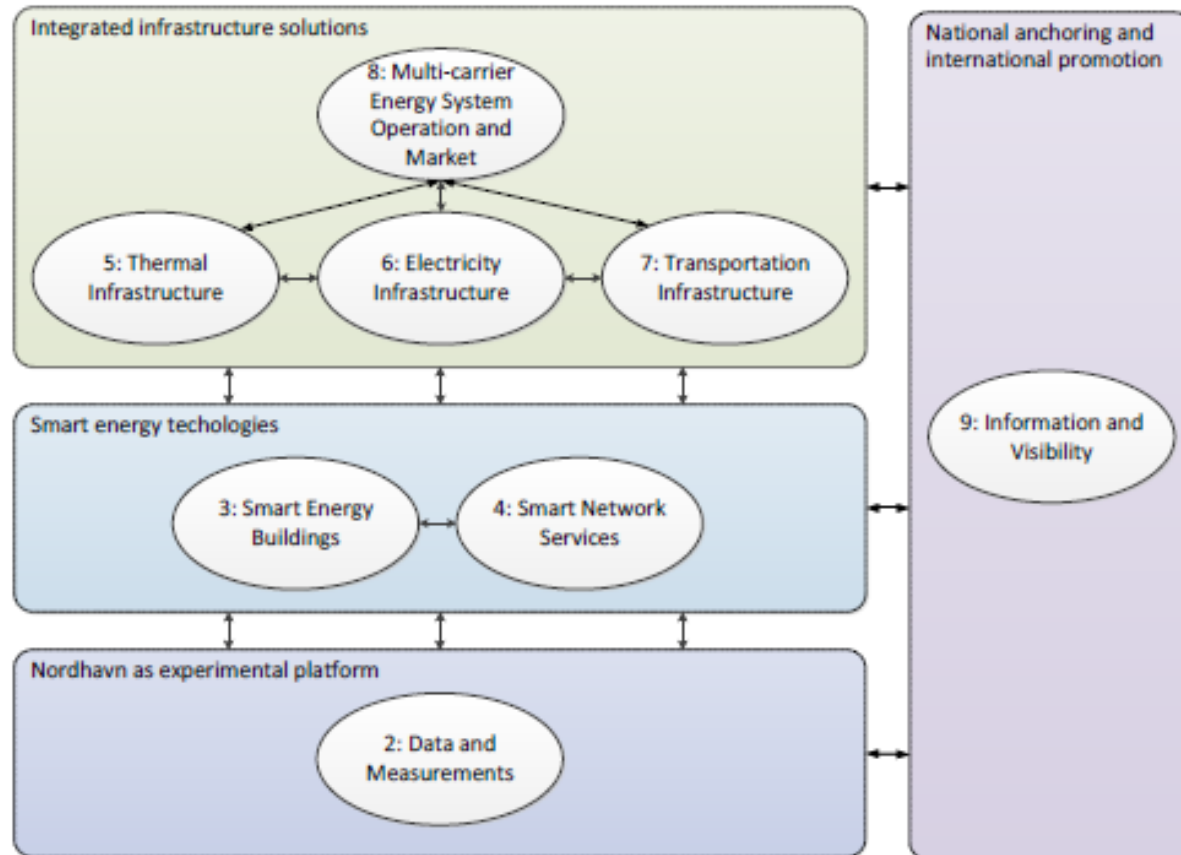
# Context

- In 50 years 40.000 new citizens, 40.000 new jobs (they claim)
- CO<sub>2</sub> neutral Capital
- All buildings Actual Building Code +1 (2020)
- Showroom for export companies
- 2014-2019 (the year before)
- 129 mill. DKK (79 mill. DKK) BYG: 6.8 mill, 1.2 co-financing

## 3 main technical foci

- Integrated energy system (electricity/thermal/transport)
- Smart buildings and flexible energy components
- New design and dimensioning methods for energy infrastructures
  - Low temperature/low energy building district (WP5)
  - New dimensioning of electrical grid due to low energy district
  - New vehicle load concepts

- WP1: Project Management (CEE, DTU)
- WP2: Data and Measurements (ABB)
- WP3: Smart Energy Buildings (Balslev Consultants)
  - Carsten Rode, Alfred Heller, 2 PhD, 1 PD
- WP4: Smart Network Services (CEE, DTU)
- WP5: Thermal Infrastructure (HOFOR)
  - Svend Svendsen, 1 PD
- WP6: Electricity Infrastructure (Dong Energy)
- WP7: Electric Transportation Infrastructure (Clean Charge Solution)
- WP8 Multi-carrier Energy Systems Operation and Markets (ABB)
- WP9 Visibility and Stakeholder Engagement (By&Havn)



# Methodology(-ies)

- The methodology of Nordhavn could be simplified to be:
  - Experiments
    - Find the flexibility that arises from the shut-down of components/system parts etc.
    - Measure the impact
    - Model the generic impact on flexibility

No.	Experimental component	Level	Qty.	Lead task	Lead partner
1	User behaviour and demand response with home management systems	User	50	T3.2	Balslev
2	Fuel-shift technology for low temperature district heating	Component/ User/Building	25+2	T4.3	MetroT
3	Grid services by electric water heaters in private homes	Component/ User/Building	20	T4.4	GlenD
4	Smart energy-flexible building management system (BMS) in commercial buildings	Building/User	2	T3.7+ T1.5	Balslev
5	Controller for optimal operation of large heat pump	Component/ Infrastructure	1	T5.2	HOFOR
6	Smart charging EV infrastructure	Component/ Infrastructure	2x10	T7.3	CC
7	Electric battery storage in the grid	Component/ Infrastructure	1	T6.3	DEE
8	Low-temperature district heating supply solutions	Infrastructure	3	T5.4	HOFOR
9	Islanding heating system supply	Infrastructure	1	T5.5	HOFOR
10	Multi-carrier market and control centers	System	1	T8.3+ T8.6	ABB

# Infrastructure /Data

- EnergyLab Nordhavn is mend to deliver energy data from all the involved components, experiments to
  - CITIES for analysis, research and modelling.
  - IEA EBC Annex 67 (Energy Flexible Buildings)
  - ... others





# CITIES 2 Nordhavn



- CITIES is seen as the research and model development partner for the EnergyLab Nordhavn



# EXTRA SLIDE – LYNGBY SMART CITY

- Community
- NIRAS
- DTU
- Others ...



## LYNGBY | SMARTBYG portal

Alle data samlet til brug i bygge- og renoveringsprocesser

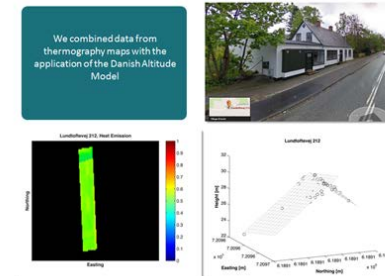


Byudvikling kræver adgang til data om det eksisterende byrum og beregninger på det nye. En dataportal skal samle alle offentlige data til brug i bygge- og renoveringsprocesser:

- Alle eksisterende data; Offentlige registre, vejrdata, luftfotos, trafikdata, højdekurver, energimålere, samt nye data fra bygningscensorer, der måler fugt, støj, vind, co2 osv.
- Samtidig skal byen udstyres med censorer, der måler vind, sol, skygge, støj osv. Data som ligeledes registreres i portalen.
- Portalen vil ikke kun huse data, men også værktøjer til visualisering, beregning, optimering, samt - vurdering af f.eks. renoveringsprocesser.

## SHOWCASE: Smart Energy Renovation

- værktøj genereret på baggrund af samkørte data



## SHOWCASE: MIKROKLIMA

- Resultat af kombineret mikroklima

Data som grundlag for optimalt design

- Omfattende manuel registrering medfører usikkerheder, da få punkter kan måles

Automatisering af processen

- Giver flere målepunkter
- Kontinuerlig måling (ikke afhængig af valgt tidspunkt)
- Automatiseret vurdering (metode)
- Kan korrigeres/flyttes m.m.

