



**Energy Lab Nordhavn**  
Sustainability defined by certification

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# Energy Lab Nordhavn

Sustainability defined by certification

Thanks to

Kirsten Ledgaard, By & Havn on DGNB Nordhavn

Jesper Ingemann Mogensen, DOMUS Architects on DGNB critical view

Presenter:

Assoc. Prof. Alfred Heller

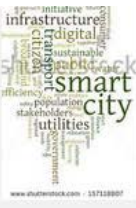
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480 x 326 - well.blogs.nytimes.com

## Smart City – Nordhavn (Copenhagen, Denmark)



Source: [Google Search images](#)

## Smart City – Nordhavn (Copenhagen, Denmark)

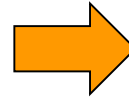
- Facts
  - 50 years of development
  - 40,000 citizens
  - 40,000 working places
  - Living Lab for Copenhagen = Aiming at CO<sub>2</sub>-free from 2025
  - Building Code +1 (< 20 kWh/m<sup>2</sup>/anno)



# EnergyLab Nordhavn Demonstration



## EnergyLab Nordhavn – Smart Energy Systems



Source: <http://www.byoghavn.dk/byudvikling/bydele/nordhavnen/landvindingsprojektet+i+nordhavnen.aspx>

- Measurements
  - 17 mil. €
  - Ca 50 buildings monitored in detail, 2 offices, ...
    - Measuring density pr. building e.g. 10,000 points
    - Frequency e.g. 1 pr. minute
  - All energy flows, water ... - mesh monitoring
  - Special energy sources/sinks monitored individually
    - Cruise ship terminal, solar, wind power ...

# How to describe a city

- IBM Rio Example:

... One huge control room



- GIS – based (e.g. <http://data.kk.dk>)
- CIM – inspired by BIM (Building Information Modelling)
- Topology etc. – e.g. street description in small pieces
- Cities as “laboratories” (living labs)
- Cities modelling and simulations/scenario modelling (mathematic-physical representations)
- Organic description:
  - BOG: Sustainable Urban Metabolism, Paulo Ferrao og John E. Fernandez
    - Mapping and Assessing Urban Metabolism (side 187 ff)



# Another way of describing Cities (Standards) City Data (ISO 37120)

- World Council
- 47 parameter
  - Economy
  - Education
  - Energy
  - Environment
  - Finances
  - Fire and emergency responds
  - Governance
  - Health
  - Safety
  - Shelter
  - Solid waste
  - Telecommunication
  - Transport
  - Urban Planning
  - Wastewater
  - Water and sanitation

**TOPIC FROM BEFORE BREAK**

New World Cities Report 2014, Amsterdam, plus a dozen other cities including Shanghai, Johannesburg and Buenos Aires, are inaugural members of a new council, the World Council on City Data. Launched at a Global Cities Summit in Toronto in late May, the council will play the important role of verifying that cities are collecting the right data the right way. The council intends to be “a global hub for cities, international organizations, corporations and academia,” sharing ideas for city performance improvement broadly.

The path to an ISO standard aimed at broad global city buy-in was not an easy one. Supporters acknowledge a heroine behind the story — Patricia McCarney, director of the University of Toronto’s Global Cities Indicators Facility, who has made creation of good global data on cities an all-consuming goal for close to a decade.

<http://www.citylab.com/politics/2014/06/finally-clear-performance-data-for-comparing-the-worlds-cities/372143/>

<http://citiscopes.org/story/2014/here-are-46-performance-measures-worlds-cities-will-be-judged>

# Certification as a methodology (or just a common language?)



# DGNB -- Principals

- 50 criteria in 6 aspects (picture)
- Nordhavn – City District Certification
  - (by Kirsten Ledgaard, By og Havn)
  - Environmental Quality
    - 11 criterion with weighting; 29,3% of total
  - Economical Quality
    - 4 criterion with weighting; 22,6% of total
  - Sociocultural and Functional Quality
    - 12 criterion with weighting; 54,0% of total
  - Technical Quality
    - 10 criterion with weighting; 20,3% of total
  - Process Quality
    - 8 criterion with weighting; 27,0% of total



– Note: Highest score = 6,8% (most scores are between 1 and 3%) – Many small contributions

## DGNB -- Facts

- 26 ha (>2 ha)
- 67,000 € (not much for an area)
- Motivation: ?? The ground for the building developers
- Note: Final certification after 75% of development is finalized = with 50 years of development – this is not “operational”
  - PS: German (origin) developments are more focused in area and time



### WHY CERTIFICATION OF NORDHAVN by Kirsten Ledgaard:

- ✓ Common language
- ✓ Focused priority list
- ✓ Clearly specification for the “ambitions” for the development area
- ✓ If you demand certification on the buildings, go with a good example for the area
- ✓ Site Quality is part of the building certification (hence clearly in place – easier certification)

## DGNB -- Some Learnings

- Old areas cannot score high – New development areas do
- Ambitious demands for buildings scores high
- DH (common solutions) add seriously to the score
- Developer (economic motivated) do consider between a “normal” city development and a “certified” area – why do they choose the certified one – work to be done
- Learning curve is steep – the first time is hard, but you get better  
.... hence probably work for consultants and not municipalities



# DGNB -- Difficulties

- Live Cycle Assessment (LCA)
  - Environmental Quality
  - Weight = 3
  - Part = 1,7%
- Considerations
  - LCA for buildings
  - LCA for traffic areas
  - LCA for green areas
  - LCA for infrastructure, streets and public supply
  - LCA for traffic
- 7 pages with a lot of mathematical summation equations (difficult)

Is it worth while?



**ANYBODY TRIED A LCA?**

**LUCKY: THE ARE TOOLS**



# DGNB -- Difficulties

- Liv Cycle Cost (LCC)
  - Economical Quality
  - Weight = 3
  - Part = 6,8%
    - Considerations
      - LCA for buildings
      - LCA for traffic areas
      - LCA for green areas
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**WEAKNESS: LACK OF TOOLS**

# Social Quality – Can we quantify social qualities ?



DOMUS /  
ARKITEKTER



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ARKITEKTER



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ARKITEKTER



# Thank you for listening



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