CITIES
Centre for IT Intelligent Energy Systems

Innovationsfonden
FORSKNING, TEKNOLOGI & VÆKST I DANMARK

Potential Student Projects in relation to CITIES

Software Engineering (02162)

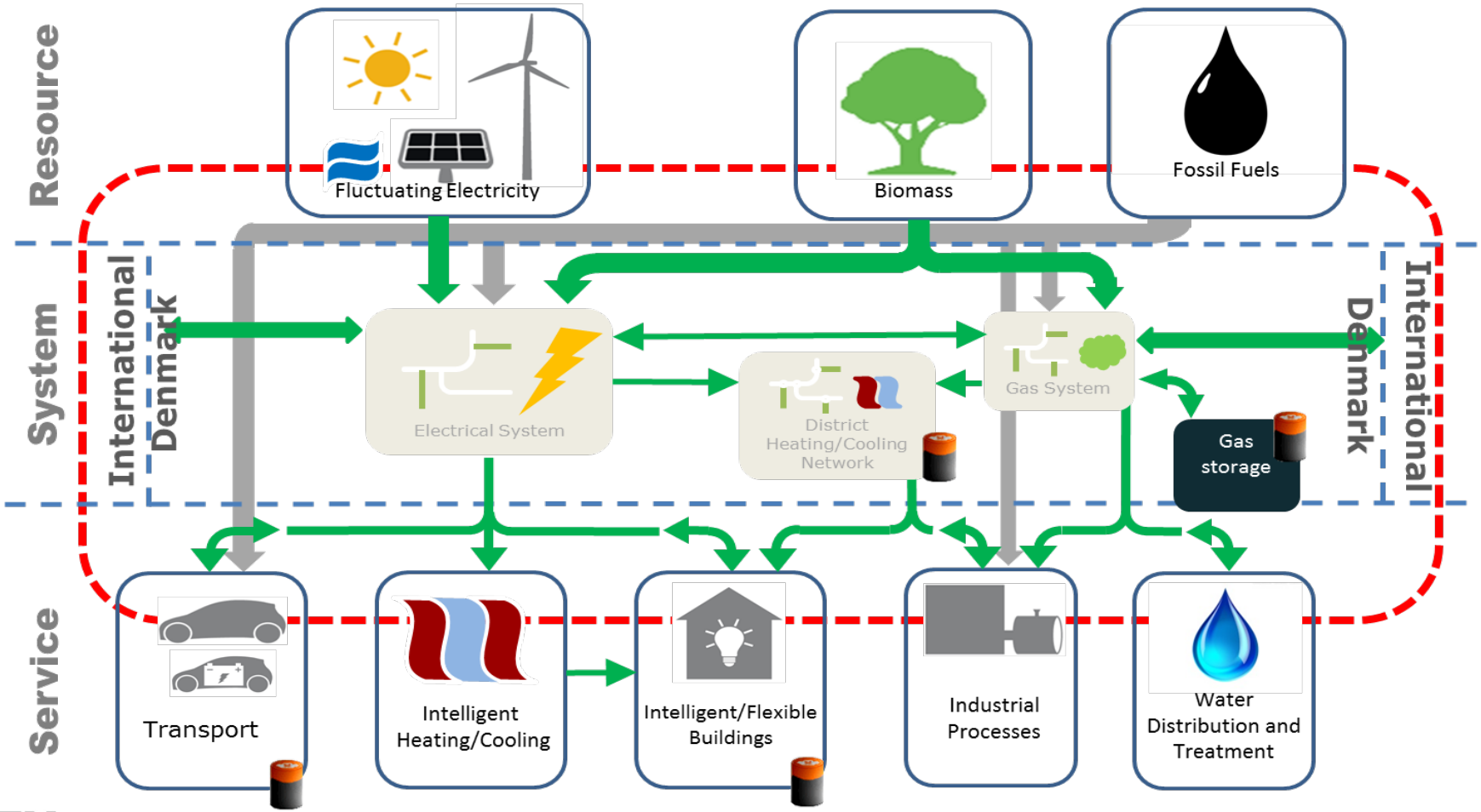
December 5th 2014

Ivan T. Herrmann and Alfred Heller

BREAKING NEW GROUND
AALBORG UNIVERSITY

DTU

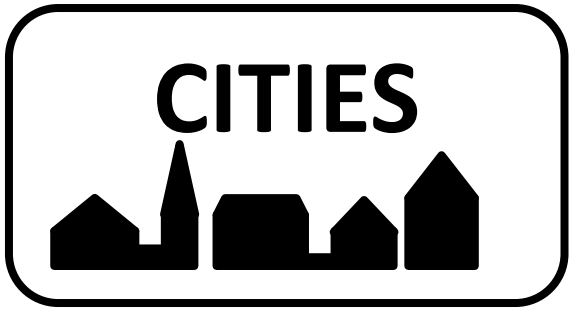
CITIES Focus



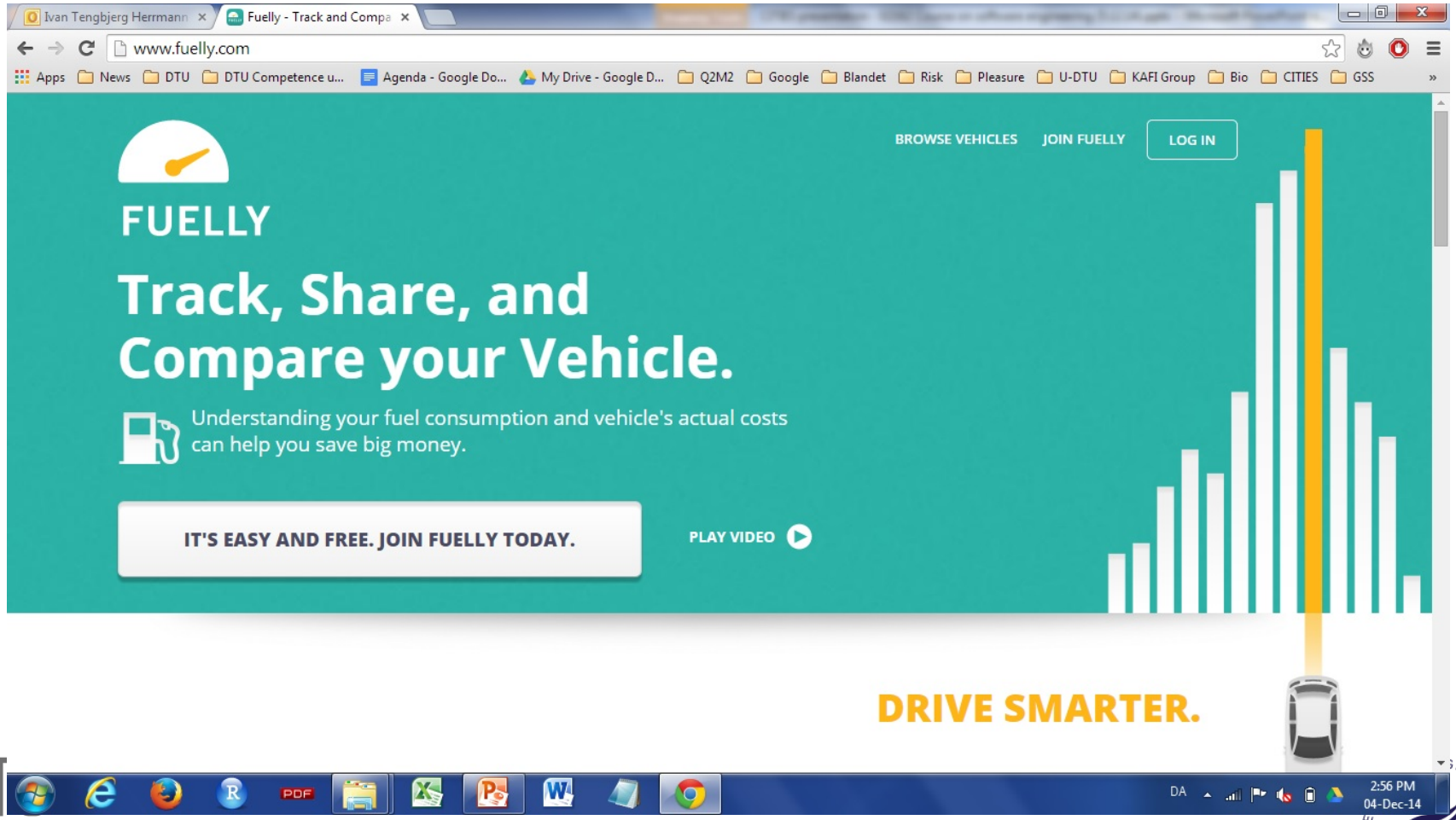
CITIES Hypothesis

The central hypothesis of CITIES is that by **intelligently integrating** currently distinct energy flows (heat, power, gas and biomass) in urban environments we can enable very large shares of renewables, and consequently obtain substantial reductions in CO2 emissions.

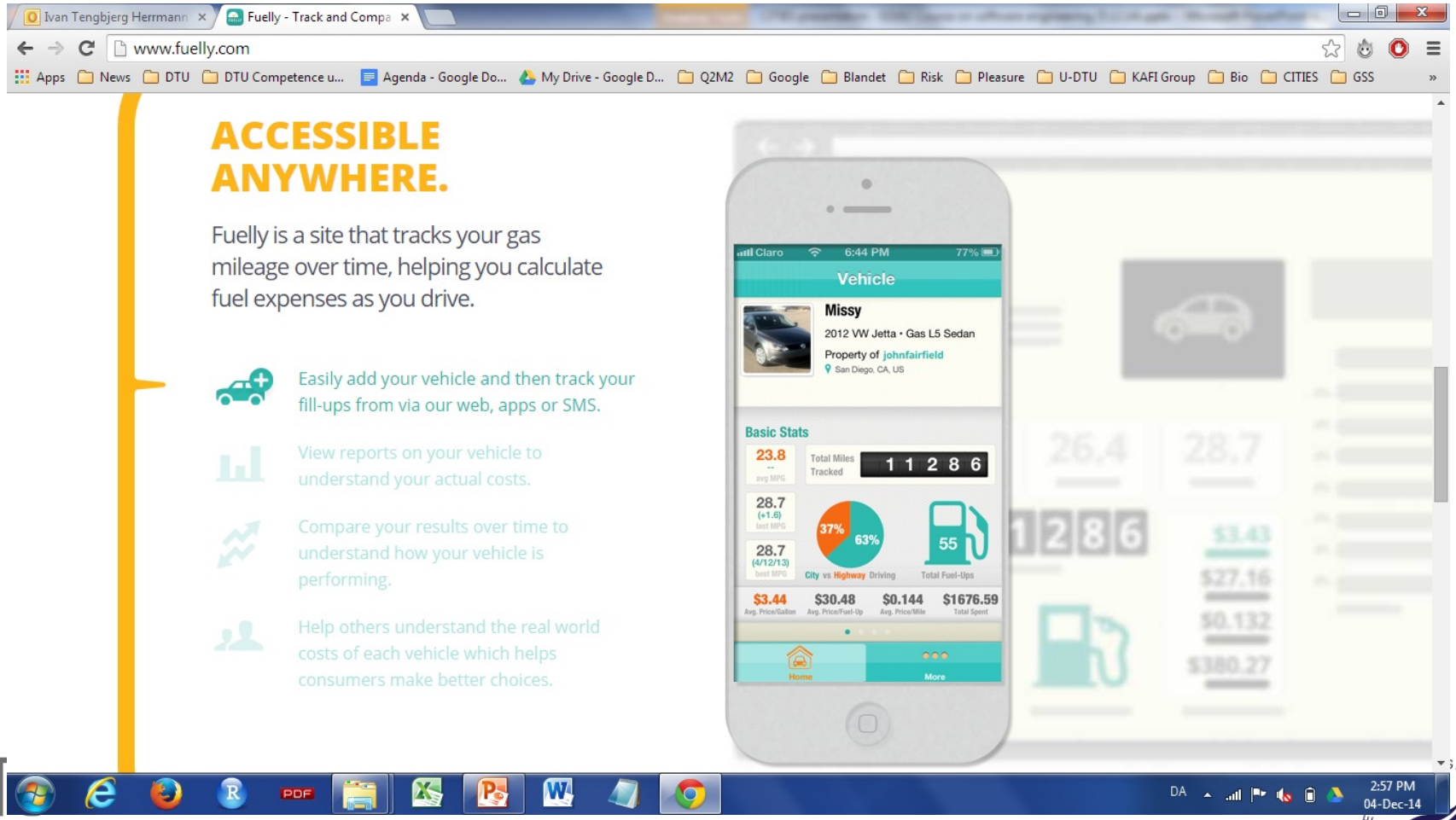
Intelligent integration will enable **lossless 'virtual' storage** on a number of different timescales.



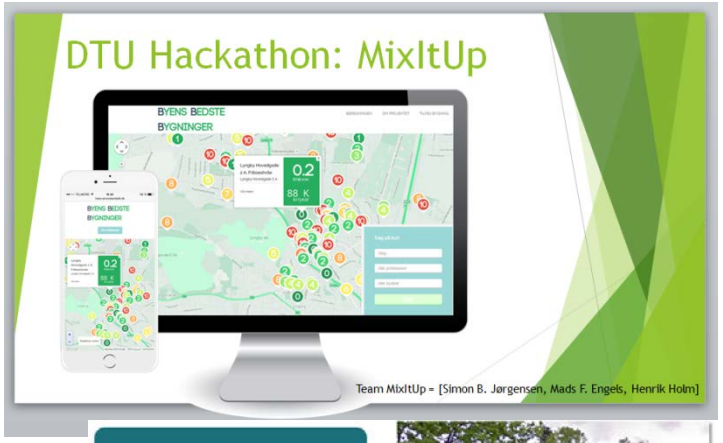
Example 1: www.fuelly.com

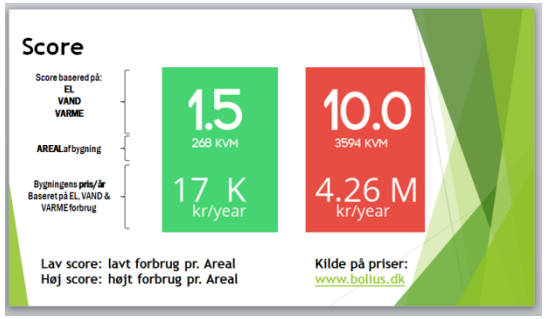


www.fuelly.com

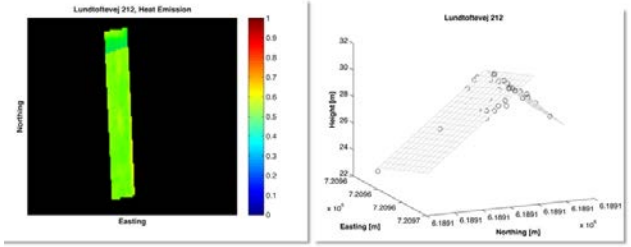


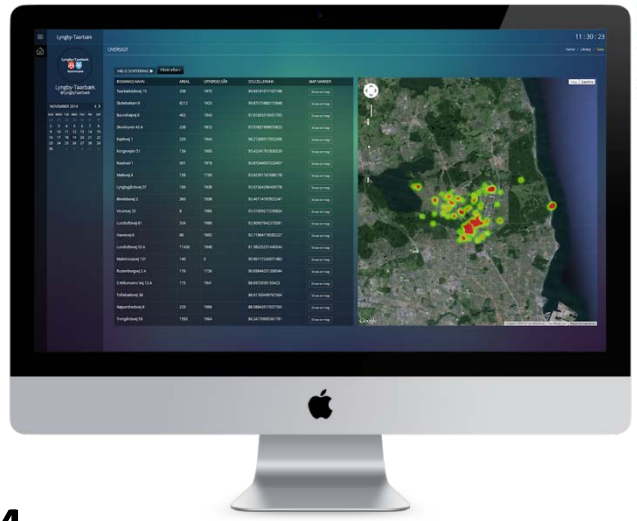
Example 2:
What's possible in two days?





We combined data from thermography maps with the application of the Danish Altitude Model



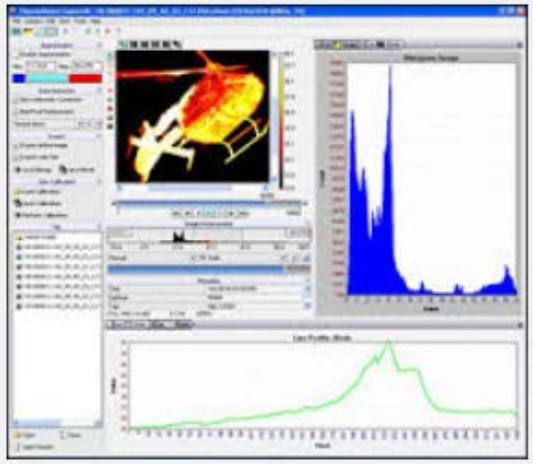


Team FancyPants

Anders Nielsen
Benjamin Hughes
Daniel J. Bertelsen
Lars Bonde
Maxim Khomiakov
William Gan

- ✓ **Big Data Hackathon 2014**
- ✓ **Both winners used energy, cities, and data**

Example 3:
Visualisation – Control screenes – State of Green Photo

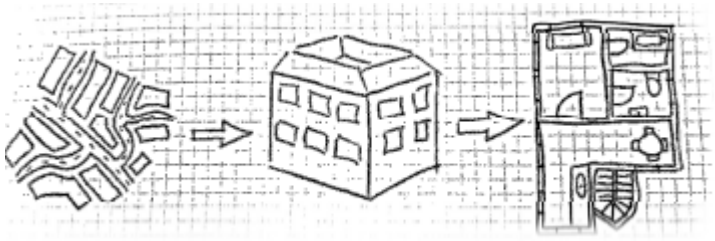


Example 4:
Master Thises – Data Visualisation

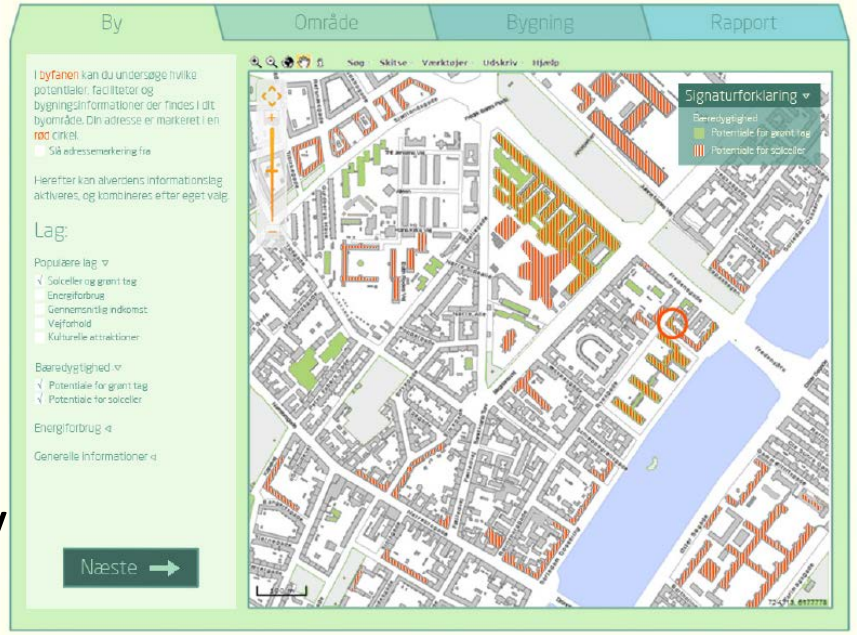
Brugervenlig visualisering

Af byplans- og bygningsspecifik data

DTU Mads Harding Møller s093341
Lærke Philipsen s093375

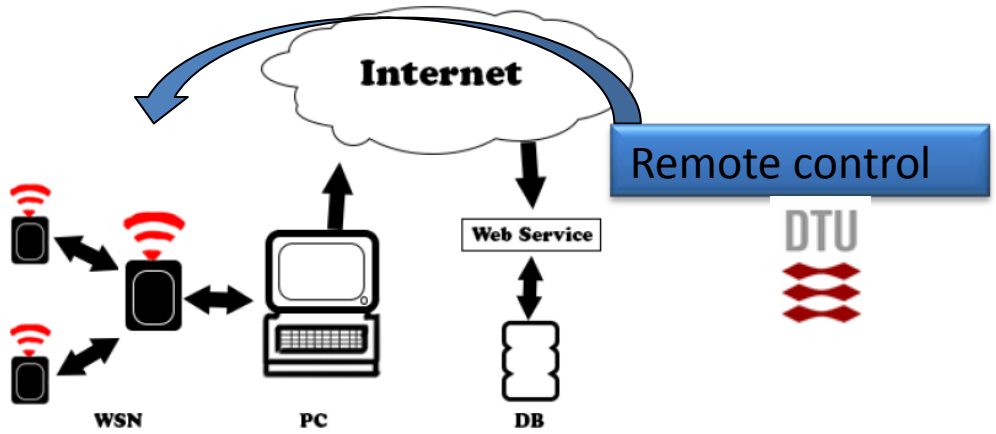


Zoom into data:
GIS>BIM>Plan>Component>…



- ✓ Automatic calculation of energy labeling

Example 5:
Data collection <-> control



Apisseq, Sisimiut - Greenland

- Communication sensors transfer data to databases
  - E.g. a local database (PC)
  - E.g. over the internettet to a central database (DB, collection)
  - E.g. over the internet to a “cloud database”
- If you can control the data flow in one direction, then you (usually) also can do it in the other direction
  - Control and remote control

Example 6:
Knowledge city – Lyngby, Smart Campus DTU

- SensibleDTU - https://www.sensible.dtu.dk/?lang=en
- In colaboration with Niras company develops the first ”Big Data” platform
  - GIS for Visualisation and localizing
    - Buildings
    - Building projects activites
    - Ressource- and energyconsumption
    - Movements of people (positioning)
  - Why?
    - Save ressources and money
      - In operation
      - In the management of Construction Projects
      - In energy- and ressource consumption
      - Facility Management
      - Etc.
- Smart Allé DTU – Innovationsplatform at


RAMBØLL


ENFOR
Forecasting and Optimization for the Energy Sector


DANSK
ENERGI


KEPCO
KOREA ELECTRIC POWER CORPORATION


HALDOR TOPSOE
CATALYSING YOUR BUSINESS


NREL
NATIONAL RENEWABLE ENERGY LABORATORY


COWI


GRUNDFOS


SAMSUNG


AD HVE VEJE
AALBORG UNIVERSITET


ENERGINET.DK


NEAS ENERGY


GRØN ENERGI


Ea Energy Analyses


DONG
energy

Partners


DFF | EDB


KOREA DISTRICT HEATING CORP.


UCD
DUBLIN

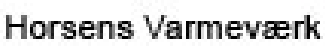

Dansk
Fjernvarme


LEAN ENERGY
CLUSTER


DI
Dansk Industri


EMT NORDIC


KU KONKUK
UNIVERSITY


Horsens Varmeværk


EMD International A/S


KØBENHAVNS KOMMUNE


NORDJYSK
ELHANDEL


EURISCO
RESEARCH & DEVELOPMENT


Fjernvarme Fyn


AARHUS
KOMMUNE


1910


Bright Green Business
ProjectZero


Danfoss


tecnalia
Inspiring
Business


FREDERIKSSUND
KOMMUNE

Test Facilities

- ESIF (NREL, USA)
- Kubic (Tecnalia, Spain)
- DH facilities in S. Korea
- Ireland
- PowerLab.dk (SYSLAB/Bornholm)
- Grundfos test buildings
- Danfoss test facility for supermarket cooling
- DTU's test houses
- **+ A number of Smart Cities projects**