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Workshop “Design tools and processes for building renovation and energy transition at district level”

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Energy landscape of the Netherlands

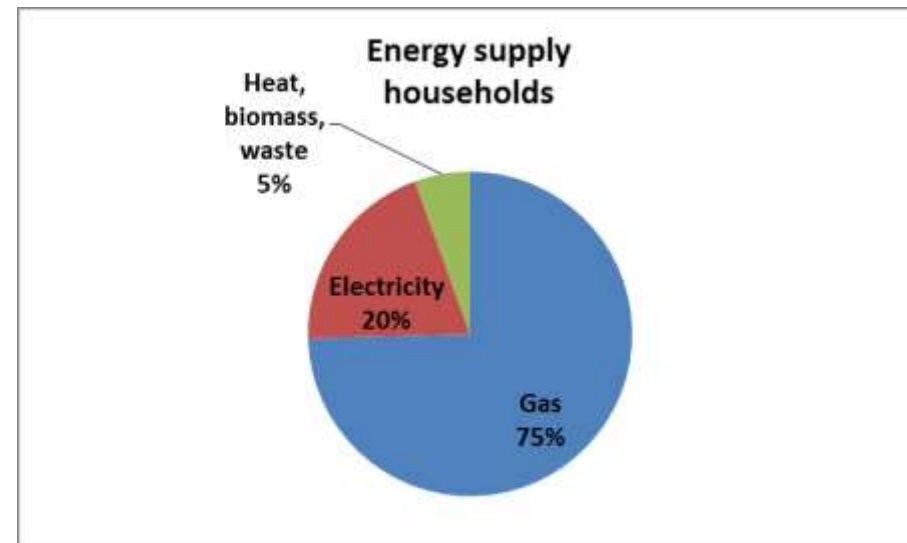
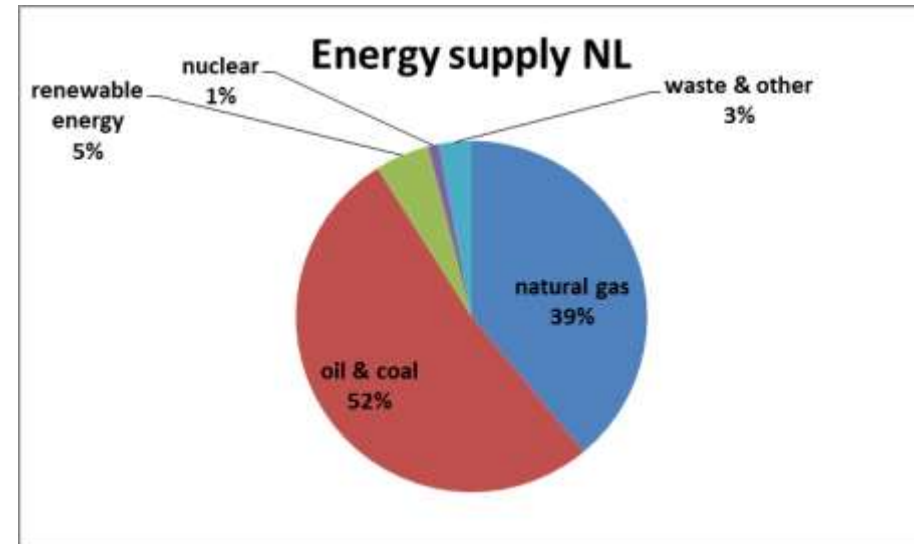
Build environment:

- High population density
- Western part of NL > 800 p/km²

Energy supply in buildings:

- Gas is dominant in energy supply
- Renewables share is lowest in EU, after Malta. Should be 14% in 2020.
- **93% of houses use gas heating**
- 7% of houses has district heating
- Ca. 3,5% of heat is from sustainable sources (biomass, waste)
- Use of wood (pellet) furnaces for houses is negligible

02/03/2017





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Natural gas in The Netherlands

- The Netherlands is a “natural gas country”
- Groningen field: Large resource discovered in 1959
 - Estimated resource: $2.800 \times 10^9 \text{ m}^3$ gas,
 - Now: 25% left
- Since 1986: earth quakes in Groningen, increasing in number and strength;
- Large structural damage to buildings, 100.000 dwellings affected;
- Estimated damage: 1 billion euro;
- **Effect: Gas extraction reduced by 50%**
- **Strong political pressure to reduce extraction even further;**





Climate Policy

- July 2015 - Court ruling: “the government must ensure that the Dutch emissions in the year 2020 will be at least 25% lower than those in 1990.”
- December 2015: Paris Climate Agreement
- October 2016: 70 Dutch cities express their intention to become “gas free” by 2035
- Will NL meet national 2020 targets??
 - 14% Renewables (now 5%)
 - 16% CO₂ reduction (now 15%)
 - 1,5% yearly energy efficiency improvement (now 1,1%)



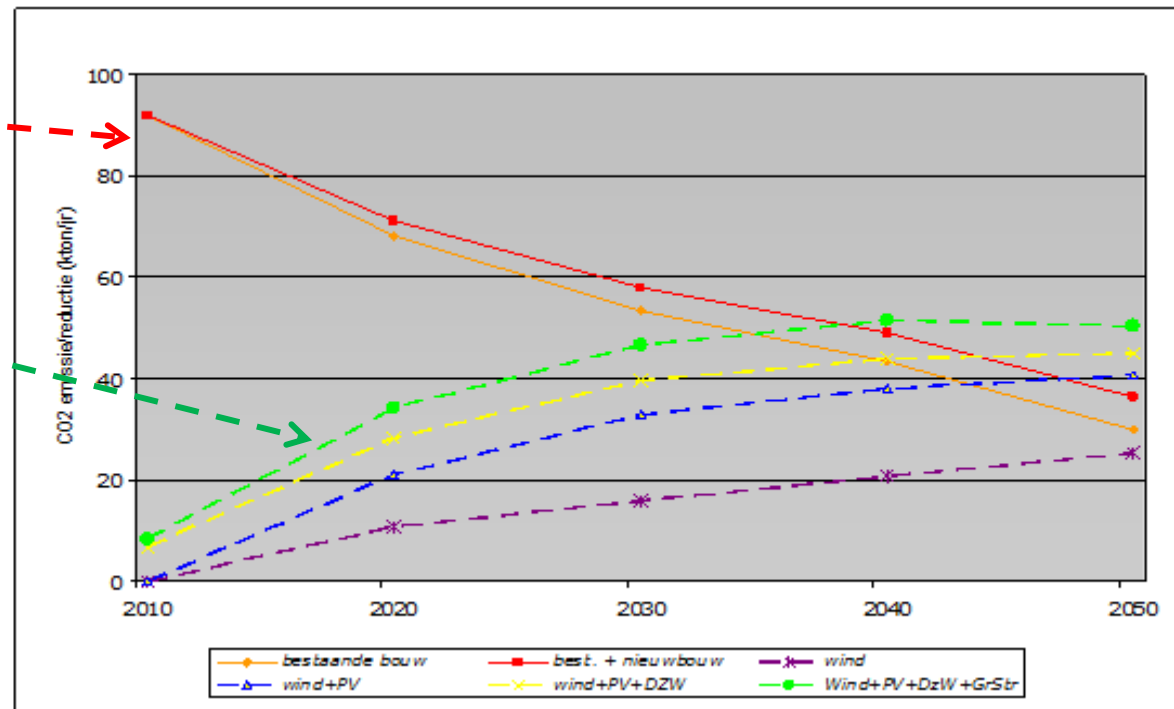
Challenge

- Transformation of city districts towards zero consumption of fossil fuels (*or zero carbon emission*)

- Two technical options:

Source: Road map for carbon neutral city of Tilburg

- Reduce energy demand
- Supply renewable energy





Demand reduction: how?

- What **level of reduction** is feasible for energy demand: 30% (label B renovation) or 100% (NOM);
- In **one step** to zero energy or in multiple steps?
- What is the **quality** and remaining **exploitation period** of the building?
- What is the influence of **building users** on energy demand?



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Zero-on-the-Meter renovation (Dutch: “NOM renovatie”)



NOM renovation Nieuw-Buinen

Conclusions:

- NOM renovation for Single-Family houses is well feasible -> all electric with PV solar;
- NOM renovation for Multi-Family (MF) buildings is challenging, little roof space per dwelling;
- Sustainable heat supply may be an option for MF buildings -> district level approach necessary;
- Investment costs are high -> extended exploitation period required (until 2040) -> sufficient user quality necessary.



NOM Renovation - Utrecht



NOM Renovation - De Bilt



Sustainable energy supply

Netherlands' options:

- Low availability of biomass from own country, import necessary
- Hydropower: almost zero
- Wind energy on land meets strong opposition (now 5% of electr. prod.)
- Wind on sea is growing since 2006 (<1% of electr. prod.)
- Solar PV is growing since 2010 (< 1% of electr. prod.)
- Heat storage in underground is good option, some (deep) geothermal energy



Energy networks in transition

- What kind of energy supply network will be necessary: electric, heat, (bio)gas, hydrogen?
- What level of peak capacity do we need for the network?
- Decentralized energy storage? Of what energy carrier?
- How are network investments allocated to users that have net-zero consumption? (business model for network operator)
- How is feed-in of sustainable energy generation regulated?
- Smart control of demand and supply?
- Privacy and security issues (i.e. read-out of smart meters)



Utrecht

- Central location
- Population = 340.000 in city, 500.000 in region
- Dwellings: 57% privately owned, 25% social housing, 18% other rental
- Oldest network for district heating of the Netherlands



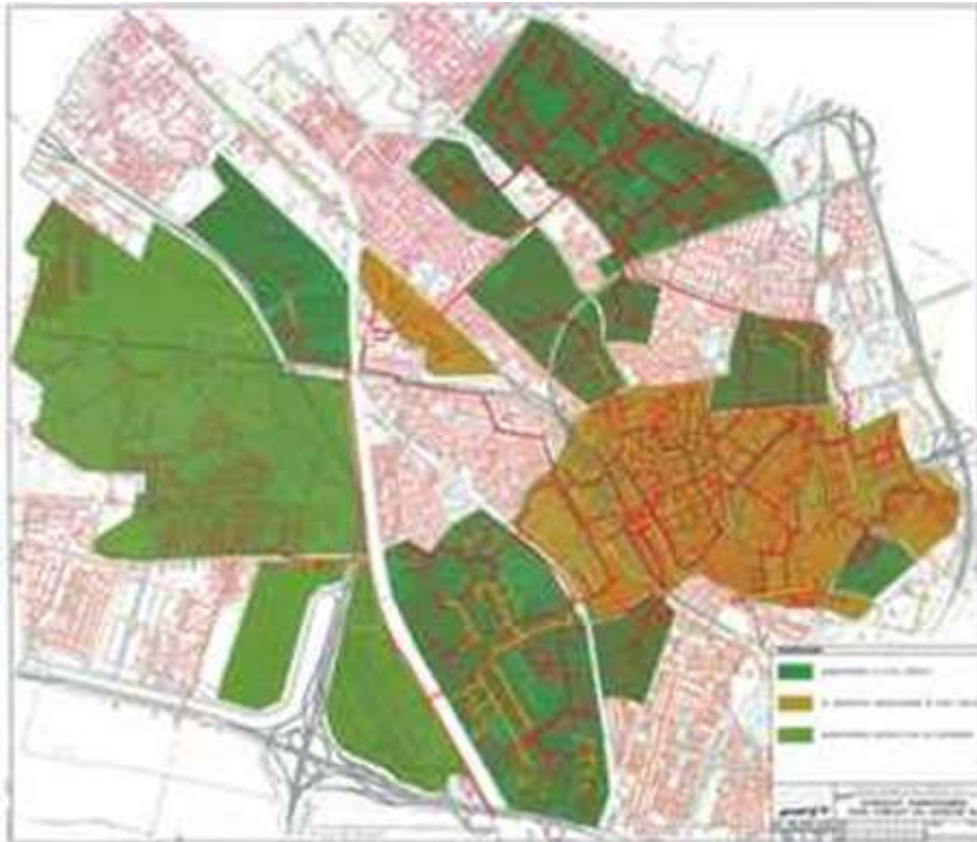
The first network for district heating was constructed in Utrecht to supply heat to the academic hospital at the Catherijnesingel (1923) ¹⁰



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City of Utrecht – Heat supply

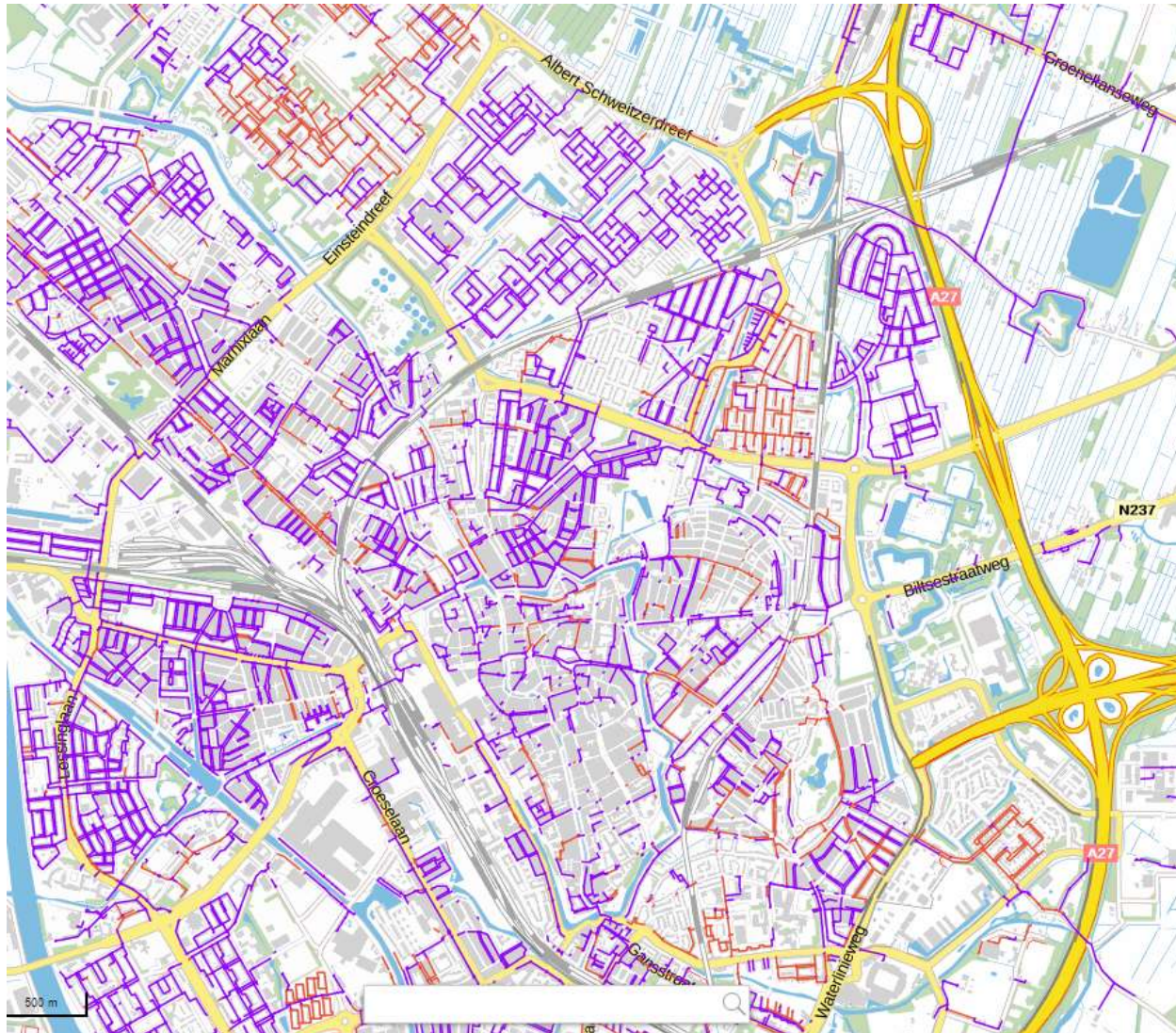




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Gas infrastructure of Utrecht



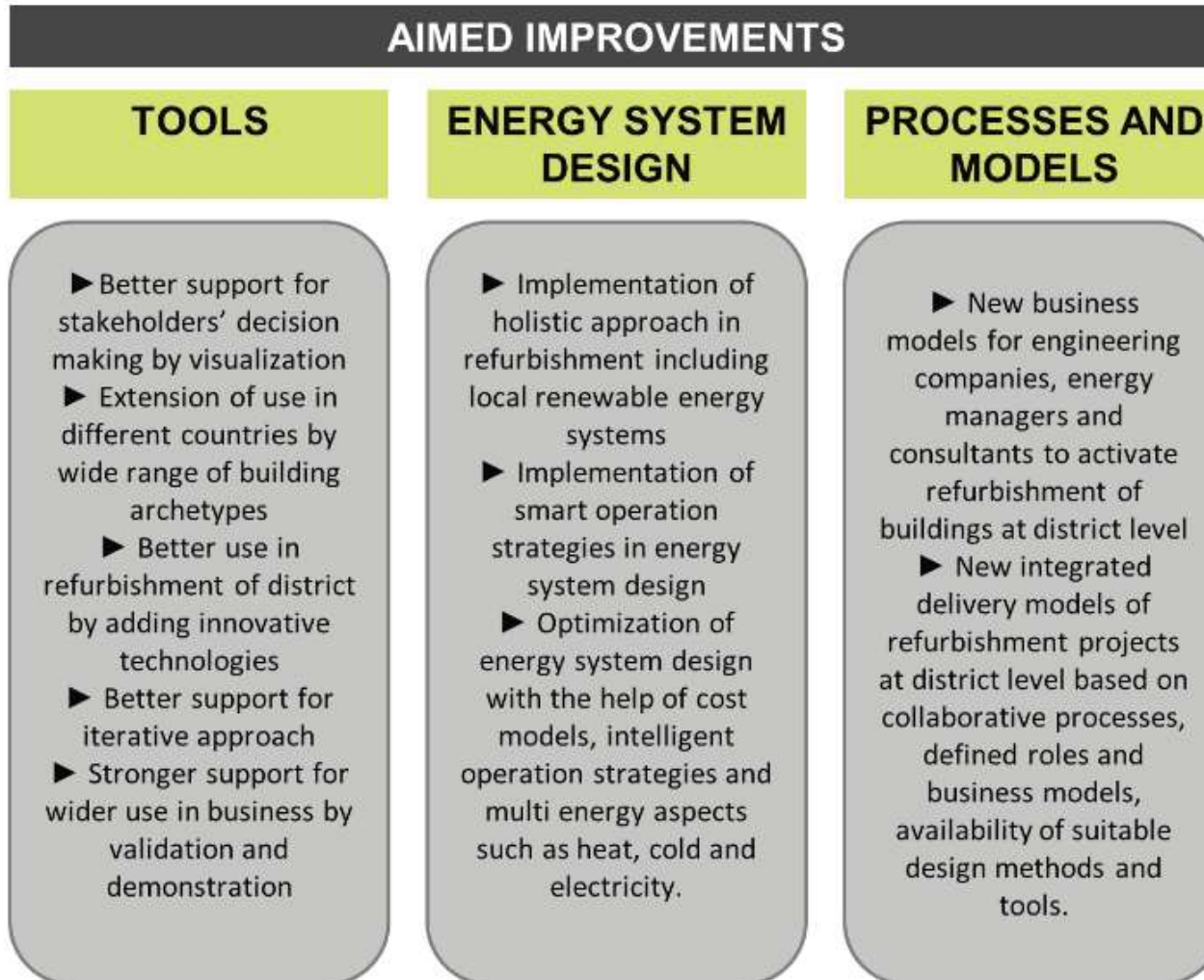
Gas network

- Te vervangen
- > 30 jaar
- ≤ 30 jaar

Source: heat atlas (RVO)



MODER - Mobilization of innovative design tools for refurbishing of buildings at district level





MODER workshops

Objectives:

- Communicate with external stakeholders and engage them in the project for getting their inputs and feedback;
- Provide information about the project results to various target groups.

Two earlier workshops:

- Kranj, Slovenia
- Linz, Austria

So

Let's get started



Programme

- Erik Alsema, W/E – *Welcome & Introduction*
- Leo Brouwer- National Expertise centre Heat, Netherlands Enterprise Agency (RvO-NEW), *The role of heat supply in the energy transition for the Netherlands*
- Dietje van Eif, Municipality of Utrecht, *City districts on the transition path to an energy supply without natural gas*
- Steven van Polen - PBL Netherlands Environmental Assessment Agency, *Vesta, spatial energy model of the heat supply of the built environment in the Netherlands*
- Wim Mans, Innoforte - Experiences with heat transition in a Dutch city: modelling with Caldomus and multi stakeholder governance

Break: 10.45-11.00

- Laure Itard, Delft University of Technology, *Energy consumption in dwellings – theory and practice*
- Anna Gralka, DEMO BV, *P2Endure project, Plug-and-Play product for deep renovation.*
- Jyri Niemenin, SWECO, *The MODER project – Design tools for refurbishing of buildings at district level*
- Erik Alsema, W/E - *GPR Real Estate as a tool to develop transition scenarios for city districts*
- Arthur Lippus, ANNE- *Experience centre for Zero-on-the-Meter dwellings*

Lunch: 12.30-13.30



Afternoon programme

Afternoon Programme - Site visits

- **13.30 Transport to 1st site**
- 14.00 – 15.00 Zero Energy renovation of multifamily building, “Flat met Toekomst”, Camera Obscuradreef, 3561 XK Utrecht (Mitros)
- 15.30 -16.30 Zero Energy renovation of multifamily building, Samuel van Houtenweg, 3732 BR De Bilt (SSW)
- ± 17.00 hour return in Utrecht

- 18.30 Dinner