

GREENING THE BUILT ENVIRONMENT

Een vergelijking van het energiebesparingsbeleid in Nederland, Duitsland, Denemarken en het Verenigd Koninkrijk

Huishoudelijke sector & utiliteitssector



Jeffrey Sipma

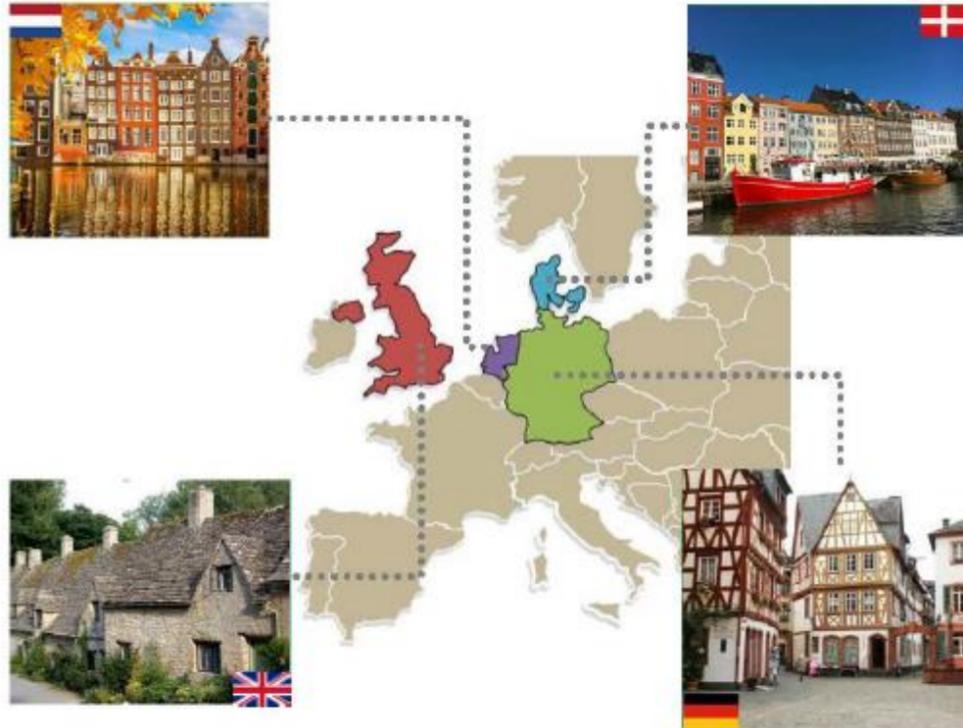


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TNO 2019 P11021

GREENING THE BUILT ENVIRONMENT



A review of Dutch, German, Danish and British energy savings policies to reduce the energy consumption and CO₂ emissions in the residential sector.

GREENING THE BUILT ENVIRONMENT



A review of Danish and German energy efficiency policy to reduce energy consumption and CO₂ emissions in the services sector

GREENING THE BUILT ENVIRONMENT



A review of British energy efficiency policy to reduce energy consumption and CO₂ emissions in the services sector

SORTEREN

- Op relevantie
- Op datum

CATEGORIËN

- Agenda (21)
- Algemeen (1)
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~ toon meer

🏠 Zoeken

ZOEKEN (12664)

Greening the built environment

PUBLICATIES

GREENING THE BUILT ENVIRONMENT: A REVIEW OF DANISH AND GERMAN ENERGY EFFICIENCY :: TNO REPOSITORY

The aim of this paper is to serve as an additional report for the larger study "GREENING THE BUILT ENVIRONMENT. A review of Dutch, German, Danish and Briti...

[\) Lees verder](#)

PUBLICATIES

GREENING THE BUILT ENVIRONMENT: A REVIEW OF BRITISH ENERGY EFFICIENCY POLICY TO :: TNO REPOSITORY

Energy efficiency policy has been on the agenda for a long time, along with the knowledge that there is a large potential for energy savings and many other...

[\) Lees verder](#)

PUBLICATIES

GREENING THE BUILT ENVIRONMENT: A REVIEW OF DUTCH, GERMAN, DANISH AND BRITISH EN :: TNO REPOSITORY

In this research we try to understand the effect that certain policy measures have had across countries in order to reduce the energy consumption and CO2 e...

[\) Lees verder](#)

Inhoud presentatie:

- Inleiding
- Database Odyssee-Mure
- Denemarken: warmtenetwerken
- De Energy Efficiency Obligation
- Evalueren beleidseffecten
- Rhianne: the UK (in English)

‘Het Nederlandse energiedebat lijkt steeds in dezelfde cirkel te draaien, gevangen in de diep gesleten groef van een te vaak gedraaide langspeelplaat, zonder een stap verder te komen. Energieia gaat op een journalistieke zoektocht naar buitenlandse successen. Wat werkt? Waarom werkt het? En zou het ook hier in Nederland kunnen werken? Wat kunnen we leren?’

Bron: Energieia brochure ‘Wat je van ver haalt is leerzaam’ gerelateerd aan de Energy Perspective dinerbijeenkomsten

› DATABASE ODYSSEE-MURE



ABOUT ODYSSEE

Database on energy efficiency indicators and energy consumption by end-use and their underlying drivers in industry, transport and buildings.

[Learn more](#)

www.odyssee-mure.eu



ABOUT MURE

Database on energy efficiency policies and measures by country in industry, transport and buildings.

[Learn more](#)

DATABASE ODYSSEE-MURE

The screenshot displays the MURE database interface. At the top, a green navigation bar contains the 'MURE' logo and several sector filters: 'HOUSEHOLD' (highlighted in red), 'TERTIARY' (highlighted with a blue arrow), 'INDUSTRY', 'TRANSPORT', 'GENERAL CROSS-CUTTING', and 'ALL SECTORS'. Below the navigation bar, there are two search input fields: 'Search by text on measure type, title, reference' and 'Search by text on measure description (PDF)', each with a 'Search' button. A horizontal line separates the search area from the main query area. The main area is titled 'Mure II Database - Query - Household - Select your options and push the button Query'. It features three filter panels: 'Country' on the left, 'Measure type' in the center, and 'Targeted end-use' on the right. A blue arrow points from the 'TERTIARY' filter to the 'Measure type' panel. The 'Country' panel lists various countries with checkboxes. The 'Measure type' panel lists categories like 'Co-operative Measures', 'Cross-cutting with sector-specific characteristics', 'Financial', 'Fiscal/Tariffs', 'Information/Education', 'Legislative/Informative', and 'Legislative/Normative'. The 'Targeted end-use' panel lists categories like 'Appliances', 'Cooking', 'Hot water', 'Lighting', 'Other targeted uses', 'Space cooling', 'Space heating' (highlighted with a blue arrow), 'Total electric cons.', 'Total final cons.', and 'Total fuel cons.'. At the bottom center, there are two buttons: 'Query' and 'More Options'.

MURE

HOUSEHOLD TERTIARY INDUSTRY TRANSPORT GENERAL CROSS-CUTTING ALL SECTORS

Search by text on measure type, title, reference Search

Search by text on measure description (PDF) Search

Mure II Database - Query - Household - Select your options and push the button Query

Country

- Countries
- Austria
- Belgium
- Bulgaria
- Croatia
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece

Measure type

- Co-operative Measures
- Cross-cutting with sector-specific characteristics
- Financial
- Fiscal/Tariffs
- Information/Education
- Legislative/Informative
- Legislative/Normative

Targeted end-use

- Appliances
- Cooking
- Hot water
- Lighting
- Other targeted uses
- Space cooling
- Space heating
- Total electric cons.
- Total final cons.
- Total fuel cons.

Query

More Options

DATABASE ODYSSEE-MURE



MURE

MORE DETAILED

Query Tertiary - 24 Measures Found

RECAP YOUR QUERY

Sort By		Sort By	Sort By	Sort By
Code	Title	Status	Type	Starting Year
TER-NLD25	Environmental Management Act (Wet Milieubeheer)	Ongoing	Legislative/Informative	1979
TER-NLD9	Long Term Agreements in Agriculture (Meerjaren Afspraken in Agro-sectoren)	Completed	Co-operative Measures	1989
TER-NLD11	Long term agreements Service sector, first and second phase (MJA1 and MJA2 service sector)	Completed	Co-operative Measures	1989
TER-NLD2	The environmental Action Plan of the energy distribution companies (Milieu Actie Plan, MAP)	Completed	Co-operative Measures	1991
TER-NLD14	The Vamil Scheme: Accelerated Depreciation on Environmental Investments	Ongoing	Fiscal/Tariffs	1991
TER-NLD8	Energy Efficient Lighting Promotion Scheme (STIMEV)	Completed	Financial	1992
TER-NLD5	Environmental Licensing: Energy Conservation Requirements	Ongoing	Co-operative Measures	1993
TER-NLD4	Energy Efficiency Programme for National Government Buildings (EER)	Completed	Information/Education/Training	1994
TER-NLD1	EU-related: Energy Performance of Buildings (Directive 2002/91/EC) - Building Decree and Energy Performance Standard	Ongoing	Legislative/Normative	1995
TER-NLD7	CO2 Reduction Plan	Ongoing	Financial	1996
TER-NLD10	Regulatory Energy Tax (REB: Reguliere Energie Belasting)	Ongoing	Cross-cutting with sector-specific characteristics	1996
TER-NLD31	Energie Tax (Energiebelasting)	Ongoing	Fiscal/Tariffs	1996
TER-NLD3	Energy Investment Tax Deduction (EIA)	Ongoing	Fiscal/Tariffs	1997
TER-NLD24	Innovation programme Greenhouse as Energy Source (De Kas als energiebron)	Ongoing	Financial	2002
TER-NLD16	Subsidy schemes (IRE, MEI, UKR, Clean and Efficient Demonstration Projects) Subsidies (IRE, MEI, UKR, Demonstratieprojecten Schoon en Zuinig)	Ongoing	Financial	2007
TER-NLD20	Taskforce lighting	Proposed (advanced)	Co-operative Measures	2008
TER-NLD22	Innovation and Action Programme for Clean and Economical Agro sectors (Convenant Schone en Zuinige Agrosectoren)	Ongoing	Unknown	2008
TER-NLD29	Long term agreements Service sector, third phase (MJA3)	Ongoing	Co-operative Measures	2008
TER-NLD19	Internal CO2 equalisation system for the greenhouse sector (CO2 sectorsysteem voor de glastuinbouw)	Ongoing	Legislative/Normative, Unknown	2012
TER-NLD30	Sustainable Energy Surcharge (Opslag voor Duurzame Energie)	Ongoing	Fiscal/Tariffs	2013
TER-NLD23	Long-Term Agreement Energy transition horticulture 2014-2020 (Meerjarenafpraak Energietransitie Glastuinbouw 2014-2020)	Ongoing	Co-operative Measures, Unknown	2014
TER-NLD27	Energy Saving Expertise Centre (Expertisecentrum Energiebesparing)	Ongoing	Information/Education/Training	2015
TER-NLD26	Investment Subsidy for Sustainable Energy (Investeringssubsidie Duurzame Energie (ISDE))	Ongoing	Financial	2016
TER-NLD28	Minimum energy performance for utility buildings (minimum label C)	Unknown	Legislative/Normative	2023



Items Countries Years

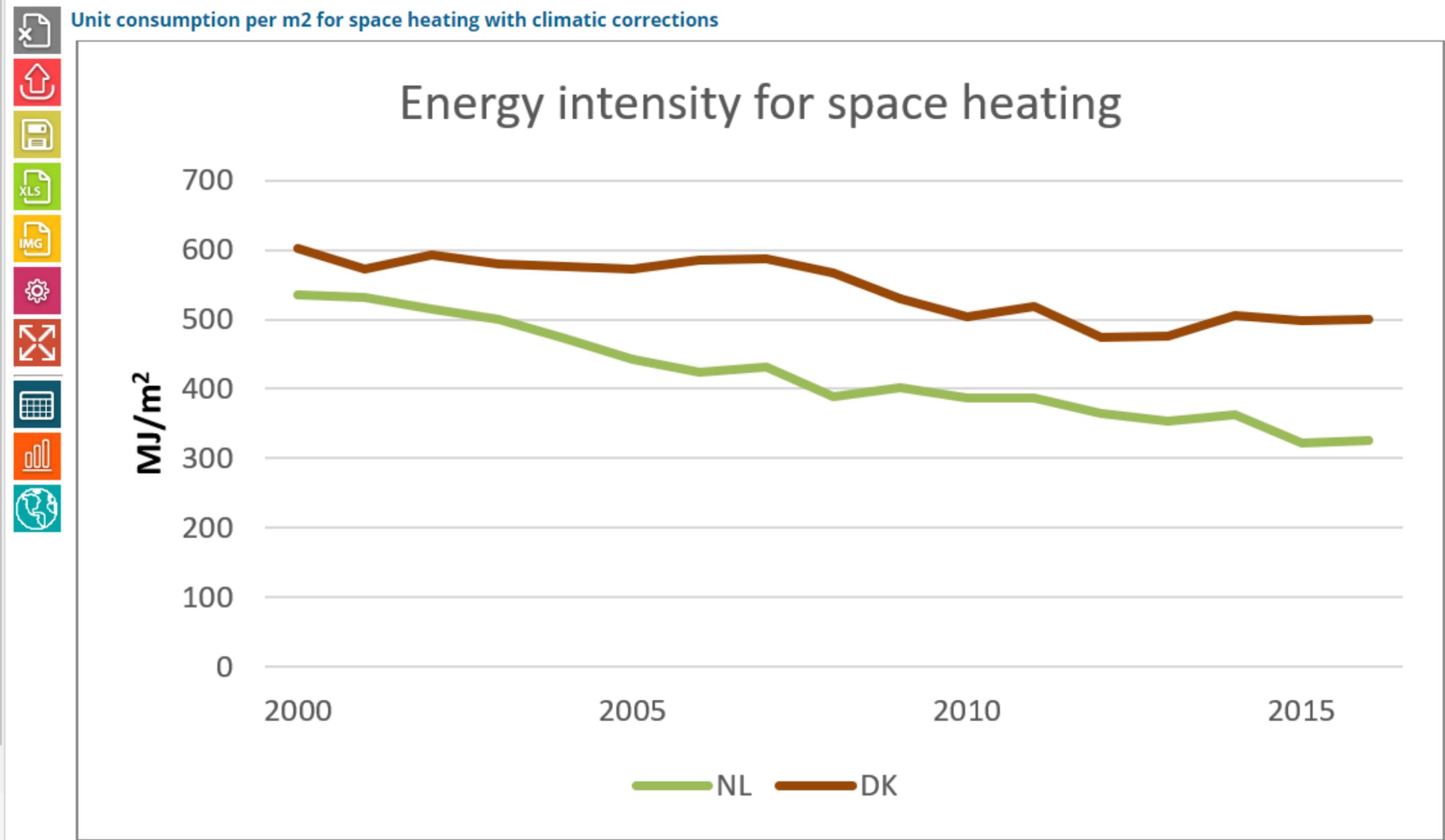
Search...

- Residential - Indicators**
- Energy efficiency index
 - Technical Index
 - Gross index
 - Gains
 - Energy savings
 - Unit consumption
 - All dwellings
 - All uses
 - Space heating, water heating
 - Space heating
 - Per dwelling with climatic corrections
 - Useful energy per dwelling
 - Per dwelling scaled to european climate
 - Useful energy per dwelling and degree day
 - Per m2 with climatic corrections
 - Useful energy per m2
 - Per m2 scaled to european climate
 - Useful energy per m2 and degree day
 - Water heating
 - Cooking
 - Air conditioning
 - Electrical appliances

Items: 1 Countries: 2

Unit consumption per m2 for space heating with climatic corrections

- Netherlands
- Denmark

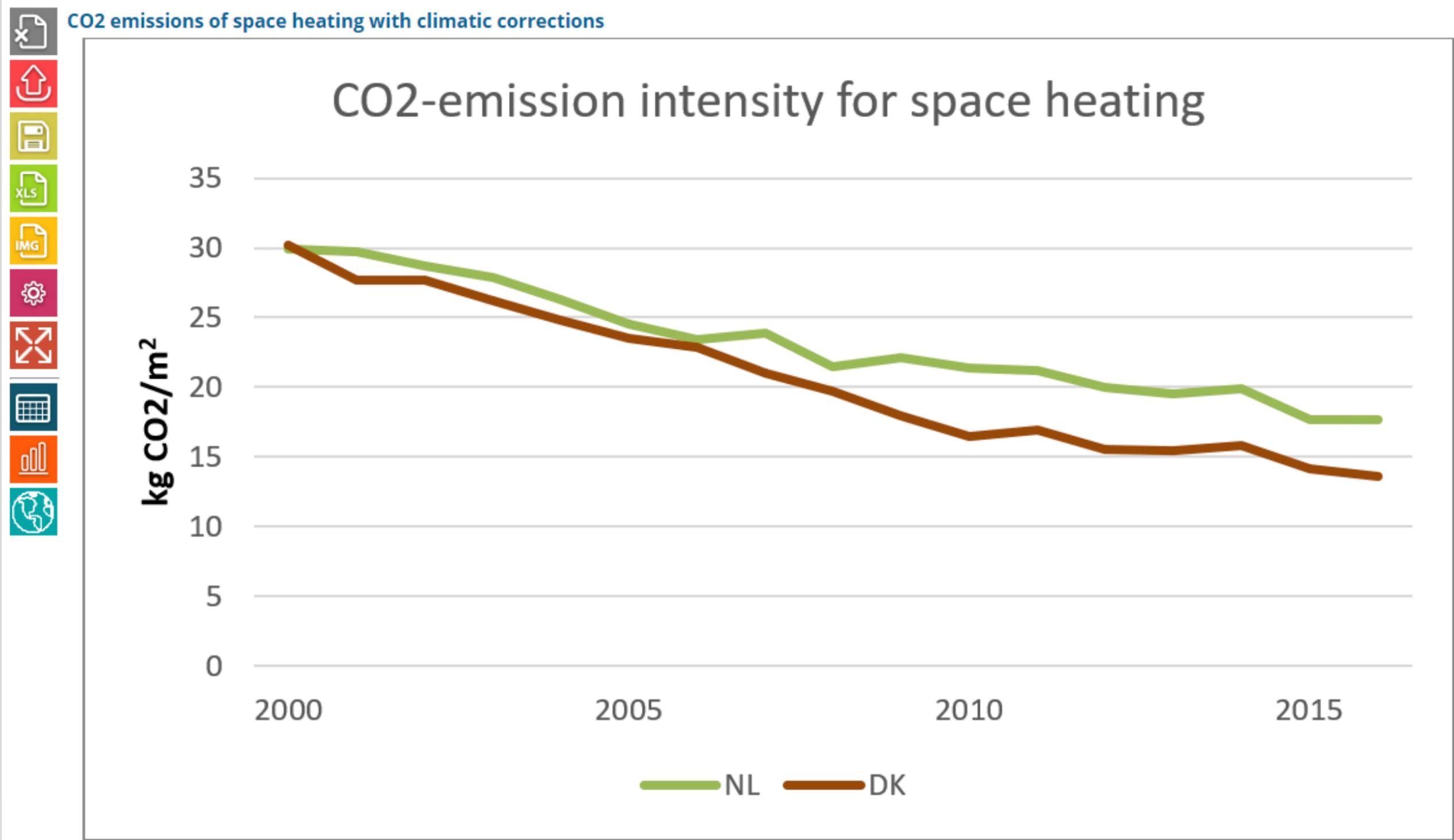


Items Countries Years
 Search...

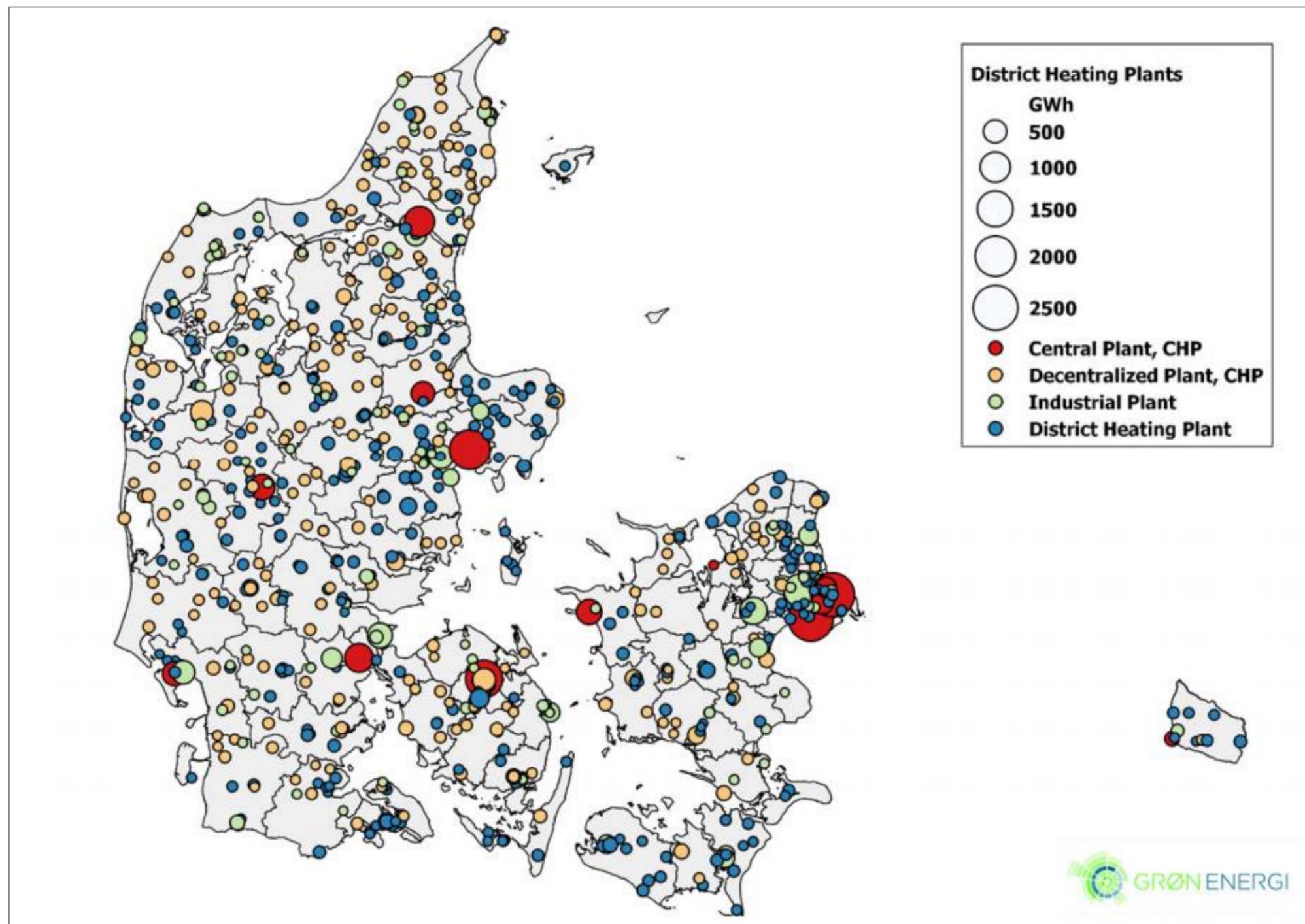
Items: 1 CO2 emissions of space heating with climatic corrections

Countries: 2
 Netherlands
 Denmark

- Residential - Indicators**
- dwelling and degree day
 - Per m2 with climatic corrections
 - Useful energy per m2
 - Per m2 scaled to european climate
 - Useful energy per m2 and degree day
 - Water heating
 - Cooking
 - Air conditioning
 - Electrical appliances, Lighting
 - Appliances
 - Single family dwellings
 - Flats
 - ▾ Diffusion
 - Share of efficient equipments
 - CFL
 - Efficient heating appliances (sales)
 - ▾ CO2 emissions
 - ▾ Per dwelling
 - Actual
 - With climatic corrections
 - Total
 - ▾ Heating per dwelling
 - Actual
 - With climatic corrections
 - Total



› DENEMARKEN: WARMTENETWERKEN EN BUFFEREND VERMOGEN



- 60.000 km centralized district heating transmission and distribution
- 64% of all homes uses district, less renovations
- Niet duurzame input 40%: coal, natural gas
- Duurzame input 60%: biogas, biomass (straw, woodchips and pellets), municipality waste, and thermal solar:
 - ❖ 70 non-profit, lokale initiatieven, waarbij zonnewarmte aan het warmtenetwerk wordt toegevoegd

Bron: <https://northsearegion.eu/media/1531/the-danish-energy-system-case-dh.pdf>

› DENEMARKEN: WARMTENETWERKEN EN BUFFEREND VERMOGEN

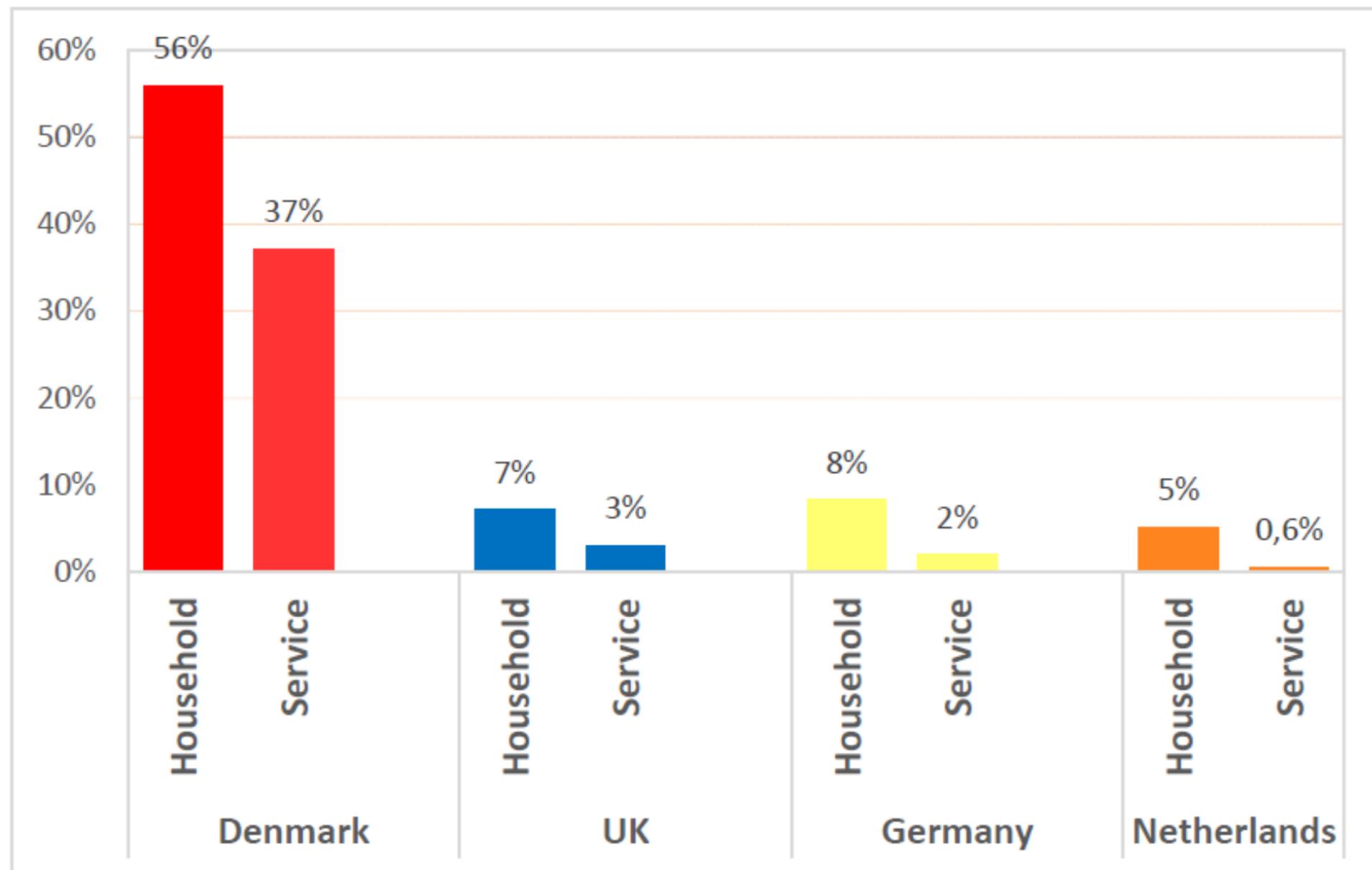
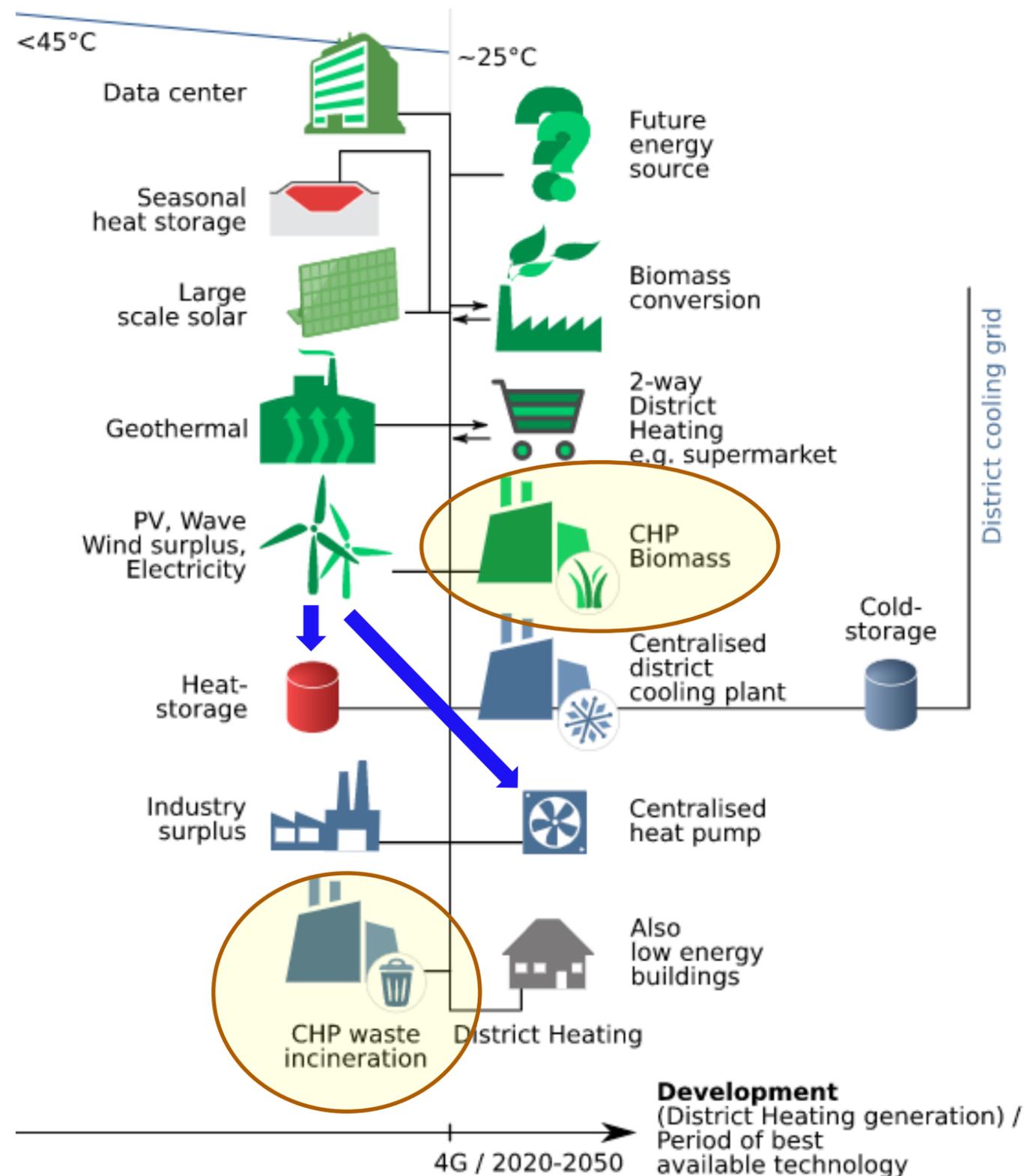


Figure 45 Share of renewable in the household- and services sector only for space heating (2016), by country. Source: Odyssee

- In Denemarken heeft 56% van het huishoudelijk energieverbruik voor ruimteverwarming een duurzame oorsprong.
- Volgens de UN is stadsverwarming één van de meest (kosten-) effectieve manieren om hernieuwbare energiebronnen te integreren in stedelijke ruimteverwarmingsmethoden.

› DENEMARKEN: WARMTENETWERKEN EN BUFFEREND VERMOGEN



Flexibiliteit en bufferend vermogen:

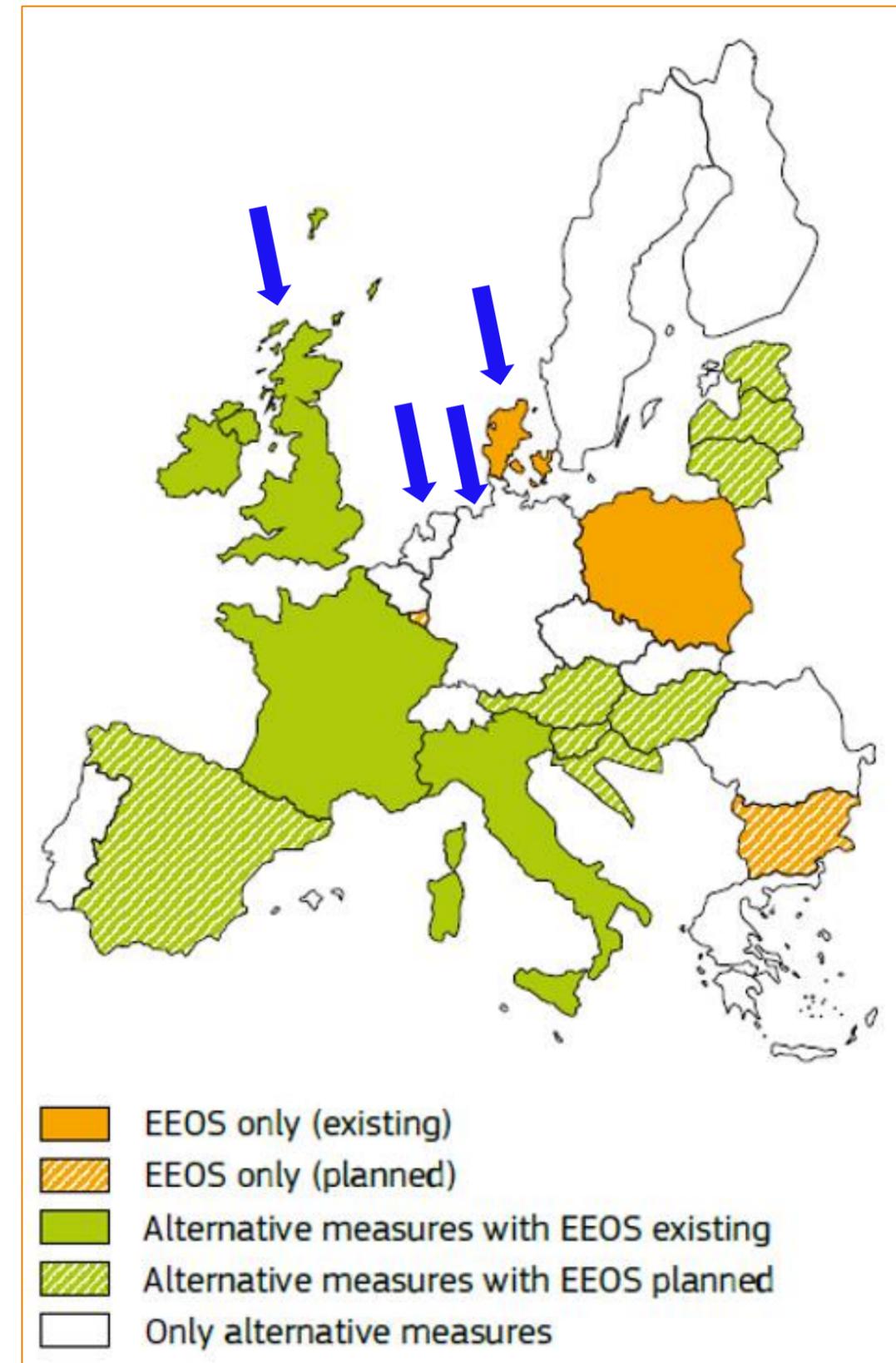
- De elektriciteitsvraag stuurt de instellingen van WKK centrales.
- Een surplus aan duurzaam opgewekte elektriciteit wordt gebufferd in waterboilers of omgezet in warmte via elektrische warmtepompen.
 - ❖ Nederland: wordt afgekoppeld
 - ❖ Duitsland: gigantische opslag batterijen

› DE ENERGY EFFICIENCY OBLIGATION VERSUS ‘THE ALTERNATIVE ROUTE’

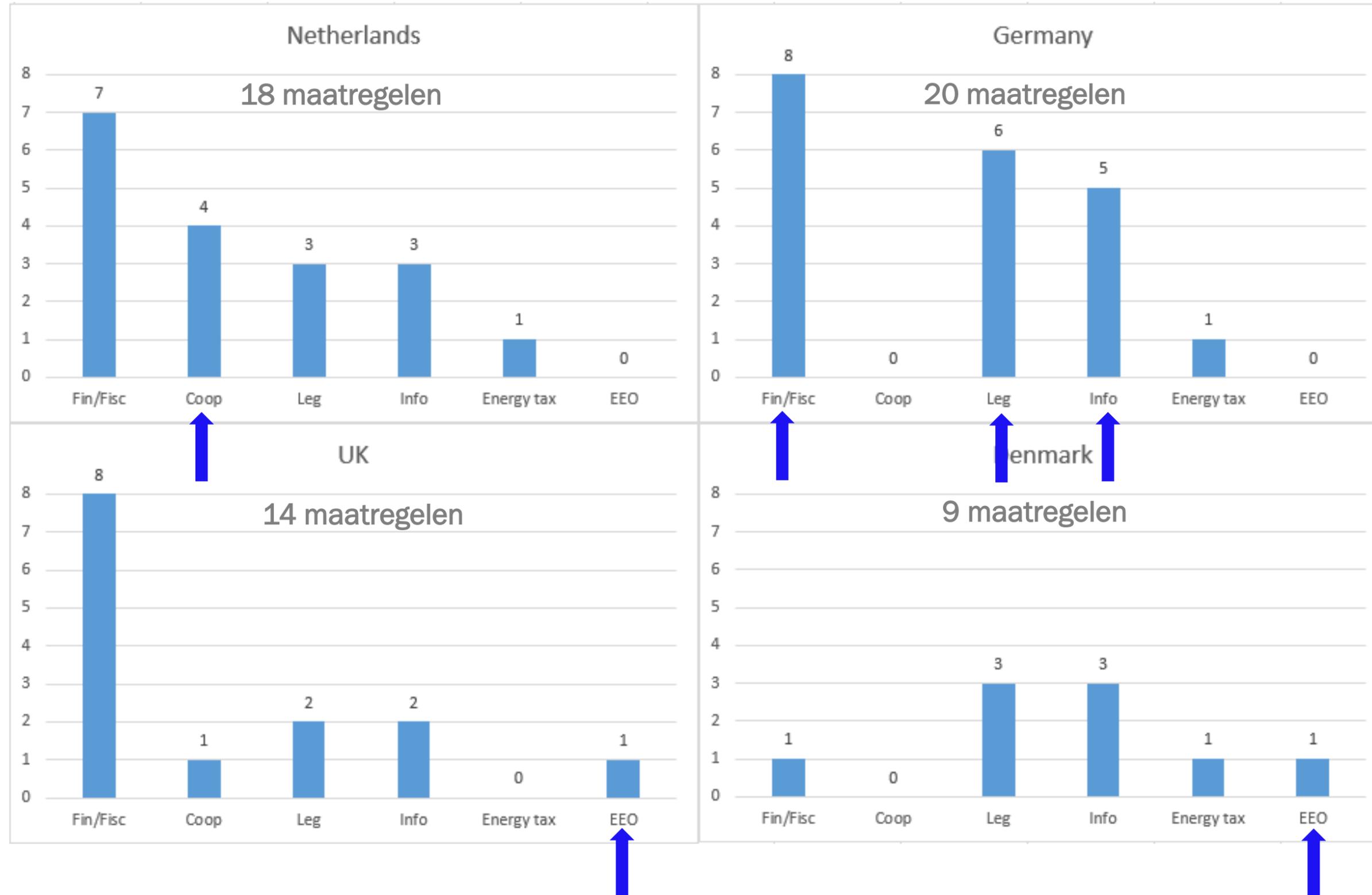
- EED: ‘mandatory to achieve yearly energy savings of 1.5%’
- Article 7 (2012): via ‘Energy Efficiency Obligation (EEO)’ of the ‘Alternative route’.
 - ❖ EEO: ‘this scheme requires **energy companies** to achieve yearly energy savings of 1.5% of annual sales to final consumers.’
 - ❖ Alternative route vrijblijvend: ‘these measures could include energy or CO2 taxes, financial incentives and/or voluntary agreements, energy labelling, training, education.’

Bron:

<https://ec.europa.eu/energy/sites/ener/files/publication/version2-web.pdf>



› DE ENERGY EFFICIENCY OBLIGATION VERSUS ‘THE ALTERNATIVE ROUTE’



› EVALUEREN BELEIDSEFFECTEN

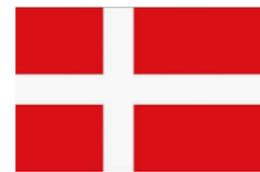
Data en kentallen verzamelen

Ex-ante affect inschatten

Monitoren

Ex-post evaluatie

Meten of berekenen?



Prebound effect



Rebound effect



Performance gap

Free-rider effect

Spill-over effect

Multiplier effects

Double-counting

Interaction of individual measures



EPATEE

About us

EPATEE (Evaluation Into Practice to Achieve Targets for Energy Efficiency) is an EU funded project which aims to give EU Member States tools and knowledge for a better evaluation of their own energy efficiency policies. This project will last 30 months from May 2017 to October 2019, and is led by a consortium of 10 partners from 8 European countries.

<https://epatee.eu/>

› EVALUEREN BELEIDSEFFECTEN

https://www.gov.uk/government/collections/national-energy-efficiency-data-need-framework

3... Apps Bitcoin Wallet - Blo... Wallet - GateHub Cryptocurrency Mar... (€ 11373.00) Bitcoin... Cryptovaluta kopen... CBS - Microdata lo... SI-voorvoegsel - 1



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Collection

National Energy Efficiency Data-Framework (NEED)

This series brings together all documents relating to National Energy Efficiency Data-Framework (NEED).

The National Energy Efficiency Data-Framework (NEED) was set up to provide a better understanding of energy use and energy efficiency in domestic and non-domestic buildings in Great Britain. **The data framework matches gas and electricity consumption data, collected for BEIS sub-national energy consumption statistics, with information on energy efficiency measures installed in homes,** from the Homes Energy Efficiency Database (HEED), Green Deal, the Energy Company Obligation (ECO) and the Feed-in Tariff scheme. It also includes data about property attributes and household characteristics, obtained from a range of sources.



GREENING THE BUILT ENVIRONMENT: INSIGHTS FROM UK POLICY

20/06/19

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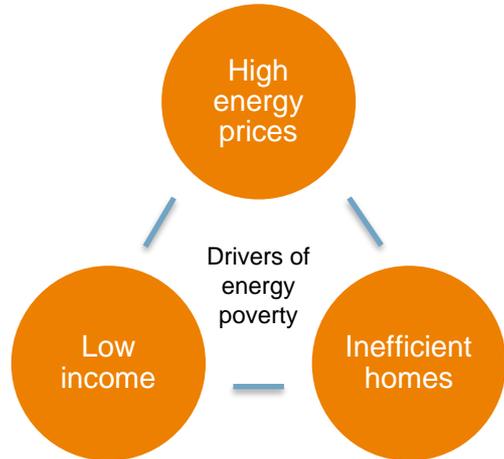
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UK INTRODUCTION

- › The UK has the oldest building stock in Europe
- › Many 'hard-to-retrofit' homes with solid walls
- › UK has high consumption of gas in buildings similar to the Netherlands
- › High proportion of homes (1.7 million) use inefficient electric storage heating systems
- › High levels of energy poverty



EEO SCHEME: THE BETTER OPTION?

- Energy suppliers have a responsibility to meet mandatory targets for improving energy efficiency in households

UK and Denmark introduced EEO approach in early 1990s



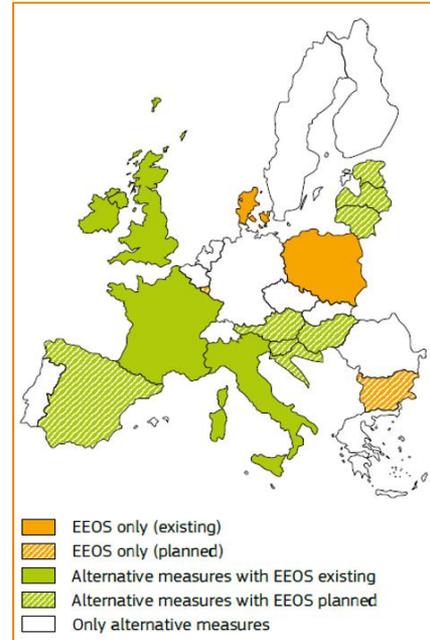
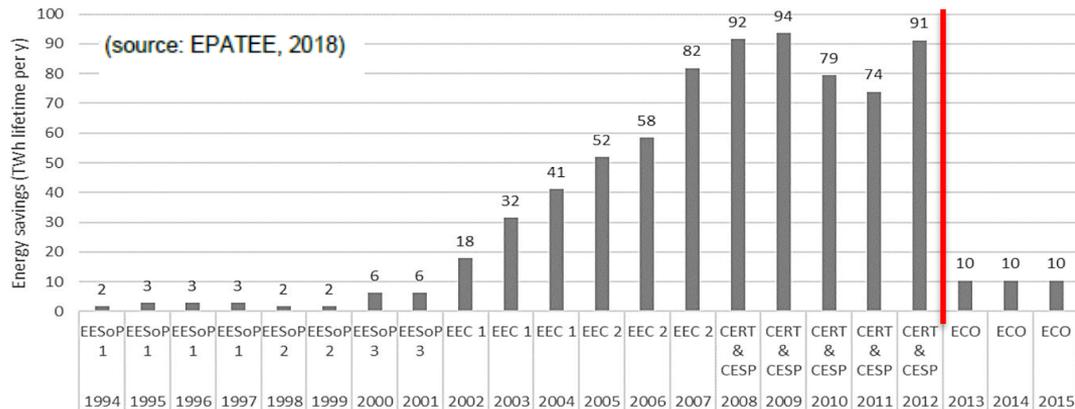
EU adopted EEO as pathway to meet directive targets

Scheme became increasingly expensive



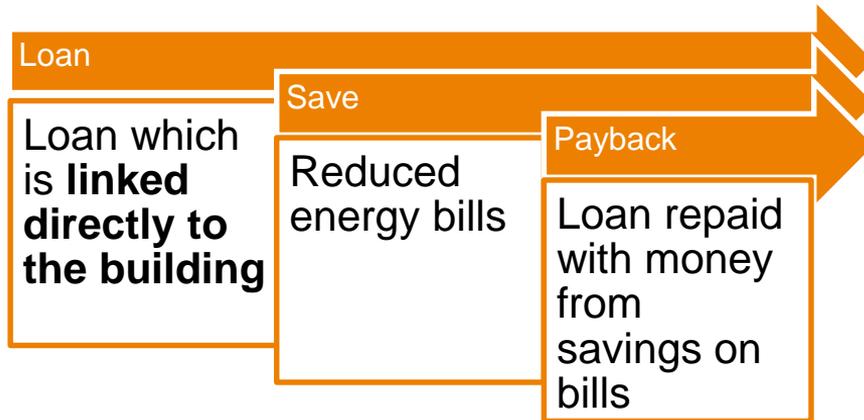
UK and Denmark were only countries to reduce targets in last NEEAP

Criticisms for raising energy bills - ECO scheme is now 100% refocused on lowering energy bills

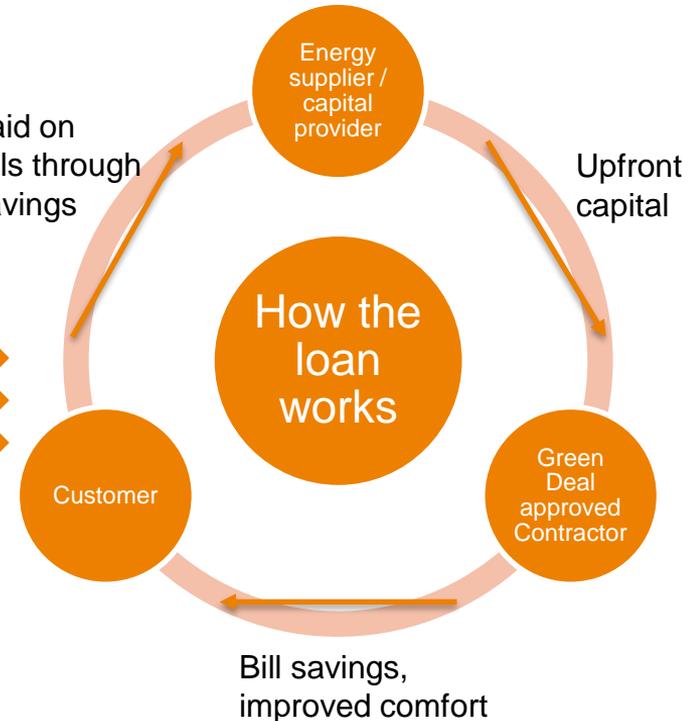


WHAT IS THE GREEN DEAL?

- › Introduced with EEO in 2013 to finance more expensive measures
- › Reduce subsidies and increase private investment
- › Building loan
- › Pay-as-you-Save (PAYS) / On-Bill financing model



Loan repaid on energy bills through energy savings



WHY DIDN'T IT WORK?

Interest rate too high

Restrictive Golden Rule

Public unaware of scheme

Too complicated

Unfamiliar networks -
Not trusted



PAYS overcomes
finance barrier

Overcomes split-
incentive barriers

Reduces reliance
on subsidies

Lower risk of debt, financed
by energy supplier

BUILDING REGULATIONS AND EPC

- › The minimum energy efficiency standards (MEES) require all private rented houses (2020) and non-domestic buildings (2018) to be at least EPC label E
- › In the Netherlands similar MEES will apply only to office buildings for 2023 (EPC levels of the counties are not comparable)
- › Up to 3,500 in expenses spent by landlord (3rd party support) to upgrade property
- › Landlords may not refuse requests from tenants for upgrades to energy efficiency



INNOVATIVE FINANCE MODELS IN SERVICES SECTOR

- › Using public sector to leverage private sector finance to create market for energy efficiency
- › Salix public financing provides interest free loan
- › Recycling/ revolving fund = money from energy savings reinvested
- › **RE:FIT London** – Non-domestic buildings > national expansion of scheme
- › Local councils compete in procurement competitions -> ESCo contracts with guaranteed energy savings
- › 13 ESCOs involved in scheme including those of major energy suppliers



ENERGIESPRONG IN THE UK

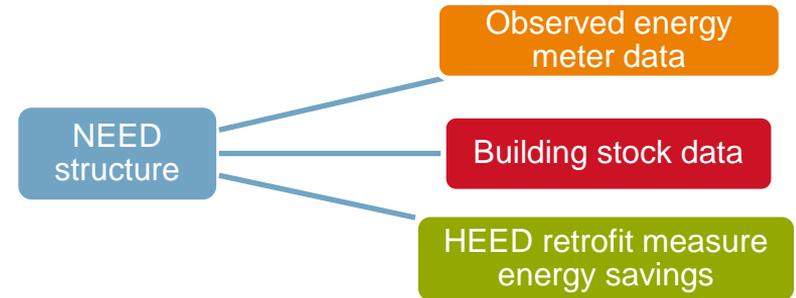
- › Dutch initiative to upscale energy efficiency retrofits (to date 1300 homes in Netherlands)
- › Collaborative projects: local authorities, housing associations, contractors, residents
- › Whole house approach, Cost-effective (secure investment), Quick (1 week-1 day), Attractive design
- › Nottingham first city to pilot scheme in the UK (France, Germany, Italy, Canada)
- › Positive results from residents – reduced bills, improved warmth and comfort



Results of the Energiesprong pilot in Nottingham, UK (2018)

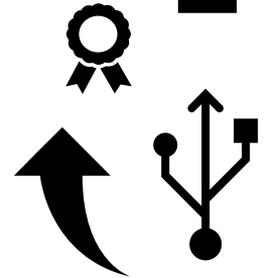
MONITORING & EVALUATIONS OF POLICY

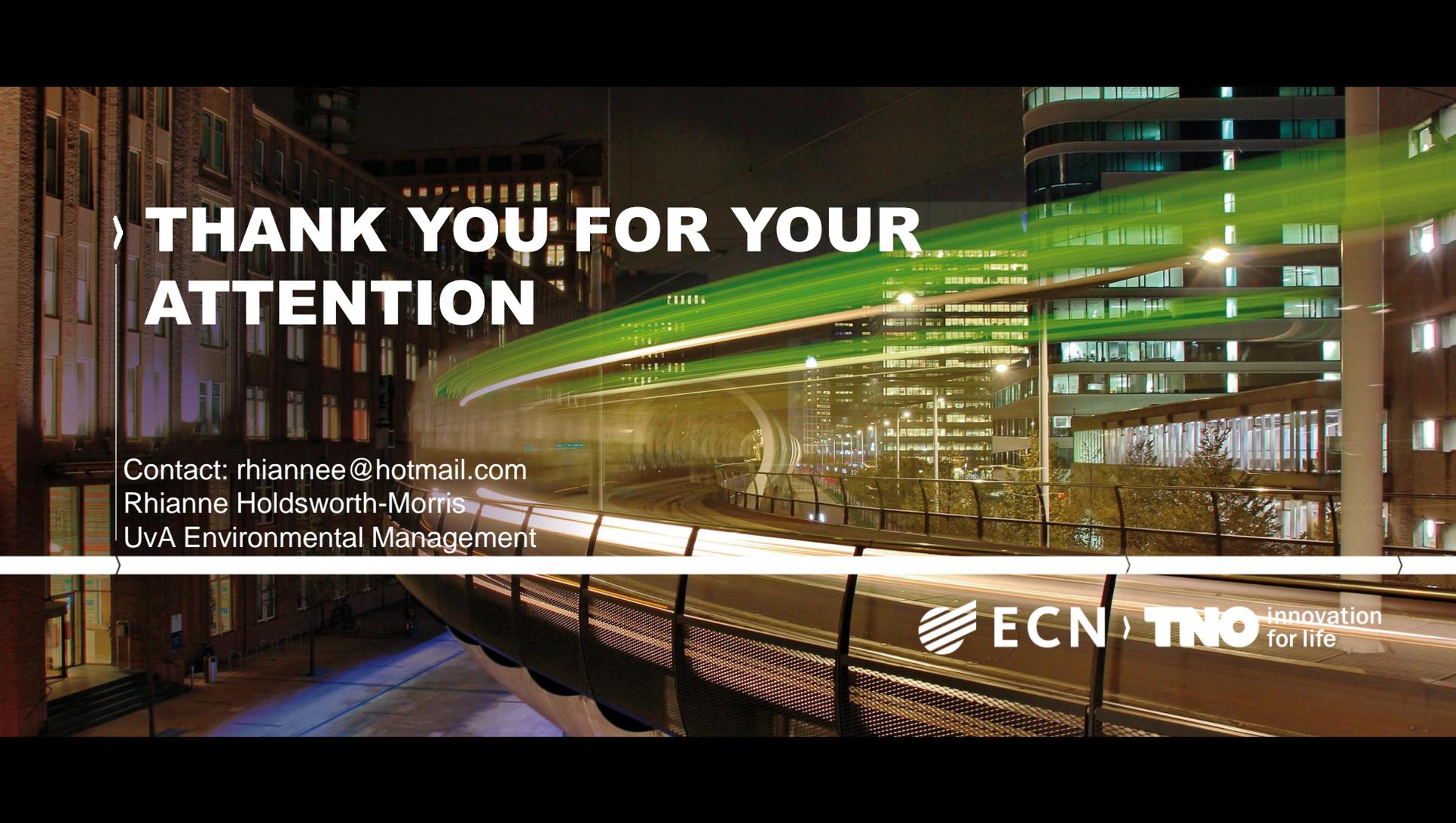
- › UK has strong evaluations supported by high quality and large quantity of data
- › Research into post savings and evaluation methods
- › NEED framework- observed data from meters
- › When used in ex-ante evaluation factors in reducing effects (rebound)
- › Smart-meters increase data availability
- › Government evaluates and then a regulator carries out second independent evaluation



WHAT CAN WE LEARN FROM THE UK EXPERIENCE?

- › Policy should target areas where savings potential is highest
- › Energy poverty directly related to efficiency (rising energy prices impact these households most)
- › Specific measures to overcome split-incentive barriers are successful
- › Create a market for energy efficiency - involve private sector to reduce costs
- › Encourage energy companies to provide services
- › Fund innovation and promote upscaling of “grassroot projects”
- › Don’t overcomplicate, hassle is a barrier to energy efficiency
- › Evaluation needs data and methods need to account for reducing effects



A nighttime photograph of a city street. In the foreground, a curved pedestrian walkway with a metal mesh railing is visible. The background shows multi-story buildings with lit windows and a prominent light trail from a moving vehicle, creating a sense of motion. The overall scene is illuminated by city lights, with a mix of warm and cool tones.

› **THANK YOU FOR YOUR
ATTENTION**

Contact: rhianne@hotmail.com
Rhianne Holdsworth-Morris
UvA Environmental Management



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