Energy efficiency measures for Europe 2022

October 2022

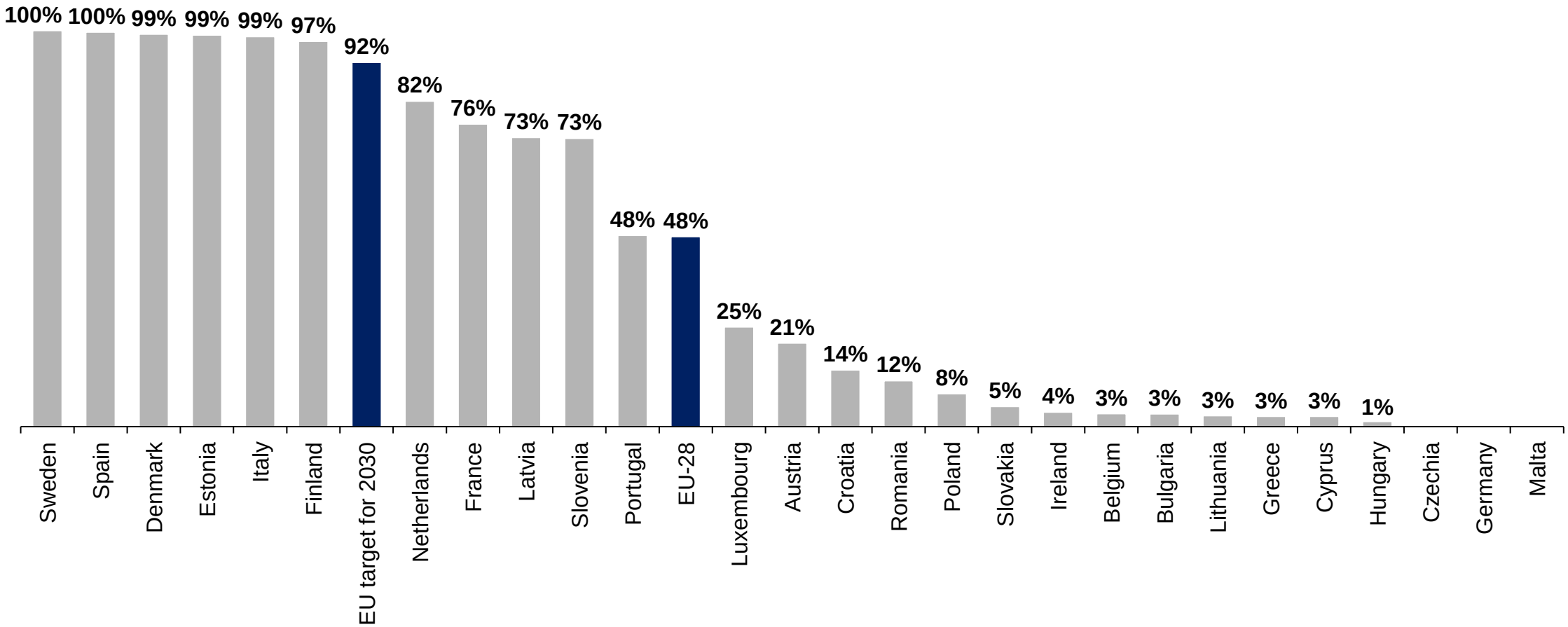
This documents includes an overview of a non-exhaustive list of potential energy efficiency measures for Europe

Content

1. **Smart meters**
2. **Electrical appliances automation**
3. **District heating and smart heating technologies**
4. **Heating temperature limit**
5. **LED bulbs**
6. **EU policies and long-list of recommendations**

Smart meter penetration rate in the EU is still relatively low, indicating substantial potential

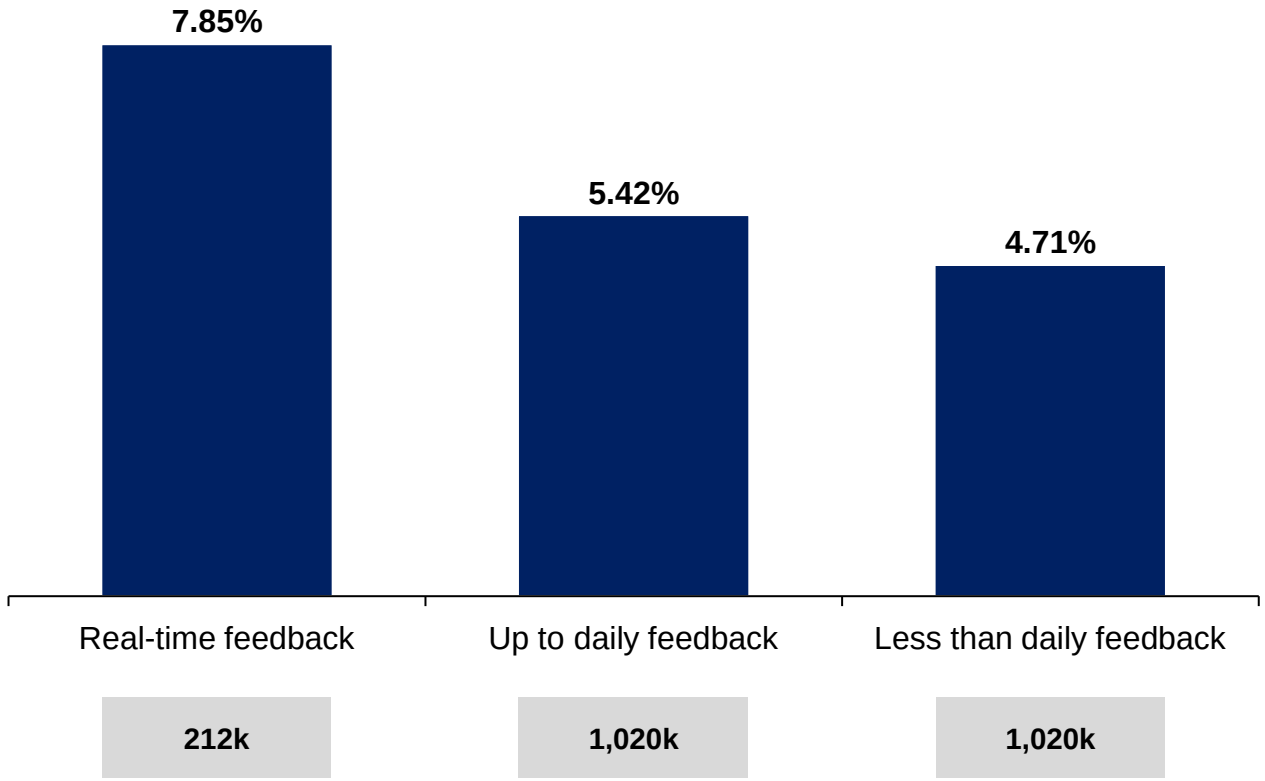
Electricity smart meter penetration rate in the EU as of 2020 (% of all metering points)



Source: Eurelectric: Distribution grids in Europe-Facts and Figures 2020, https://cdn.eurelectric.org/media/5089/dso-facts-and-figures-11122020-compressed-2020-030-0721-01-e-h-6BF237D8.pdf

Research shows that smart meters providing data feedback to consumers result in electricity savings of ~5-8% on a yearly basis

Relative electricity savings[1] by type of feedback provided by smart meters (% of total demand)



Rationale

- Feedback gains interest and involvement of consumers and raises awareness
- It allows consumers to link their daily activities with their electricity consumption and therefore better focus their efforts
- In particular, **real-time feedback** allows consumers to explore the links between their behavoir and energy consumption – results in new habits on energy consumption

1) Results include data from ~70 public pilots conducted in Germany, Netherlands, Austria, Spain, UK, Czech Republic, Sweden, Bulgaria, Italy, France, Belgium, Ireland, USA, Australia and Canada from 2005-2017
Source: VaasaETT - The Role of Data for Consumer Centric Energy Markets and Solutions, https://www.esmig.eu/esmig-publications/report-the-role-of-data-for-consumer-centric-energy-markets-and-solutions-2/

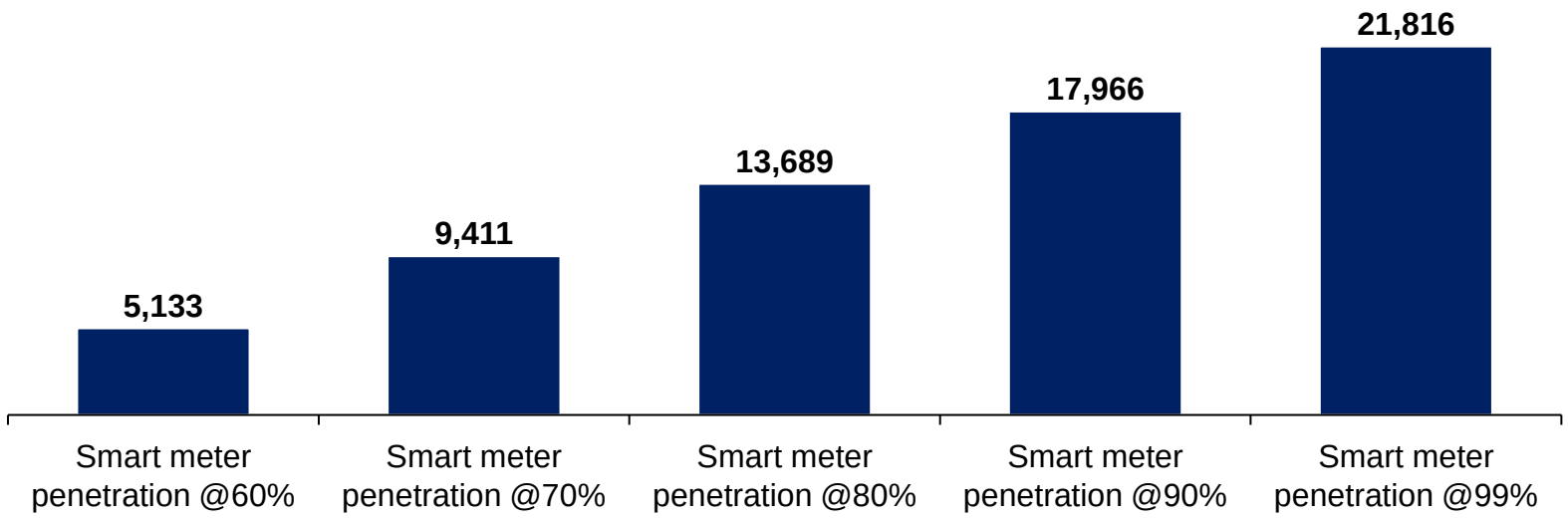
Applying this saving rate to the EU scale: just increasing smart meter penetration rate to 80% would result in electricity savings equivalent to total annual electricity demand of Slovenia

Simulation of electricity savings with different smart meter penetration rates on the EU scale (GWh)

~714,000 GWh
Household electricity demand in the EU in 2020

~2,600,000 GWh
Total electricity demand in the EU in 2020

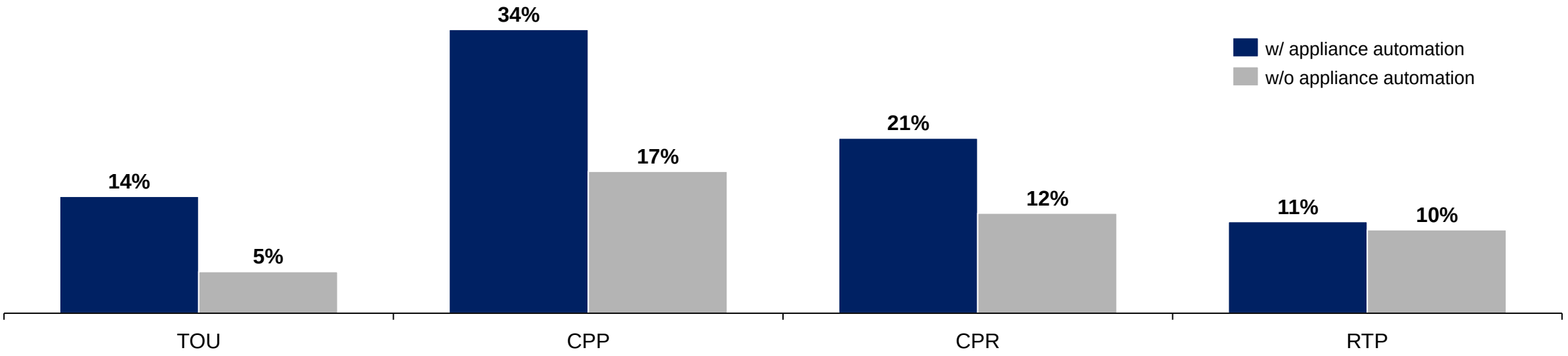
% of EU household el. demand	0.7%	1.3%	1.9%	2.5%	3.1%
Equivalent to total electricity demand of	Cyprus	Estonia	Slovenia	Lithuania & Luxembourg	Croatia & Latvia
Population	1.2m	1.3m	2.1m	3.5m	6m



Source: Eurostat, own analysis

Another tool that can be used by utilities to achieve electricity savings in combination with smart meters is dynamic pricing

Impact[1] of different dynamic pricing models on peak load reduction (% of total demand)



Time-of-Use tariffs
- Prices are set based on time of the day – higher prices at times of generally higher consumption (e.g. in the morning and in the aternoon) and lower at times of generally lower consumption (e.g. at night)

Critical Peak Pricing
- Significant increase in prices at predictable periods of either very high consumption or when the system stability is threatend – these times are agreed in advance or consumers are notifed on time

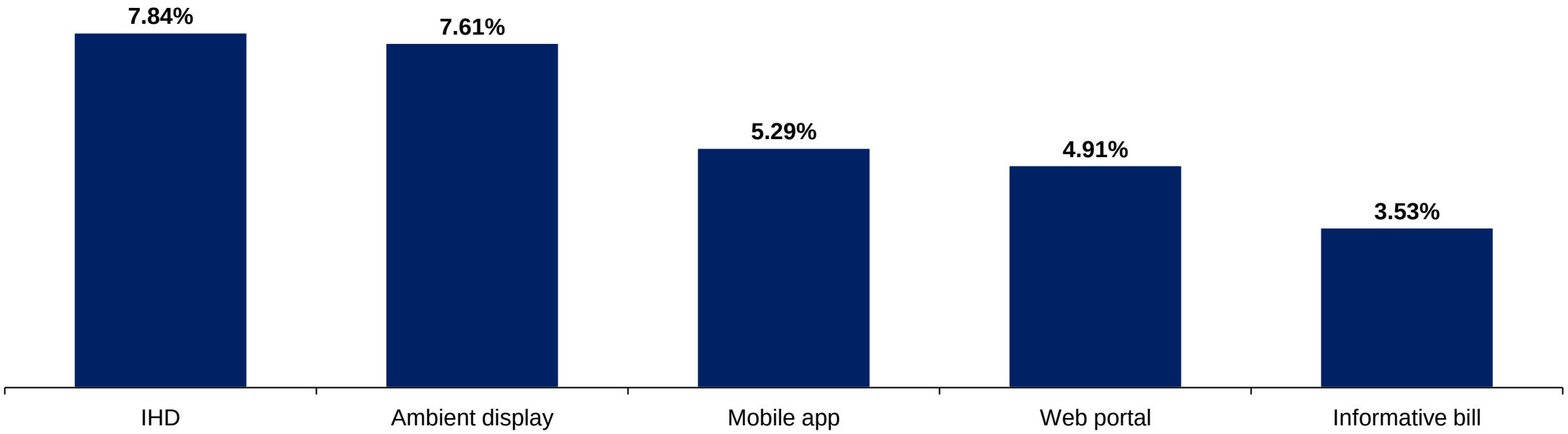
Critical Peak Rebates
- Inverse form of CPP
- Consumers are given rebates based on their effort of actual demand reduction (in comparison to their usual predicted levels) during peak hours

Real-Time-Pricing
- Consumers' retail prices are linked to wholesale prices – participants are warned in advance of the periods when wholesale prices are expected to increase, to encourage reduced consumption during those hours

1) Results include data from ~70 public pilots conducted in Germany, Netherlands, Austria, Spain, UK, Czech Republic, Sweden, Bulgaria, Italy, France, Belgium, Ireland, USA, Australia and Canada from 2005-2017
Source: VaasaETT - The Role of Data for Consumer Centric Energy Markets and Solutions, https://www.esmig.eu/esmig-publications/report-the-role-of-data-for-consumer-centric-energy-markets-and-solutions-2/

Type of feedback channel, i.e. technology, has substantial impact on the level of electricity savings

Relative electricity savings[1] by type of feedback channel (% of total demand)



IHD	Ambient display	Mobile app	Web portal	Informative bill
• Dynamic dysplays providing close to real-time and historical info on usage and costs	• Visually signal messages on consumption level and price changes • Don't provide specific consumption info	• Provide information on current and historic consumption level and price bands on a phone / desktop • Also used to remotely control appliances	• Regular (e.g. monthly) bills with actual consumption (as opposed to estimated consumption)	

1) Results include data from ~70 public pilots conducted in Germany, Netherlands, Austria, Spain, UK, Czech Republic, Sweden, Bulgaria, Italy, France, Belgium, Ireland, USA, Australia and Canada from 2005-2017

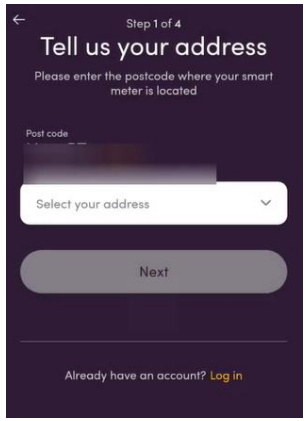
Source: VaasaETT - The Role of Data for Consumer Centric Energy Markets and Solutions, https://www.esmig.eu/esmig-publications/report-the-role-of-data-for-consumer-centric-energy-markets-and-solutions-2/

EARTH 2.O

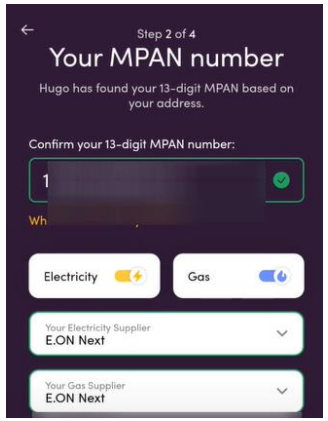
There are examples of smart meter mobile apps in some countries – this needs to happen on a much larger scale

Quick and easy setup

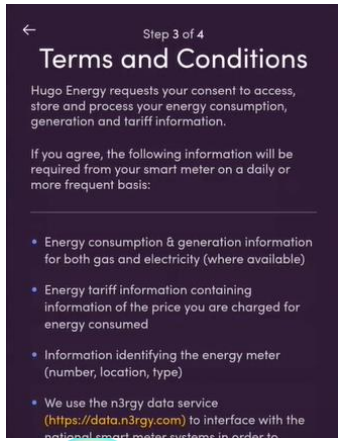
1. Link the address



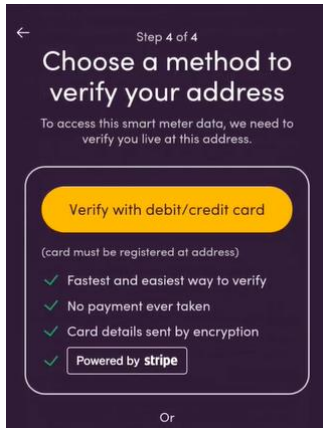
2. Connect with the bill from supplier



3. Accept T&C



4. Verify profile

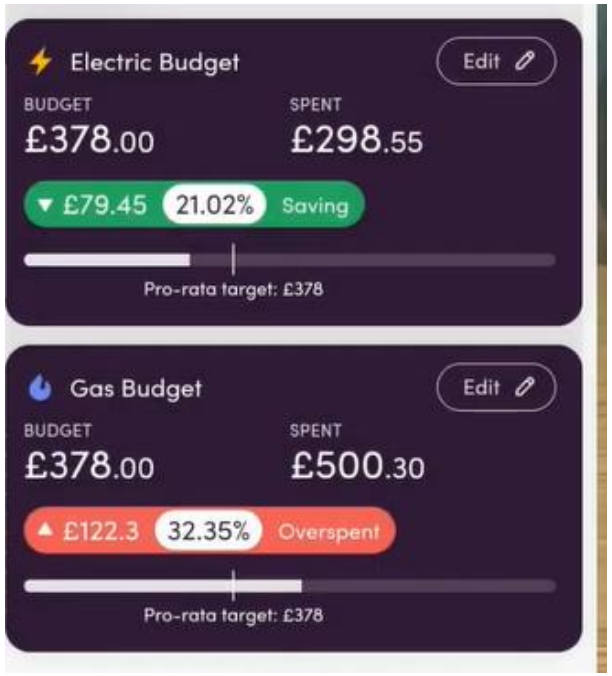


Consumption data linked to the smart meter is automatically loaded to the app

Simple but insightful dashboard

Historic usage data on different scales – daily, weekly monthly, yearly

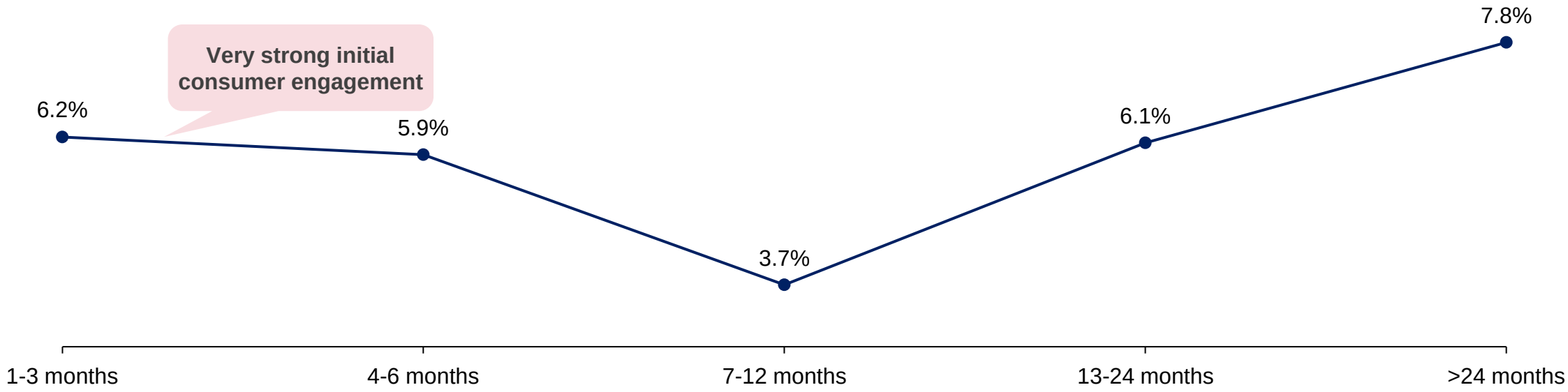
Budget data with possibility to set saving targets



Source: Hugo Energy

Same research shows that impact of smart meters on electricity savings is sustainable over time

% of electricity savings[1] with smart meters incl. data feedback over time (% of total demand)



Within a short time frame, involvement and momentum are high and feedback enables to directly identify opportunities for savings

Afer several months, the novelty effect has faded and consumers become disegaged, which results in a decreasing impact on savings

Over a longer period, consumers for sustainable habits and choose to replace their appliances with more efficient ones so the effect becomes substantial

1) Results include data from ~70 public pilots conducted in Germany, Netherlands, Austria, Spain, UK, Czech Republic, Sweden, Bulgaria, Italy, France, Belgium, Ireland, USA, Australia and Canada from 2005-2017

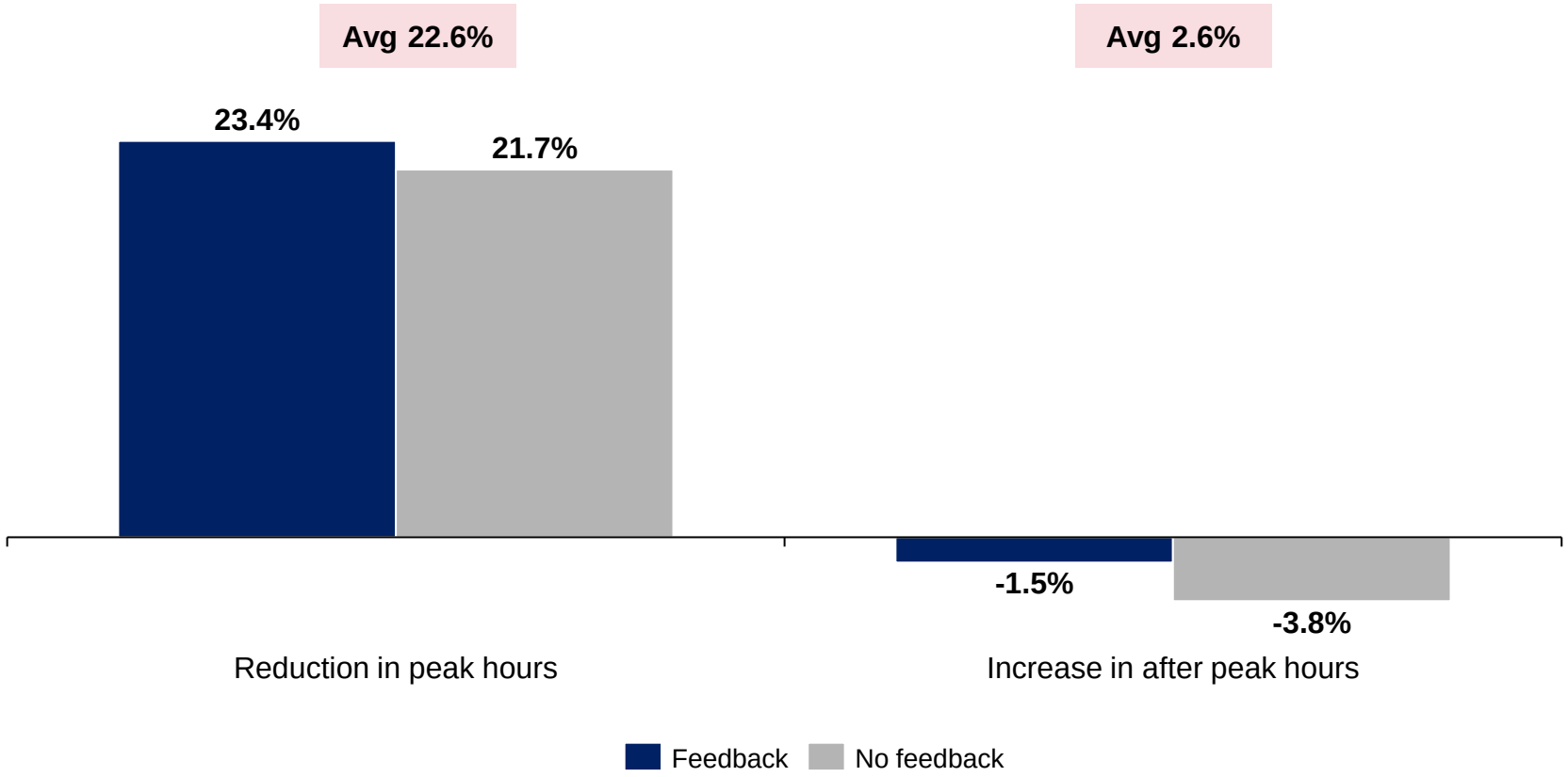
Source: VaasaETT - The Role of Data for Consumer Centric Energy Markets and Solutions, https://www.esmig.eu/esmig-publications/report-the-role-of-data-for-consumer-centric-energy-markets-and-solutions-2/

Key benefits of smart meters for power utilities

Real-time information	• Allows for real-time billing, which enables implementation of dynamic pricing and demand response programs, which in turn results in a more stable power grid • Enables peak load and overal demand reduction through providing information to consumers • In comparison to periodical manual readings, utilities can model their cash flows and financial performance based on real-time usage
Increased understanding and control over power system	• Enables detecting outages and faults rapidly with high degree of accuracy • Enables utilities to process the data from consumers to predict peaks more accurately and reliably • Enables for understanding of consumer habits
Cost savings	• No need for human resources for readings and data processing • Enables fully informed decisions on e.g. where to deploy assets

In addition, appliance automation combined with feedback from smart meters results in significant demand reduction during peak hours

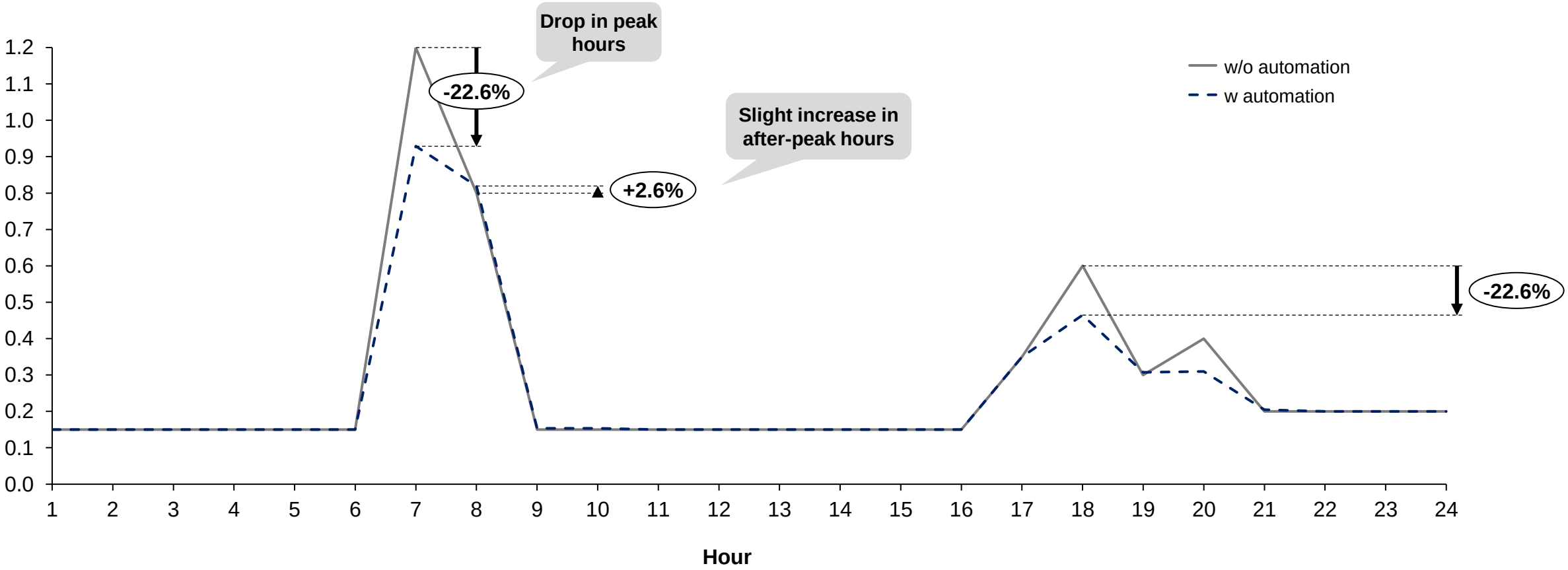
Impact[1] of apliance automation on peak load (% of demand during peak/after peak hours)



1) Results include data from ~70 public pilots conducted in Germany, Netherlands, Austria, Spain, UK, Czech Republic, Sweden, Bulgaria, Italy, France, Belgium, Ireland, USA, Australia and Canada from 2005-2017
Source: VaasaETT - The Role of Data for Consumer Centric Energy Markets and Solutions, https://www.esmig.eu/esmig-publications/report-the-role-of-data-for-consumer-centric-energy-markets-and-solutions-2/

How does that look on an example of an average household

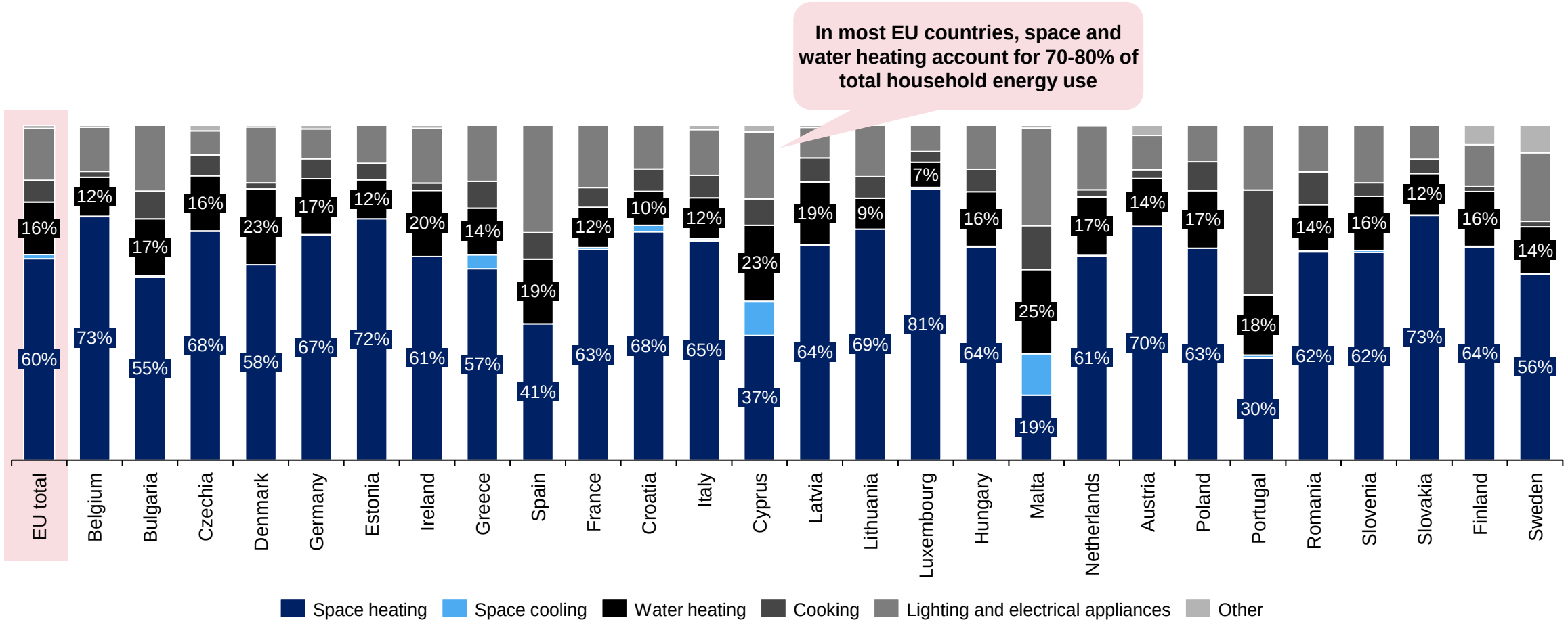
Simulation of daily electricity consumption curve of an average household (kW)



Source: own analysis

Space heating accounts for 60% of end-use energy consumption in the residential sector in the EU

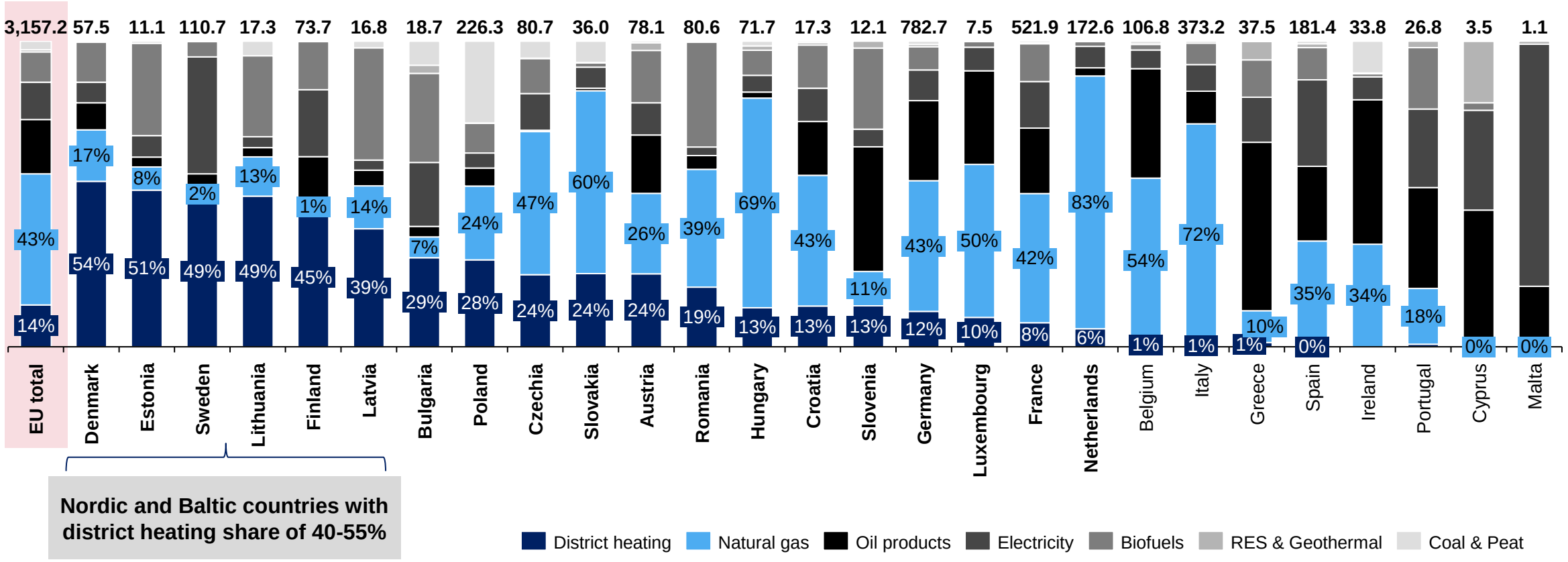
Share of final energy consumption in the residential sector by type of end-use in 2020



Source: Eurostat, https://ec.europa.eu/eurostat/statisticsexplained/index.php?title=Energy_consumption_in_households#Energy_products_used_in_the_residential_sector

District heating still has a potential to grow in the EU, but in Nordic and Baltic countries it already accounts for ~50% of total heat demand

Share of heat sources in residential and service sector in EU (% of total heat demand in TWh)



Source: Heat Roadmap Europe, https://heatroadmap.eu/wp-content/uploads/2018/09/STRATEGO-WP2-Background-Report-4-Heat-Cold-Demands.pdf

Apart from „traditional" heat savings measures, technology-based measures have a substantial potential to drive savings in district heating

Four general types of technology based solutions for district heating systems

Intelligent control system

AI-driven

- Control system with **real-time collected** operation parameters
- Includes **dispatching and management** system, energy **consumption analysis** system and **accident alarm** system
- Predicts and adjusts heat loads based on historic data and consumption patterns

DH system with variable-frequency pump

- The system uses variable-frequency pump to **adjust water flow instead of the valve**, making it flexible to adjust and suitable for heat metering
- It allows for **controlling the flow rate of the primary supply water and temperature changes** according to the outdoor temperature
- Leads to significant **savings of electricity** used for running the pump

Household intelligent control system

AI-driven

- Similar as smart meters + appliance automation in electricity
- The intelligent control system **compares real-time room temperature with the user preset value**, then automatically adjust the water flow
- Heating time, heat load and room temperature preference are collected and upload to database, **the control center in turn could predictand pre adjust the heat load according to user's heating characteristic**

Multi-heat source joint heating system

- Multiple heat sources in one system
- Several heat sources, which include a **main heat source with maximum heat capacity and some auxiliary heat sources**, simultaneously supply heat to the thermal grids
- Allows for the **wide use of heat from waste-to-energy and various industrial surplus heat** sources as well as the inclusion of geothermal and solar energy

Source: Lin Gao et al., Technologies in Smart District Heating Systems, https://reader.elsevier.com/reader/sd/pii/S1876610217363270?token=D4A98352D97EFE07CDC4D752872CB10B1E31F42197084B5B795F8A869579D285D4B51B062D97A71F984F9F4A8110F7C0&originRegion=eu-west-1&originCreation=20220913162836

AI-driven technologies – for district heating operators and for consumers

Technologies on DH operator side

Demand side management	• Gives possibility possible to start optimizing the operational behavior of that system • By controlling the demand it is **possible to reduce expensive fossil peaks, balance base loads, synchronize demand with market** or marginal production prices and actively reduce return temperatures
Dynamic supply temperature	• Provides a way to dynamically control the supply temperature • The system uses **data-driven analysis and self-learning models to continuously relate the current supply temperature to the actual operational requirements** throughout the network
Data driven analytics	• **Platform for advanced AI-based analytics, and integrates freely with most data management systems** using standard API solutions • Can co-exist “under the bonnet” with existing solutions

Technologies on consumer side

Heat control	• Uses indoor temperature sensors and weather forecasts in combination with AI-based models of the operational behavior of the heating system **to relate energy usage to actual demand**
Tariff control	• **Adapts the energy usage of the building in relation to the pricing structure** of the tariff in each heat network or power grid
Climate control	• Based on self-learning AI that uses indoor sensors for temperature and humidity to create a virtual model of the building • The algorithms analyse the building **based on climate zones for maximum comfort and energy efficiency**

Source: NODA, https://noda.se/casestudies/

Deployment cases have shown that AI-based technologies in district heating grids can lead to heat savings of 10-15% per year

Case	Country	Period	Scope	Technology applied	Observed savings
Kraftringen	Sweden	2021-	30 residential buildings	**Heat control**	**10-12%**
Norrenergi	Sweden	2019-	n/a	**Heat control**	**13%**
Karlshamn Energi	Sweden	2019-	90 residential buildings	**Demand side management**	**15%**
C4 Energi	Sweden	2020-	19 multi-family buildings	**Heat control & climate control**	**13%**

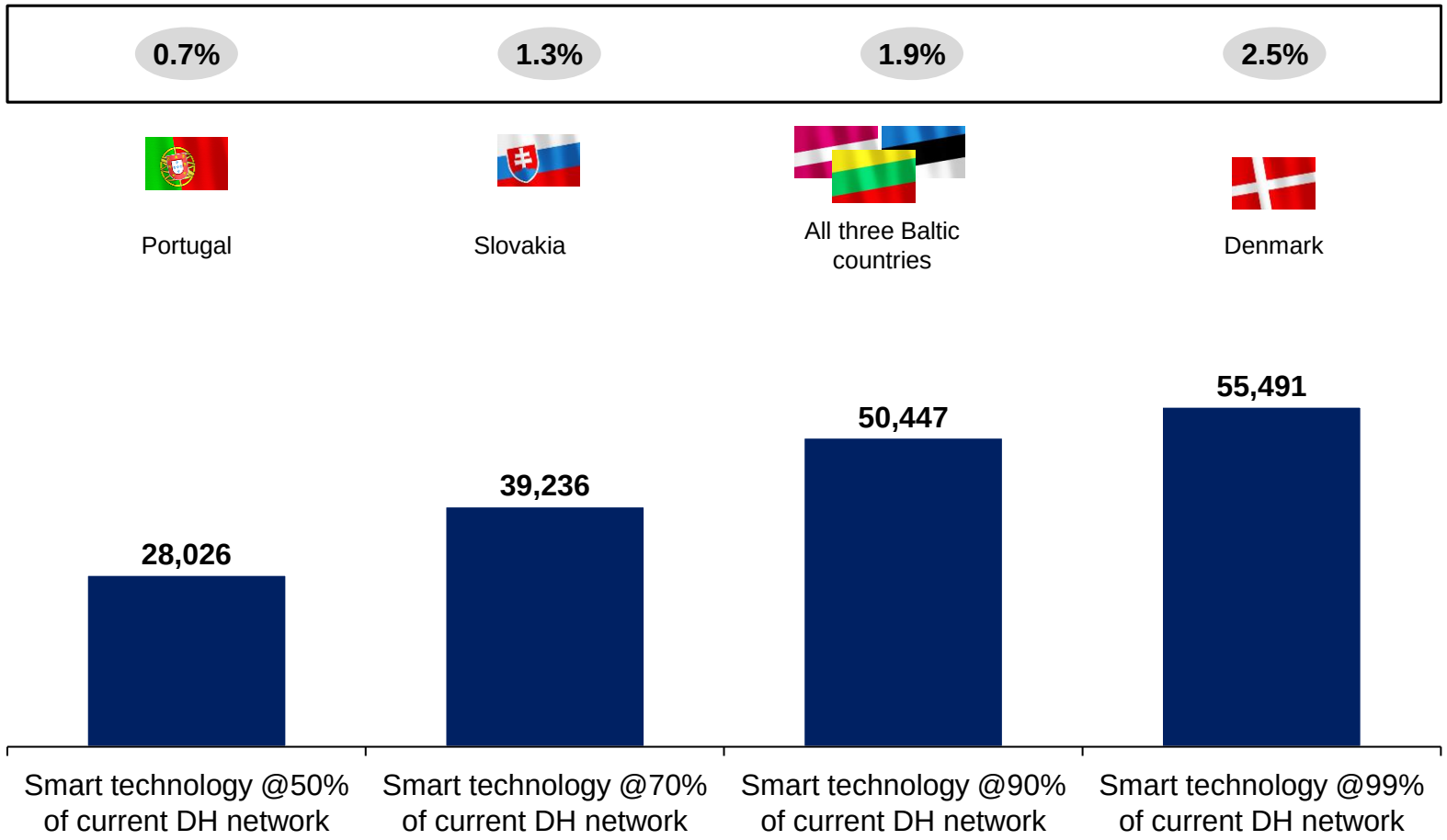
Source: NODA, https://noda.se/casestudies/

Rolling out these technologies to the existing district heating network in EU would bring savings equivalent to entire heat demand of Denmark

Simulation of heat savings with different smart meter penetration rates on the EU scale (GWh)

~3,157,000 GWh
Total heat demand in Europe in 2020

~431,000 GWh
Heat demand **supplied through district heating** in 2020



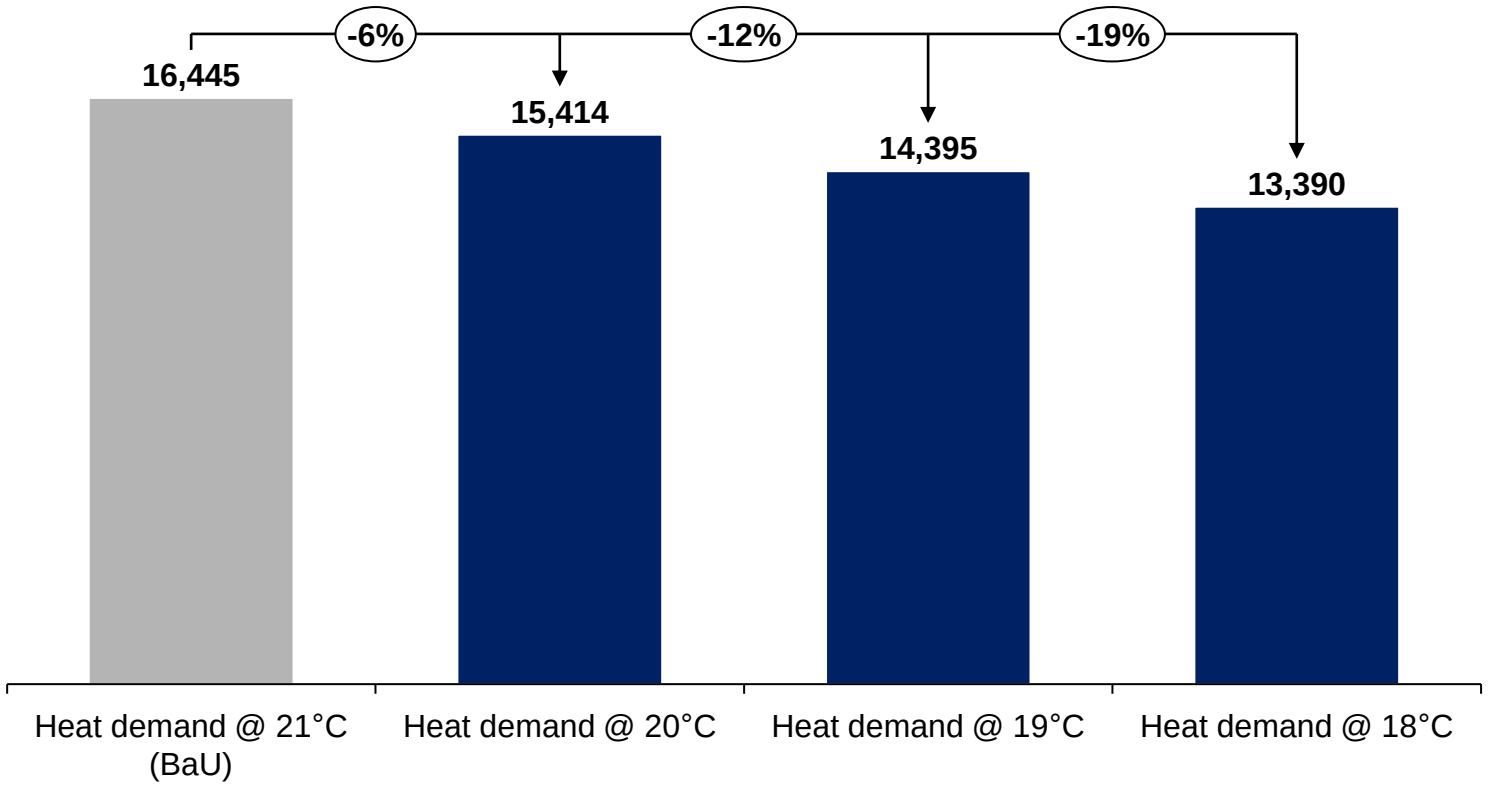
In an average household in the Nordics, every 1°C of drop in average indoor temperature brings ~6% of heat savings in a year

Simulation of heat savings on an average household in north Denmark

Location characteristics	
Location	Aalborg, Denmark
Average annual temperature	8.8°C
Sunshine hours per year	1765 (20%)
Space / house characteristics	
Area	85 m^2
Room height	2.5 m
Window area	20 m^2
Ventilation rate	0.6 / hour
Ventilation rate factor	0.33
Heating characteristics	
Specific trans. heat loss	1.55 W/(m^2K)
Solar gain factor	0.25
Indoor temperature - BaU	21°C

Annual heat demand at different indoor temperatures (kWh)

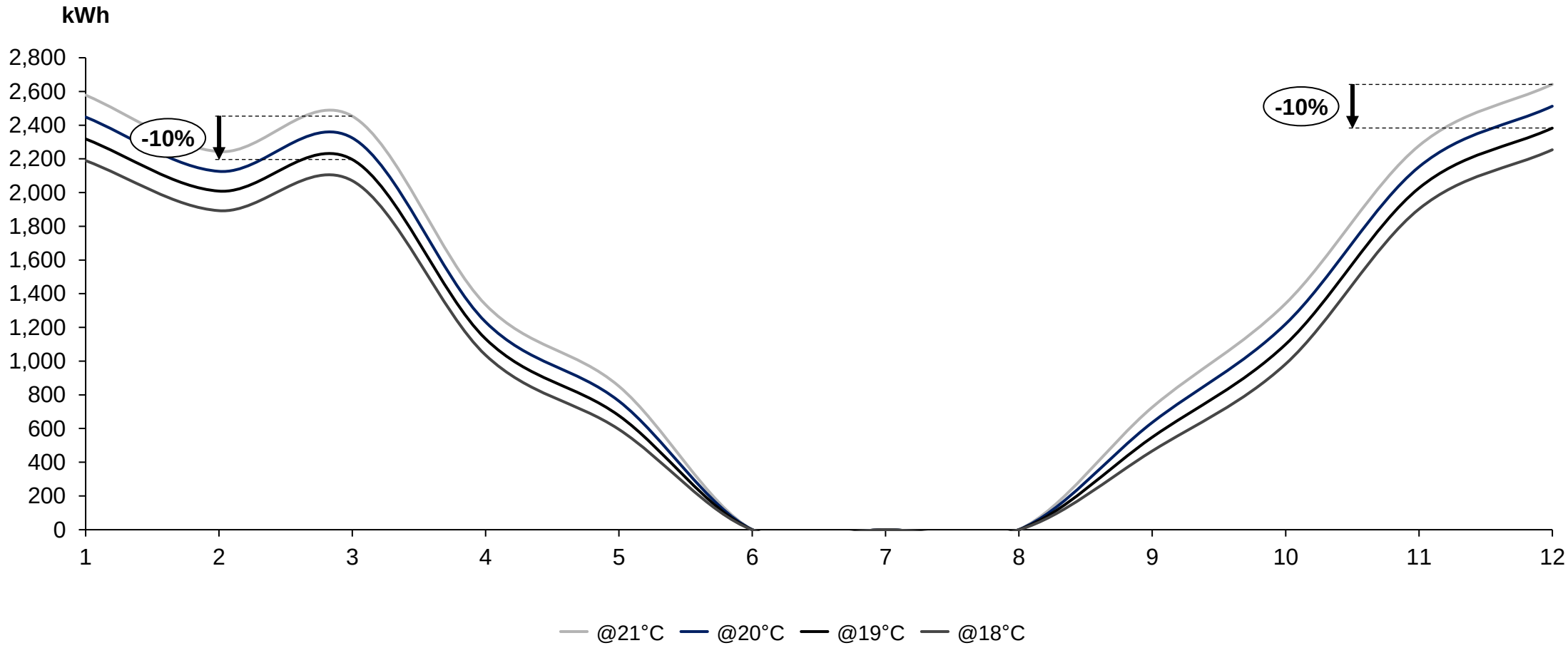
Indoor temperature is the only changing variable, others are fixed across the scenarios



Source: own analysis

Temperature limit also flattens the peaks in heat demand over the year

Illustration of monthly heat demand at different indoor temperatures



Source: own analysis

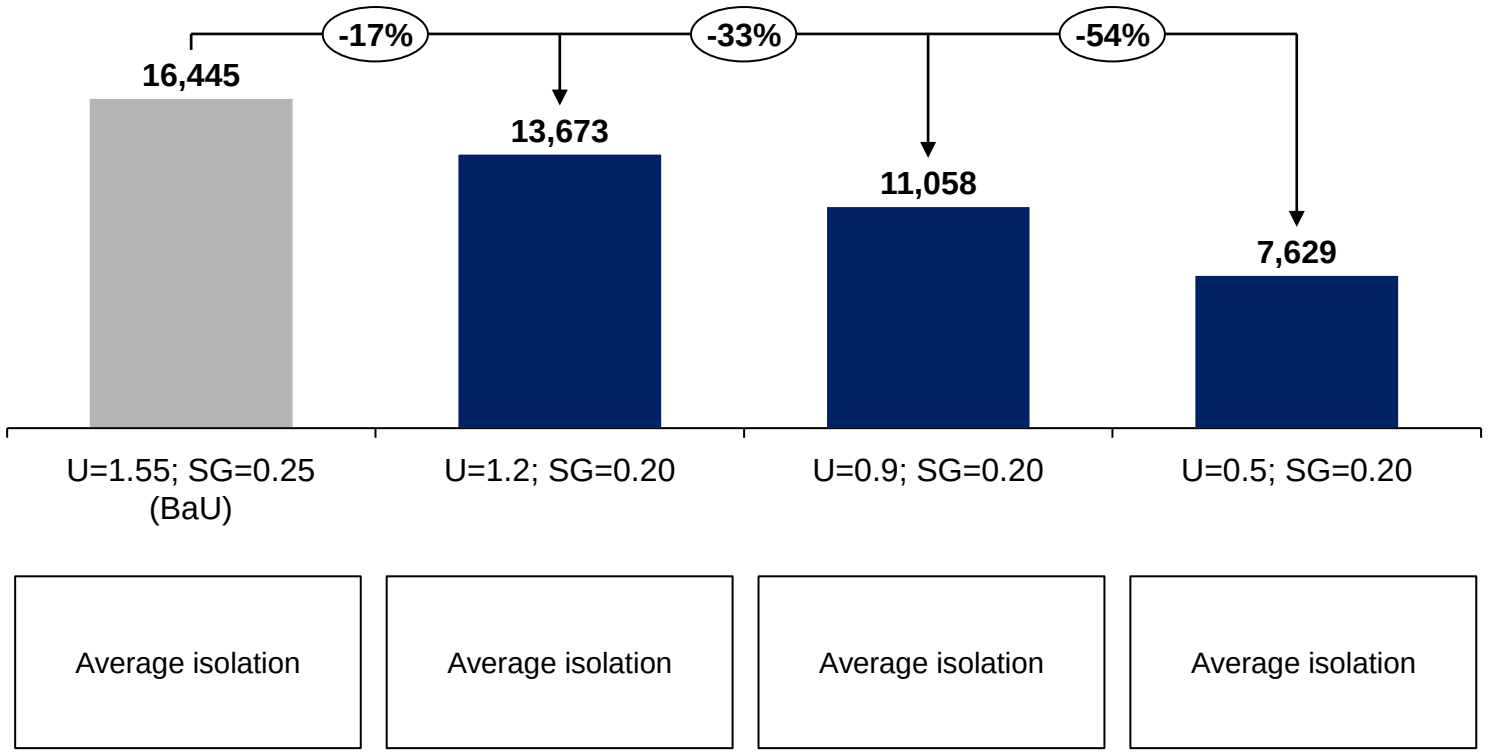
Impact of building isolation is even higher and heat savings can go over 50%

Simulation of heat savings on an average household in north Denmark

Location characteristics	
Location	Aalborg, Denmark
Average annual temperature	8.8°C
Sunshine hours per year	1765 (20%)
Space / house characteristics	
Area	85 m^2
Room height	2.5 m
Window area	20 m^2
Ventilation rate	0.6 / hour
Ventilation rate factor	0.33
Heating characteristics	
Specific trans. heat loss	1.55 W/(m^2K)
Solar gain factor (SG)	0.25
Indoor temperature - BaU	21°C

Annual heat demand at different building isolation levels (kWh)

Specific transmission heat loss (level of isolation) and solar gain factor are the only changing variable, others are fixed across the scenarios



Source: own analysis

EC estimates residential lighting accounts for around 85 TWh of electricity consumption or ~10% of residential electricity demand

LED model validation: bottom-up vs. EC top-down estimation of electricity consumption for lighting

Market sizing

General assumptions	
EU population	447.7. mil.
# of households	197.0 mil.
# of bulbs in the EU	
1-room households *(25%)*	4 bulbs
2-room households *(25%)*	6 bulbs
3-room households *(25%)*	9 bulbs
4-room households *(25%)*	13 bulbs
Total # of bulbs in the EU	**1,576 mil.**
Average use of lighting in a day	36% of hours

Electricity consumption bottom-up estimate

Bulb type (800 lm)	Electricity use[1]	Share in EU[2]
Incadescent	60 W	4%
Halogens	43 W	12%
Fluorescent	15 W	33%
LED	9 W	51%

Top-down input

85.9 TWh

EU residential lighting electricity consumption based on bottom-up estimates TWh

85.0 TWh

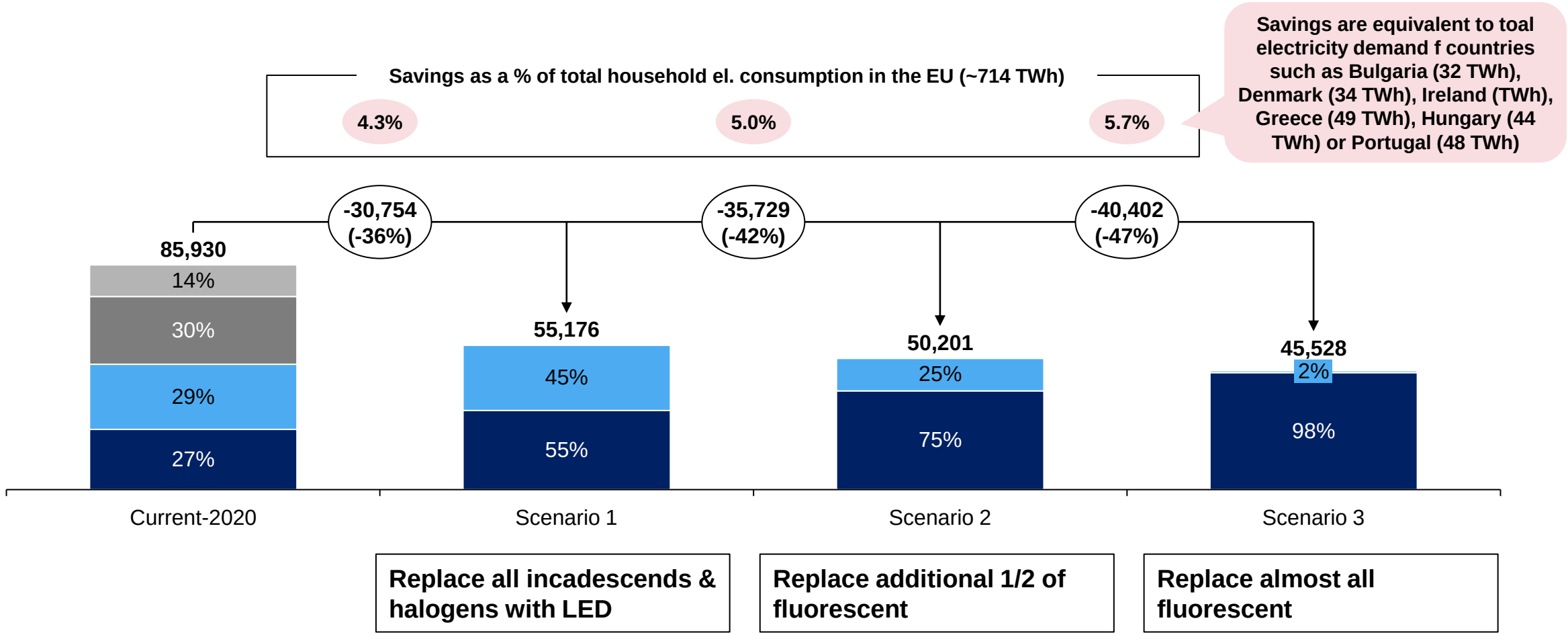
European Commission official estimate

1.1% difference

1) https://www.researchgate.net/figure/Energy-consumption-by-the-different-lighting-systems-From-left-to-right-incandescent_fig9_315738966
2) https://www.iea.org/reports/lighting
3) https://joint-research-centre.ec.europa.eu/energy-efficiency/energy-efficiency-products/residential-lighting_en
Sources: Eurosta

Utilizing more efficient lighting on a larger scale in the EU could bring up to 50% of savings of electricity used for lighting

Theoretical scenarios for electricity savings with more efficient lighting (GWh)



Source: Eurostat, own analysis

In May 2022, EU released REPowerEU, a plan to rapidly reduce dependence on Russian fossil fuels – energy efficiency is one of the three key pillars

Three key pillars REPowerEU

Energy savings

- **In the long term** – increase the binding Energy Efficiency Target under the 'Fit for 55' package of European Green Deal legislation **from 9% to 13%**
- **In the short term-** behavioural changes are estimated to cut **gas and oil demand by 5%**
- Member States are also encouraged to **use fiscal measures to encourage energy savings**, such as reduced VAT rates on energy efficient heating systems, building insulation and appliances and products.

Supply diversification

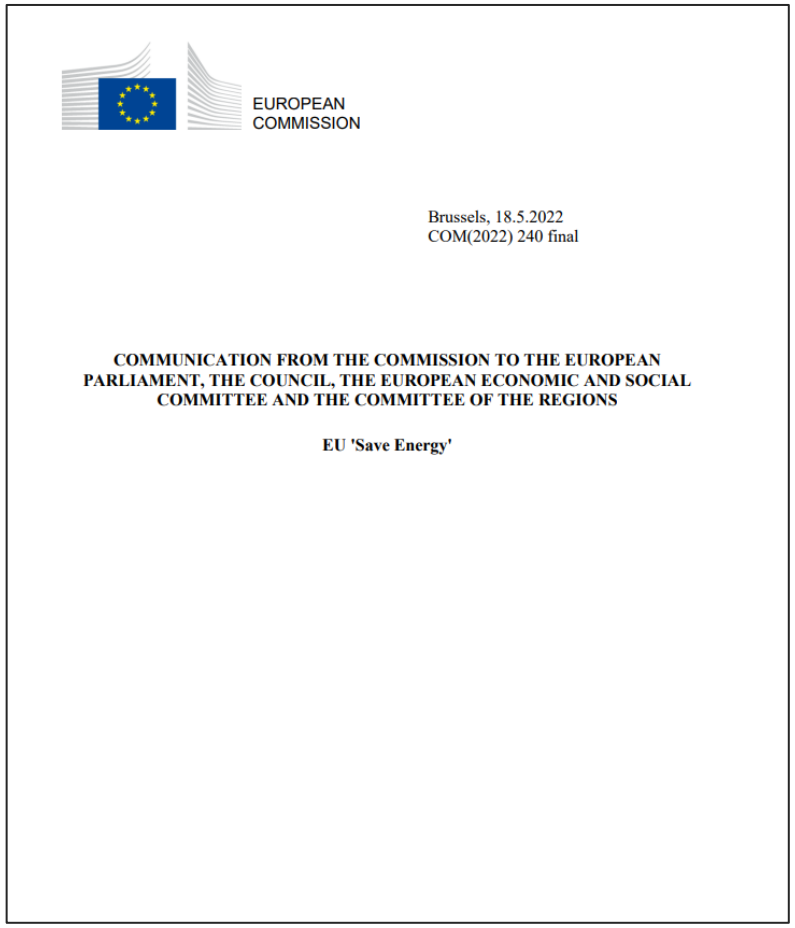
- **Increase levels of LNG imports** and higher pipeline gas deliveries
- **Joint purchasing mechanism** to negotiate and contract gas purchases on behalf of participating Member States
- Commitment to the global green and just energy transition

RES rollout acceleration

- **Increase the headline 2030 target for renewables from 40% to 45%** under the Fit for 55 package
- A dedicated **EU Solar Strategy** to double solar photovoltaic capacity by 2025 and install **600GW by 2030**
- A **Solar Rooftop Initiative** with a phased-in **legal obligation to install solar panels** on new public and commercial buildings and new residential buildings.
- **Doubling of the rate of deployment of heat pumps**
- **tackle slow and complex permitting for major renewable projects**
- **Target of 10 million tonnes of domestic renewable hydrogen**

Source: REPowerEU – European Commission, https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3131

Also in May, EU has launched a „EU Save Energy" plan, which takes a two-pronged approach to energy efficiency



EUROPEAN COMMISSION

Brussels, 18.5.2022
COM(2022) 240 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

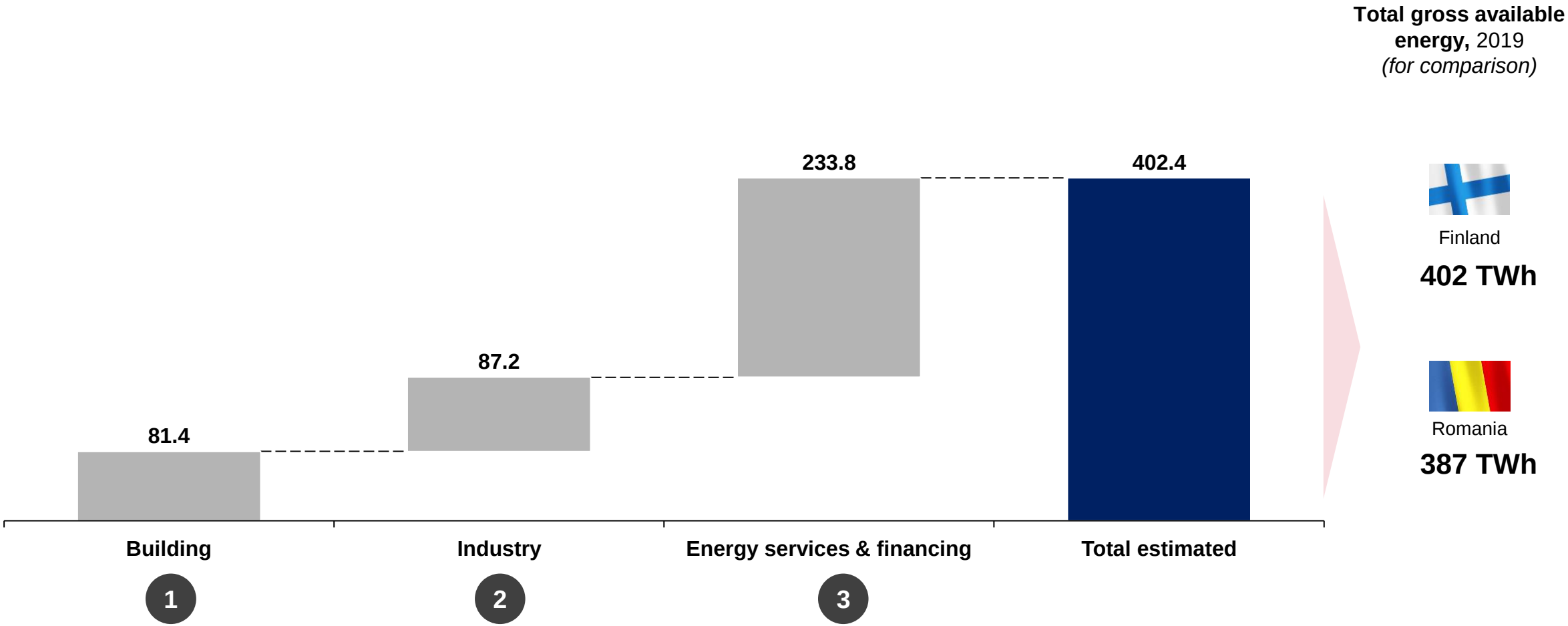
EU 'Save Energy'

1. **Achieving immediate energy savings through voluntary choices – short term**

2. **Accelerating and strengthening structural, mid- to long-term energy efficiency measures**

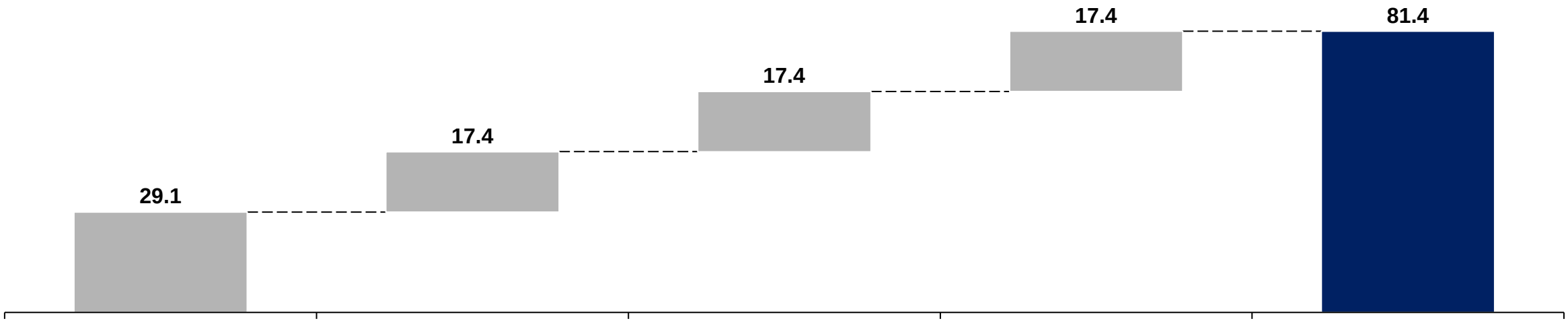
Estimated savings from the recommendations in the plan are 402 TWh, equivalent of total gross available energy of Finland or Romania

EU Save energy estimated energy savings with proposed short-term measures (TWh)



In building sector, saving potential of short-term measures is estimated on 81 TWh, primarily from heating measures and quick technology interventions

1 Proposed short-term energy efficiency measures and estimated impact in building sector (TWh)

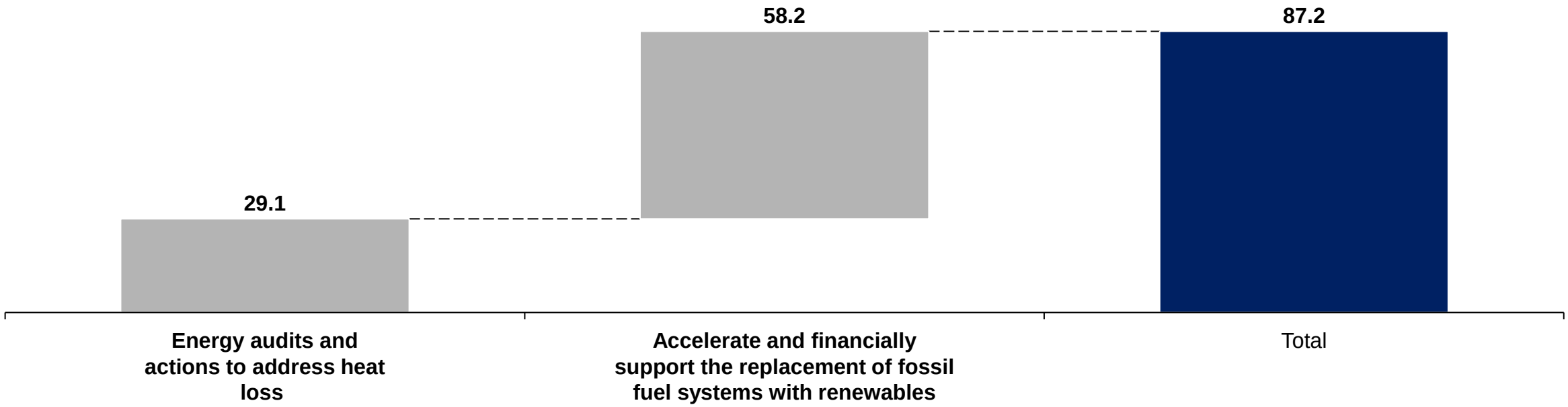


Heating and airconditioning use in buildings	Speedy heat pumps roll-out through dedicated financing incentives	Building automation and energy management systems	Information on easy to install insulation measures in buildings
Default settings on condensing boilers can often be adjusted to increase efficiency and save up to 8% of the energy used to heat rooms and water	Activate financing and fiscal incentives for fast tracked heat pumps roll-out, for example through VAT reduction Bonus grants to replace fossil-fuel based boilers to direct offset natural gas demand.	Encourage fitting of Building automation and control systems (BACS) that monitor and automatically adjust energy use in buildings.	Address easy to install insulation measures in attics and roofs, and through high performance windows and double-glazing

Source: European Commission – EU Save Energy, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0240&from=EN

In industry sector, the savings could come from reduced heat losses due to more intense energy audits and elimination of fossil fuel systems

2 Proposed short-term energy efficiency measures and estimated impact in industry sector (TWh)

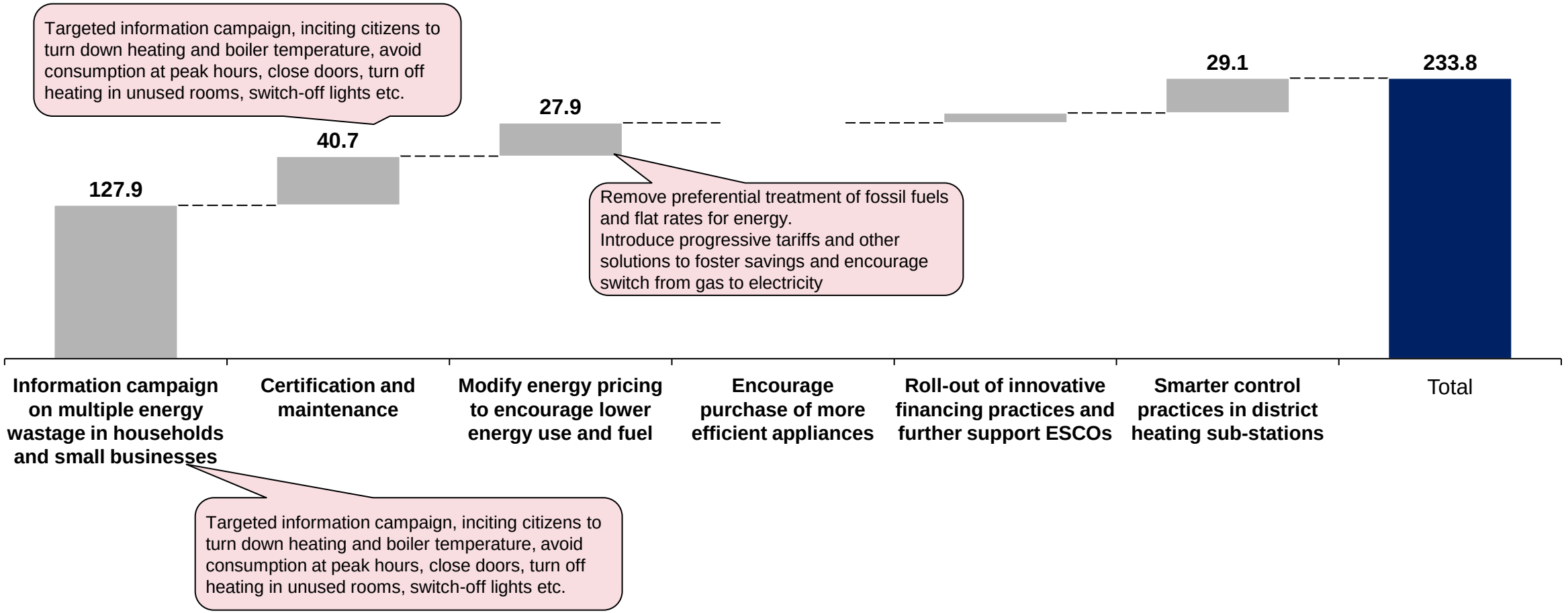


Energy audits and actions to address heat loss	Accelerate and financially support the replacement of fossil fuel systems with renewables
Incentivise heat loss audits and actions to avoid heat losses from high temperature processes. Encourage SMEs to carry out audits.	Incentives, such as tax breaks or subsidies, to accelerate the replacement of fossil fuel systems with renewables, particularly in existing buildings with boilers more than 12 years old.

Source: European Commission – EU Save Energy, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0240&from=EN

In addition, a significant portion of savings is estimated to come from energy services; citizen behaviour holds the highest potential

3 Proposed short-term energy efficiency measures and estimated impact of services and financing (TWh)



Source: European Commission – EU Save Energy, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0240&from=EN

A set of measures for the transport sector has been defined as well

Proposed short-term energy efficiency measures for transport sector – qualitative assessment (1/2)

Measure	Potential impact	Description
Reinforce the adoption of electric and more efficient cars, vans, trucks and buses		• Continued/extended public support for sustainable vehicle purchase • Dedicated support schemes for specialized and captive fleets (taxis, shared fleets, logistic fleets, buses) • Investment in publicly accessible recharging and refueling infrastructure • Support for the deployment of private recharging infrastructure (at home/in offices/in businesses) by means of subsidies or tax incentives • Investment in zero emissions public transport infrastructure with the aim of reducing private car usage
Encourage reducing speed while driving		• Reducing motorway speeds • Recommend reduced-speed zones in urban areasDevelop car-free zones to facilitate soft mobility
Reduce the price of public transport and rail		• Price reduction for public and rail transport based on public support to operators
Incentivize walking, cycling and micromobility in cities		• Support for free bike sharing and other micromobility solutions • Incentivizing bike purchases through bike purchase subsidies or tax/VAT reductions • Incentives/rewards for employees that use public transport or active modes for commuting to work • Investing in new bike lanes in and around/towards cities • Promoting/incentivizing last-mile delivery by cargo bike or smaller delivery e-vehicles • Increasing possibilities to travel on public transport (train, metro) with a bike

Source: European Commission – EU Save Energy, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0240&from=EN

A set of measures for the transport sector has been defined as well

Proposed short-term energy efficiency measures for transport sector – qualitative assessment (2/2)

Measure	Potential impact	Description
Promote more efficient driving and operation of freight vehicles and delivery of goods		• Ensuring better/full loading of heavy-duty vehicles through better planning/data • Optimising multi-modal delivery solutions, including through last-mile zero-emission solutions and pick up stations • Offering eco-drive training • Accelerating rollout of ITS services
Car free days		• Organizing car free days in cities
Adapt existing road charging schemes		• Road charging schemes reducing congestion during peak times and/or incentivizing more sustainable vehicles

Source: European Commission – EU Save Energy, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0240&from=EN

Moreover, the plan defines a set of mid-long term energy efficiency measures to tackle efficiency over a longer period of time (1/2)

Mid-long term energy efficiency measures - buildings

Sector	Measure	Description
Buildings	**Strengthen the implementation of energy audit results**	• Ensure that cost effective measures are implemented and that companies (in particular SMEs) and other entities such as public bodies that are not subject to the energy audit obligation are incentivised to undertake such audits and act on its results • Data centres and the use of waste heat should also be addressed
	Introduce additional Minimum Energy Performance Standards	• Boost renovations that encompass also heating (and cooling) systems, with sufficiently ambitious timelines • Set a pathway to upgrade worst performing buildings in the Energy Performance Certificate “G class” up to “D class”
	Phase out Member States’ subsidies for fossil fuel-based boilers in buildings	• As of 2025 as a minimum • Encourage redirection to incentivise support schemes for heat pumps instead
	Strengthen national energy (and resource efficiency) requirements of new buildings	• Introduce heating system requirements • Introduce zero-emission standards before 2030
	Tighten national heating system requirements for existing buildings	• Address major renovations and boiler replacements and connection to efficient district heating systems in densely populated areas
	Introduce national bans for boilers based on fossil fuels in existing and new buildings	• Set requirements for heat generators based on greenhouse gas emissions or the type of fuel used

Source: European Commission – EU Save Energy, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0240&from=EN

Moreover, the plan defines a set of mid-long term energy efficiency measures to tackle efficiency over a longer period of time (2/2)

Mid-long term energy efficiency measures - transport

Sector	Measure	Description
Transport	Aerodynamic retrofitting of heavy-duty vehicles and facilities to plug refrigerated trailers	• Refers to longer trucks with eco-design such as aerodynamic devices on their trailers
	Further eco-design requirements or higher energy efficiency targets for vehicles and trailers	• Amid the upcoming revision of the CO2 performance standards for newly sold heavy-duty vehicles, due in December 2022
	Incentivise the uptake of zero-emission heavy-duty vehicles	• Boosting the energy saving potential of longer and heavier trucks to drive cross-border within the European Union in the upcoming revision of the Weights and Dimensions Directive
	Boost the use of combined transport	• To achieve energy savings in the upcoming review of the Directive on Combined Transport

Source: European Commission – EU Save Energy, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0240&from=EN

The Cities Energy Savings Sprint is an initiative to undertake concrete short-term energy saving measures tailored specifically to urban areas

Long list of short-term energy saving recommendations for cities (1/3)

Sector	Measure	Description
Heating and cooling	**Encourage an adaptative thermal set point in winter and summer**	• Lowering heating and cooling energy demand in public buildings • E.g. **lowering ambient temperatures from 21°C to 18°C can save up to 15% of natural gas consumption** • Additionally, all boilers should have efficient, optimum settings so as not to overproduce hot water • In summer/the warm season, **setting the temperature below 25°C can consume up to 10% more electricity per degre**
	Deploy Smart thermostats in public buildings	• Adapt temperatures based on whether a person is at home, or a window is open, **advanced thermostats can save up to 10% in annual energy consumption without affecting comfort**
Lighting	**Adapt lighting systems**	• **Switch on public lighting later and switch it off earlier** in a day • Adapt lighting needs based on weather and seasonal sunlight changes
	Use LED light bulbs	• Equip public buildings with **LED lights** - LED lights consume **85% less electricity than incandescent** bulbs and **50% less than fluorescent tubes**
	Ban or reduce shop lights and electric billboards	• **An electric panel (2 cm2 LCD) consumes about 2000 kWh/year, which represents approximately the annual electricity consumption of a French home** (excluding hot water and heating)

Source: Covenant of Mayors for Climate & Energy: The Cities Energy Savings Sprint, https://www.eumayors.eu/plans-and-actions/cities-energy-saving-sprint.html#:~:text=WHAT%20IS%20THE%20CITIES%20ENERGY%20SAVING%20SPRINT%3F&text=The%20Cities%20Energy%20Saving%20Sprint%20is%20a%20joint%20initiative%20of,immediately%20reduce%20their%20energy%20consumption.

The Cities Energy Savings Sprint is an initiative to undertake concrete short-term energy saving measures tailored specifically to urban areas

Long list of short-term energy saving recommendations for cities (2/3)

Sector	Measure	Description
Transport	**Promote car-free days**	• Periodically **ban cars from driving in urban areas** • Potential to save up to one tank of petrol if cumulatively pursued for at least 15 days a year, and about EUR 1000 a year per household if done e.g. every Sunday
	Encourage work-from-home days	• E.g. **one day of the week working from home**, for those jobs that allow it within city administrations and beyond – to avoid urban car use to and from the office
	Subsidise fares and passes for public transport systems	• Increase use **calls for greater frequency and alternatives**, to improve the efficiency of the public transport system compared to private transport
	Reduce speed limits	• Reducing speed limits on outer-city roads **from 90 to 80 km/h and inner-city roads to 30km/h** positively influences consumption • The highest fuel efficiency in internal combustion engines is achieved in the speed range of 50 to 80 km/h
	Close areas to traffic	• **Ban private vehicles from entering certain urban areas**, either permanently or at specific times - encourage people to choose public transport options to reach their desired destination or to avoid a large detour
	Encourage ride sharing and soft mobility	• **Promote carpooling platforms** to reduce energy consumption in commuting to poorly-connected locations • **Promote walking and cycling** as alternative modes of transport eventually leads to energy savings

Source: Covenant of Mayors for Climate & Energy: The Cities Energy Savings Sprint, https://www.eumayors.eu/plans-and-actions/cities-energy-saving-sprint.html#:~:text=WHAT%20IS%20THE%20CITIES%20ENERGY%20SAVING%20SPRINT%3F&text=The%20Cities%20Energy%20Saving%20Sprint%20is%20a%20joint%20initiative%20of,immediately%20reduce%20their%20energy%20consumption.

The Cities Energy Savings Sprint is an initiative to undertake concrete short-term energy saving measures tailored specifically to urban areas

Long list of short-term energy saving recommendations for cities (3/3)

Sector	Measure	Description
Demand & supply balancing	Use dynamic energy pricing to change consumption	• Promote **dynamic energy pricing** to encourages users to **shift electricity consumption to times of low demand or high renewable electricity supply** through lower prices – to reduce peak consumption and avoid peak electricity generation
	Selective unplugging	• Engage with local communities and stakeholders **to explore what services or facilities** (e.g. swimming pools, sport centres, museums) **to shut down to make substantial energy savings** and deal with soaring prices
Support to residents & local businesses	Develop a communication campaign on the importance of saving energy	• Disseminate the International Energy Agency's nine points to citizens and local businesses: a set of behavioural norms that can influence an individual's energy requirements, while still maintaining a sufficient level of wellbeing
	Provide citizens with energy-saving advice	• E.g. videos, energy saving toolkits, in-house coaching • Work closely with social housing energy advice services that have tools, expertise and experience in communicating with the most vulnerable households

Source: Covenant of Mayors for Climate & Energy: The Cities Energy Savings Sprint, https://www.eumayors.eu/plans-and-actions/cities-energy-saving-sprint.html#:~:text=WHAT%20IS%20THE%20CITIES%20ENERGY%20SAVING%20SPRINT%3F&text=The%20Cities%20Energy%20Saving%20Sprint%20is%20a%20joint%20initiative%20of,immediately%20reduce%20their%20energy%20consumption.

Examples of good practices from cities (1/5) – Amsterdam & Lyon

City	Amsterdam, the Netherlands
Initiative start	March 30, 2022
Description	**Heating** • Reduction of the base temperature of public buildings by 3°C **(from 21°C to 18°C)** • For sensitive places (e.g. archives, health facilities, orphanages etc.) the temperature was only reduced by 1°C **Campaign** • Campaign to reduce gas consumption by 15% • Four pillars: 1) District-oriented insulation measures for households and SMEs; 2) facilitation of collective purchasing of solar panels or insulation; 3) Energy consumption decrease in office buildings; 4) Industry energy consumption decrease

City	Lyon, France
Initiative start	After the invasion of Ukraine
Description	**Heating** • Limiting the ambient temperature in **all public buildings to 19°C on average** **Lighting** • **Switching off night-time lighting** at 370 sites from Sunday to Thursday under the “Lyon Lighting Plan” **Transport** • Reducing the speed limit to 30 km/h across 84% of the municipal road network (from the previous 34%) **Campaign** • Actively **advertising the energy-source replacement campaigns** it is pursuing in the municipality

Source: Covenant of Mayors for Climate & Energy: The Cities Energy Savings Sprint, https://www.eumayors.eu/plans-and-actions/cities-energy-saving-sprint.html#:~:text=WHAT%20IS%20THE%20CITIES%20ENERGY%20SAVING%20SPRINT%3F&text=The%20Cities%20Energy%20Saving%20Sprint%20is%20a%20joint%20initiative%20of,immediately%20reduce%20their%20energy%20consumption.

Examples of good practices from cities (2/5) – Paris & Brussels

City	Paris, France
Initiative start	After the invasion of Ukraine
Description	**Heating** • Pledging to regulate the temperature of public buildings according to their characteristics and purposes **Campaign** • Disseminating technology to quickly and easily save energy **Engaging with local stakeholders** • Fostering discussions with major Parisian companies, such as local utility managers and signatories

City	Brussels, Belgium
Initiative start	March 21, 2022
Description	**Heating** • **Reducing the heating temperature by 3°C in 11 pilot public buildings** including the Town Hall, administrative buildings and sport centres (estimated saving of 20%) **Transport** • Developing and action plan **to redesign the public space to give active modes of transport** the opportunity to develop and to give the people of Brussels the chance to move around other than in their cars **Campaign** • Communication campaign entitled “Bike for Brussels”

Source: Covenant of Mayors for Climate & Energy: The Cities Energy Savings Sprint, https://www.eumayors.eu/plans-and-actions/cities-energy-saving-sprint.html#:~:text=WHAT%20IS%20THE%20CITIES%20ENERGY%20SAVING%20SPRINT%3F&text=The%20Cities%20Energy%20Saving%20Sprint%20is%20a%20joint%20initiative%20of,immediately%20reduce%20their%20energy%20consumption.

Examples of good practices from cities (3/5) – Dublin & Flamanzi

City	Dublin, Ireland
Initiative start	Before 2022
Description	**Energy saving dissemination campaign** • Awareness campaign called Think Energy to incentivise civil servants in public spaces to reduce their energy consumption • **Home Energy Saving Kit** - five practical tools (fridge/freezer thermometer, temperature/humidity thermometer, radiator key, thermal leak detector and plug-in energy monitor) and six practical exercises to provide **a better understanding of how energy is being consumed in domestic surroundings** and how to decrease it – estimated saving of ~20% of total energy consumption

City	Flamanzi, Romania
Initiative start	Early 2022
Description	**Lighting** • **Turning off public lighting** between 11 pm and 4 am

Source: Covenant of Mayors for Climate & Energy: The Cities Energy Savings Sprint, https://www.eumayors.eu/plans-and-actions/cities-energy-saving-sprint.html#:~:text=WHAT%20IS%20THE%20CITIES%20ENERGY%20SAVING%20SPRINT%3F&text=The%20Cities%20Energy%20Saving%20Sprint%20is%20a%20joint%20initiative%20of,immediately%20reduce%20their%20energy%20consumption.

Examples of good practices from cities (4/5) – Geneva & Sredets

City	Geneva, Switzerland
Initiative start	March 2022
Description	**Heating** • Plan to reduce indoor temperatures in public buildings during winter 2022/2023 (not specified to which level) **Training** • Working closely with the local utility company to deliver effective energy-saving measures while minimizing the impact on Genevan livelihoods **Campaigns** • Public campaigning to encourage temperature reductions in households during the cold season, raising awareness among the local population **Financing** • Increased financial incentives for building retrofits

City	Sredets, Bulgaria
Initiative start	Early 2022
Description	**Lighting** • **Switch on the public lights 20 minutes later and switch them off 20 minutes earlier** • **Reducing the intensity** from 11 pm to 5 am instead of midnight to 4 am

Source: Covenant of Mayors for Climate & Energy: The Cities Energy Savings Sprint, https://www.eumayors.eu/plans-and-actions/cities-energy-saving-sprint.html#:~:text=WHAT%20IS%20THE%20CITIES%20ENERGY%20SAVING%20SPRINT%3F&text=The%20Cities%20Energy%20Saving%20Sprint%20is%20a%20joint%20initiative%20of,immediately%20reduce%20their%20energy%20consumption.

Examples of good practices from cities (5/5) – Torun & Valencia

City	Torun, Poland
Initiative start	Early 2022
Description	**Lighting** • **Switch of the public lightining** in 1/3 of the city **Other** • Introduction **of ad-hoc energy-saving measures** for the public buildings accounting for the largest share of energy consumption • Obligation to **present energy-saving schemes for every office and space** controlled by the municipality

City	Valencia, Spain
Initiative start	Before 2022
Description	**Campaign** • Free **energy advice** (delivered remotely or in person) and short reports with **ad-hoc suggestions for energy saving** actions – 180 local SMEs already covered with a plan to cover additional 3000 SMEs in the period 2022-2025

Source: Covenant of Mayors for Climate & Energy: The Cities Energy Savings Sprint, https://www.eumayors.eu/plans-and-actions/cities-energy-saving-sprint.html#:~:text=WHAT%20IS%20THE%20CITIES%20ENERGY%20SAVING%20SPRINT%3F&text=The%20Cities%20Energy%20Saving%20Sprint%20is%20a%20joint%20initiative%20of,immediately%20reduce%20their%20energy%20consumption.

Thank you