26 April 2023

Clean heating: Ensuring low-income households aren't left out in the cold

Electrification Academy – 26 April 2023

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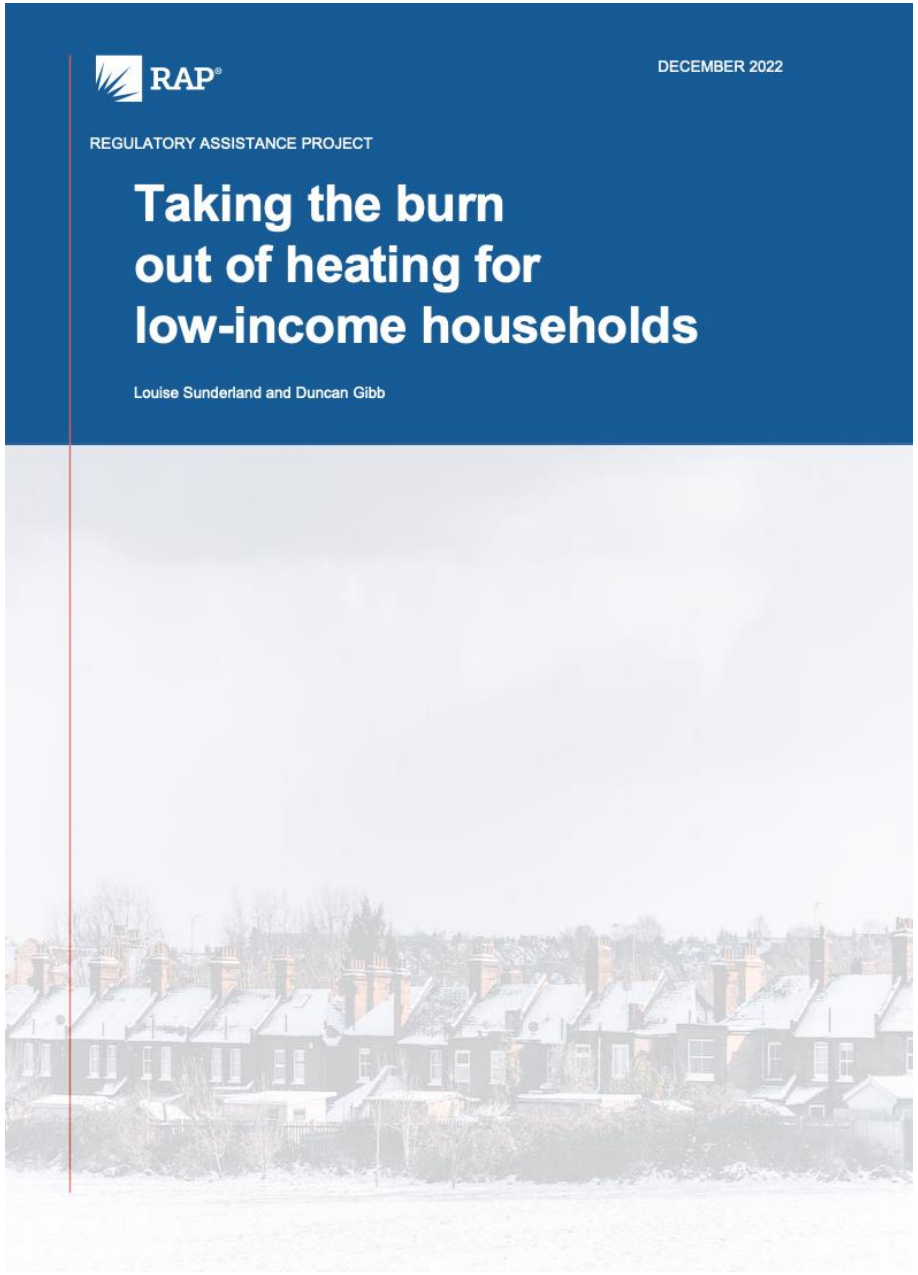
Background work

Starting point: the need to better understand how we enable households who are already struggling to afford adequate heating to shift to clean heating.

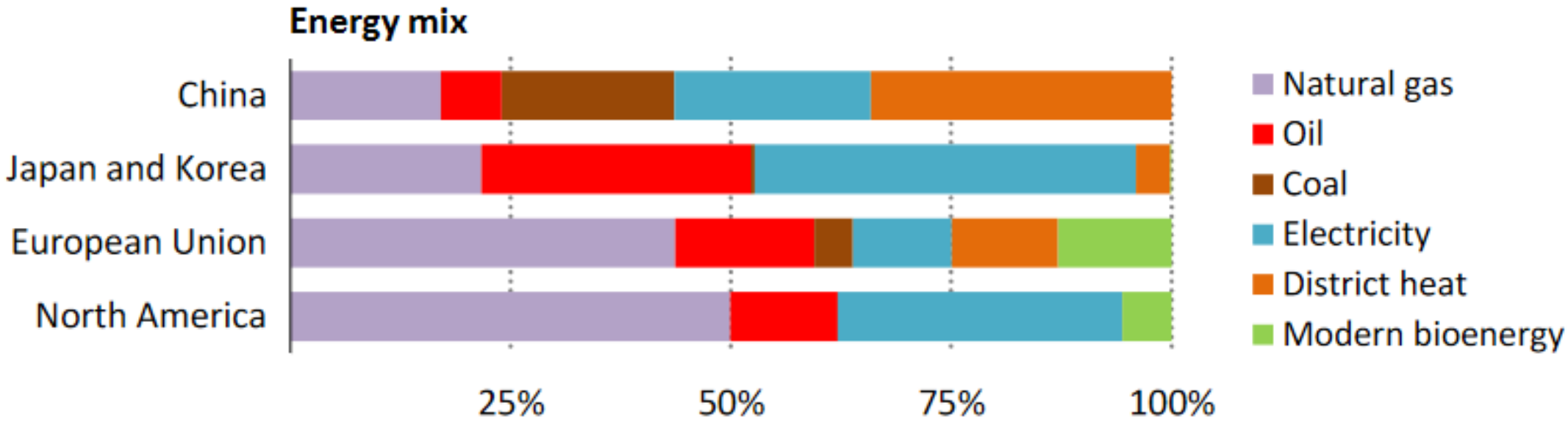
Available at: https://www.raponline.org/knowledge-center/taking-burn-out-of-heating-low-income-households/



1 Context: Why the focus on heat?

Fossil fuels still dominate heating in Europe

Household space heating in selected regions, 2021

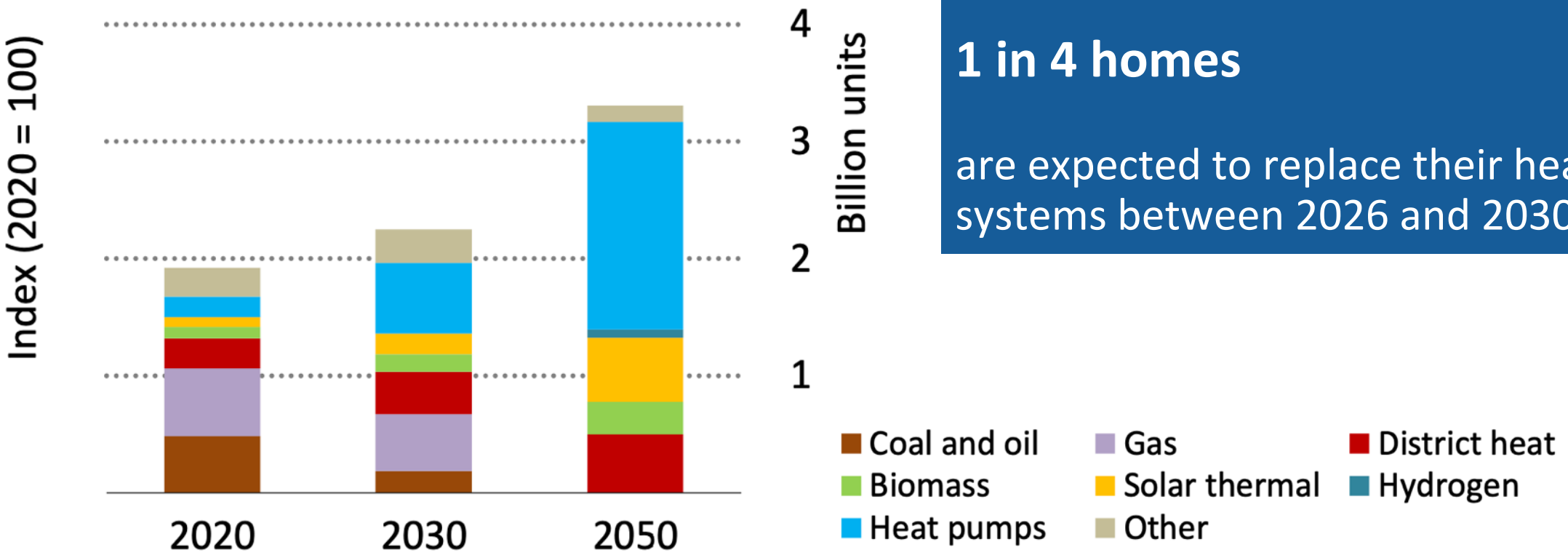


More than 65% of Europe's household space heating needs are still met by fossil fuels.

IEA (2022). The Future of Heat Pumps. https://www.iea.org/reports/the-future-of-heat-pumps

Cutting fossil fuel use in heating before 2030

Global heating equipment stock changes in IEA's Net Zero Emissions by 2050 scenario



To meet the EU's carbon target:

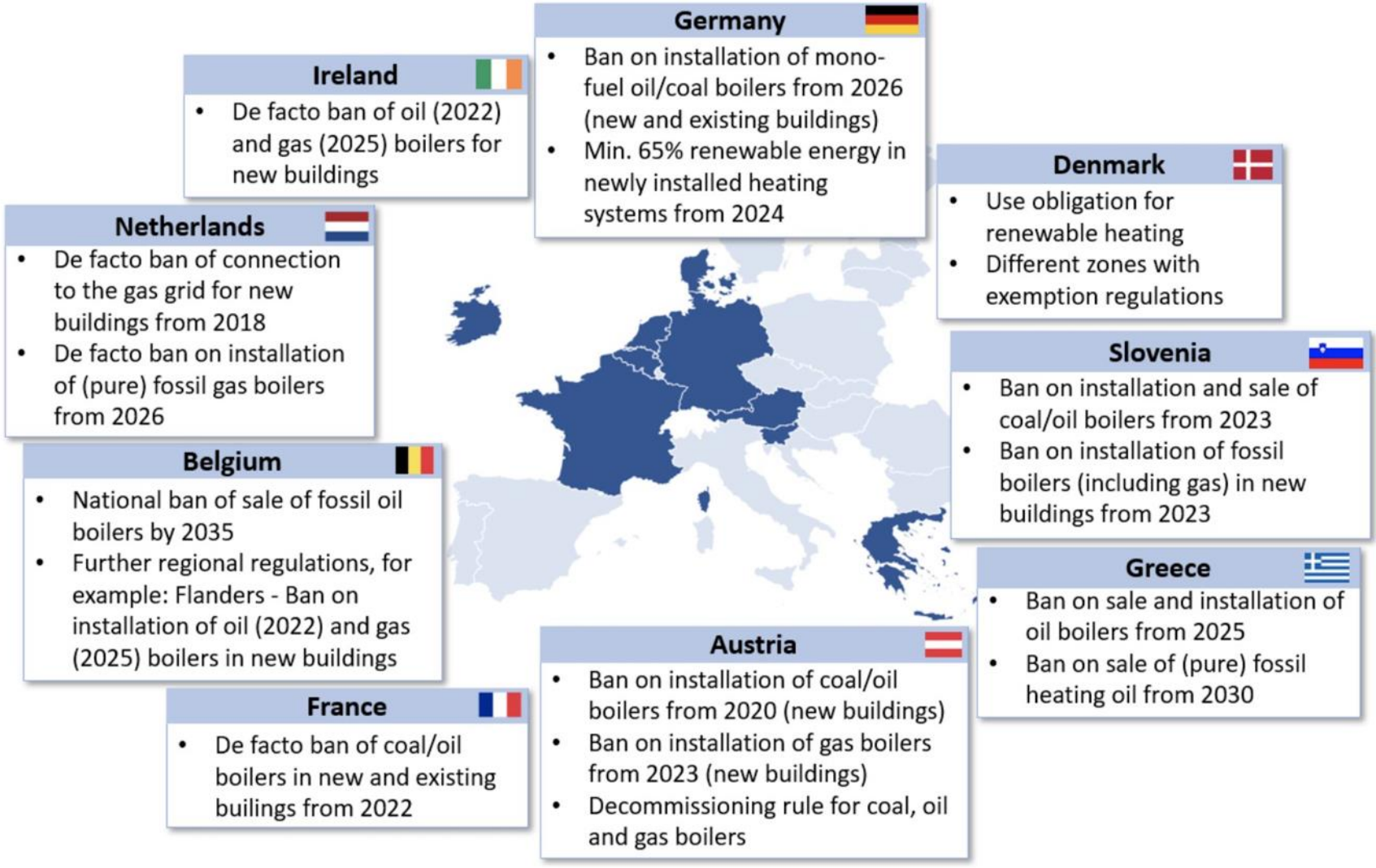
1 in 4 homes

are expected to replace their heating systems between 2026 and 2030.

LEFT: IEA (2021) Net zero by 2050 Roadmap. https://iea.blob.core.windows.net/assets/deebef5d-0c34-4539-9d0c-10b13d840027/NetZeroby2050-ARoadmapfortheGlobalEnergySector_CORR.pdf
RIGHT: European Commission. (2020). Commission communication: Stepping up Europe's 2030 climate ambition; Investing in a climate- neutral future for the benefit of our people. Commission staff working document, impact assessment. https://eur-lex.europa.eu/legal- content/EN/TXT/?uri=CELEX:52020SC0176

National phase out policies for fossil heating

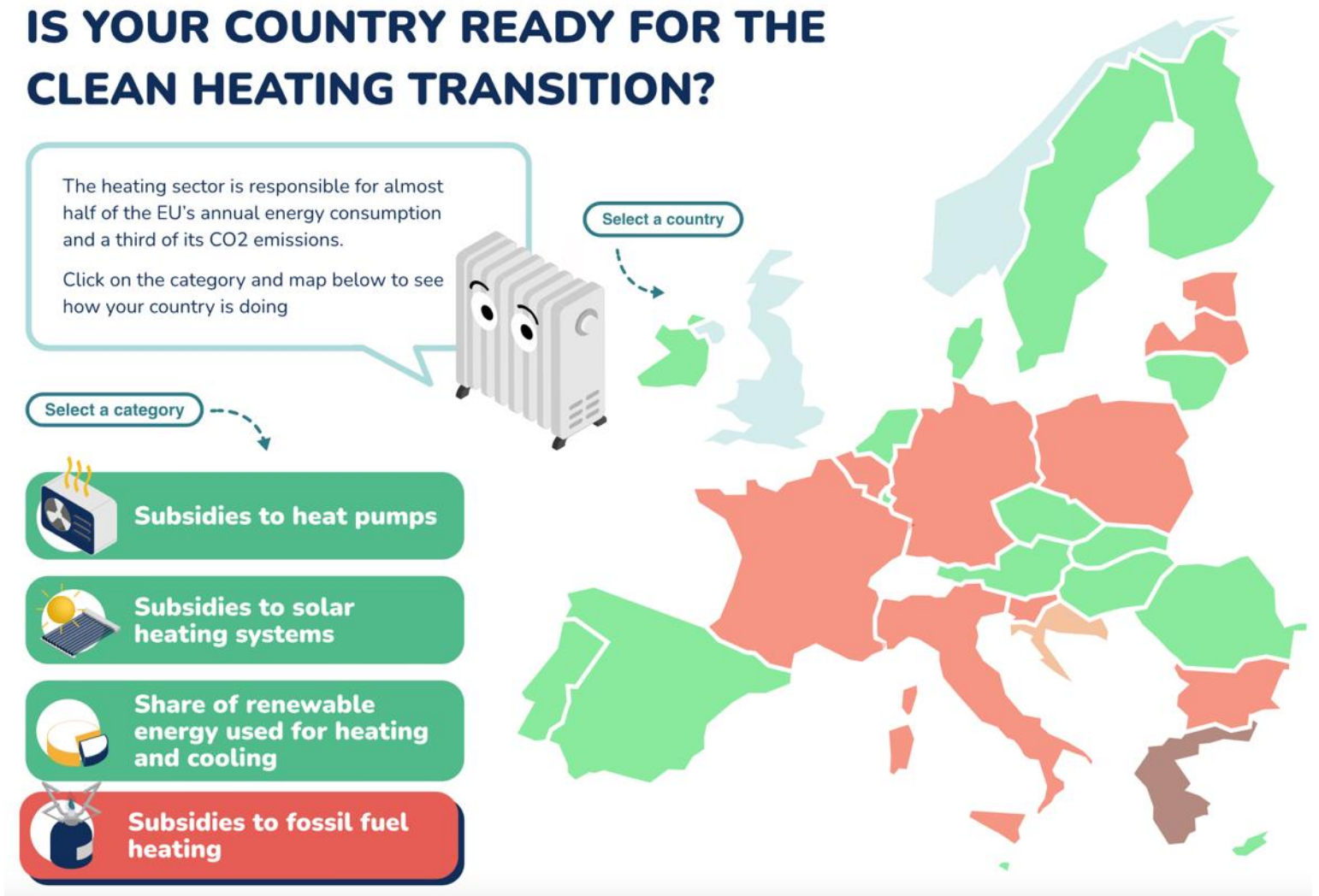
- Many EU countries already have phase-out policies in place
- The EU itself may ban fossil boilers by 2029 through its Ecodesign Directive



Fossil fuel heating subsidies will end

Many countries are ending subsidies for fossil fuel heating technologies.

Fit for 55 proposals to end subsidies by 2025 or 2027.



Coolproducts (2022) Ban for good: end of fossil fuel boiler can pave EU's way out of Russian gas.
https://www.coolproducts.eu/uncategorized/ban-for-good-end-of-fossil-fuel-boiler-can-pave-eus-way-out-of-russian-gas/

The energy price crisis, volatility and future risks

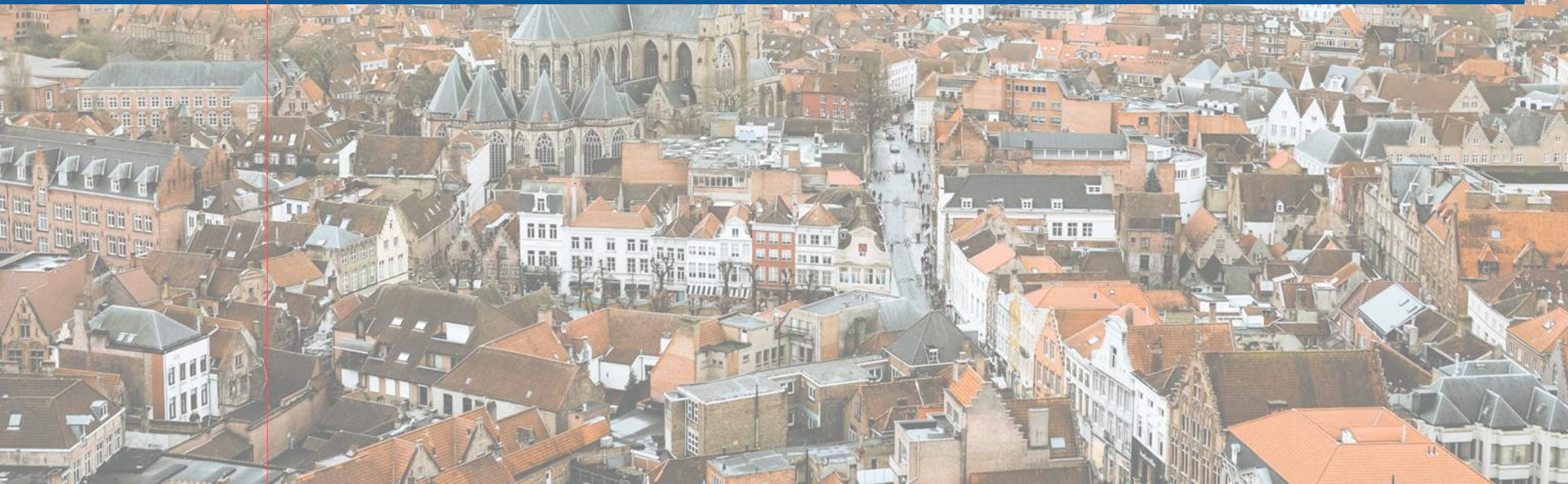
50 million Europeans lived in energy poverty even before the current gas price crisis.

The crisis makes clearer than ever the risk of remaining on fossil fuels for low-income households:

- Price volatility
- Security of supply
- Future cost of stranded infrastructure
- Future cost of hydrogen development

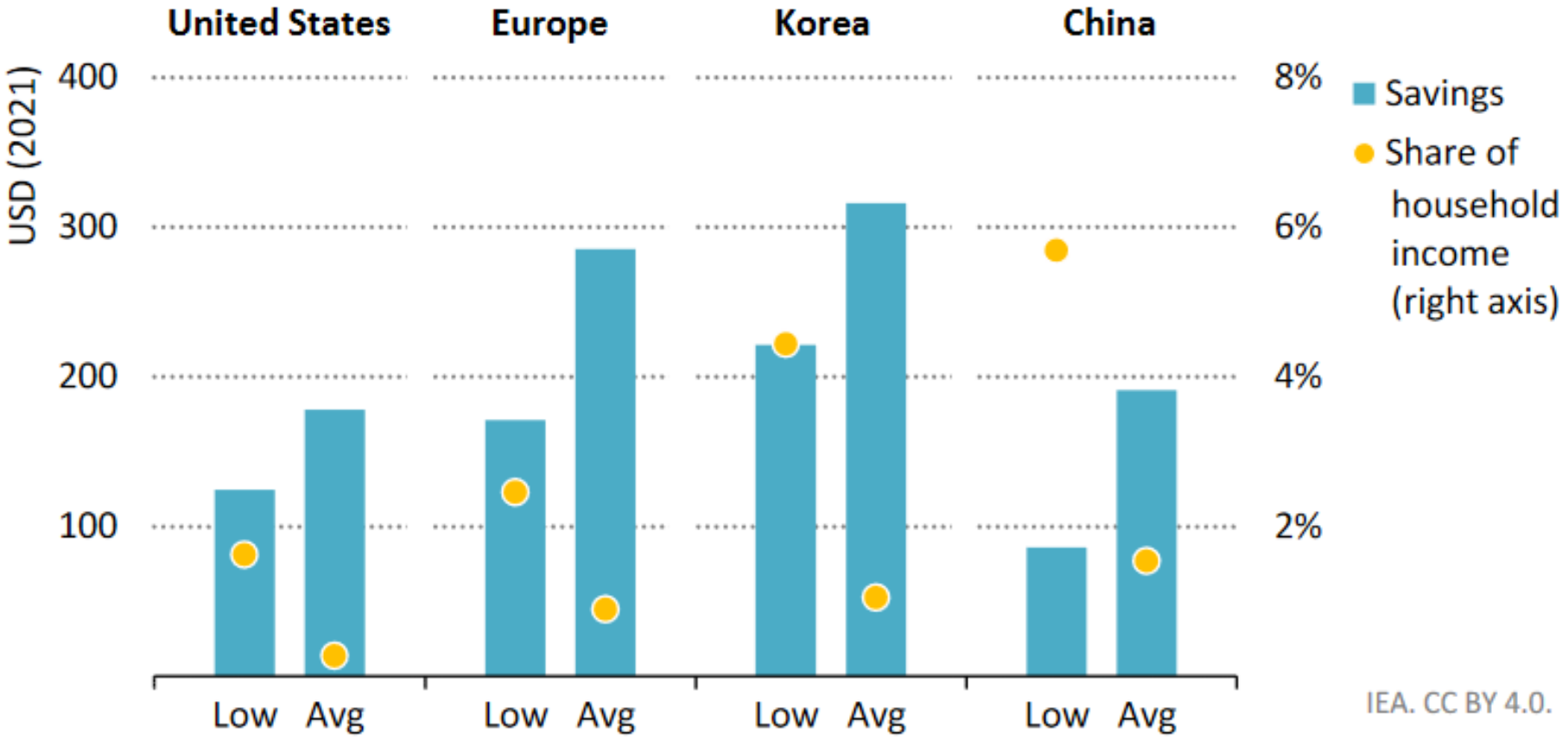
Affordable pathways for low-income households to switch to clean heat are essential for continued social acceptance of strong fossil fuel phase out polices.

2 What are the most affordable cleat heat options?



Heat pumps already provide running cost savings

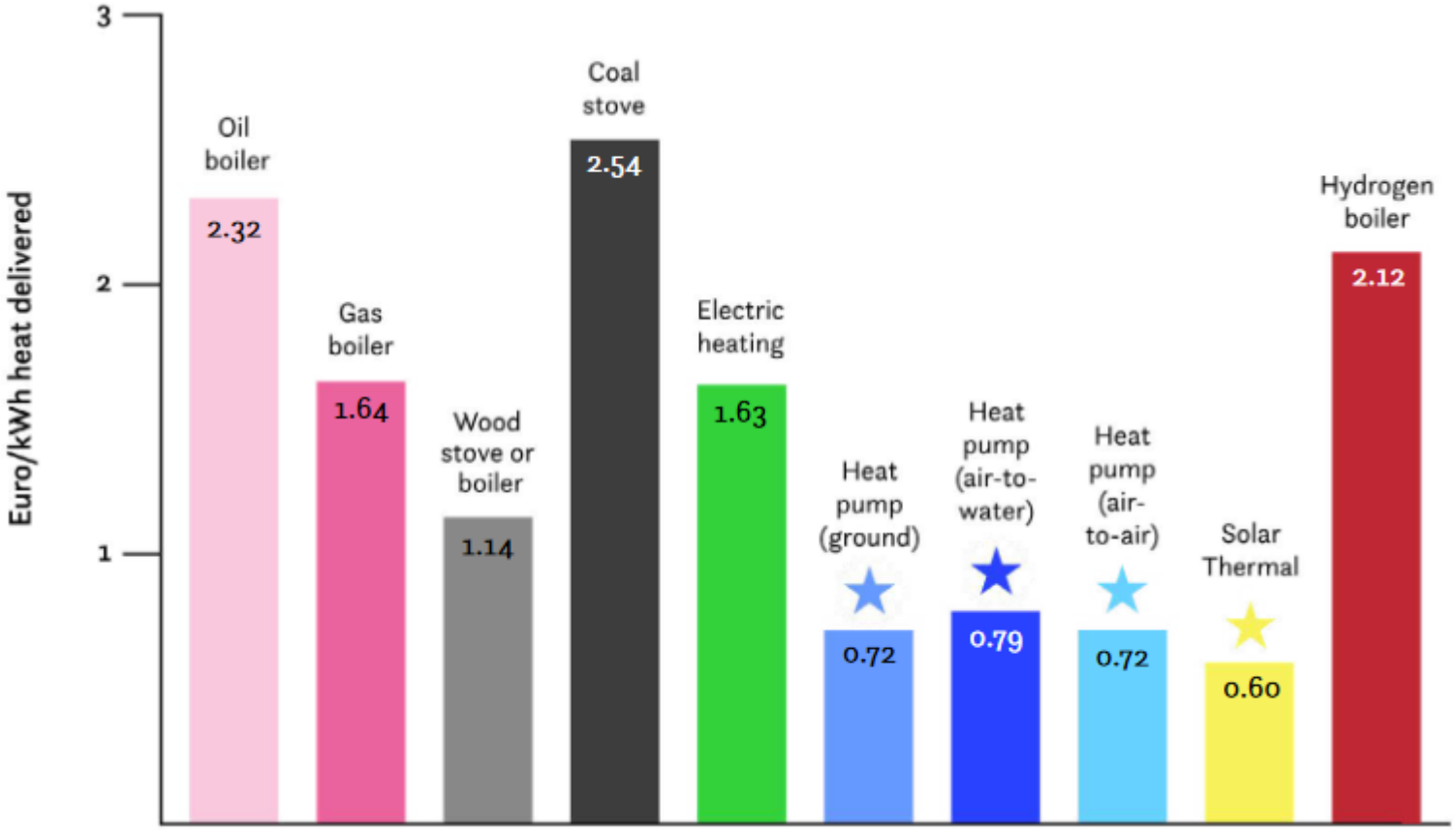
Energy bill savings for low- and average-income households switching to a heat pump from a gas boiler in 2021



International Energy Agency. (2022). The Future of Heat Pumps. https://www.iea.org/reports/the-future-of-heat-pumps

We know the low-cost direction of travel in Europe

Total cost of ownership of heating technologies over the period 2030-40



Heat pumps, solar thermal and district heating expected to be the most affordable future heating options.

Hydrogen boilers are among the most expensive.

European Climate Foundation (ECF) and the European Alliance to Save Energy (EU-ASE). (2022). Building Europe's net-zero future: Why the transition to energy-efficient and electrified buildings strengthens Europe's economy. Based on analysis by Cambridge Econometrics. https://europeanclimate.org/resources/renovating-and-and-electrifying-buildings-strengthens-europes-economy-and- energy-security/

Our study focuses on heat pumps. Why?

Significant differences between the switch to individual heating technologies compared to the switch to shared or district heating:

- Economics
- Ownership
- Consumer protection and control

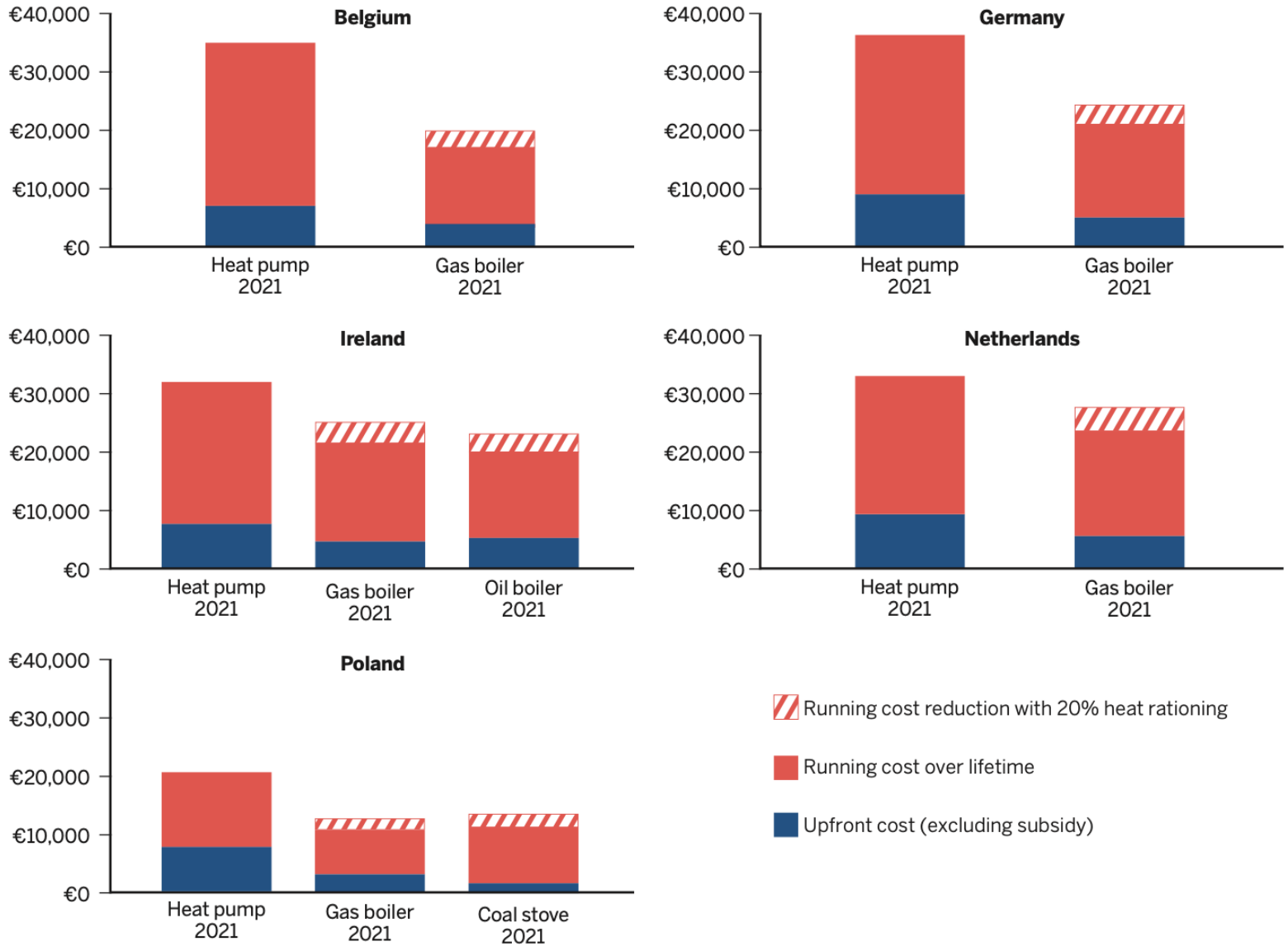
Photo by @joesmyth on Twitter

3 The economics of switching to clean heat

Pre-crisis fossil fuel heat was cheaper

Total cost of ownership - upfront costs, maintenance and running costs - based on pre-crisis prices in the first half of 2021.

Excluding available subsidy.



Sunderland, L. & Gibb, D. (2022, forthcoming) Taking the burn out of heating for low-income households. Regulatory Assistance Project. https://www.raponline.org/knowledge-center/taking-burn-out-of-heating-low-income-households/

Today, the economics of clean heat has improved ...

Total cost of ownership based on recent prices in July and August 2022

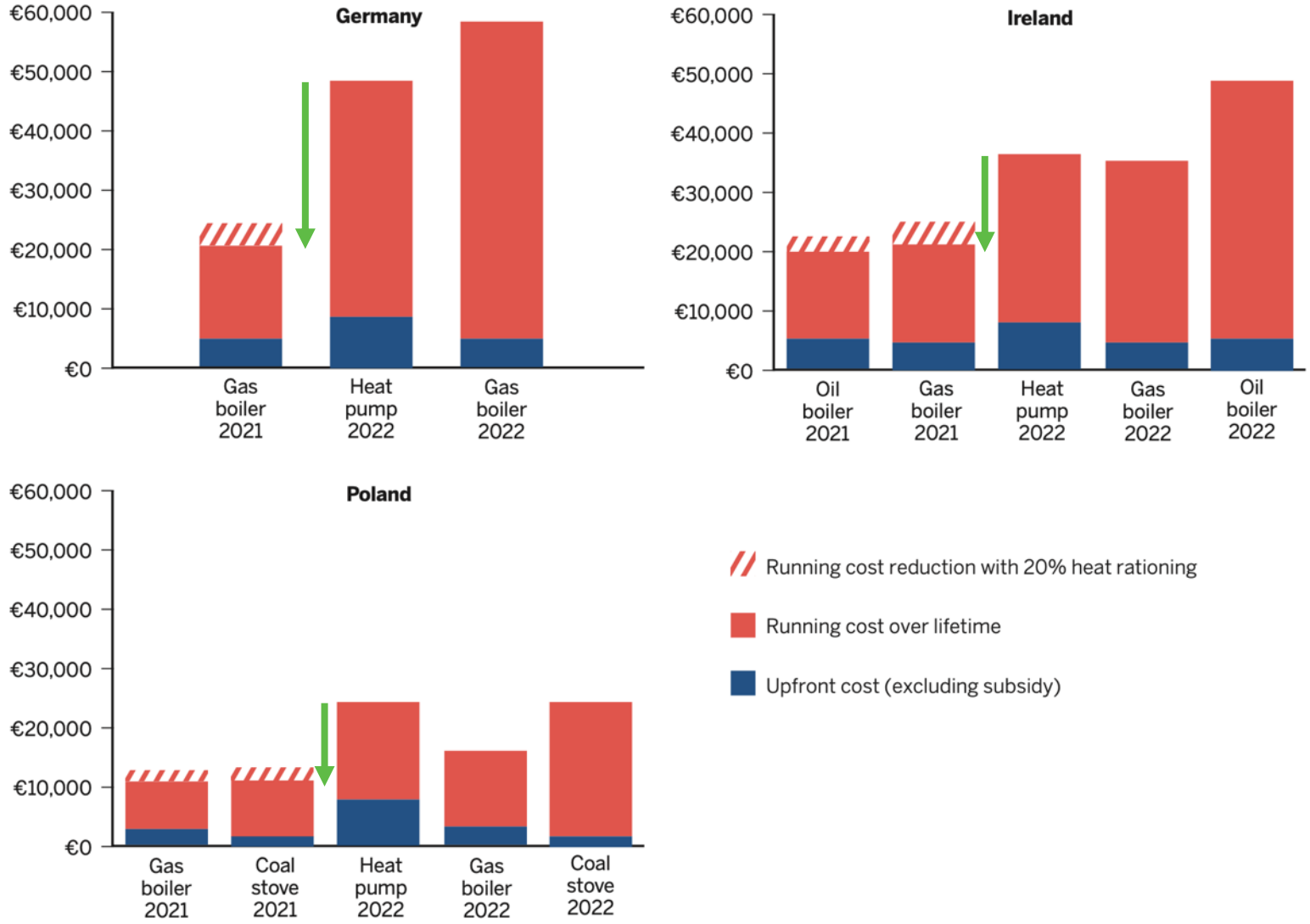
Excluding available subsidy.

Sunderland, L. & Gibb, D. (2022, forthcoming) Taking the burn out of heating for low-income households. Regulatory Assistance Project. https://www.raponline.org/knowledge-center/taking-burn-out-of-heating-low-income-households/

…but affordability has worsened

Total cost of ownership based on recent prices in July and August 2022

Excluding available subsidy.



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4 Strategies for affordable clean heat: Reducing upfront investment costs

Subsidise upfront costs

From a review of national clean heat subsidies:

- 9 countries have clean heat technology subsidies of 70% or more
- Only 1 that addresses other barriers:
  - Competing subsidies for fossil fuels
  - Budget not dedicated for low-income households
  - Short term budgets
  - Availability for funds before works are paid for.

Country/ region	Subsidy level	Subsidises fossil fuel systems	Dedicated budget for low-income households	Budget time period
Austria	Up to 100%. Available to households in income deciles 1-3, with income eligibility adjusted for household size.	No	No	Ends in 2022
Brussels, Belgium	Up to 90%. Differentiated based on household income (three income bands).	Yes	No	To 2024
Wallonia, Belgium	Up to 70%. Differentiated based on household income (five income bands) and size.	No	No	Unknown
France	Up to 90%. One programme dedicated to low-income households, one offering differentiated subsidy levels based on income (four income bands) and household size.	No	Yes	Long-term
Greece	Up to 70%. Interest-free loan and subsidy combination, with variable rates of subsidy based on household income and number of children.	Yes	No	Rolls over
Ireland	Up to €6,500 for a heat pump. Not means tested. Fully funded energy upgrades for eligible households living in poorly performing homes.	No	Not for clean heat	Part of funding package to 2030
Italy	Subsidy of 110% of the total costs.	Yes	No	Ends in 2022
Poland	Up to 80%. Three subsidy levels based on income.	Yes	Yes	To 2027
Portugal	Subsidy up to 85% for a heat pump.	No	No	Ends in 2022
Slovenia	Up to 100% for low-income households.	Yes	No	Unknown

Sunderland, L. & Gibb, D. (2022) Taking the burn out of heating for low-income households. Regulatory Assistance Project. https://www.raponline.org/knowledge-center/taking-burn-out-of-heating-low-income-households/

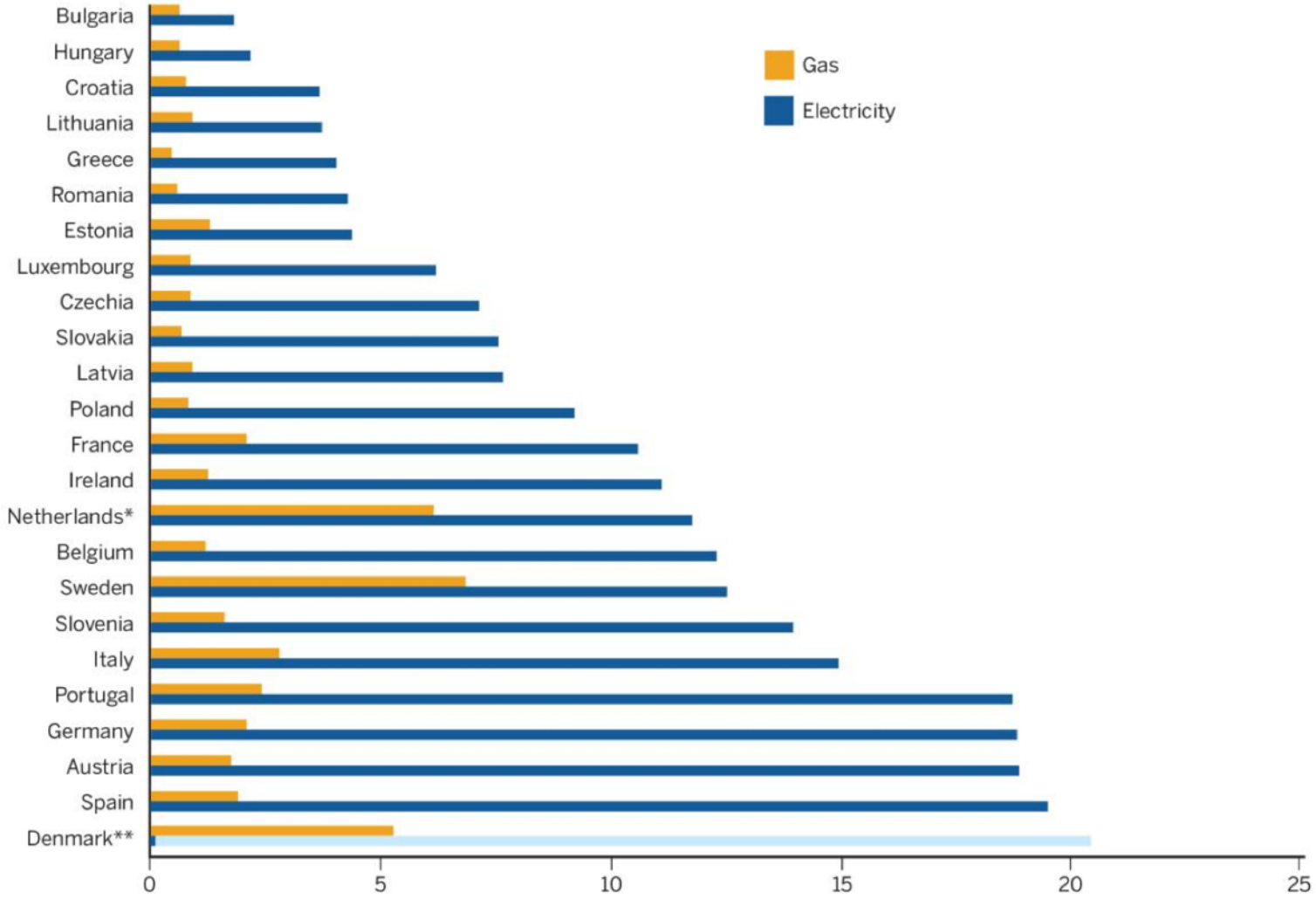
5 Strategies for affordable clean heat: Reducing running costs

Strategies to reduce running costs (and address other needs)

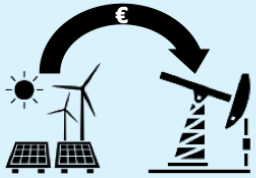
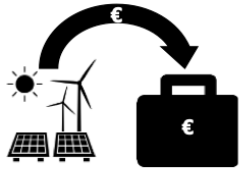
1. Rebalancing without burdening: importance of the electricity/fossil price relationship
2. Energy efficiency
3. Multiple building level technologies
4. Importance of flexible energy use
5. Focus on service

1. Rebalancing fossil fuel and electricity prices

Levies and taxes (inlc. VAT) on residential gas and electricity (Euro cents per kWh) in EU Member States, average in 2021



Rosenow et al. (2022) Levelling the playing field: Aligning heating energy taxes and levies in Europe with climate goals. Regulatory Assistance Project and 3E. https://www.raponline.org/knowledge-center/aligning-heating-energy-taxes-levies-europe-climate-goals/

	Option	Description	Examples	Advantages	Disadvantages	Key considerations
	Lower tax on electricity for heating	Lowering the tax rate applied to electricity that is used for heating	Denmark	Simplicity No negative impact on low-income customers	Loss in revenue If tax rate is low to start with, impact is limited	Potential for incentivising excessive electric resistive heating
	Shift levies to fossil fuels	Levies are shifted from electricity to fossil fuels	Netherlands Considered in UK	Simultaneously lowers cost of clean heating and increases cost of fossil heating	Impact on low-income customers using fossil fuels	Need to ensure low-income customers are not disadvantaged, and protected from impact
	Shift levies to public budget	Levies are shifted to the public budget	Germany	No negative impact on low-income customers	Additional cost item in public budget	Potentially less stable funding for clean energy programmes previously funded through levies
	Environmental taxation	Fossil fuels are taxed based on environmental impacts	Swedish carbon tax	Simplicity Source of additional revenue to support heat decarbonisation	Impact on low-income customers using fossil fuels	Need to ensure low-income customers are not disadvantaged, and protected from impact

Rosenow et al. (2022) Levelling the playing field: Aligning heating energy taxes and levies in Europe with climate goals. Regulatory Assistance Project and 3E. https://www.raponline.org/knowledge-center/aligning-heating-energy-taxes-levies-europe-climate-goals/

2. Energy efficiency

Efficiency first to safeguard clean heat affordability:

- Reduce heating need
- Enable better heat pump performance
- Gateway the benefits of lower electricity prices at different times of the day when heat is scheduled flexibly.

3. Beyond efficiency: multiple building level technologies

Broader technology mix lowering the running costs and reducing cost risk in the future

- Technology combinations:
  - ASHP, PV, Battery
  - Heat pump and heat storage

Warmworks Scotland and Angus Housing Association

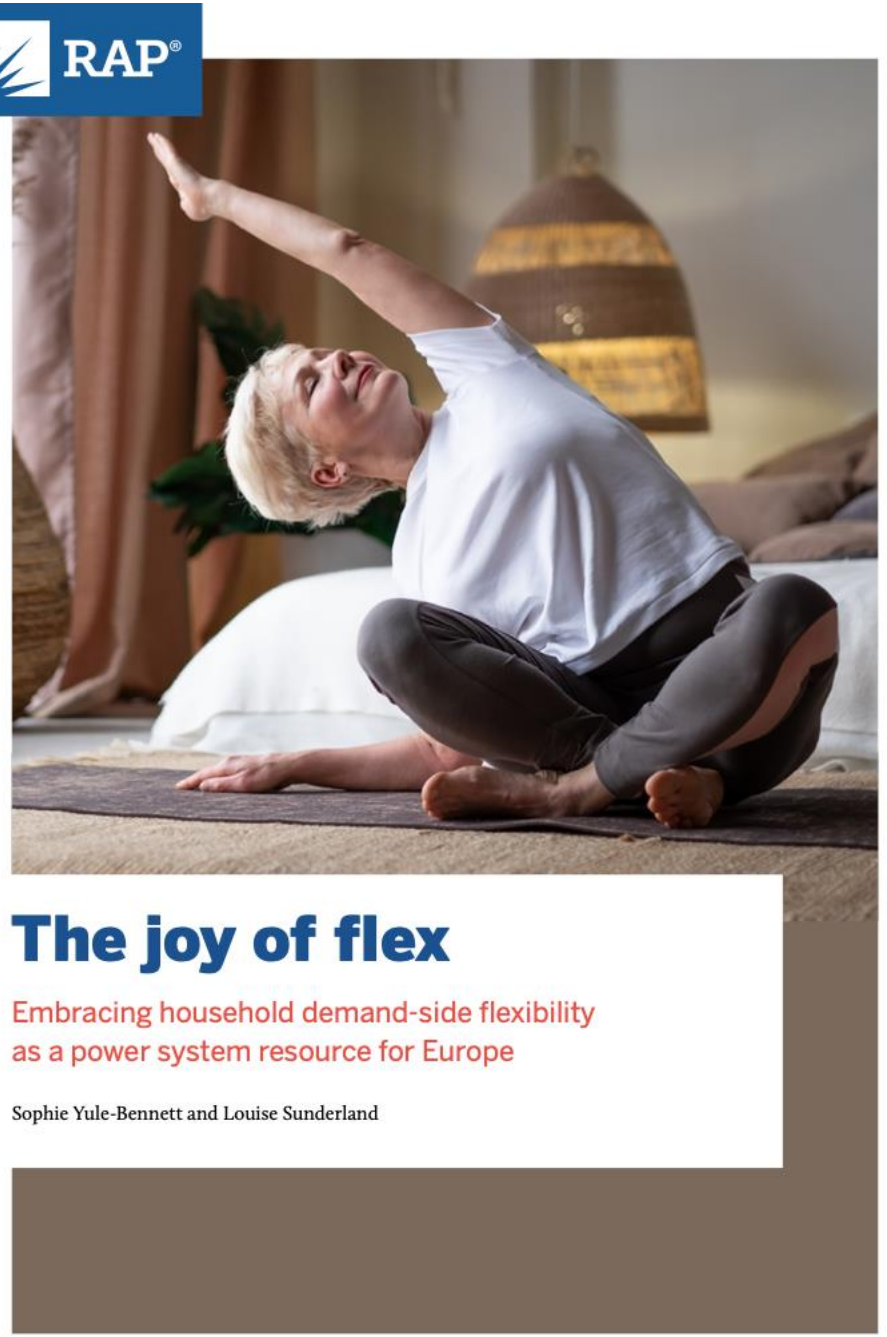
Selected results:

- One tenant saw 89% of electricity supply come from on-site PV, used via the battery storage
- Bill reductions can be significant – one tenant seeing electricity bills as low as £7 a week
- High levels of satisfaction with the service and process

Warmworks Scotland (nd) Renewable heat project with Angus housing association: Final report https://www.warmworks.co.uk/our-work/renewable-heat-project-with-angus-housing-association/

4. Importance of flexible energy use

- Important for new electric loads to make best use of renewable generation. Key to lowest costs for all → public benefits
- Significant value is available to households that provide these services. This value can translate into bill reductions → private benefits

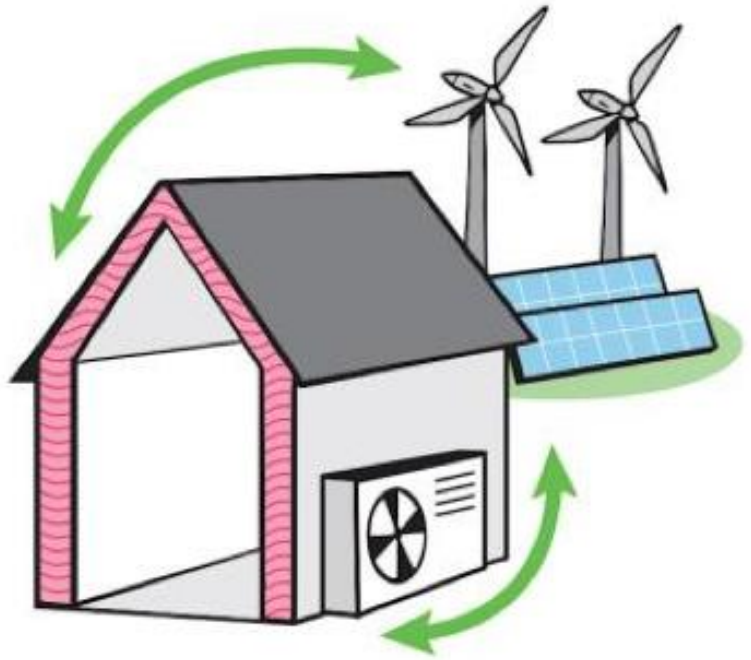


Yule-Bennett, S and Sunderland, L. (2022) The Joy of Flex: Embracing household demand-side flexibility as a power system resource for Europe. Regulatory Assistance Project. https://www.raponline.org/knowledge-center/joy-flex-embracing-household-demand-side-flexibility-power-system-resource-europe/

Enablers of flexible energy use

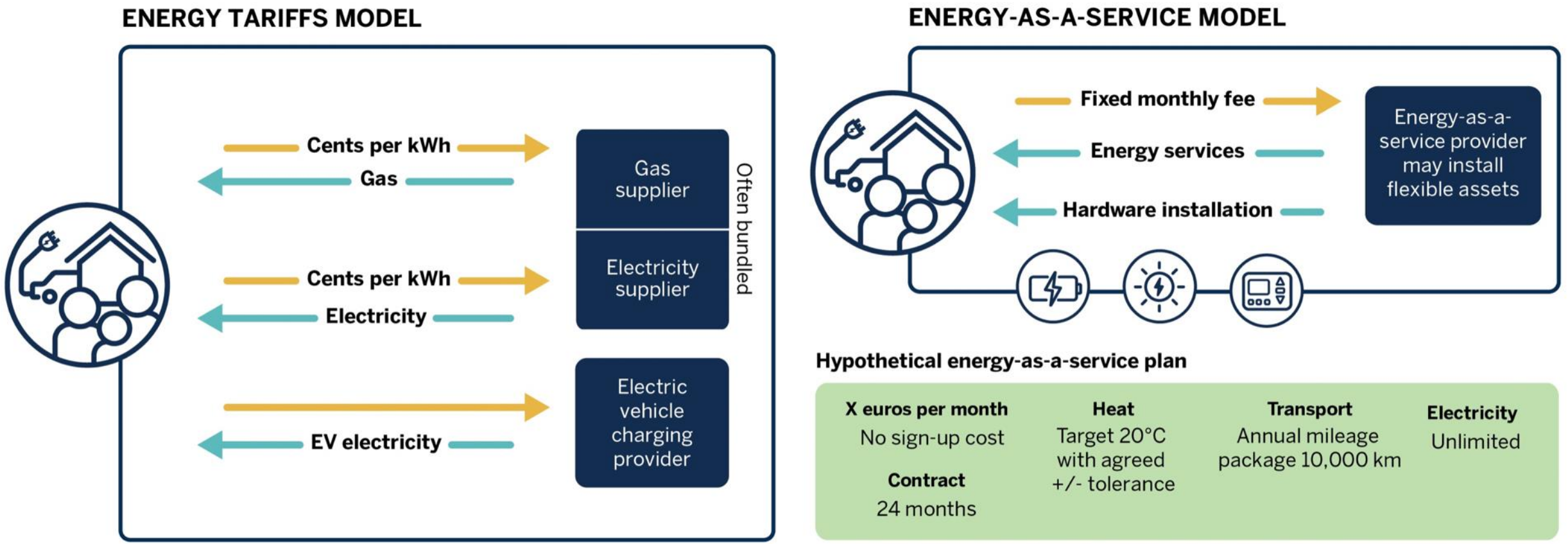
Innovations to provide access to flexibility benefits for low-income households:

- Upside only tariffs
- Matching existing heat storage with surplus renewables e.g. EnergyCloud
- More complex services:
  - Aggregation matching of supply and demand in real time at a granular level
  - Coupling and matching ‘behind the meter’ assets with local demand e.g. RESCoop VPP



5. Focus on services

Heat as a service



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5. Focus on services

- Heat as a service
  - Allows **integration of subsides** for technologies and running cost into an efficient package (e.g., social tariffs)
  - Can overcome **bureaucratic barriers** in access to subsidy Addresses challenges of **complex technology mixes** and **interactions with electricity systems**
  - **Reduces unexpected costs** (maintenance, service)
  - Contracted **costs don't fluctuate**
  - **Performance** of the heating system is the responsibility of the service provider

6 What’s next?

Priorities for equitable heat decarbonisation:

- Redesign subsidies to support low-income households as a priority – either available directly or through services
- Energy efficiency first or with – minimum efficiency standards and optimal performance for individual household
- Rebalance energy prices without burdening
- Taking the risk out of flexibility through automation, aggregation and services
- Develop heat as a service offerings suitable for all types of household
- **Inclusive innovation**

About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org

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