

18th January 2023

Taking the burn out of heating for low- income households

International Energy Agency User-centred energy systems TCP

Louise Sunderland
Senior Advisor
Regulatory Assistance Project (RAP)[®]

Rue de la Science 23
B 1040 Brussels
Belgium

+44 7989 356644
lsunderland@raponline.org
raponline.org

Contact

Louise Sunderland

lsunderland@raponline.org

+44 7989 356644

raponline.org



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/>

Taking the burn out of heating for low-income households

Louise Sunderland and Duncan Gibb



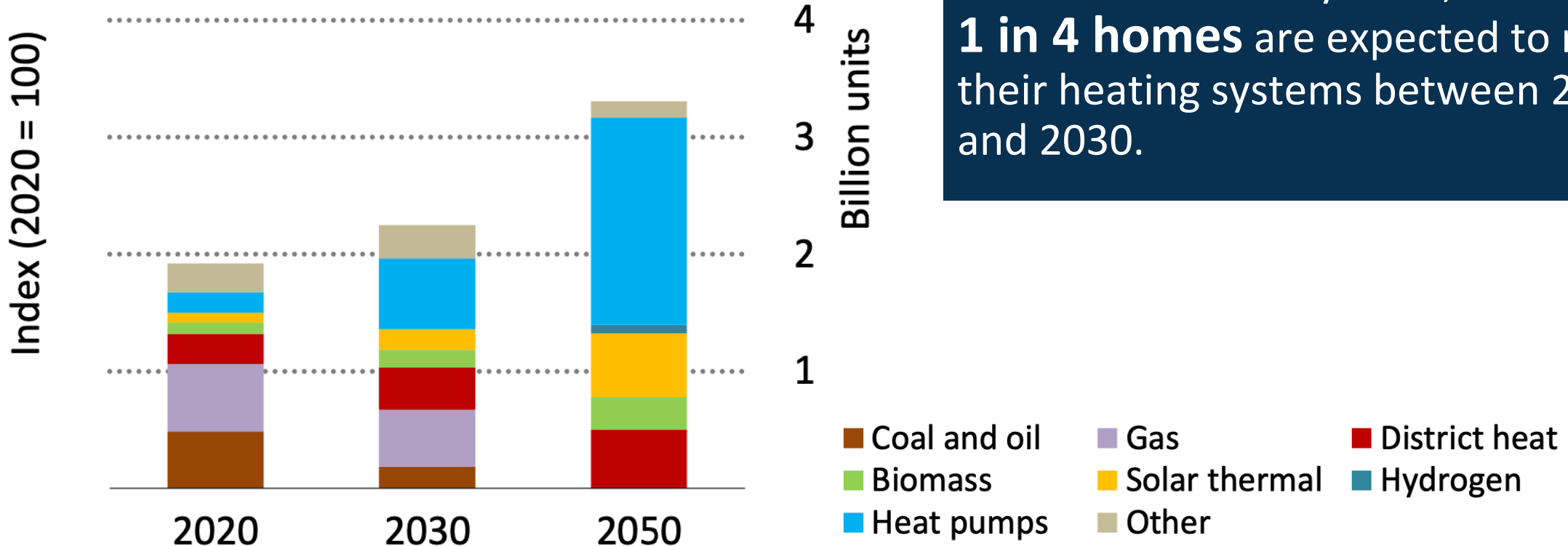
1

Context: Why the focus on heat?



Need to cut fossil fuel use in heating before 2030

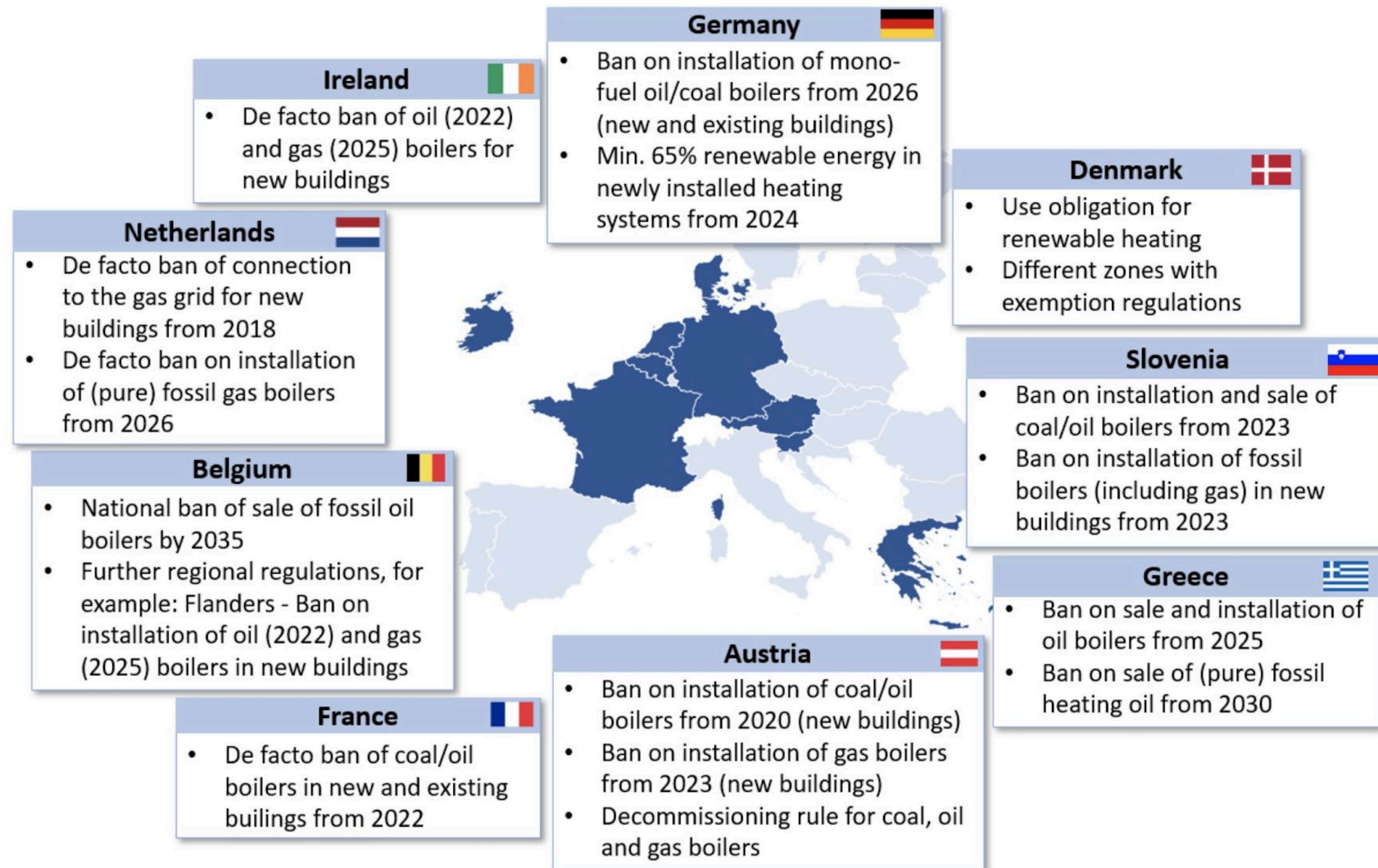
Global heating equipment stock changes in the Net Zero Emissions by 2050 scenario



To meet the EU's carbon target of 55% carbon reduction by 2030, **1 in 4 homes** are expected to replace their heating systems between 2026 and 2030.

National phase out policies

To make use of the natural replacement cycle – based on the lifetime of heating systems - phase out policies need to start soon.



Fossil fuel heating subsidies ending

Many countries are ending subsidies for fossil fuel heating technologies.

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

IS YOUR COUNTRY READY FOR THE CLEAN HEATING TRANSITION?

The heating sector is responsible for almost half of the EU's annual energy consumption and a third of its CO2 emissions.

Click on the category and map below to see how your country is doing

Select a country

Select a category



Subsidies to heat pumps



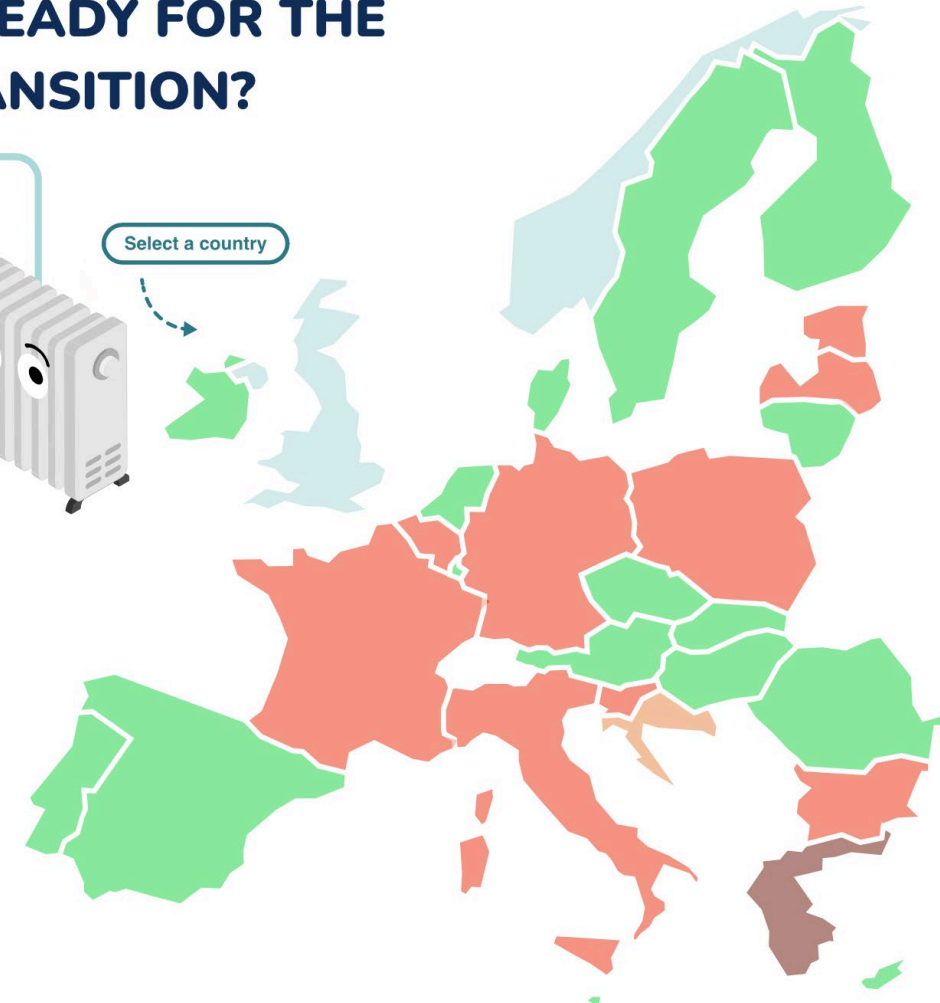
Subsidies to solar heating systems



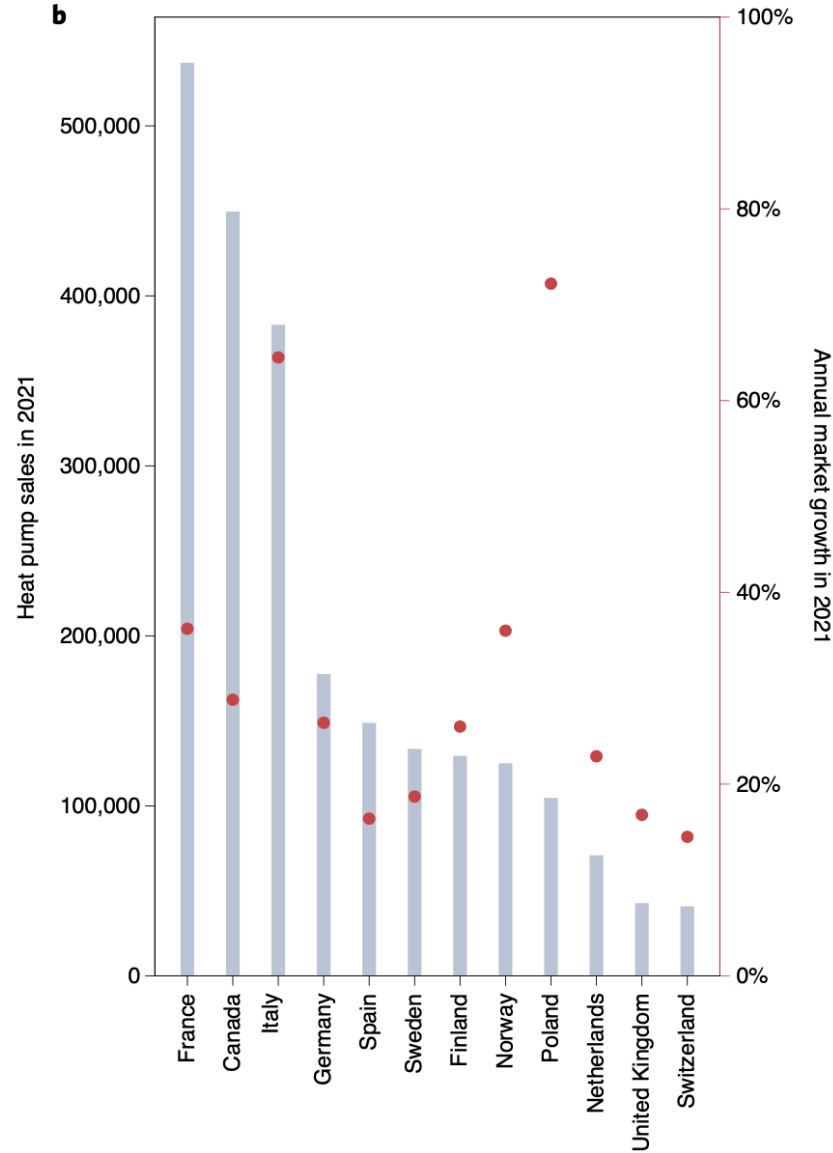
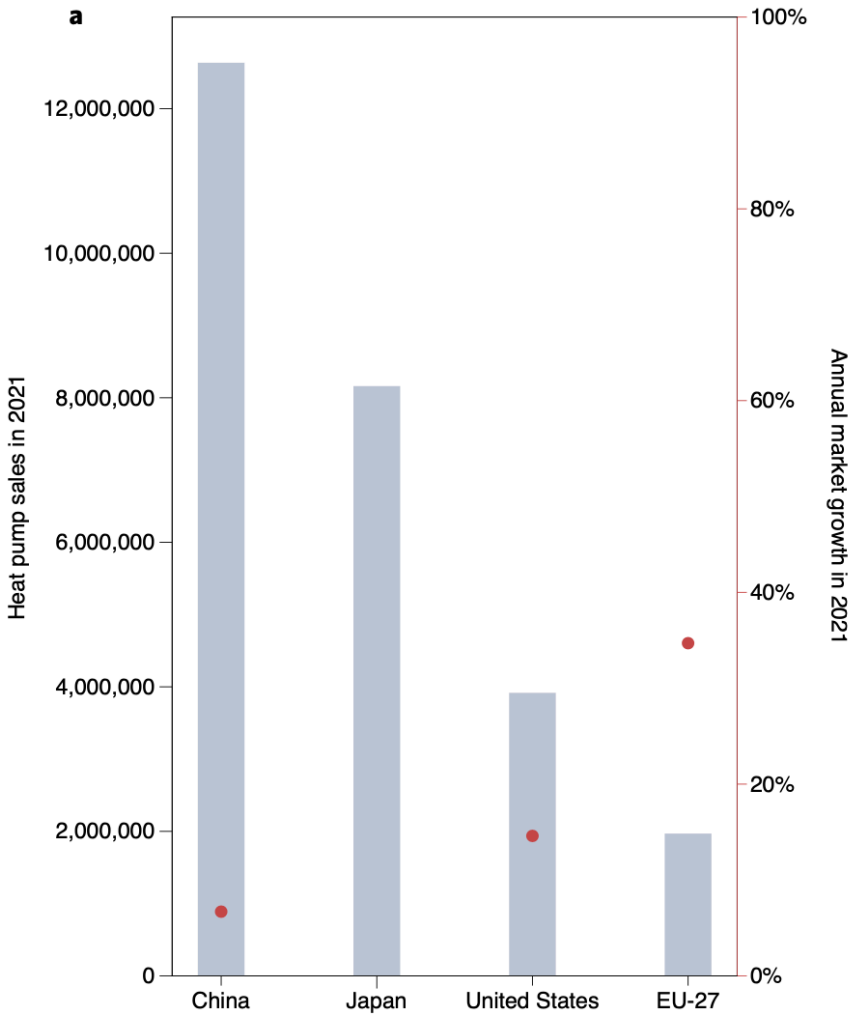
Share of renewable energy used for heating and cooling



Subsidies to fossil fuel heating



Air source heat pump sales and market growth in key markets in 2021



The energy price crisis, volatility and future risks

The price 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

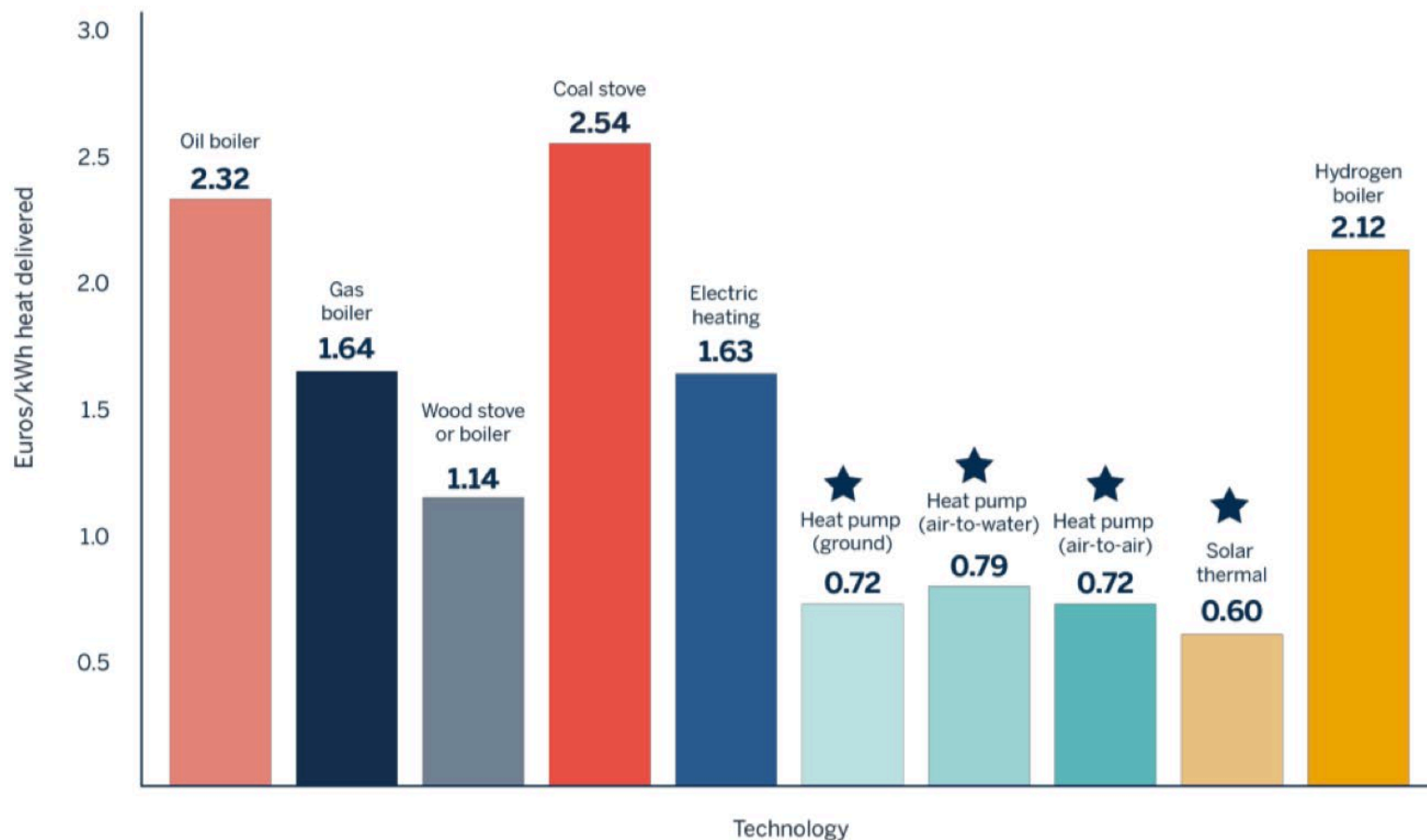
Affordable pathways for low-income households to switch to clean heat are essential for continued social acceptance of strong fossil fuel phase out policies.

2

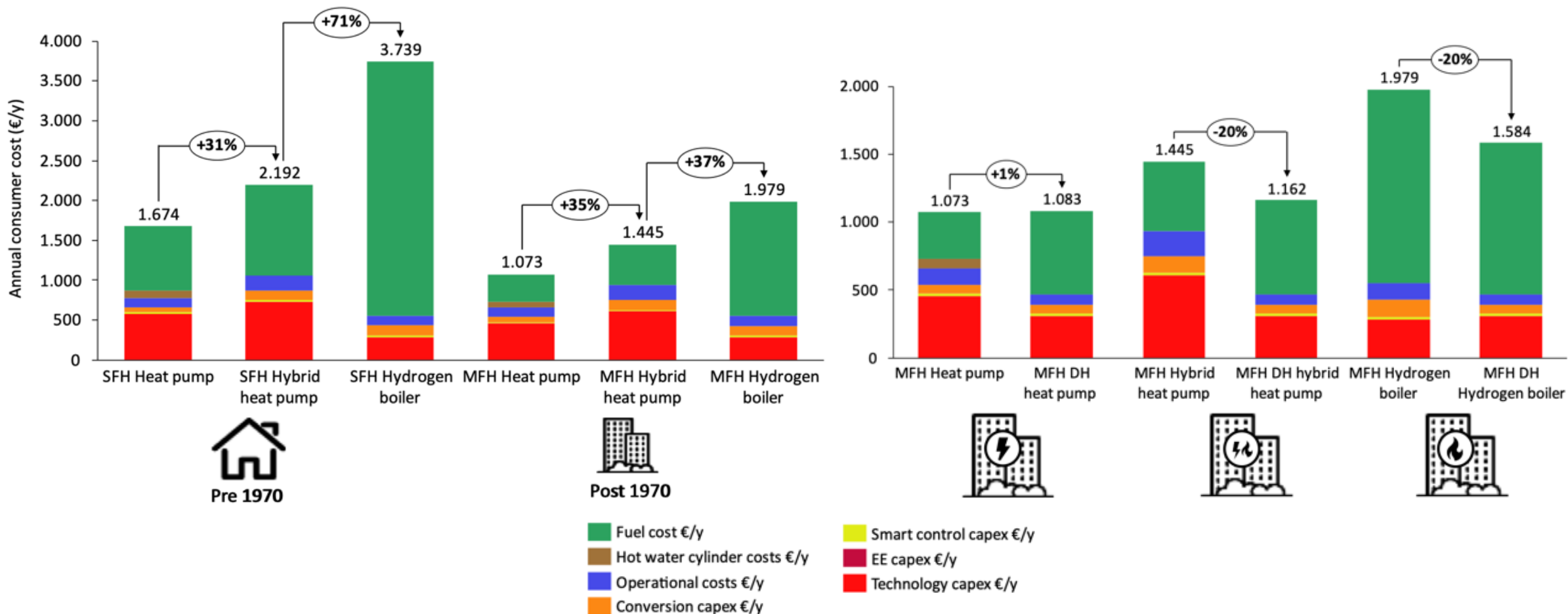
What are the most affordable cleat heat options?



Total cost of owning and running different heating technologies, 2030-40



District heating offers cost efficiencies



Our study focusses 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

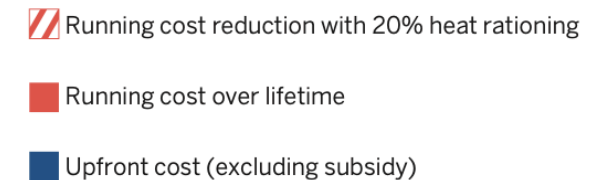
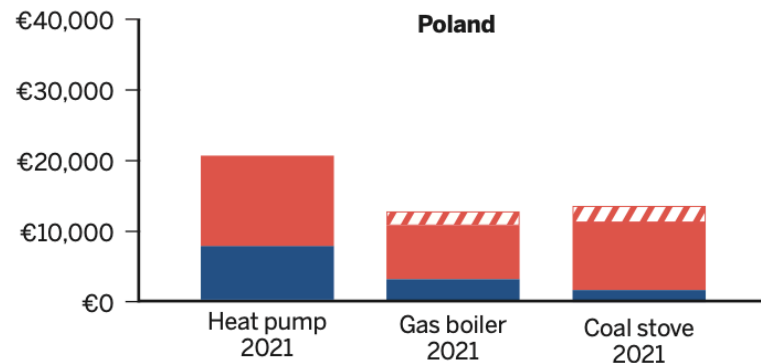
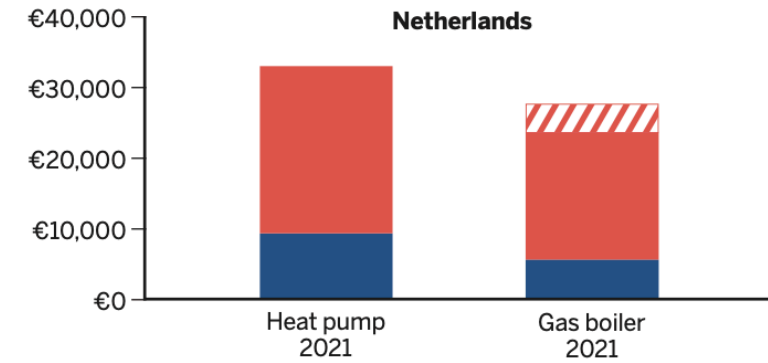
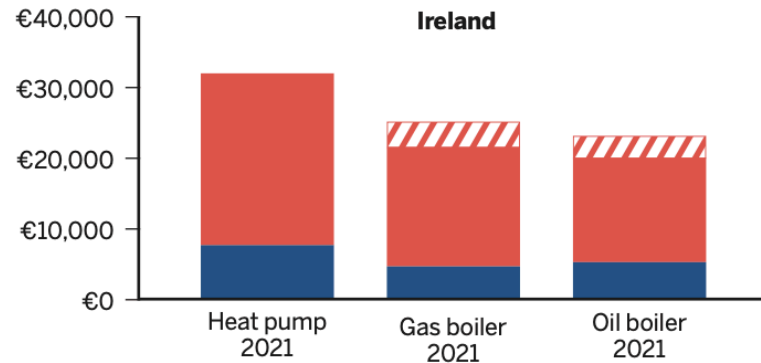
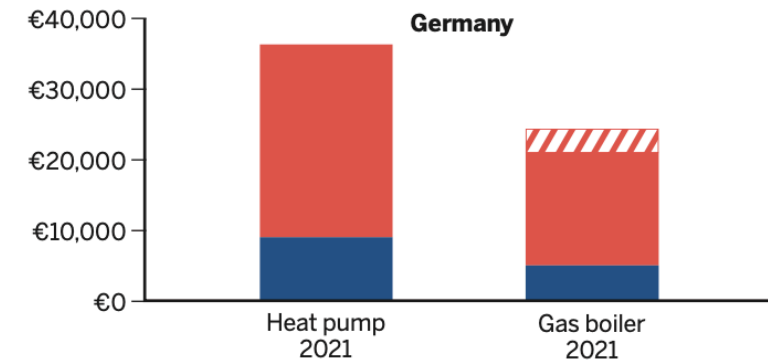
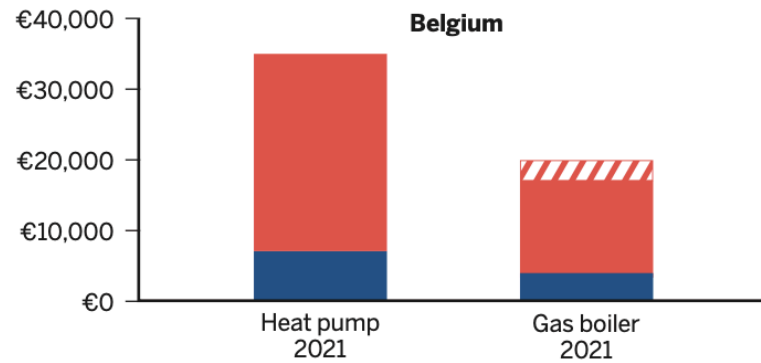


3 The economics of switching to clean heat



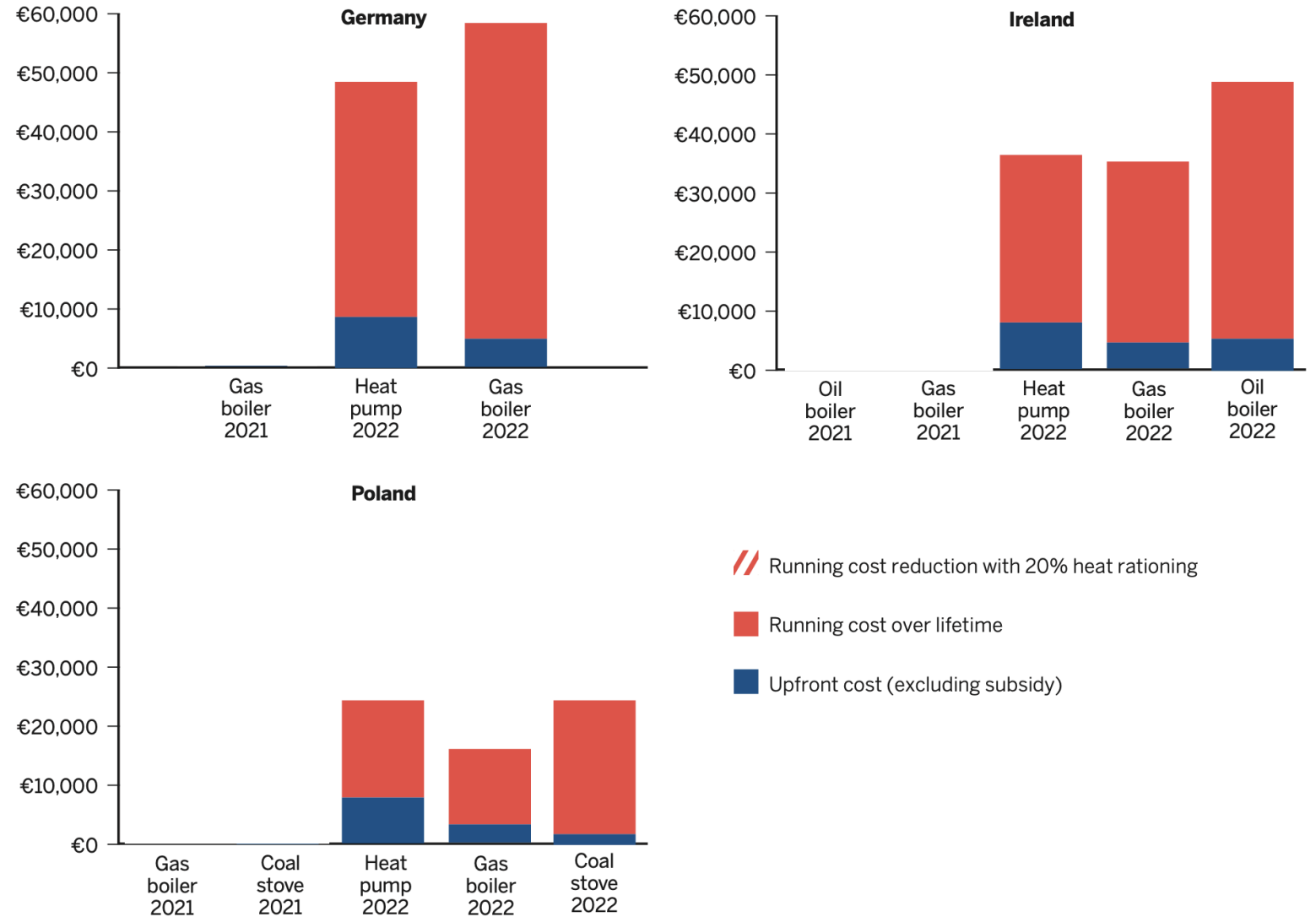
Pre-crisis fossil fuel heat was cheaper

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



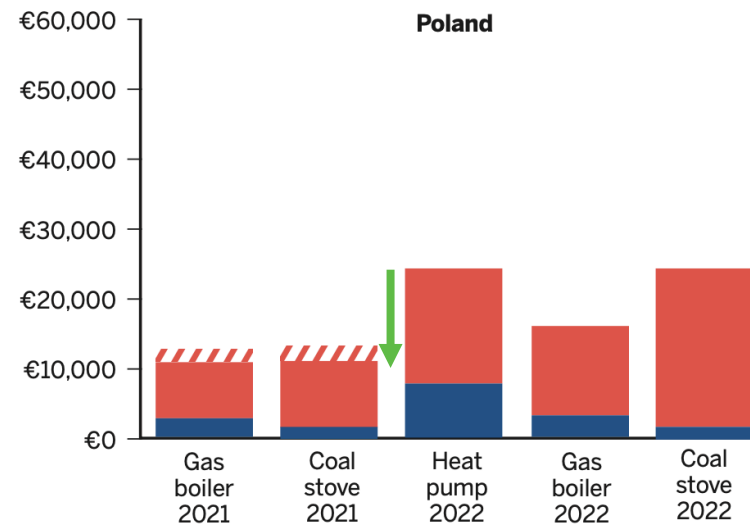
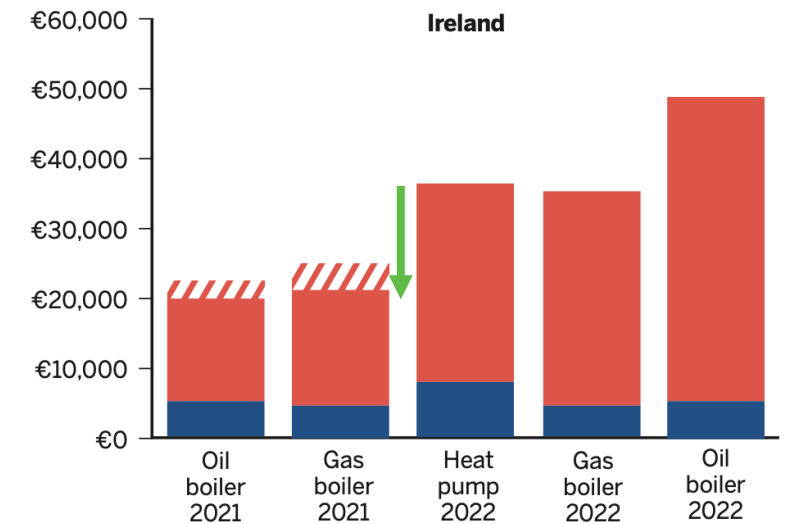
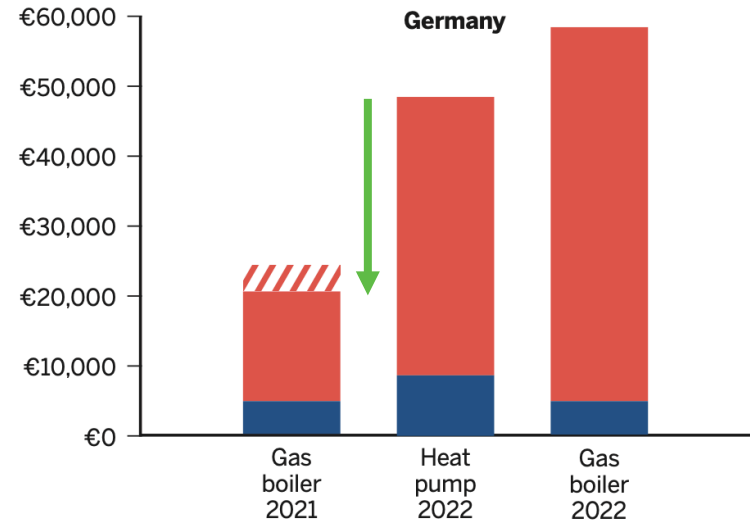
Today, the economics of clean heat has got better

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



But affordability has got worse

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



- Running cost reduction with 20% heat rationing
- Running cost over lifetime
- Upfront cost (excluding subsidy)

4

Strategies for affordable clean heat: reducing upfront investment costs



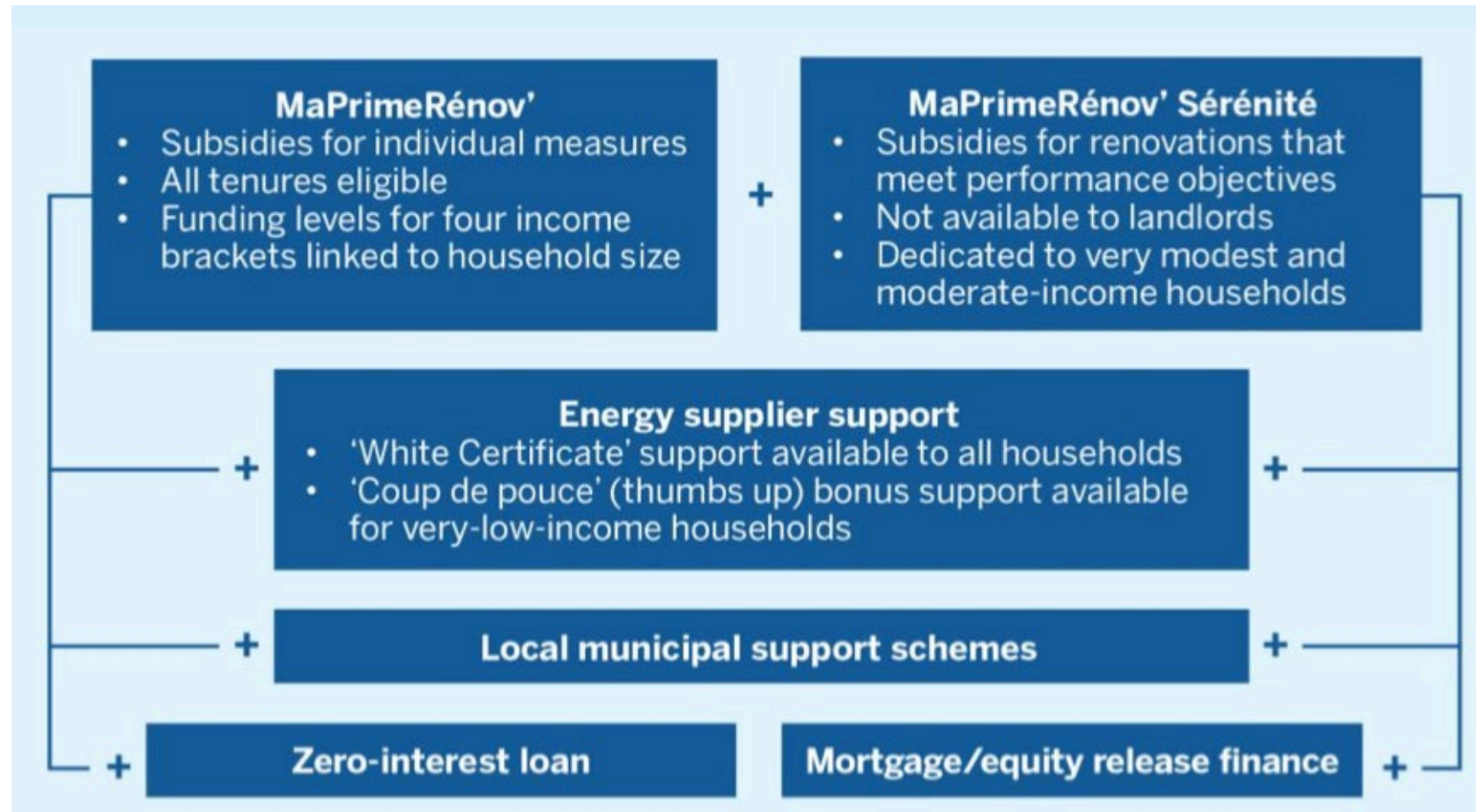
Subsidise upfront costs

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

France's framework of support



? Complexity and administrative burden

5

Strategies for affordable clean heat: Reducing running costs

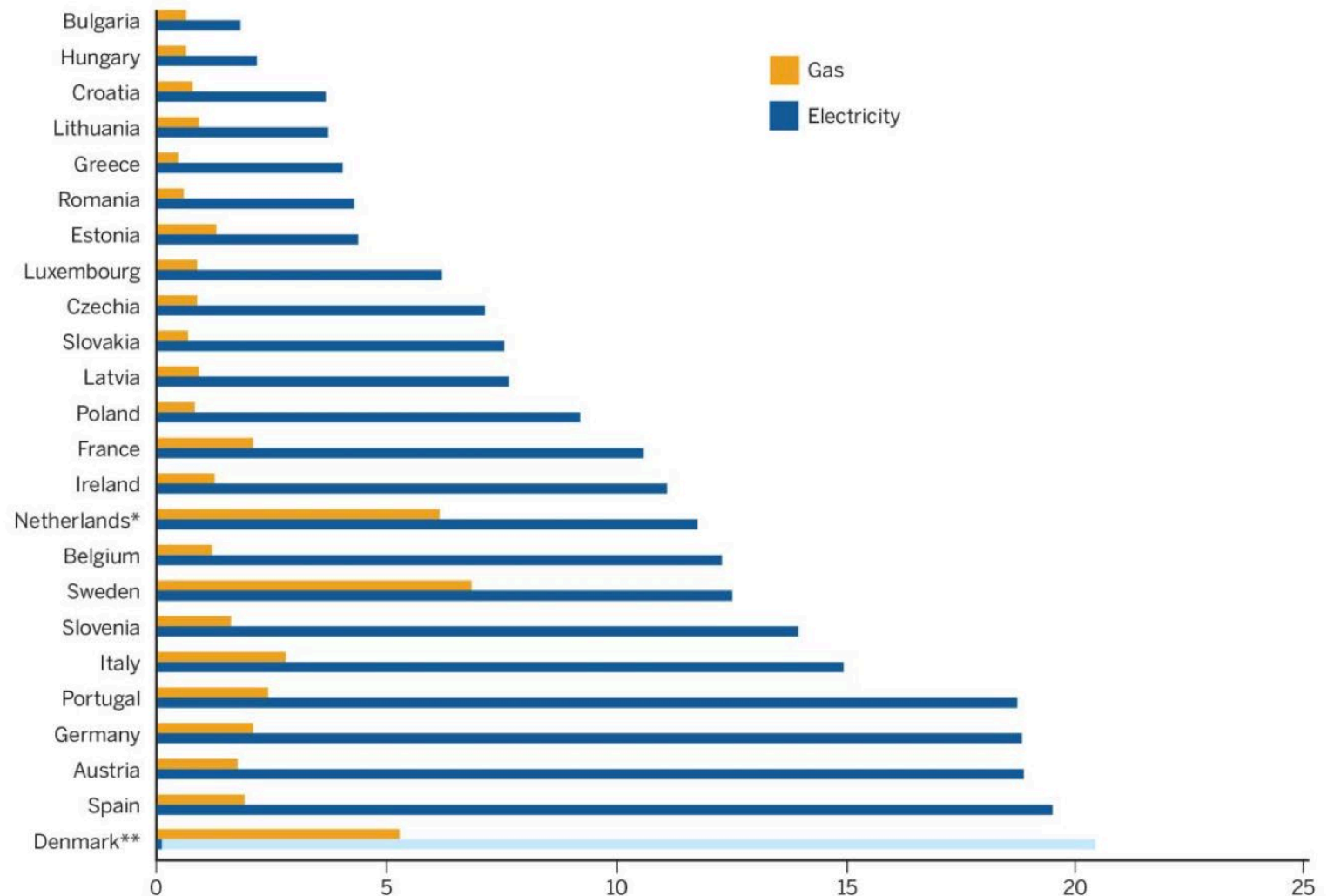



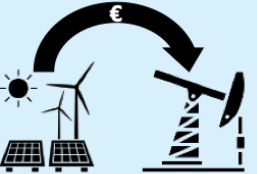
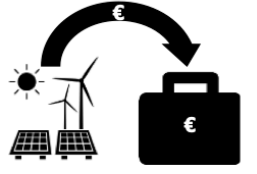

Strategies to reduce running costs (and address other needs)

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



	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

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.

Energy efficiency and efficient clean heating working together

- Member States (and EPBD) using minimum energy performance standards alongside fossil fuel heat phase outs, eg Scotland
- Dutch home insulation standard sets level of fabric efficiency to enable efficient **renewable heating.**

3. Beyond efficiency: multiple building level technologies

Broader technology mix reducing 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



4. Importance of flexible energy use

- As we add new electric loads from heat and transport it's important for these loads to be timed to make best use of renewable generation. This is 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)



The joy of flex

Embracing household demand-side flexibility as a power system resource for Europe

Sophie Yule-Bennett and Louise Sunderland

What shouldn't it look like?



Ironing clothes at night



Cogs in the machine



Flex vs inflex customers

Enablers of flexible energy use

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

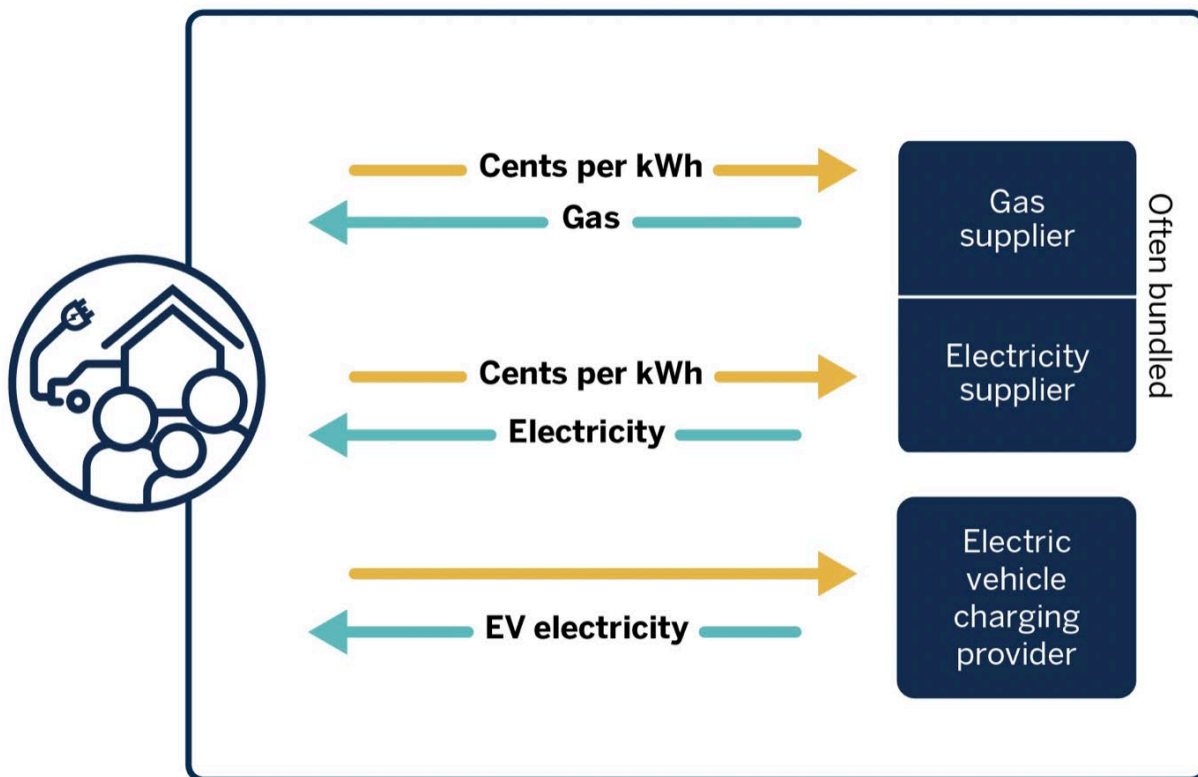
- Upside only tariffs
- Matching existing heat storage with surplus renewables Eg EnergyCloud
- More complex services:
 - Aggregation matching of supply and demand in real time at a granular level
 - Coupling and matching 'behind the meter' assets with local demand eg RESCoop VPP



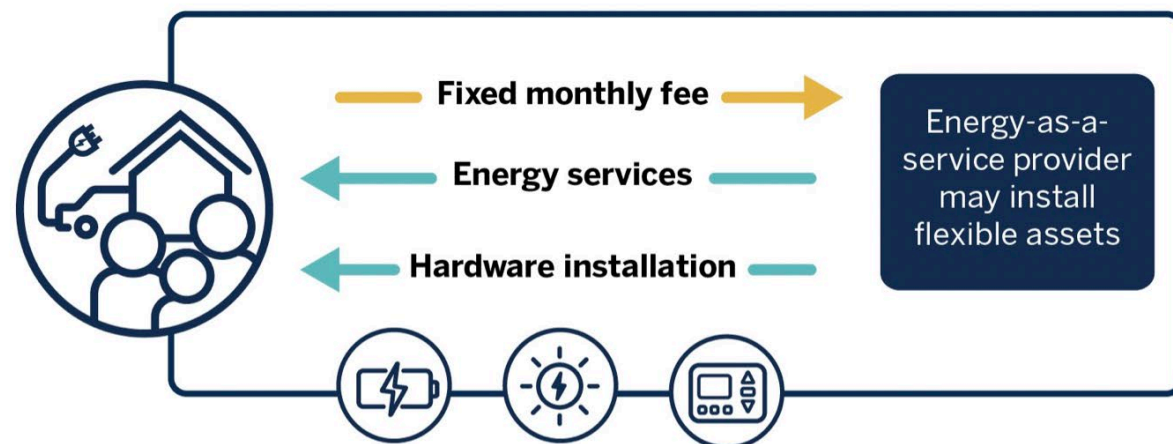
5. Focus on services

Heat as a service

ENERGY TARIFFS MODEL



ENERGY-AS-A-SERVICE MODEL



Hypothetical energy-as-a-service plan

	Heat	Transport	Electricity
X euros per month			
No sign-up cost	Target 20°C with agreed +/- tolerance	Annual mileage package 10,000 km	Unlimited
Contract			
24 months			

5. Focus on services

- Heat as a service
 - Allows **integration of subsidies** for technologies and running cost into an efficient package
 - Can overcome **bureaucratic barriers** in access to subsidy schemes
 - 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?



A lot to do this decade...amongst other things:

- 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**

Further resources

- Sunderland L. and Gibb, D. (2022) Taking the burn out of heat for low-income households. Regulatory Assistance Project. <https://www.raonline.org/knowledge-center/taking-burn-out-of-heating-low-income-households/>
- 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.raonline.org/knowledge-center/joy-flex-embracing-household-demand-side-flexibility-power-system-resource-europe/>
- Sunderland, L. How much insulation is needed? A low-consumption, smart comfort standard for existing buildings. Regulatory Assistance Project. <https://www.raonline.org/knowledge-center/how-much-insulation-needed-low-consumption-standard-for-existing-buildings/>
- Sunderland, L., and M. Santini. (2021) Next steps for MEPS: Designing minimum energy performance standards for European buildings. Regulatory Assistance Project. <https://www.raonline.org/knowledge-center/next-steps-for-meps-designing-minimum-energy-performance-standards-for-european-buildings/>

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