

07 February 2023

Heat pumps: how to scale this critical clean energy technology across the world?

Oxford University, Energy Seminar

Dr Jan Rosenow

Director of European Programmes

The Regulatory Assistance Project (RAP)®

Rue de la Science 23

B-1040 Brussels

Belgium

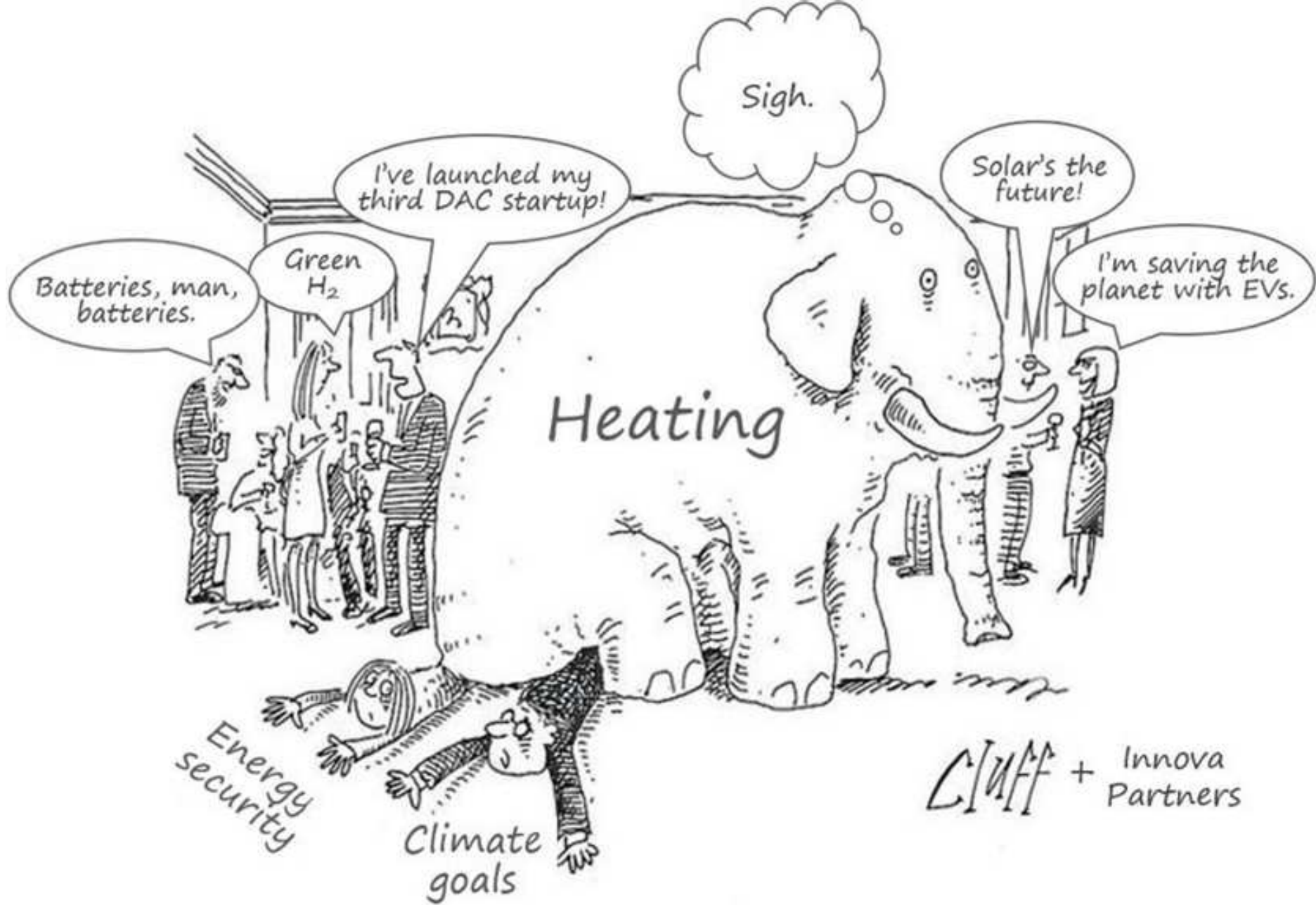
+44 7722 343137

jrosenow@raponline.org

raponline.org







"HAVE YOU NOTICED IT, TOO?"

An iceberg floating in a blue ocean under a blue sky with white clouds. The tip of the iceberg is above the water, while the much larger base is submerged. The text is overlaid on the right side of the image.

Electricity 17%

Heat & cooling 51%

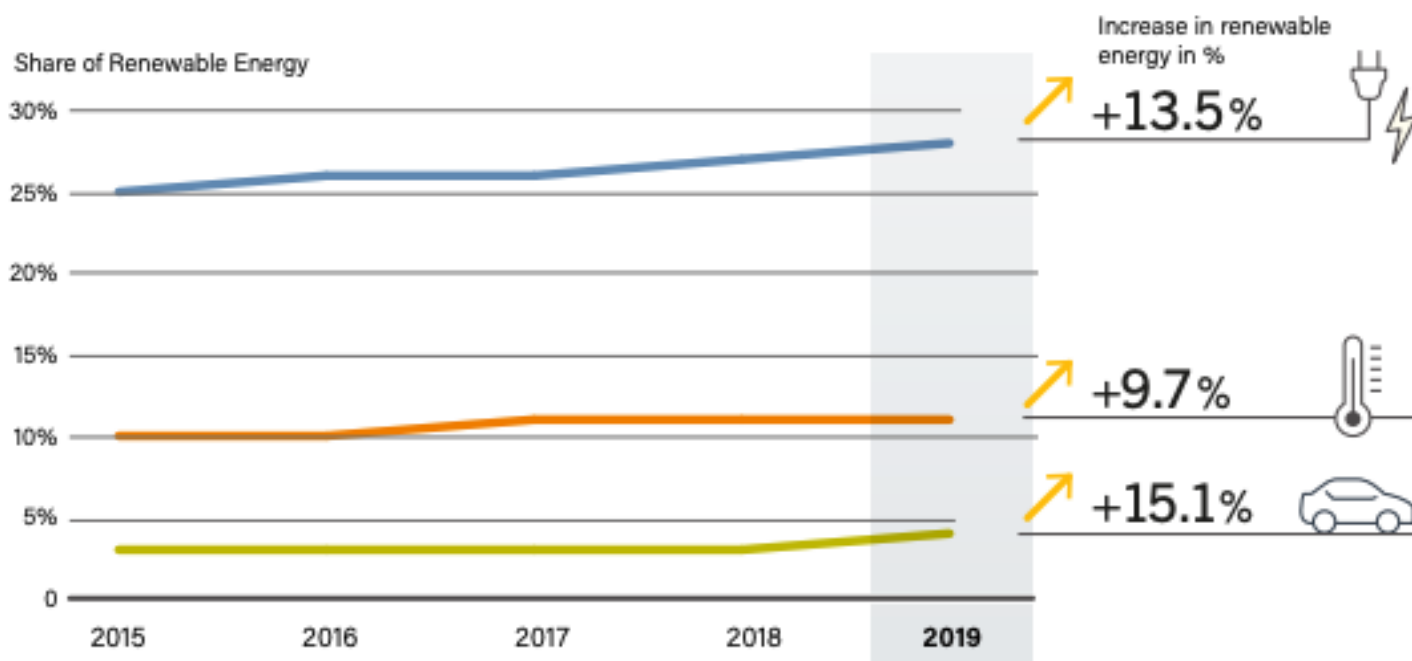
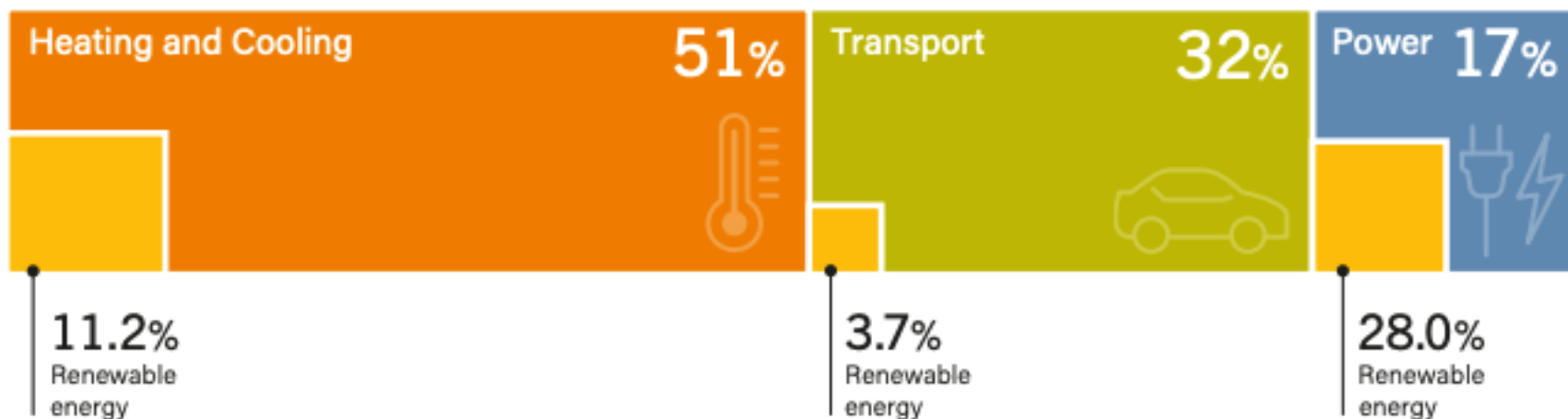
Transport 32%

% of global final energy use by sector



FIGURE 3.

Renewable Energy in Total Final Energy Consumption, by Final Energy Use, 2019

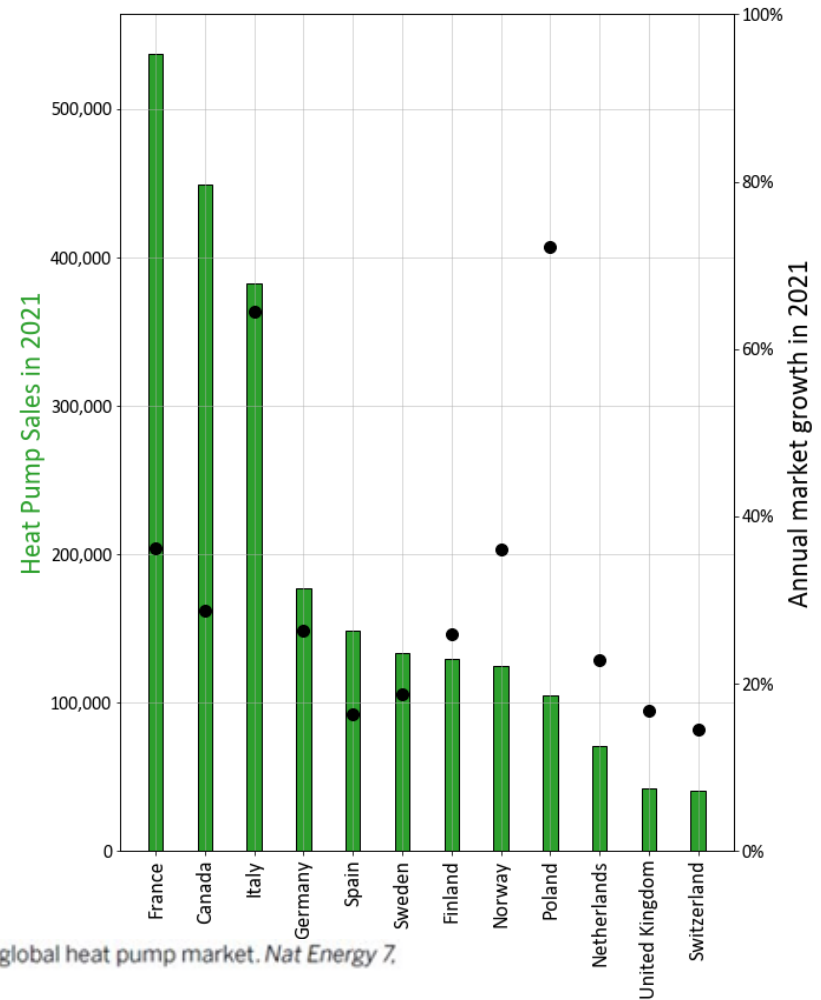
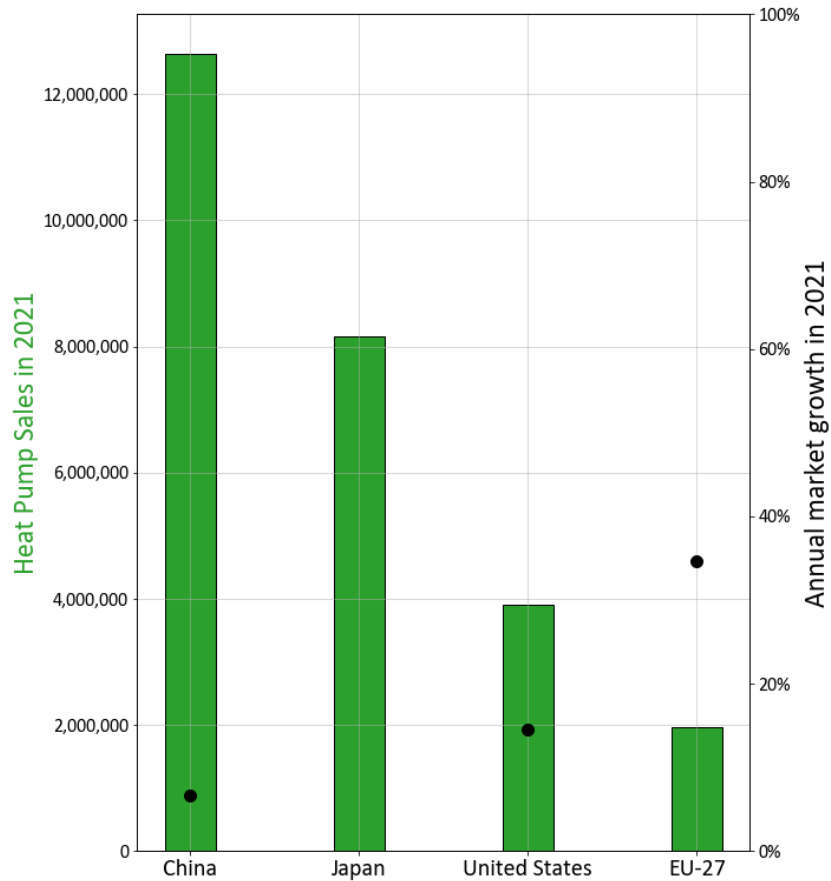


Heat pumps are a critical technology for heat decarbonisation



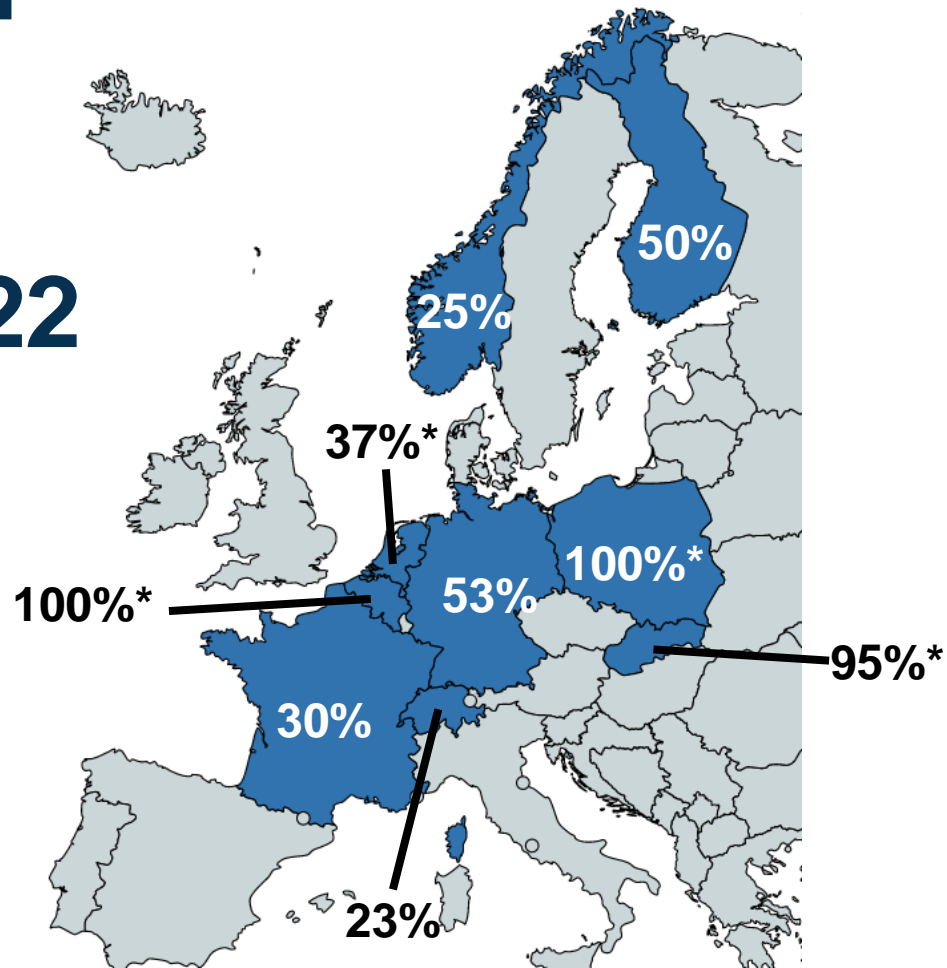
Source: IEA. (2021, May). *Net Zero by 2050: A Roadmap for the Global Energy Sector*.

Significant growth in major markets in 2021



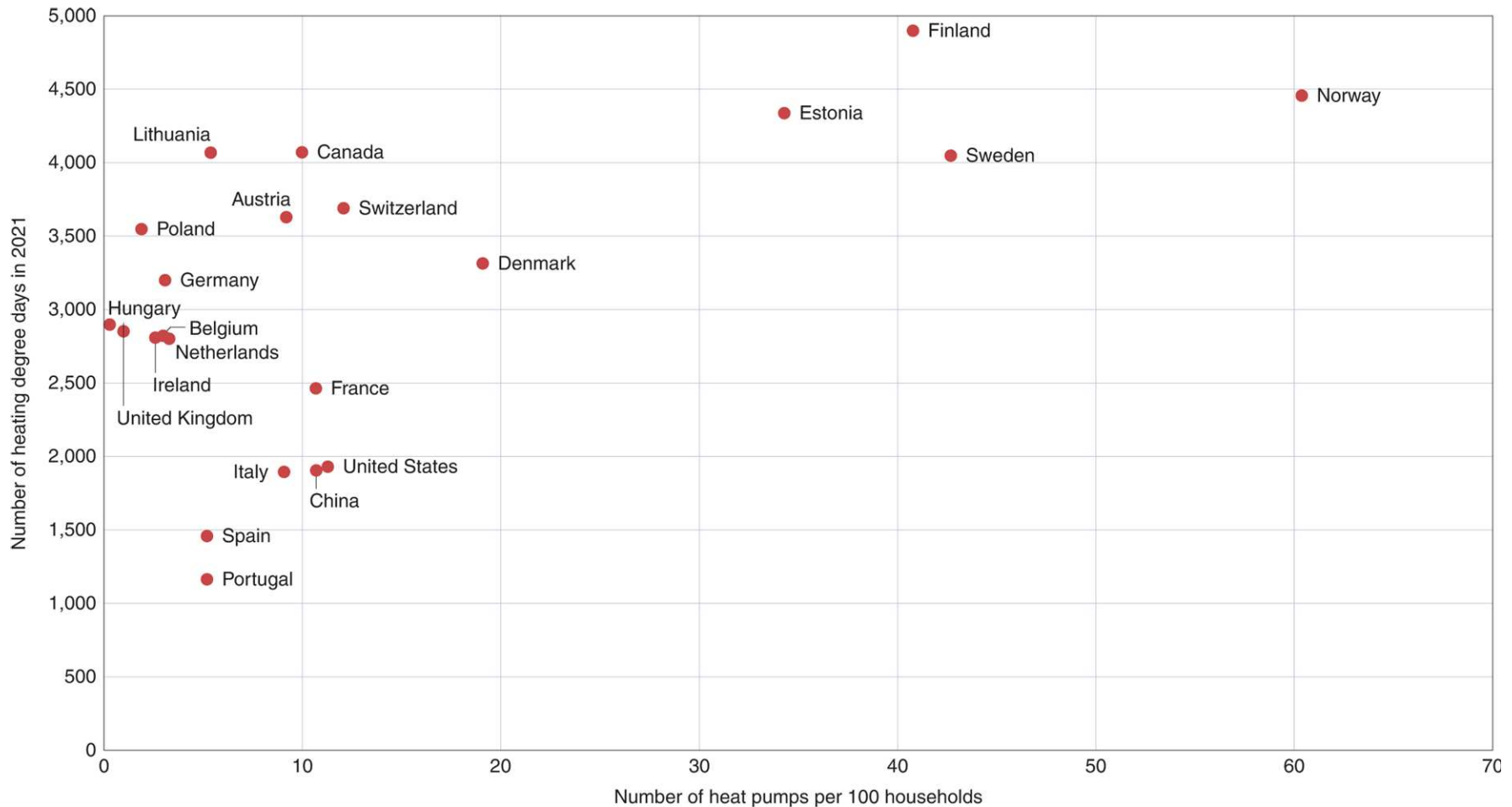
Rosenow, J., Gibb, D., Nowak, T. & Lowes, R. (2022a, September). Heating up the global heat pump market. *Nat Energy* 7, 901–904. <https://doi.org/10.1038/s41560-022-01104-8>

Early signs of significant growth in Europe in 2022



* preliminary data

Most heat pumps in coldest climates



Rosenow, J., Gibb, D., Nowak, T. & Lowes, R. (2022a, September). Heating up the global heat pump market. *Nat Energy* 7, 901–904. <https://doi.org/10.1038/s41560-022-01104-8>

A step change is needed



Rosenow, J., Gibb, D., Nowak, T. & Lowes, R. (2022a, September). Heating up the global heat pump market. *Nat Energy* 7, 901–904. <https://doi.org/10.1038/s41560-022-01104-8>



RAP®

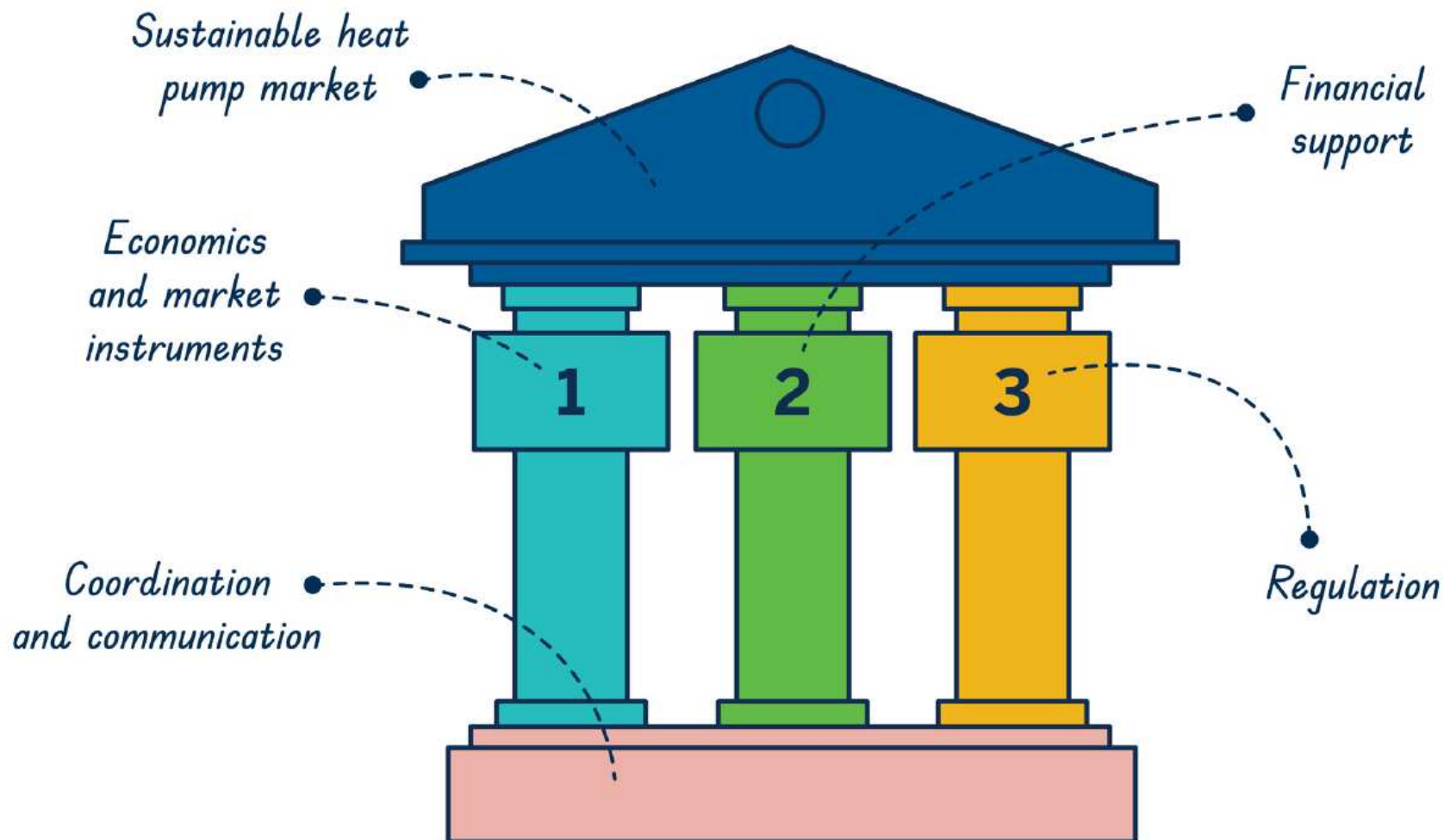







A policy toolkit for global mass heat pump deployment



Historical progress on heat pumps can inform the future

1. Packages of policy and regulatory measures
2. Pricing reform and financial support
3. Softer measures on skills and engagement
4. Policy support needs to be sustained



Country	Coordination	Communications	Training	Economic & market	Financial support	Regulations
China ^{26,27} 					Subsidies	Minimum energy performance standard (MEPS)
Switzerland ²⁸ 	Conferences	Exhibition	Installer training, driller quality label		Subsidies	Non-renewable standard, labelling
Sweden ^{29,30} 	Expert groups	Public demonstrations, information, and advice	Training of installers	Increased tax on oil	Subsidies and loans	Labelling
Denmark ³¹ 	Promotion		Quality assurance for installers	Increased taxation of electricity, but not fossil fuels (!)	Subsidies	Electric resistance and oil ban
Finland ^{32,33} 		Messaging boards to improve consumer confidence		Increased fossil fuel taxation	Subsidies, tax deductions	Building codes account for carbon intensity of heat








Detailed analysis of taxes and levies on heating fuels in Europe



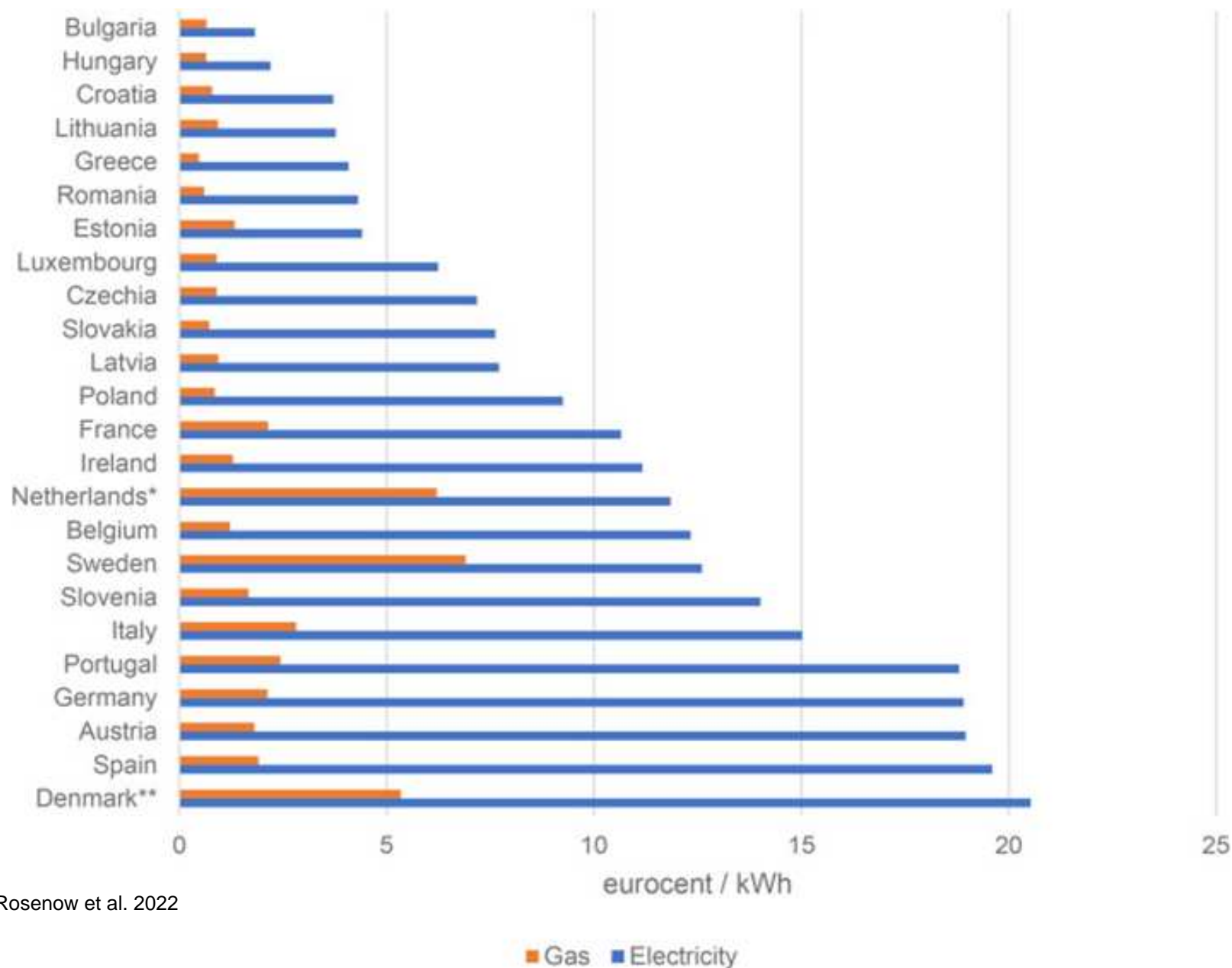
Energy Policy
Volume 173, February 2023, 113367



Clean heating: Reforming taxes and levies on heating fuels in Europe

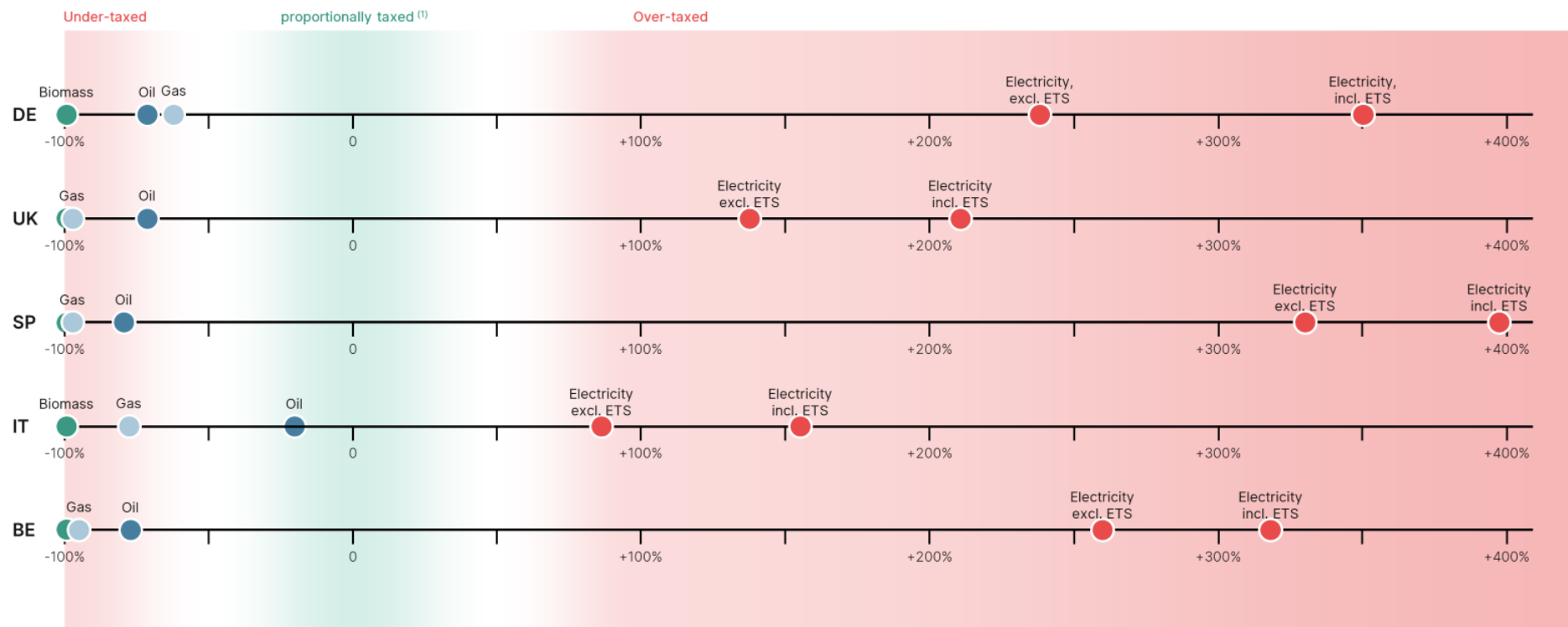
Jan Rosenow^{a b}  , Sam Thomas^a , Duncan Gibb^a , Ruben Baetens^c ,
Andries De Brouwer^c , Jan Cornillie^c 

Levies and taxes (including VAT) on residential gas and electricity prices (euro cents per kWh) in EU Member States



Source: Rosenow et al. 2022

Heating fuels very unevenly priced



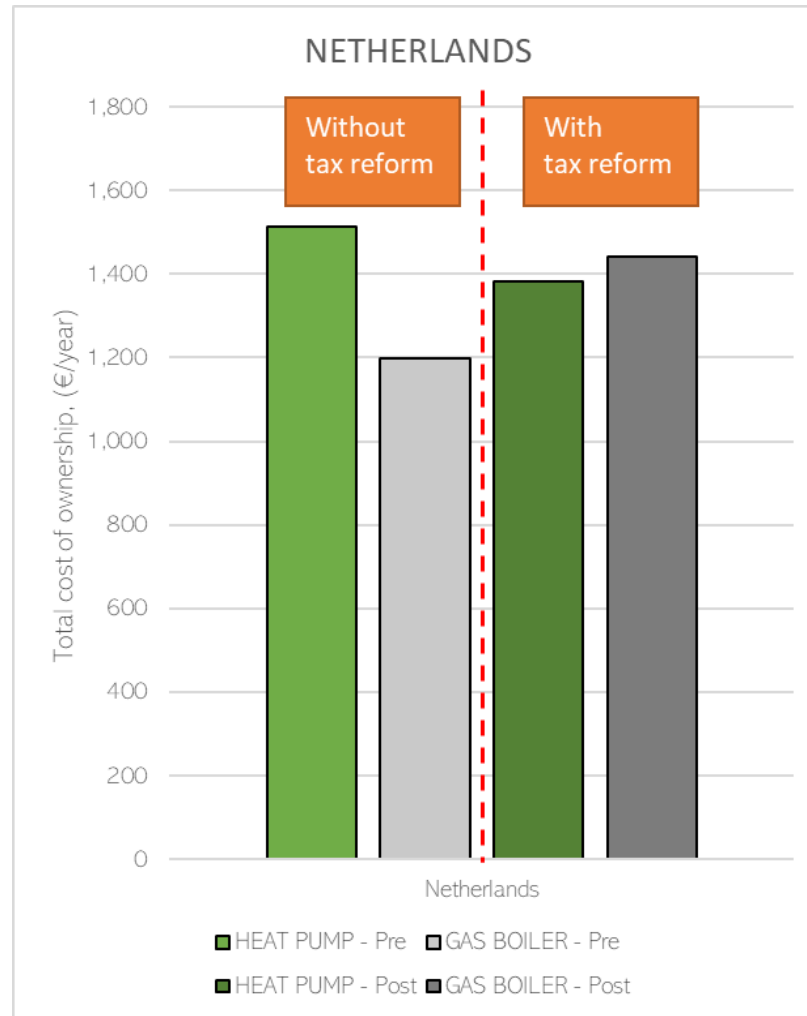
(1) Proportionality is defined as when the total energy taxation ⁽²⁾ is almost equal to the environmental externalities ⁽³⁾

(2) The total energy taxes have been defined by RAP & 3E based on all national or regional levies and taxes, valid in each country in 2022

(3) Environmental externalities have been defined by RAP & 3E based on CE Delft (2019) "Milieuschadekosten van verschillende technologieën voor woningverwarming"

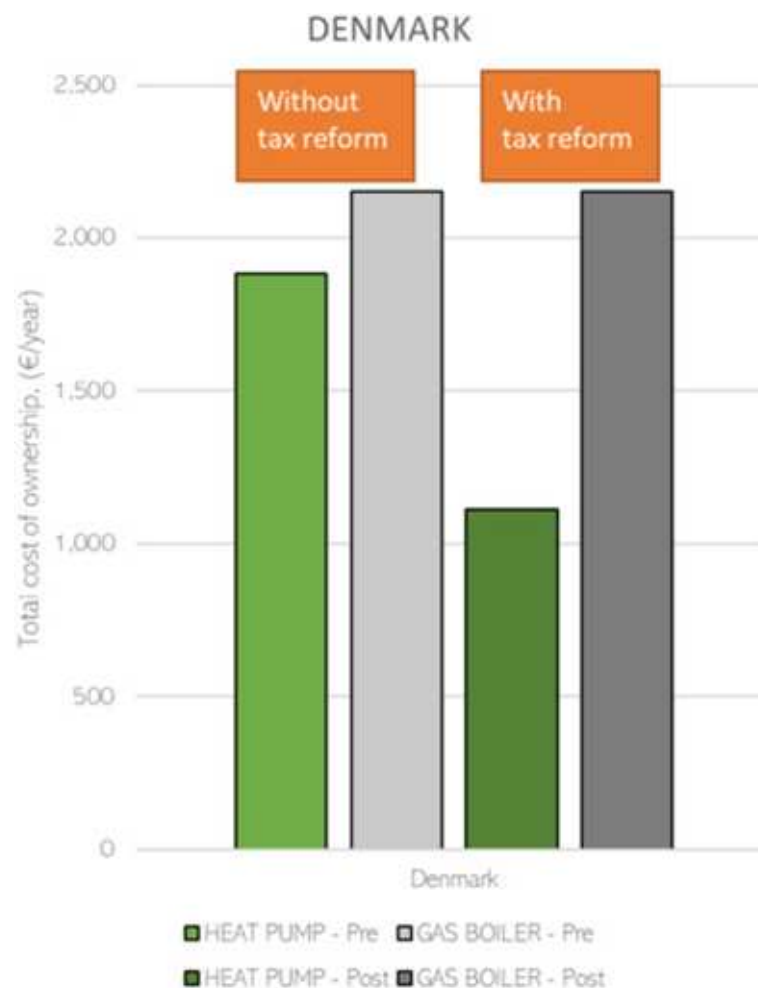
Source: Rosenow et al. 2022

Tax reform in Netherlands



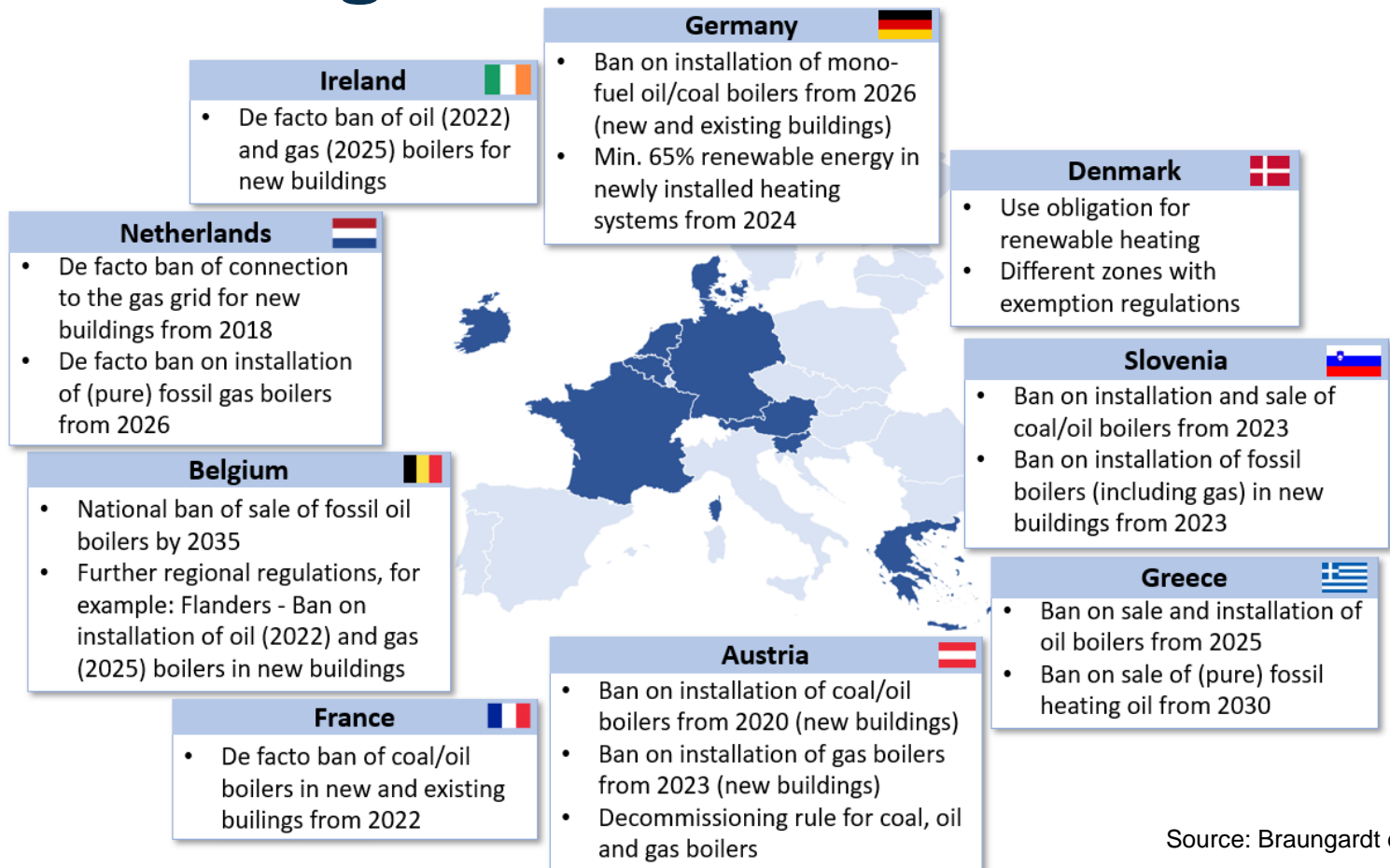
Source: Rosenow et al. 2022

Tax reform in Denmark



Source: Rosenow et al. 2022

Regulation - example: banning fossil fuel heating



Source: Braungardt et al. forthcoming

European Commission considers fossil fuel phase-out date for 2029



REPowerEU Actions



MAY 2022

A fair transition



Ensure 'fossil free first' for low-income households.



Elevate efficiency.



Subsidise the technology switch.

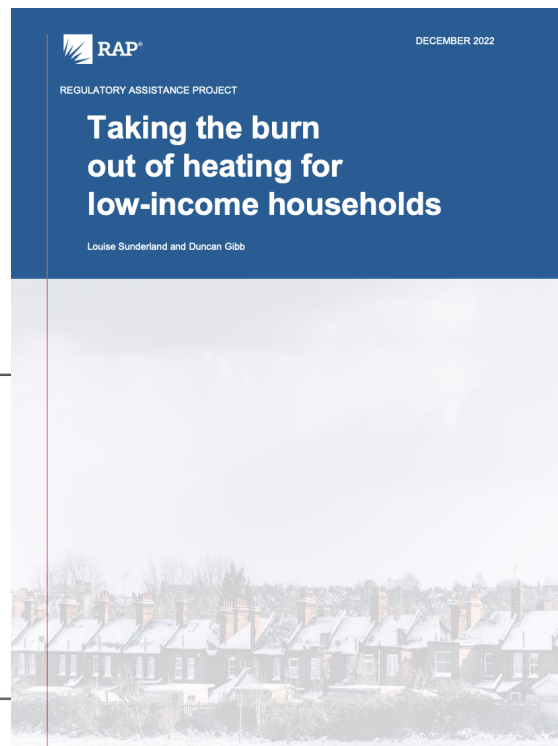


Rebalance the burden.

Policy costs



Innovate inclusively.



How heat pumps got hot

Why an eco-friendly heating system is the new must-have bit of home kit — and where to get yours





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



Dr Jan Rosenow
Director of European Programmes
The Regulatory Assistance Project (RAP)®

Rue de la Science 23
B-1040 Brussels
Belgium

+44 7722 343137
jrosenow@raponline.org
raponline.org | janrosenow.com