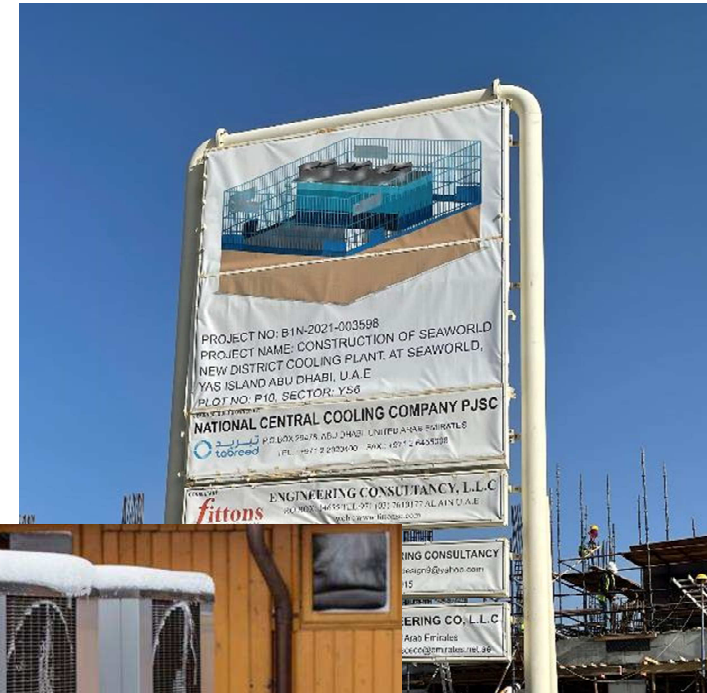


Heating and cooling in the energy transition: The path to 1.5°C

Dr Ute Collier

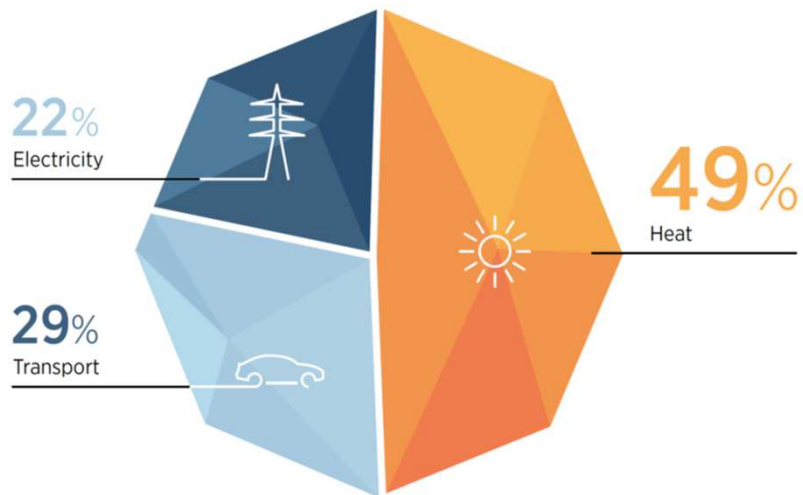
Deputy Director of Knowledge, Policy and Finance Centre (KPFC)
International Renewable Energy Agency (IRENA)

7 April 2022, Graz, 2nd International Sustainable Energy Conference 2022

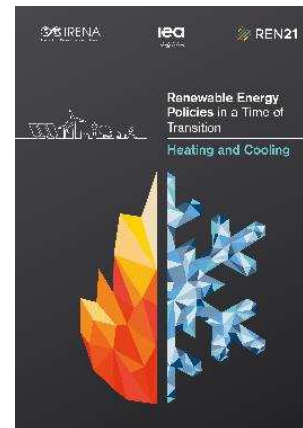
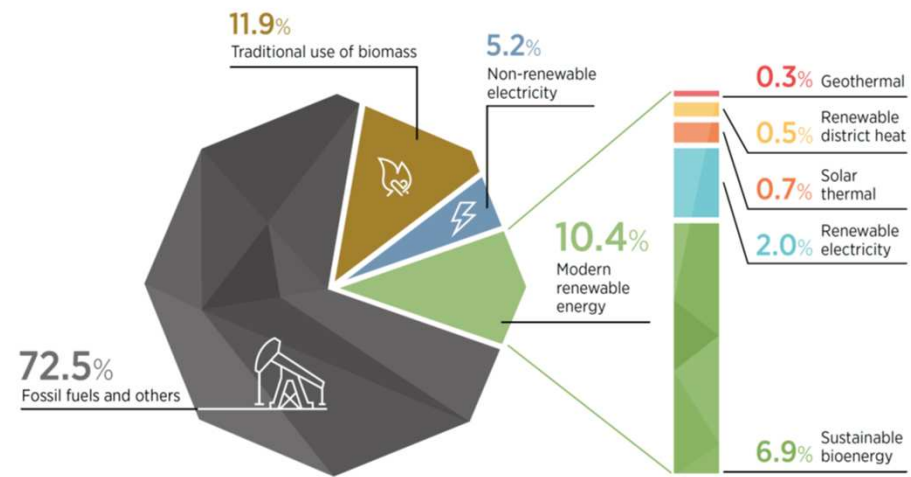


Heating and cooling accounts for half of total energy demand

TFEC shares by end use, 2019

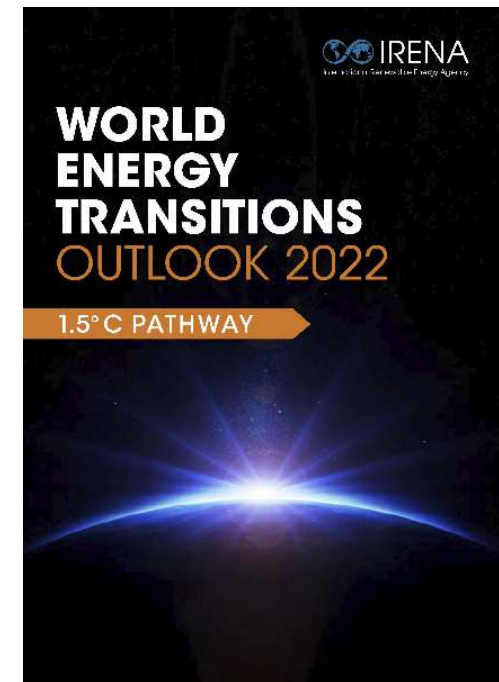
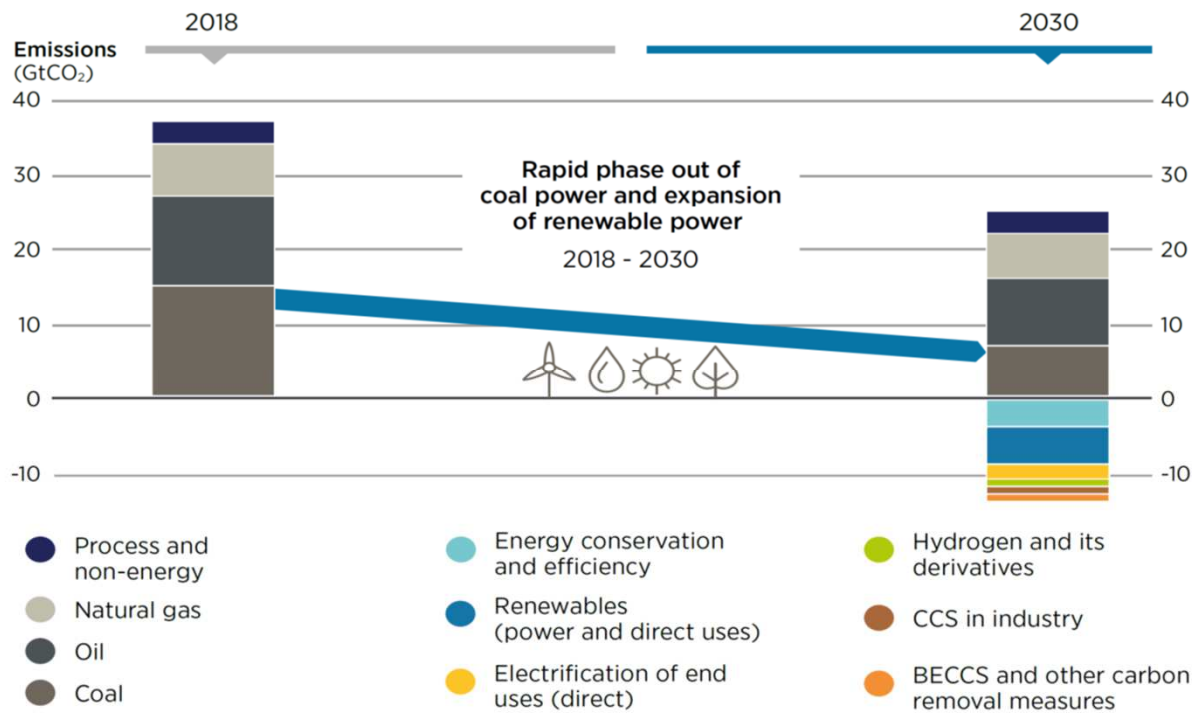


TFEC in heating and cooling, by source, 2019



The global energy transition requires a renewables-based decarbonisation of end uses

Required emission reductions 2018-2030



Current progress is not on track

	Recent years	2050	Off/on track	Required scaling factor by 2050
DIRECT RENEWABLES IN END-USES				
Share of renewables in final energy consumption	16% ⁶⁾	79%		5x
Solar thermal collector area	25 million m ² /yr ⁷⁾	165 million m ² /yr		6x
Modern bioenergy consumption	18 EJ ^{8), 23)}	58 EJ		3x
Geothermal consumption	0.9 EJ ⁹⁾	4 EJ		4x
District heat generation - buildings	0.4 EJ ¹⁰⁾	7.3 EJ		Significant increase

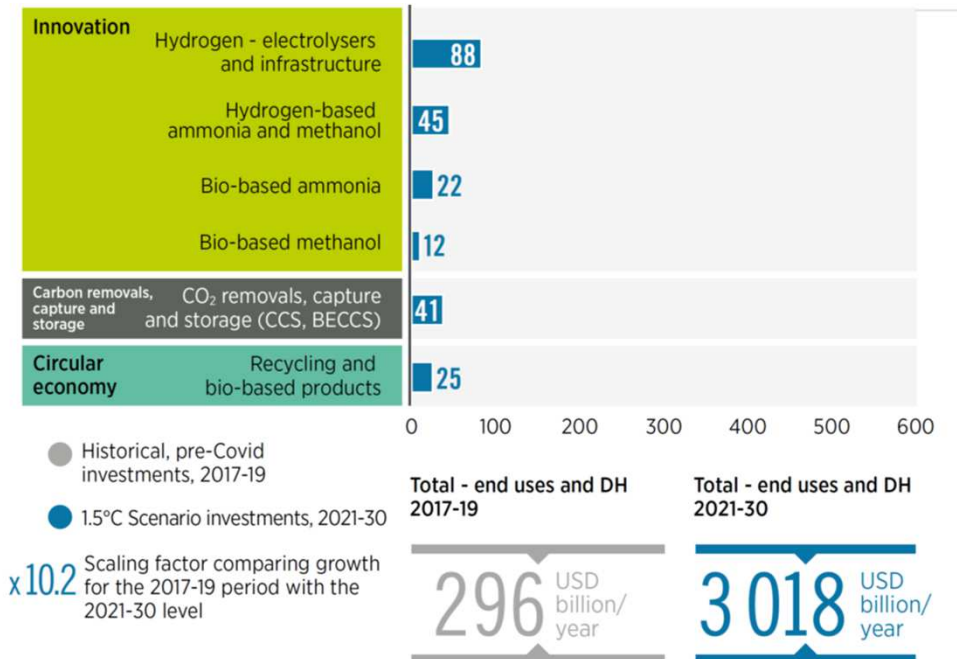
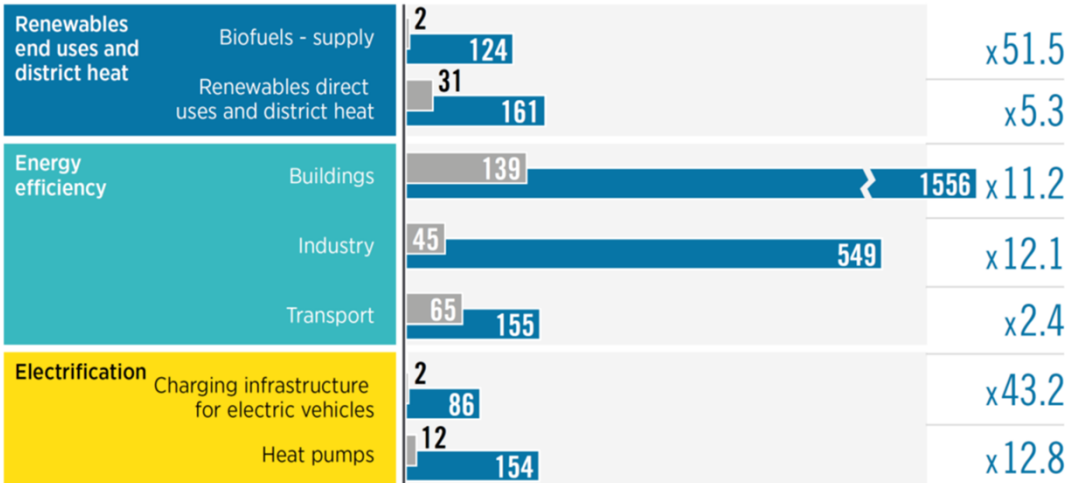
Investments need to be scaled up

Average annual investments in USD billion per year by technology, 2021-2030

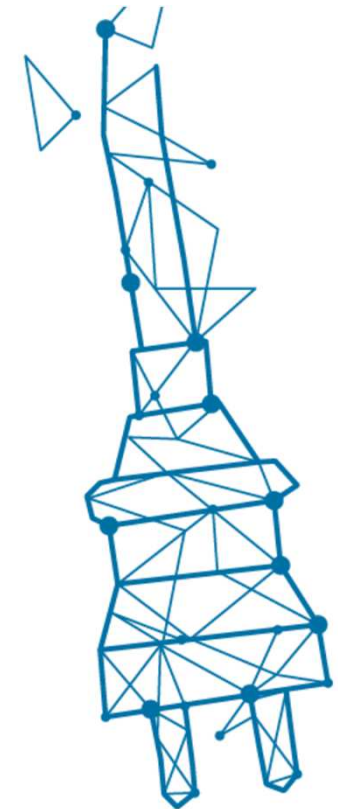
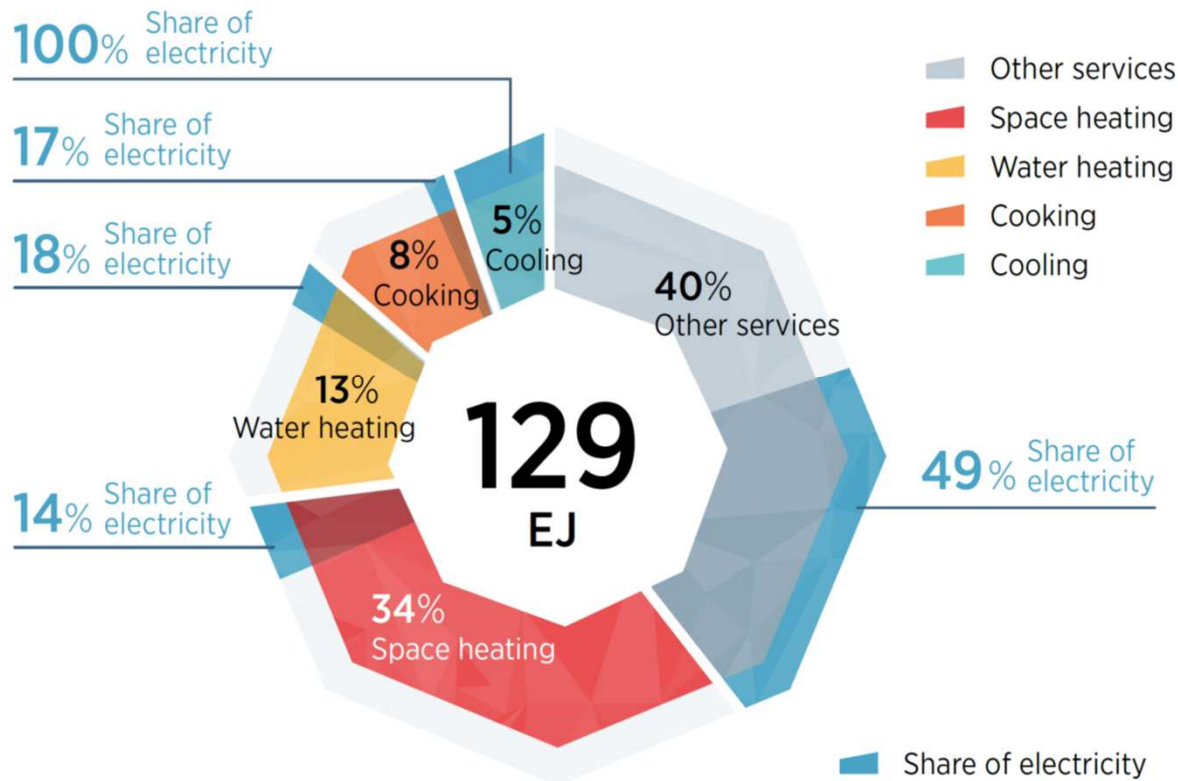


End uses and district heat

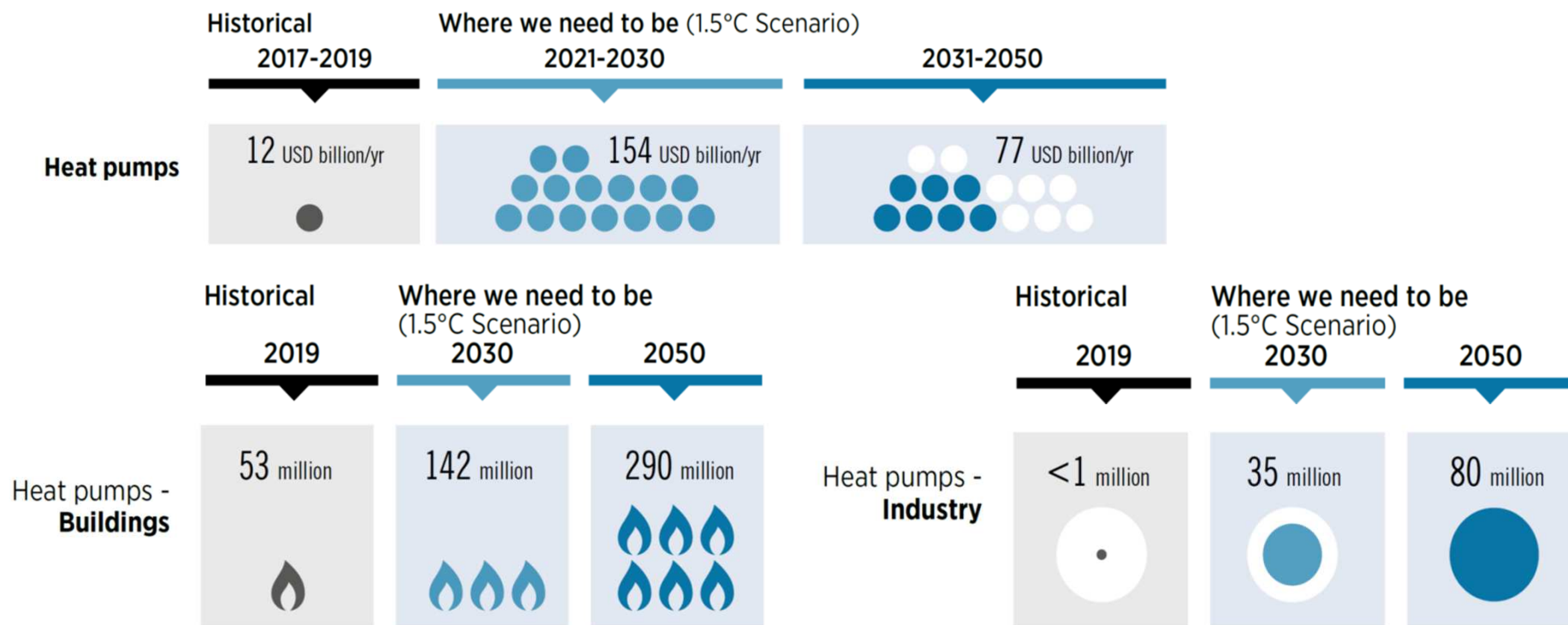
Annual average investments (USD billion/yr)



Electrification is one of the major solutions

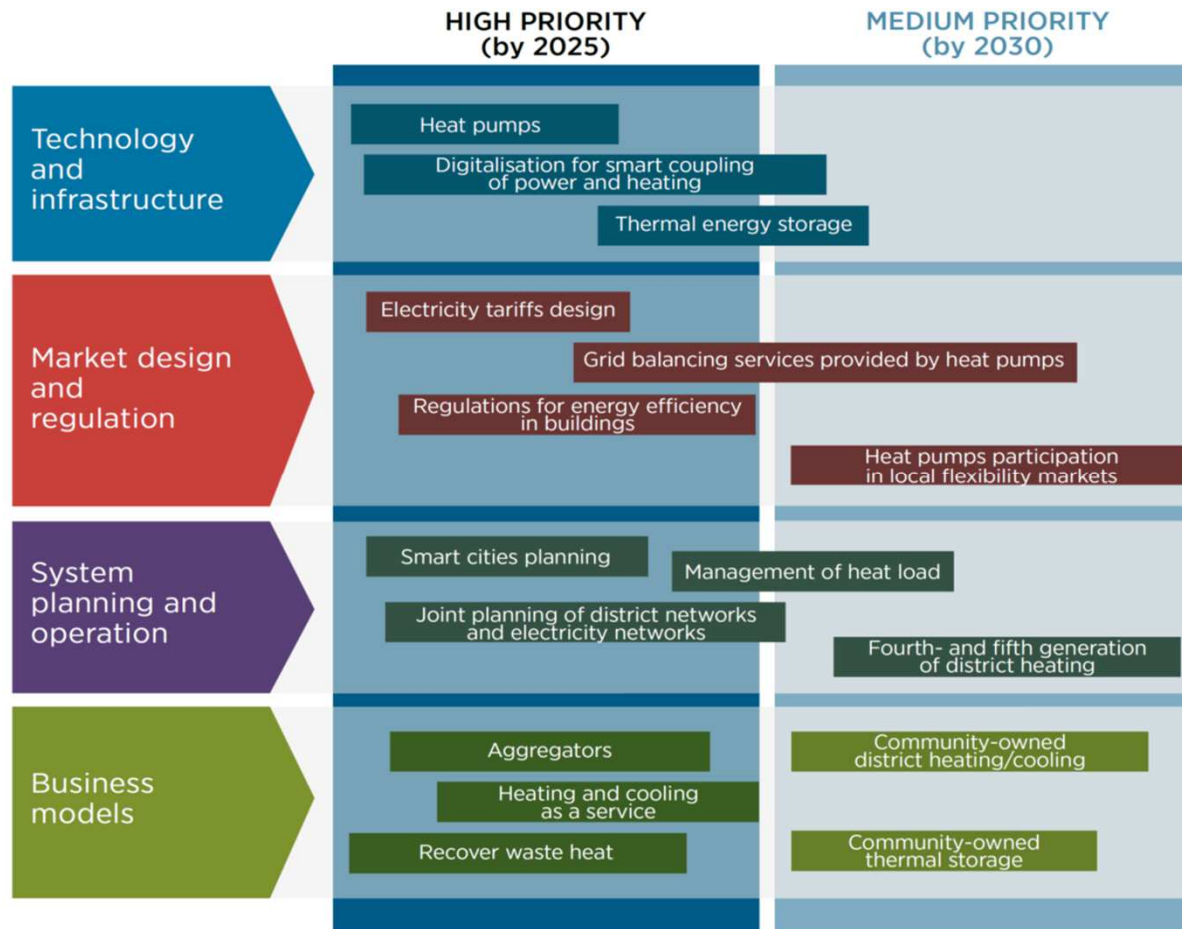


Heat pumps: progress and investments



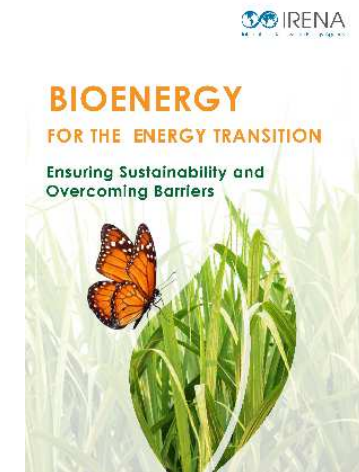
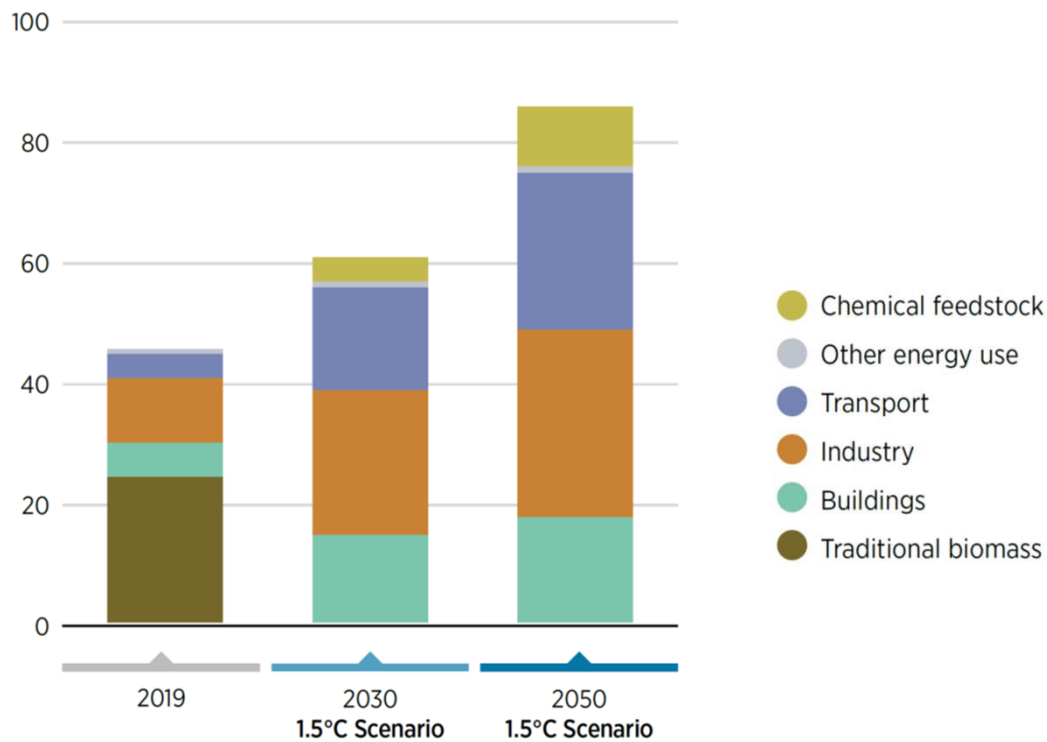
Heat pumps: priorities for 2030

Priorities for the smart electrification of the heating and cooling sectors for 2025 and 2030



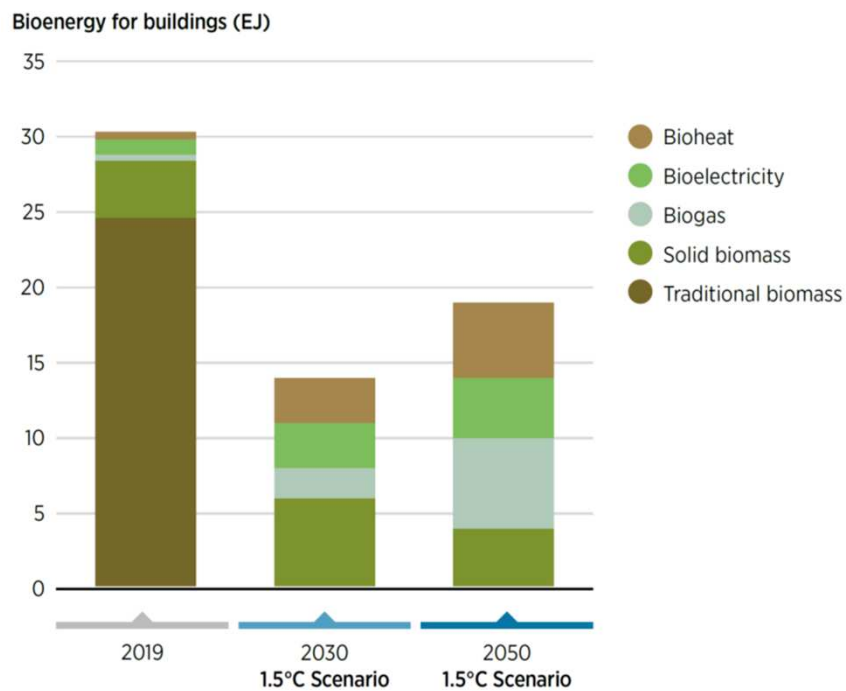
Bioenergy is the biggest contributor to renewable heat

Biomass demand in the 1.5°C Scenario

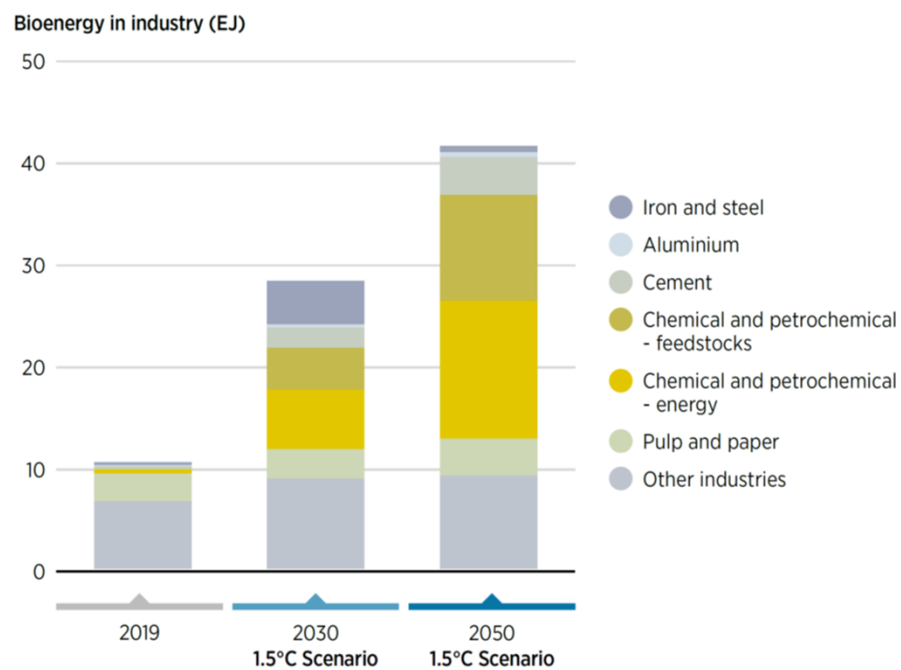


Bioenergy use in buildings and industry

Bioenergy consumption in buildings in the 1.5°C Scenario



Bioenergy consumption in industry in the 1.5°C Scenario

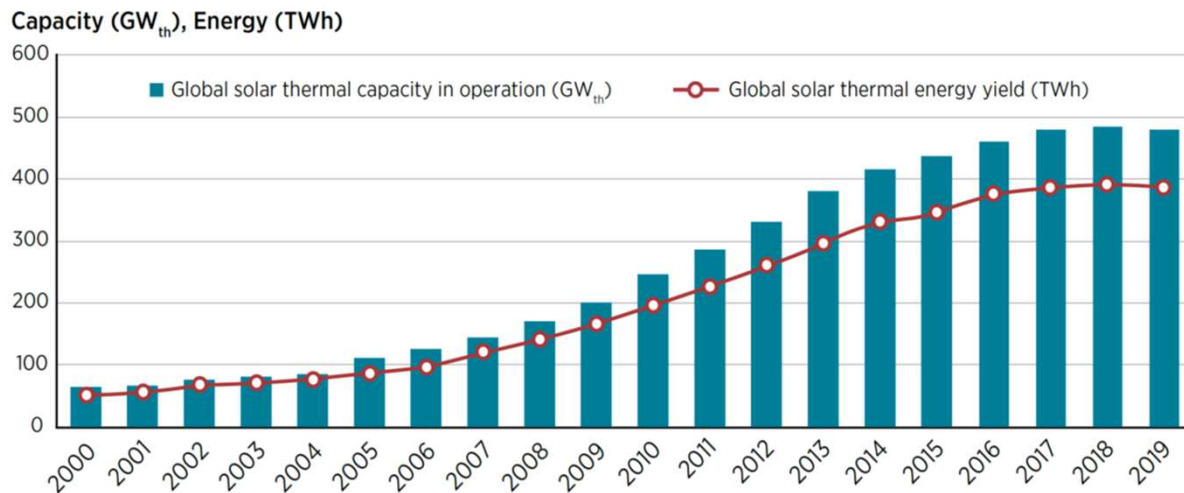


Policies are needed ensure bioenergy sustainability and minimise adverse outcomes

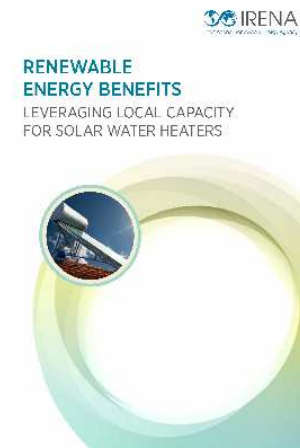
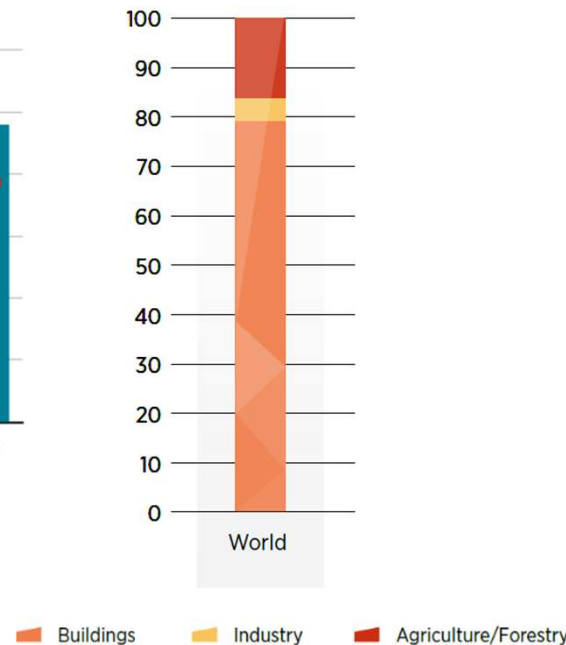


Solar thermal heat and direct use of geothermal are also key pathways for renewable heating and cooling

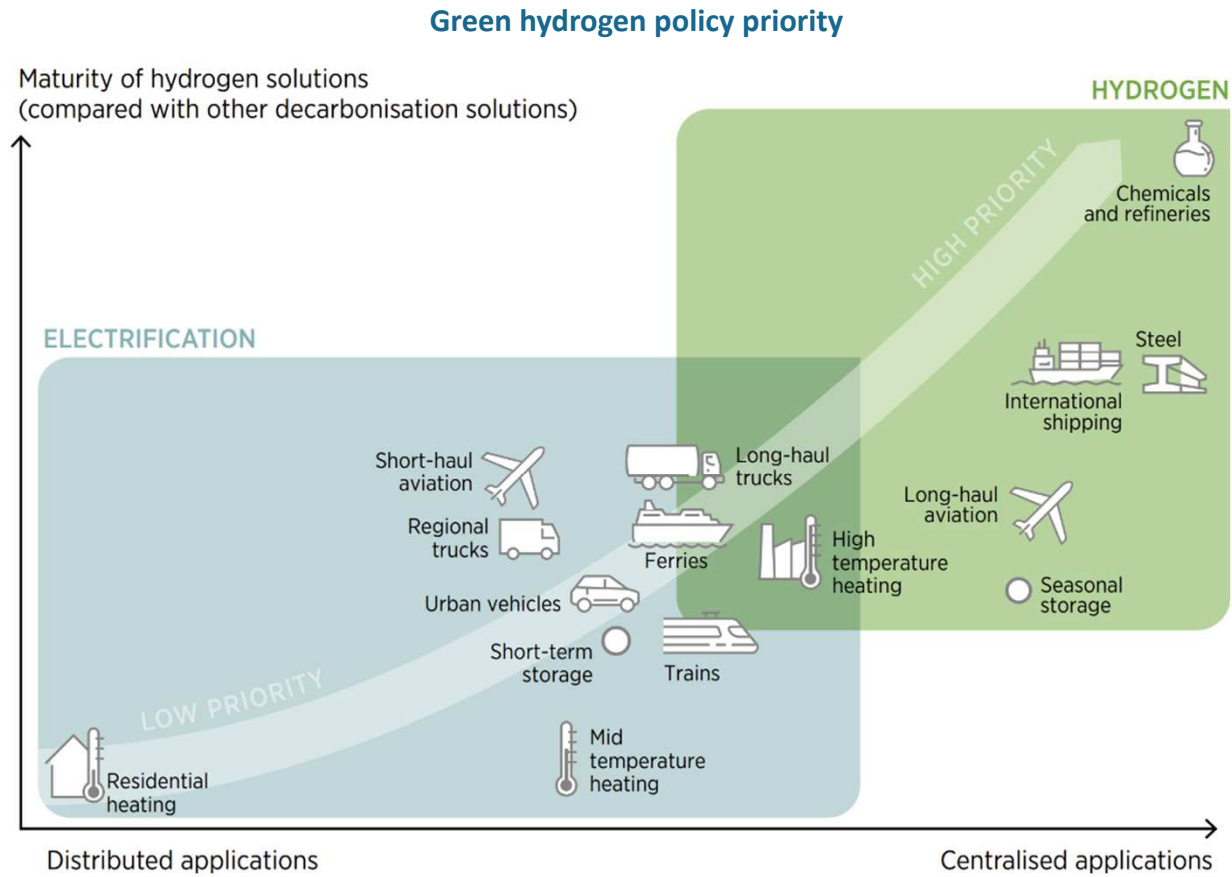
Global solar thermal capacity in operation, 2000-2019



Global geothermal heat use by sector, 2020 (%)

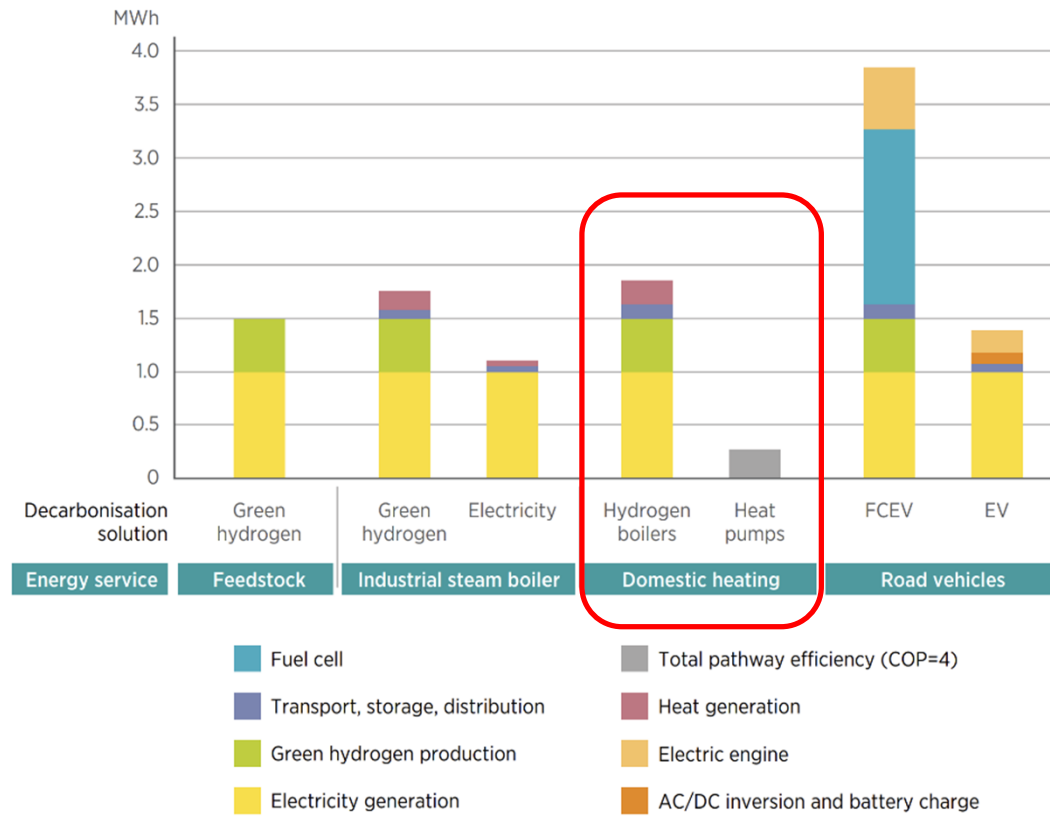


Does it make sense to focus on hydrogen for residential heating?



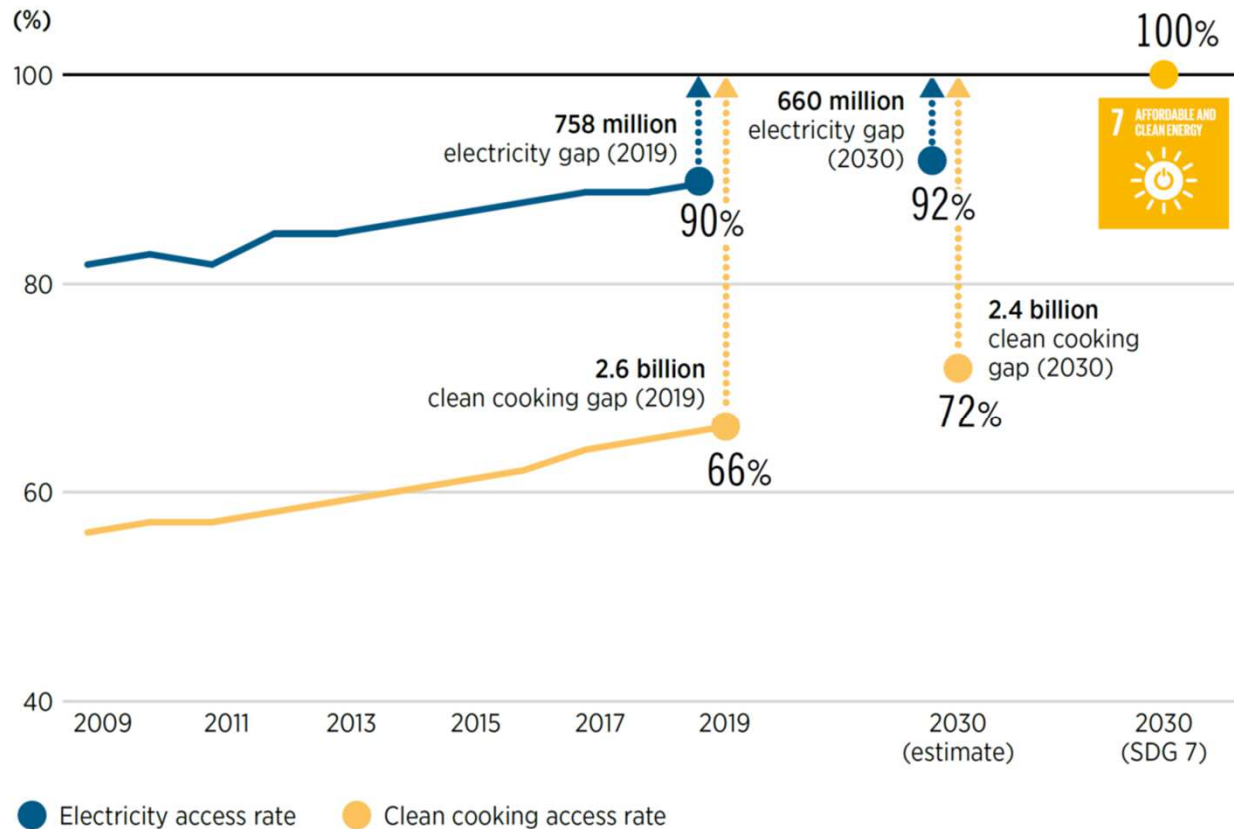
Not a lot of thermodynamic sense

Renewable electricity generation needed for 1 MWh by energy services and by transformation passage



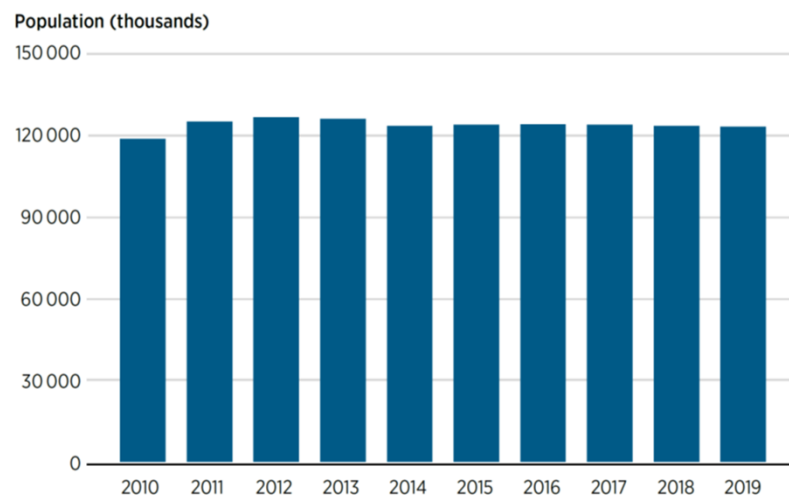
Investments in clean cooking solutions must be urgently scaled up

Electricity and clean cooking access rates, global, 2009 to 2019, and forecasted for 2030

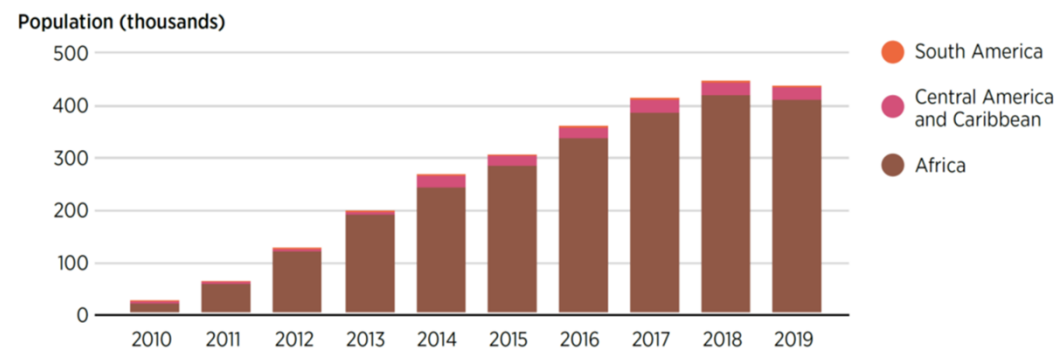


Biogas is one of the cleanest cooking options

Number of people using biogas for cooking, 2010–19, Asia



Number of people using biogas for cooking, 2010–19, Rest of Global South



Scaling up clean cooking solutions will require supportive policy and regulatory frameworks

ADDRESS LACK OF POLICY ATTENTION

- Prioritisation of clean cooking
- Clean cooking strategies (international and national)
- Integrated energy planning, including grid, off-grid and clean cooking
- Cross-ministerial approaches (including energy, health, agriculture and forestry)



TACKLE COST AND FINANCE BARRIERS

- Financial support (e.g. results-based finance, direct consumer subsidies, low interest loans)
- Fiscal measures (e.g. reduced VAT and import duties)



BOLSTER SUSTAINABILITY AND SUPPLY CHAINS

- Regulation and equipment standards
- Licensing and certification
- Fiscal measures
- Training (e.g. business skills, installation and maintenance)
- Enable access to early stage/growth capital



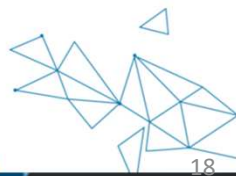
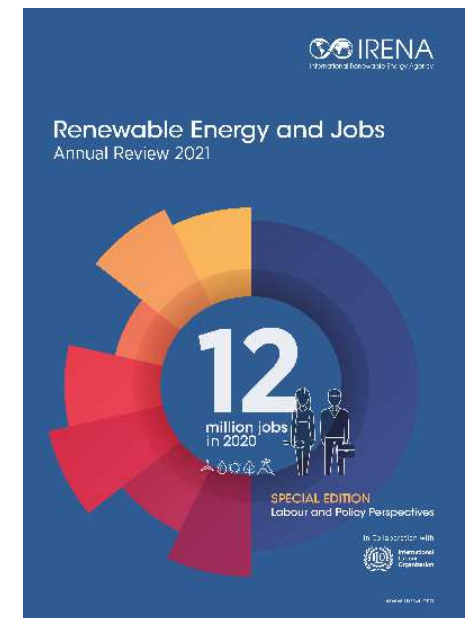
CREATE AWARENESS ABOUT IMPACTS AND SOLUTIONS

- Data collection
- Education, information and awareness programmes
- Gender-inclusive policies and programmes



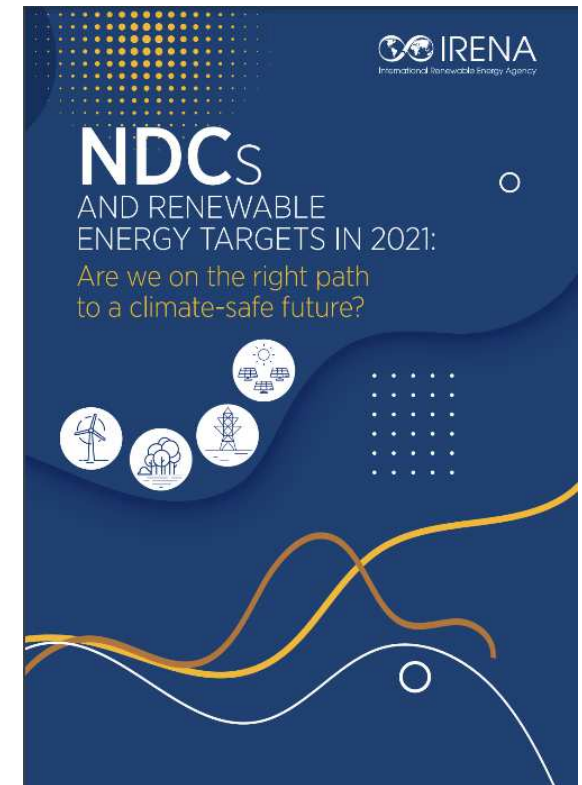
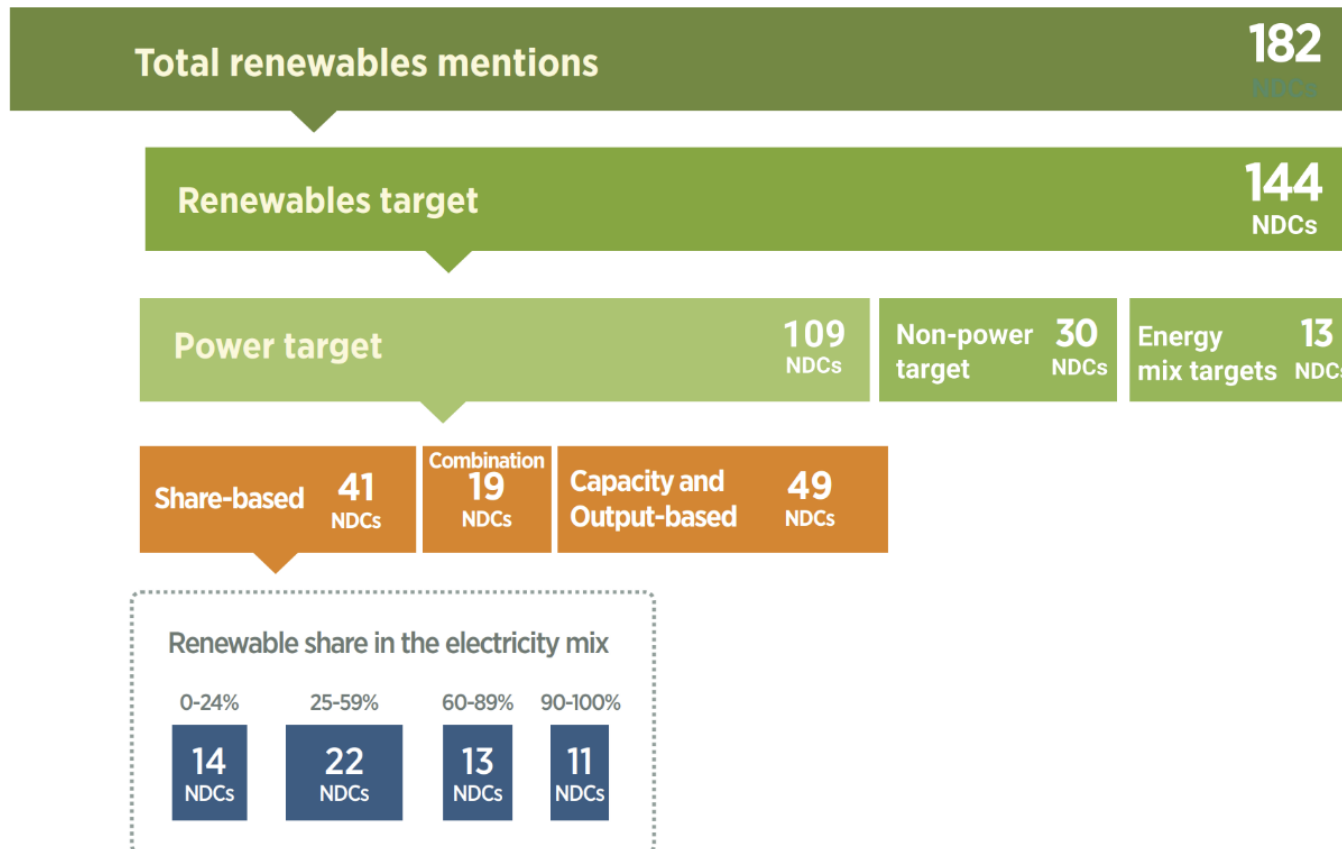
Renewable heating and cooling brings socio-economic benefits, including jobs

Global renewable energy employment by technology, 2012-20



Globally, heating and cooling continues to lag far behind the power sector in terms of targets & policies

2030 Renewable Energy Targets in NDCs





Vielen Dank!

Thank you!

