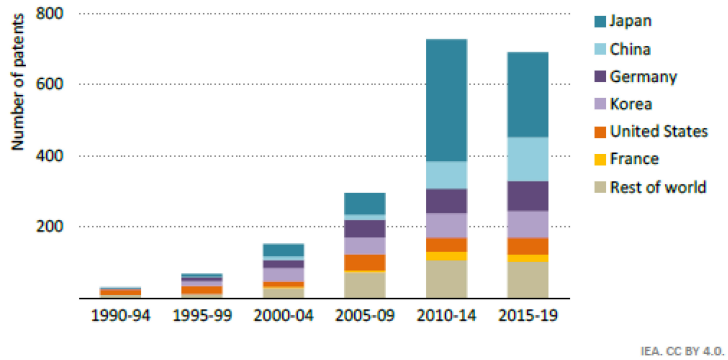
Corrigendum: The Future of Heat Pumps
Issued: 15 December 2022
Link to report: https://www.iea.org/reports/the-future-of-heat-pumps

1. On **page 30**, source added below Figure 1.11

Before:

Figure 1.11 ▷ Patent counts for heat pump technologies by country, 1990-2019

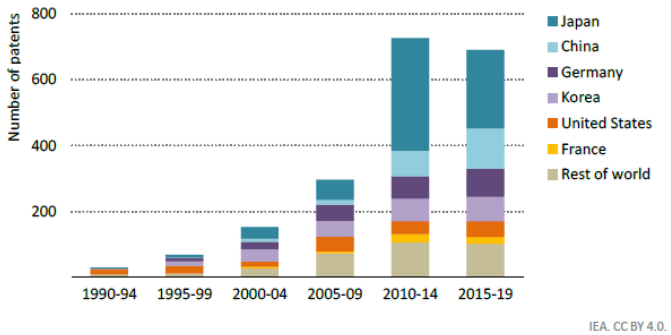


IEA. CC BY 4.0.

The number of patents for heat pump technologies has risen drastically, led by China and Japan who accounted for more than half of the new patents since 2010

After:

Figure 1.11 ▷ Patent counts for heat pump technologies by country, 1990-2019



IEA. CC BY 4.0.

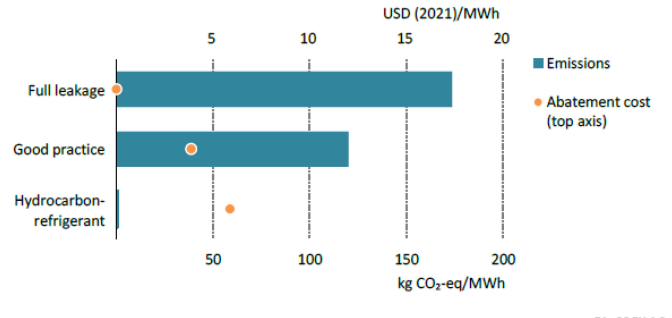
The number of patents for heat pump technologies has risen drastically, led by China and Japan who accounted for more than half of the new patents since 2010

Source: IEA analysis based on PATSTAT data.

2. On **page 57**, title and notes of Figure 2.6 replaced

Before:

Figure 2.6 ▷ **Heat pump refrigerant GHG emissions per MWh of useful heat output and abatement cost by refrigerant option**



EA. CC BY 4.0.

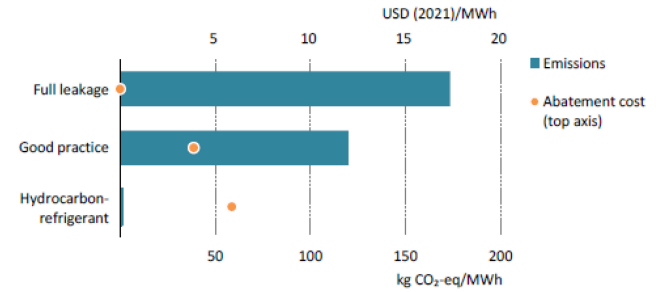
Specialised maintenance, recycling and the use of alternative refrigerants can substantially reduce emissions due to refrigerant leakage

Notes: kg CO_2-eq = kilogrammes of CO_2 equivalent. Baseline refrigerant mix with a GWP of 2 000.

Source: IEA analysis based on Purohit and Höglund-Isaksson (2017).

After:

Figure 2.6 ▷ **Heat pump refrigerant lifetime GHG emissions per MWh of annual useful heat output and abatement cost by refrigerant option**



EA. CC BY 4.0.

Specialised maintenance, recycling and the use of alternative refrigerants can substantially reduce emissions due to refrigerant leakage

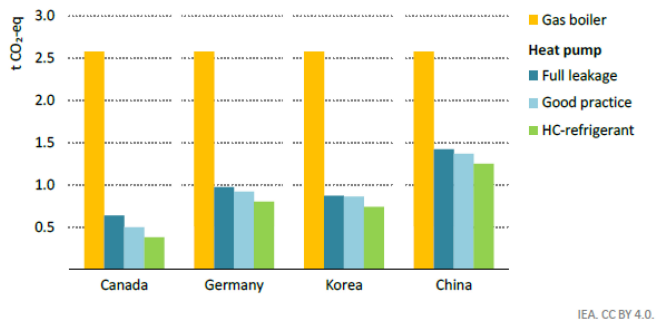
Notes: kg CO_2-eq = kilogrammes of CO_2 equivalent. Baseline refrigerant mix with a GWP of 2 000. Lifetime GHG emissions include greenhouse gas emissions from refrigerant leakage during operation and decommissioning.

Source: IEA analysis based on Purohit and Höglund-Isaksson (2017).

3. On **page 58**, title and notes of Figure 2.7 replaced

Before:

Figure 2.7 ▷ **GHG emissions per MWh of useful heat output for gas boiler and heat pump depending on refrigerant option**



IEA. CC BY 4.0.

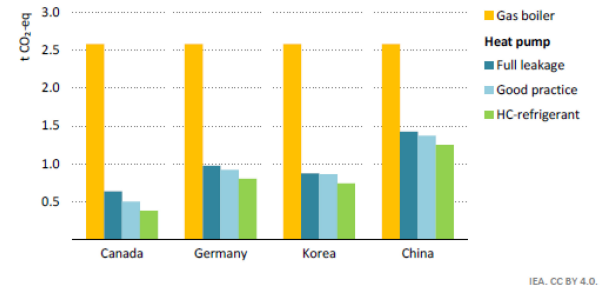
Switching to a heat pump substantially decreases emissions regardless of climate conditions and electricity mix. Addressing F-gas emissions can reduce emissions further.

Notes: t CO_2-eq = tonnes of CO_2 equivalent; HC = hydrocarbon. Emissions savings of a heat pump are compared with a gas boiler with 90% efficiency and F-gas emissions for a baseline without professional recycling and abatement options and a refrigerant mix with GWP = 2 000. GHG emissions include greenhouse gas emissions from operating and decommissioning. Electricity production emissions factors: Canada (119 g CO_2-eq/kWh), Germany (352 g/kWh), Japan (416 g/kWh), China (549 g/kWh). Canada climate based on Ontario, Japan on Central Japan and China on Northern China.

Sources: IEA analysis based on Purohit and Höglund-Isaksson (2017); Purohit et al. (2022a); and Kowalski and Szałański (2019).

After:

Figure 2.7 ▷ **Total lifetime GHG emissions per MWh of annual useful heat output for gas boiler and heat pump by refrigerant option**



IEA. CC BY 4.0.

Switching to a heat pump substantially decreases emissions regardless of climate conditions and electricity mix. Addressing F-gas emissions can reduce emissions further.

Notes: t CO_2-eq = tonnes of CO_2 equivalent; HC = hydrocarbon. Emissions savings of a heat pump are compared with a gas boiler with 90% efficiency and F-gas emissions for a refrigerant mix with GWP = 2 000. Total lifetime GHG emissions include greenhouse gas emissions from electricity use and refrigerant leakage during operation and decommissioning. Electricity production emissions factors: Canada (119 g CO_2-eq/kWh), Germany (352 g/kWh), Korea (424 g/kWh), China (549 g/kWh). Canada climate based on Ontario and China on Northeastern China.

Sources: IEA analysis based on Purohit and Höglund-Isaksson (2017); Purohit et al. (2022a); and Kowalski and Szałański (2019).

4. On **page 59**, the last sentence was changed from:

As with installers, China has the biggest heat pump manufacturing labour force, numbering around 55 000, consistent with its **45%** share of global heat pump manufacturing, followed by the United States, where around a quarter of heat pumps are produced.

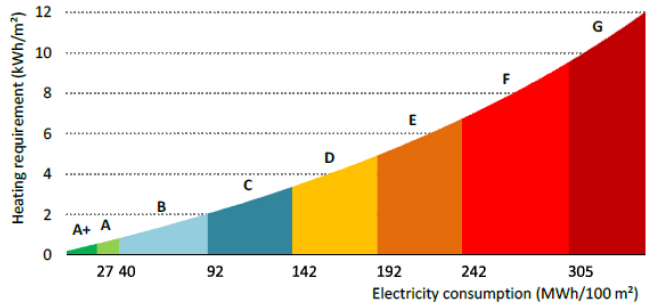
To :

As with installers, China has the biggest heat pump manufacturing labour force, numbering around 55 000, consistent with its **40%** share of global heat pump manufacturing, followed by the United States, where around a quarter of heat pumps are produced

5. On **page 74**, Figure 3.4 replaced

Before:

Figure 3.4 ▷ **Annual heat pump electricity consumption by building energy efficiency class in Denmark, 2022**



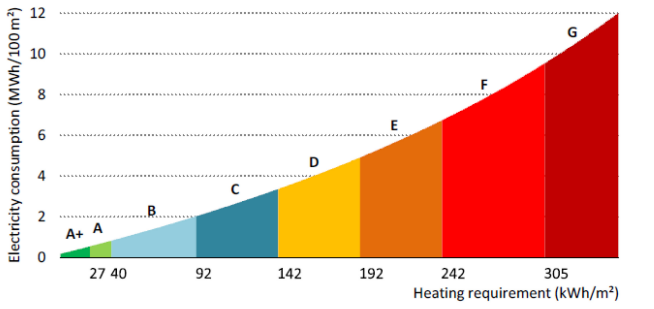
Electricity consumption by heat pumps in Denmark is up to 30 times lower in homes with the highest efficiency rating compared with the lowest efficiency rating

Notes: m² = square metre. The absolute values are based on the Danish building classification. Threshold values for classes depend on local climate conditions. Class A2015 is presented as A, Class A2020 is presented as A+. The electricity consumption refers to a 100 m² floor area.

Source: IEA representation based on Danish Energy Agency (2022).

After:

Figure 3.4 ▷ **Annual heat pump electricity consumption by building energy efficiency class in Denmark, 2022**



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Notes: m² = square metre. The absolute values are based on the Danish building classification. Threshold values for classes depend on local climate conditions. Class A2015 is presented as A, Class A2020 is presented as A+. The electricity consumption refers to a 100 m² floor area.

Source: IEA representation based on Danish Energy Agency (2022).