Strengthening Climate Resilience: Opportunities for Mongolia's Private Sector

Practical Climate Solutions for the Private Sector – Energy Efficiency

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*"At International Energy Agency (IEA), we call energy efficiency **"the first fuel"** – which shows the significance of energy efficiency in transition to net zero."*

Fatih Birol – IEA Executive Director

Global Renewables and Energy Efficiency Pledge

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COP28UAE

Global Renewables and Energy Efficiency Pledge

We, Heads of State and Governments as the Participants in the COP28 Global Renewables and Energy Efficiency Pledge:

We declare our intent to work collaboratively and expeditiously to pursue the following objectives:

Commit to work together to triple the world's installed renewable energy generation capacity to at least 11,000 GW by 2030, taking into consideration different starting points and national circumstances.

Commit to work together in order to collectively double the global average annual rate of energy efficiency improvements from around 2% to over 4% every year until 2030.

Mongolia | Energy Consumption by Sector

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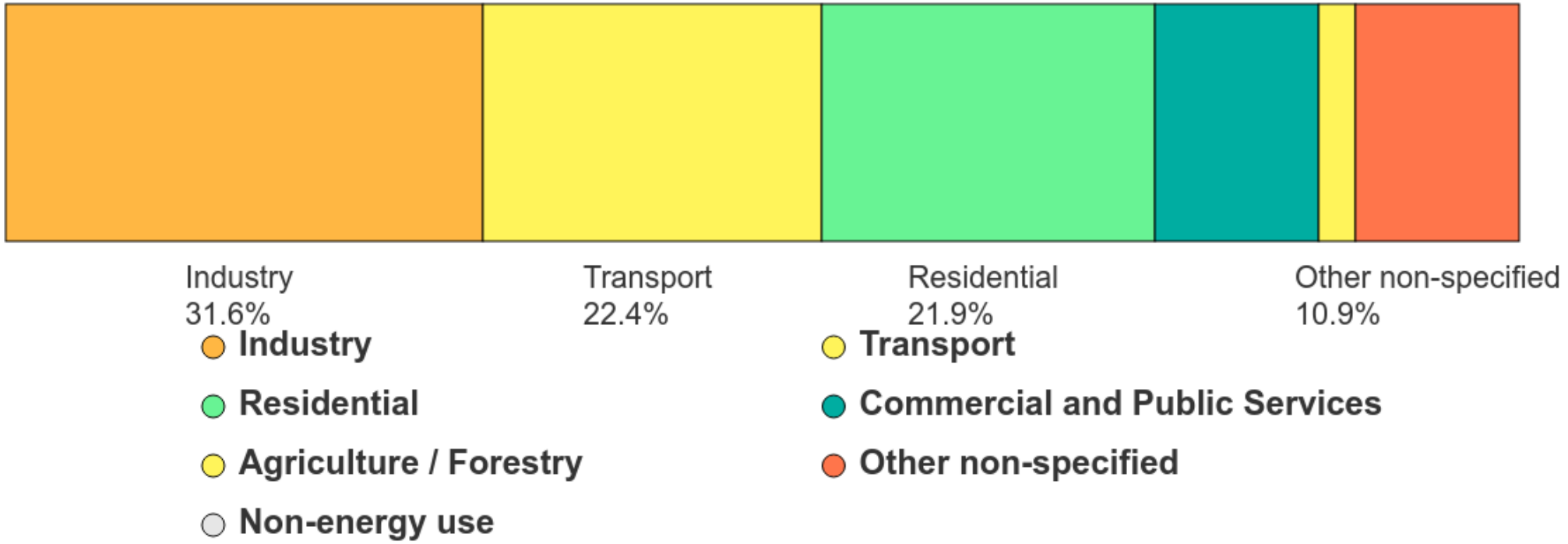
Total final consumption, Mongolia, 2022



Source: International Energy Agency. Licence: CC BY 4.0

Mongolia | Industrial Energy Use by Source

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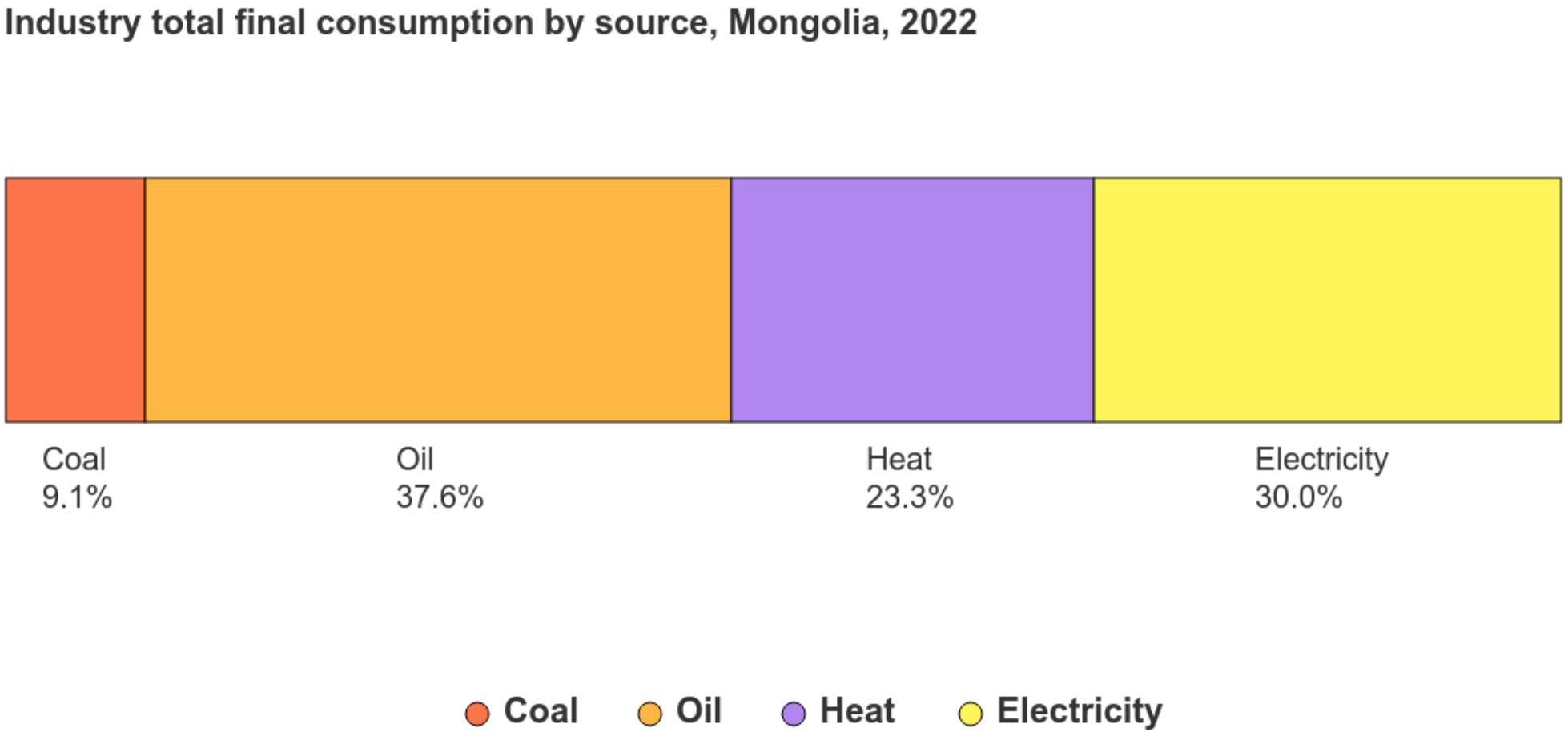

Mongolia | Electricity Generation

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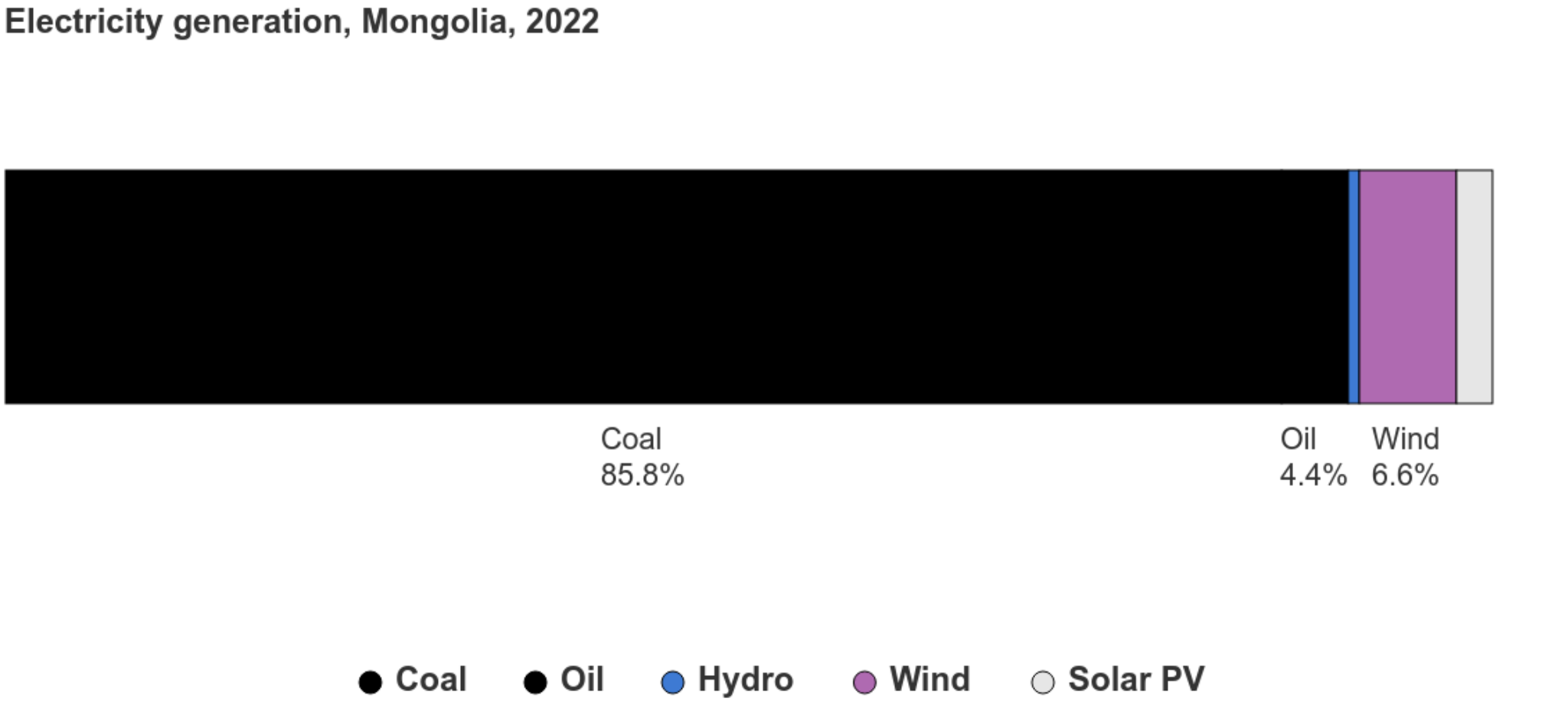

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EBRD Support to Energy Efficiency

EBRD's Support to Energy Efficiency

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- EBRD Agrifood Nexus Programme in Central Asia (2023-present)
- EBRD's Resources Efficiency and Transformation (ResET) Programme
- EBRD Mongolian Sustainable Energy Financing Facility (MonSEFF) (2014-2019)
  - ➢ US$25 million credit line facility for Mongolian SMEs and corporates investing in EE and small-scale renewable energy (financing through PFIs). 40 Mongolian businesses benefited. Projects financed generated **255,000 MWh in annual energy savings** and **reduced carbon emissions by 94,000-ton eq. CO2/y**.
- EBRD Green Economy Financing Facility (GEFF) Mongolia (2023-present)
  - ➢ Credit line facility of up to US$137 million to local PFIs to on-lend to private sector businesses and households for investment in high performing green technologies for climate change mitigation and adaptation.
- EBRD FINTECC Programme on Climate Technology Transfer
  - ➢ Mongolia – Shunkhlai Holding: Sustainable office buildings by refurbishing HQ to receive Leadership in Energy and Environmental Design (LEED) silver rating through reduction of 30% energy consumption and 20% water consumption. Concessional financing via FINTECC to install new air-conditioning systems and LED lighting and introduce other modern building-management systems

EBRD's Support to Energy Efficiency

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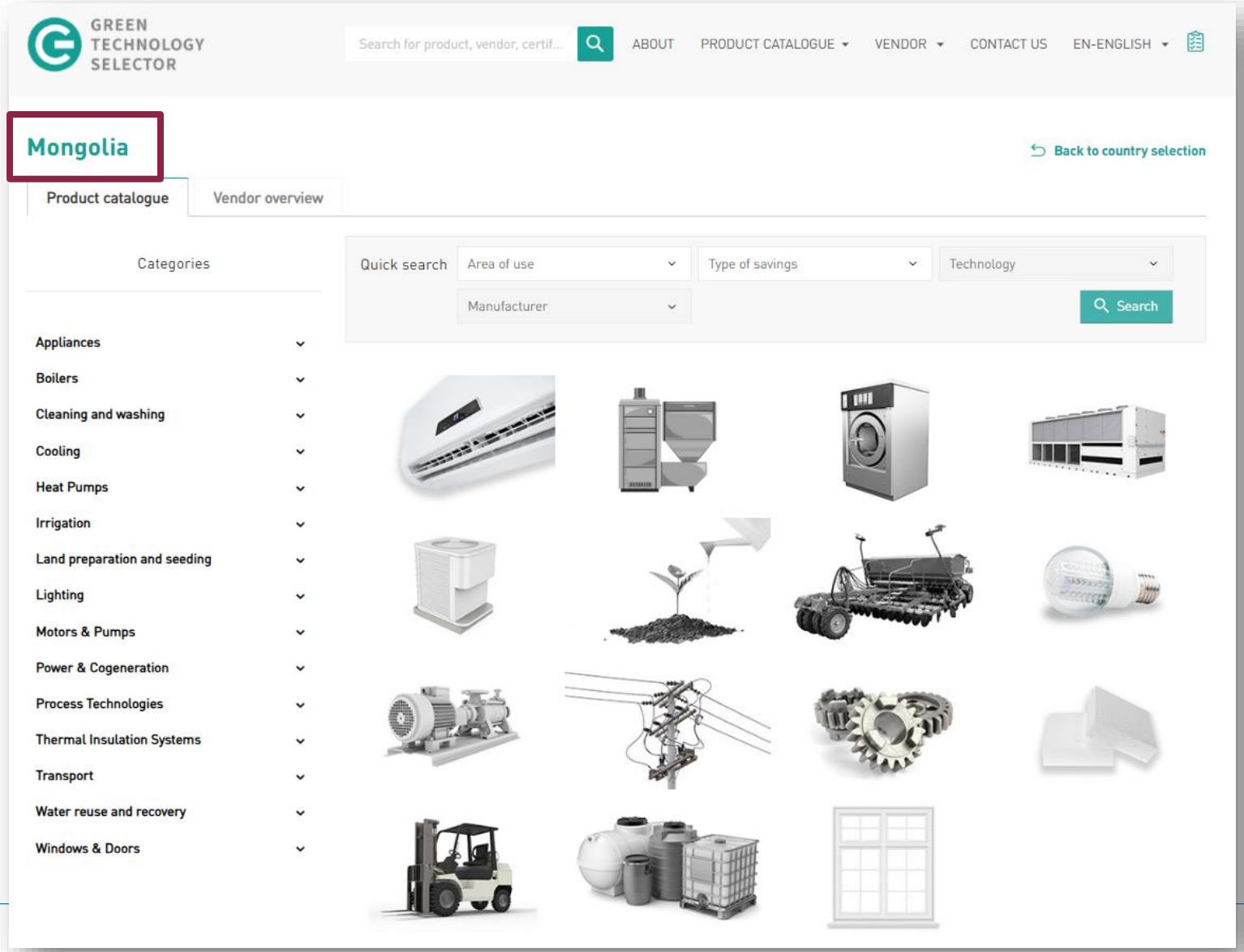

- **EBRD Green Technology Selector (GTS)**

➢ *As of September 2024, over 30,000 green technologies worldwide, including **755 products from 132 green technology vendors and producers in Mongolia** are registered in the GTS.*

https://www.techselector.com/mongolia-en/

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Energy Efficiency Solutions for the Private Sector

Practical EE Solutions for the Private Sector

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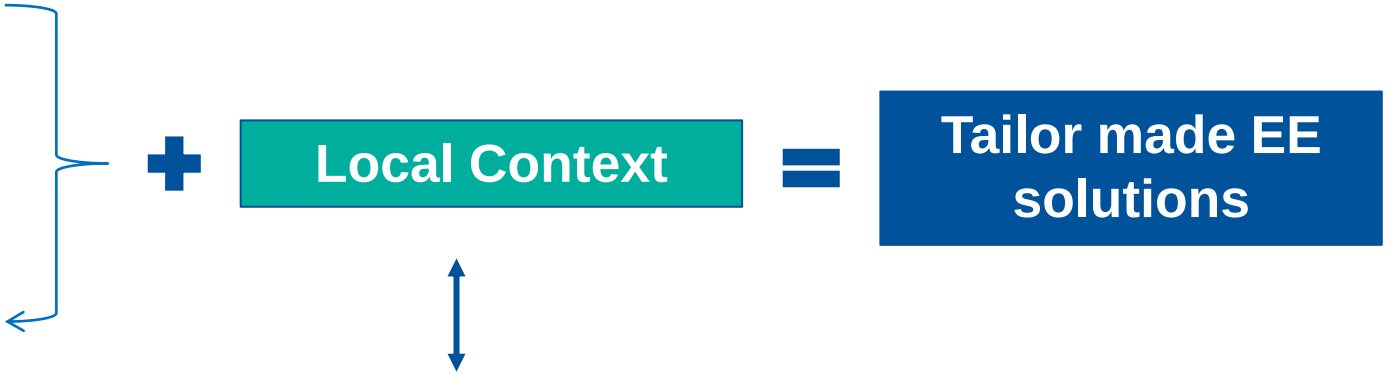
- General EE Measures
- Sector-specific EE Measures



Country-specific prioritisation:

- ✓ Existing energy infrastructure
- ✓ Weather conditions
- ✓ Renewable energy potential
- ✓ Access to energy efficient equipment in the local market
- ✓ National policies and regulatory framework

General EE Measures

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- **Energy Management, Monitoring and Training**
  - Energy audits, smart meters, staff training
- **Lighting and Controls**
  - LED retrofits, motion/occupancy sensors
- **Heating, Ventilation and Air Conditioning (HVAC)**
  - Zoning, insulation (walls/windows/rooms/pipes/tanks), double doors/air curtains and vestibules, natural (passive) cooling/ventilation, programmable thermostats
- **Equipment/Machinery**
  - High-efficiency motors/air compressors/steam boilers, variable frequency drives (VFDs), automated cleaning-in-place (CIP) systems
- **Renewable Energy Integration**
  - Rooftop solar PV, solar water heating, solar-powered equipment

LED Lighting → Result in 70-80% reduction in lighting costs

HVAC → For every 1°C of overheating (or overcooling) energy costs rise about 8%

Sector-specific EE Measures

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❑ Crop Production

- Drip irrigation, greenhouse insulation, soil moisture sensors, smart controllers for irrigation timing

❑ Dairy Production

- Pre-cooling with plate heat exchangers, solar chillers

❑ Bakery

- Oven flue gas recovery to preheat air or water, modern electric ovens with programmable controls

❑ Textile (Cashmere/Wool) Production

- Insulation of dyeing tanks/boilers/pipes, waste heat recovery from effluents, thermostatic controls on heating units, task lighting for workers (no full-room lighting)

❑ Beverage/Brewery

- Heat recovery systems, CO2 recovery in breweries, efficient boiling, low-GWP based ammonia or CO2-based cooling systems

❑ (Food) Retail

- Refrigeration heat recovery, night blinds/glass doors, cold chain resilience (thermal curtains and insulated delivery containers), refrigeration with low-GWP refrigerants

IEA Energy Efficiency Policy Toolkit 2024

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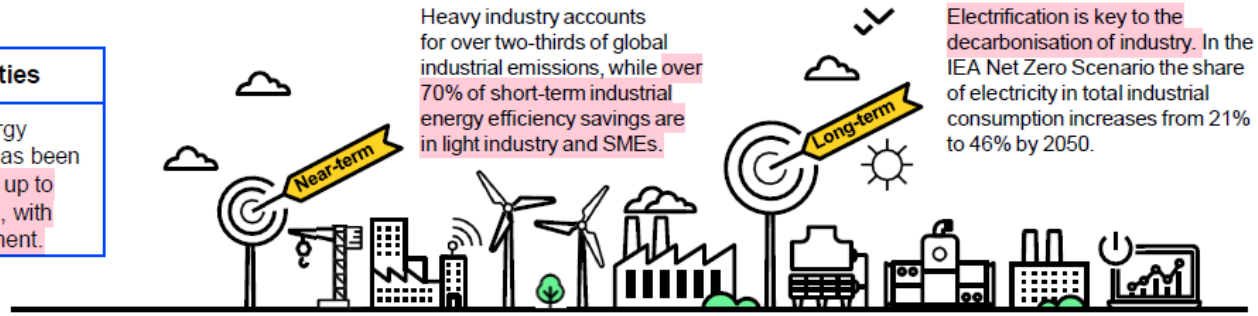
Policy Package – Industry Energy Efficiency

Immediate opportunities

Implementing better energy management practices has been shown to deliver savings up to 15% in the first 1-2 years, with little or no capital investment.

Heavy industry accounts for over two-thirds of global industrial emissions, while over 70% of short-term industrial energy efficiency savings are in light industry and SMEs.

Electrification is key to the decarbonisation of industry. In the IEA Net Zero Scenario the share of electricity in total industrial consumption increases from 21% to 46% by 2050.



REGULATION

- **Minimum Energy Performance Standards** for key equipment, such as motors and pumps, can drive up overall industrial efficiency levels.
- **Regulation** extends beyond technology to target areas such as research and development, energy auditing, mandatory consumption reporting, energy management systems, and upskilling of the workforce. Incorporating life cycle impacts into regulation helps promote material efficient choices at the design stage.
- **Regulatory instruments** yield best results when rooted in a good understanding of local context and include ambitious, regularly updated, standards.
- **Regulations to ensure demand side response capabilities** help provide flexibility to the grid.

INFORMATION

- **Benchmarking, indicators and other forms of detailed data** allow governments to track the progress of policies and allow industries to compare their energy performance with that of their peers.
- **Digital technologies** enable industries to track energy use in real time and help ensure flexible demand side response, resulting in energy optimisation and cost saving opportunities.
- **Sharing information on energy efficiency best practice** through targeted information and industry networking activities helps industries raise ambition and improve energy performance.

INCENTIVES

- **Incentives** such as preferential finance, links to carbon trading, obligations and tax-based measures can motivate crucial energy efficient decisions at the process design and equipment selection stage, supporting industry's transition to near zero emission technologies.
- **Free or subsidised energy audits**, often targeted at SMEs and other sectors of strategic importance, can help rapidly increase energy efficiency.
- **Policies to foster Energy Service Companies** provide industry with access to significant external energy expertise and attractive structured financial packages.
- **Incentives for the reuse and recycling** of materials reduce the need for higher-emission primary materials production.

iea

https://www.iea.org/reports/energy-efficiency-policy-toolkit-2024

IEA ETP Clean Energy Technology Guide

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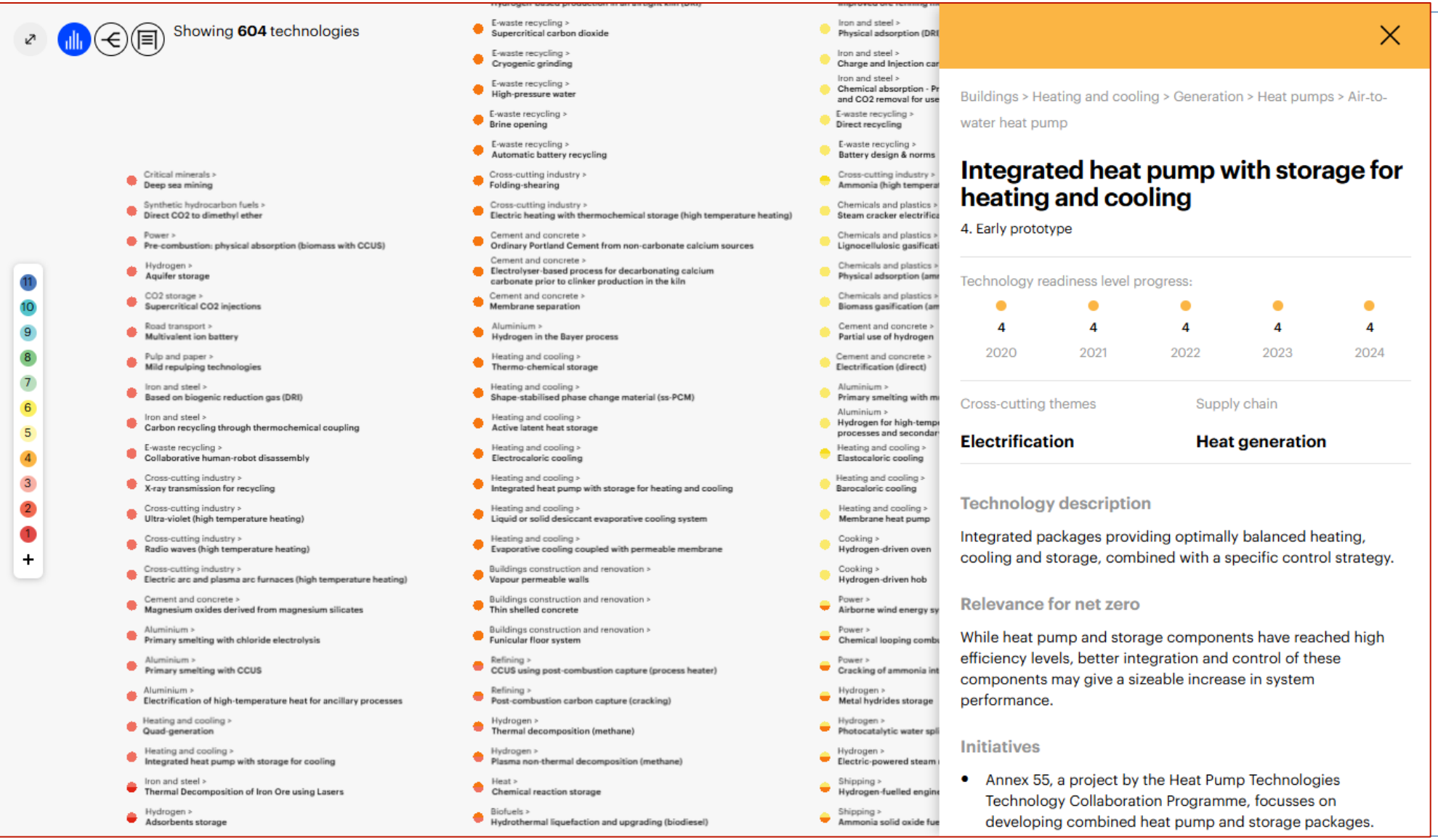

The **Clean Energy Technology Guide** is an interactive database containing information about nearly 600 individual technology designs and components across the whole energy system that can contribute to achieving net zero emissions.

https://www.iea.org/data-and-statistics/data-tools/etp-clean-energy-technology-guide

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Case Studies

Case Study | Industrial Bakery in Morocco

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Moroccan industrial bakery founded in 1995 (exclusive supplier of bread to McDonald's Morocco)

Impact

- 40% reduction in energy consumption
- Reduction of "energy consumption/quantity of dough processed"

Energy Savings

- 44.8 MWh/year

CO2 Savings

- 26 T eq CO2 per year

Investment: Replacement of old dough mixer with new generation direct-drive mixer

Investment Size = EUR 157k; ROI = 4.47 years

Case Study | Brewery in Georgia

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New brewery fully operational as of 2017 (domestic production of international brands)

Impact

- CO2 recovery system allows the brewery to recuperate and reuse around 35% of the CO2 generated by its production processes
- Eliminate importation costs
- Improved production efficiency

CO2 Savings

- 500 T eq CO2 per year

Investment:

- ✓ New CO2 Recovery System
- ✓ High-efficiency filling machines (reduce energy and wastewater)
- ✓ Variable speed drives that match motor electricity use to process requirements

Case Study | Beverage/Beer Manufacturer in Kyrgyz Republic

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Beverage manufacturer (soft drinks, bottled water) rebuilding factory to include beer manufacturing (fully operational since 2015)

Impact

- Annual savings of more than EUR 75,000 in heating and electricity

CO2 Savings

- 600 T eq CO2 per year

Investment:

- ✓ Factory reconstructed with thermal insulation and new windows
- ✓ High-efficiency steam boiler
- ✓ CO2 recovery system
- ✓ Energy management system
- ✓ Variable speed drives that optimize electricity use by motors

Case Study > Sustainable Tourism in Mongolia

European Bank
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A new resort "White House" using international best practice energy efficiency technologies

Impact

- 72% energy saving (thermal insulation layers, windows, energy efficient lamps and heating system)
- New building construction exceeds the national EE standards by average 15-20%

Energy Savings

- 958 MWh/year

CO2 Savings

- 308 T eq CO2 per year

Investment: A new sustainable tourist resort (30 km outside of Ulaanbaatar) that uses energy efficient technologies

Investment Size = USD 100k; ROI = 4 years

Case Study > Textile Manufacturer in Morocco

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Moroccan SME operating in the textile and non-woven materials sector since 1999

Impact

- 28% reduction of electrical energy consumption and CO2 emissions
- 90% increase in plant output
- Average annual monetary gain of EUR 120,000

Energy Savings

- 116 MWh/year

CO2 Savings

- 66.6 T eq CO2 per year

Investment: New Weaving Machines

Investment Size = EUR 615k; ROI = 7.3 years

Case Study | Cold Storage Facility in Uzbekistan

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Uzbek company to diversify into the fruit and vegetable storage market by fitting its warehouses with a modern tunnel freezer for shock-freezing, a process that preserves the produce's nutritional values and quality.

Impact

- Increased production output
- New tunnel freezer uses only around half of the energy required by conventional systems in use

Energy and Water Savings

- 1,468 MWh/year energy
- 9,425 m3/year water

CO2 Savings

- 219 T CO2 per year

Investment: Modern and energy efficient Tunnel Freezer

Investment Size = USD 540k; ROI = 3.76 years

Tunnel Freezer photo from www.lindeus.com (for reference purposes only, not related to the case study investment)

Case Study | Food Retail Chain in Türkiye

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Food Retail Sector Trend for Electricity Consumption

Refrigeration	30-60%
Lighting	15-25%

Largest retail chain in Türkiye, with over 13,600 stores in cities across the country

Investment:

- ✓ Reducing the energy consumption and carbon emissions of stores through refurbishment
- ✓ Installing solar energy panels for internal consumption up to 30 MW
- ✓ Introducing resource efficiency measures

Case Study | Food Retail Resource Efficiency Audit in Uzbekistan

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EE Measure	Store #1	Store #2	Store #3	Store #4	Store #5	Store #6	Store #7	Store #8
Energy Management System	√	√	√	√	√	√		√
Lighting Automation/ Improvements	√	√		√		√		√
Solar PV Rooftop	√	√			√	√		√
Fridge Doors			√				√	√
HVAC Replacement	√		√	√		√		
Improvements in Refrigeration Rack Systems							√	
Insulation in Boiler House		√		√		√		

! Refrigeration system with low-Global Warming Potential (GWP) refrigerants !

Refrigeration | Shift to Low-GWP Refrigerants

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Kigali Amendment to the Montreal Protocol (entered into force in 2019) mandates a phasedown of hydrofluorocarbons (HFCs) — potent GHGs used in refrigeration and air conditioning — due to their high global warming potential (GWP) → shift towards low-GWP refrigerants.

Mongolia ratified the Kigali Amendment in 2022 (as an Article 5 Group 1 country) → Mongolia is scheduled to **begin freezing HFC consumption in 2024**, with a gradual reduction leading to an 80% decrease by 2045.

Refrigerant	Type	GWP	Typical Applications	Notes
R-134a	HFC	~1430	Domestic fridges, commercial refrigeration, transport AC	Common, but being phased down
R-404A	HFC blend	~3922	Supermarket freezers, transport refrigeration	High GWP; inefficient; early target of Kigali
R-410A	HFC blend	~2088	Residential & commercial air conditioning	Still widespread; Kigali target
R-507A	HFC blend	~3985	Low-temp refrigeration (cold storage, ice rinks)	Phasedown encouraged urgently
R-407C	HFC blend	~1774	AC systems, retrofits for R-22	Used as transitional refrigerant

Low-GWP Refrigerants

Refrigerant	Type	GWP	Typical Applications	Comments
R-744 (CO_2)	Natural	1	Supermarkets, heat pumps, industrial cold storage	Excellent for low temps; high operating pressure
R-717 (Ammonia)	Natural	0	Cold storage, food processing, large-scale AC	High efficiency; toxic, needs safety precautions
R-290 (Propane)	Natural	~3	Stand-alone units, bottle coolers, small AC systems	Highly flammable; low charge systems preferred
R-600a (Isobutane)	Natural	~3	Household refrigerators, small freezers	Excellent efficiency; flammable
HFO-1234yf	HFO	<1	Mobile AC (vehicles), small commercial units	Drop-in replacement for R-134a; mild flammability
HFO-1234ze	HFO	~6	Chillers, vending machines, foam blowing	Non-flammable; good for commercial AC
R-513A	HFO blend	~630	Commercial refrigeration (retrofit for R-134a)	Non-flammable blend with moderate GWP
R-452A	HFO blend	~2140	Transport refrigeration (e.g., trucks)	Lower GWP than R-404A, but not ultra-low
R-32	HFC	~675	Residential split type AC, small commercial AC	Transition refrigerant; mild flammability

- ✓ Targeted phase-down of HFCs (like R-134a, R-404A, R-410A) over time.
- ✓ Adoption of low-GWP alternatives including natural refrigerants (CO_2, ammonia, hydrocarbons) and new generation HFOs as alternatives.
- ✓ Refrigerant selection must consider safety (toxicity, flammability), efficiency, and GWP.
- ✓ By 2045, developing countries like Mongolia must achieve an 80%+ phasedown of HFCs (with early reductions starting as of 2024–2028 depending on group).

Ghana | Imported Refrigerators (2005-2023)
Electricity Consumption – Used Refrigerators vs. New Refrigerators

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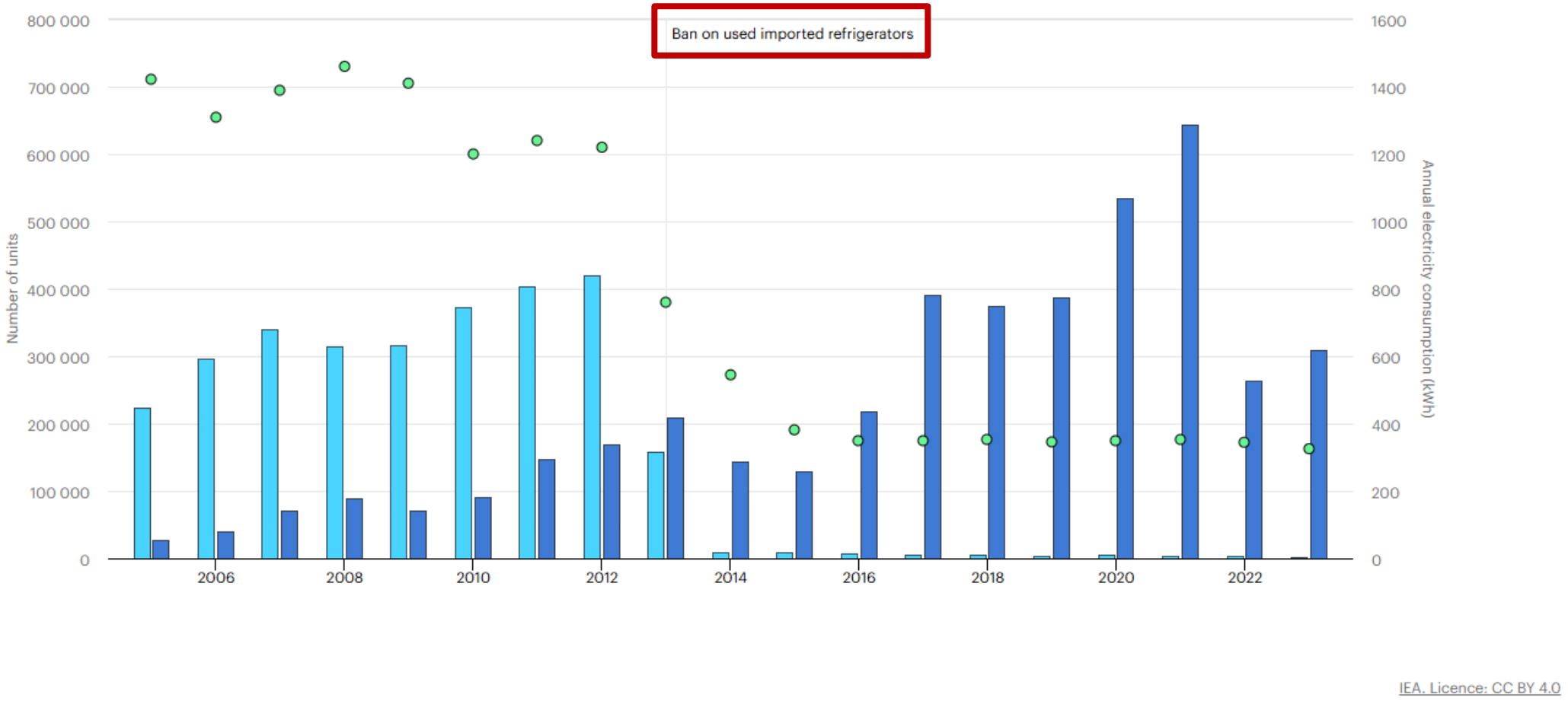

IEA (2024), Imports and average consumption of imported refrigerators in Ghana, 2005-2023, IEA, Paris https://www.iea.org/data-and-statistics/charts/imports-and-average-consumption-of-imported-refrigerators-in-ghana-2005-2023, Licence: CC BY 4.0

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Thank You

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