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Sustainable Development Issues in the Energy Sector

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Rotary International 3rd District Conference

Grayson Heffner

Resident Advisor

USAID Energy Sector Capacity Building Activity



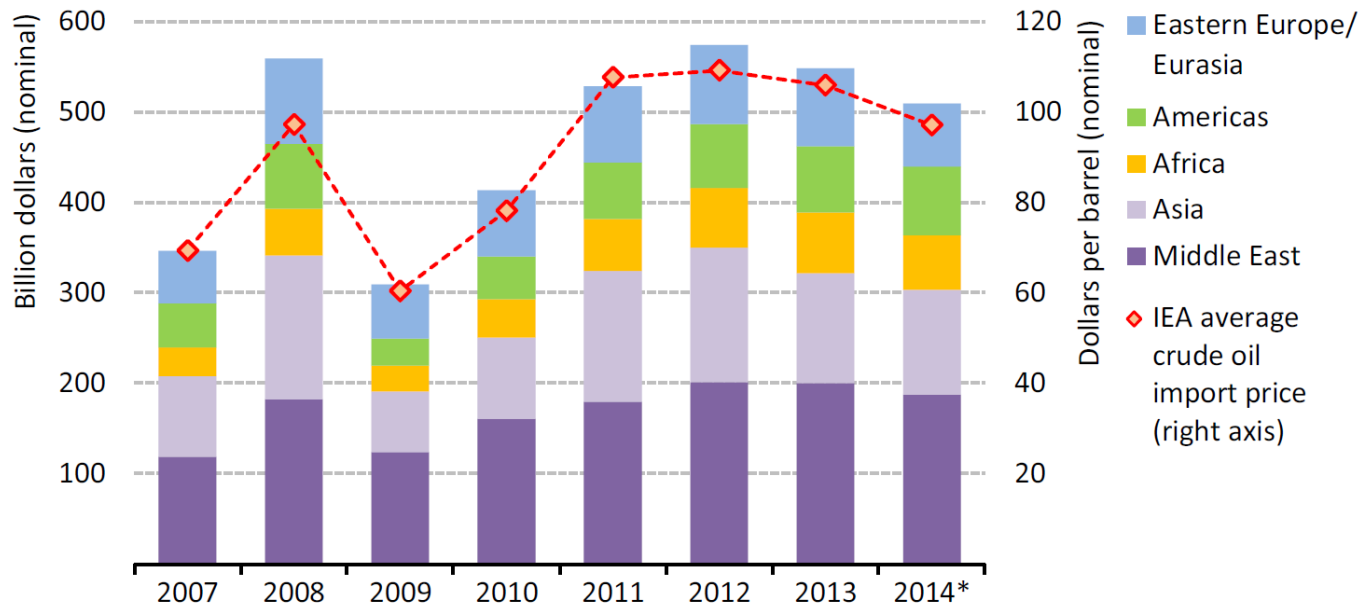


Topics

- What is sustainability in the energy sector?
- Global state-of-play
- Regional perspective
- Examples from Jordan
- The Way Forward



Fossil Fuel Subsidies

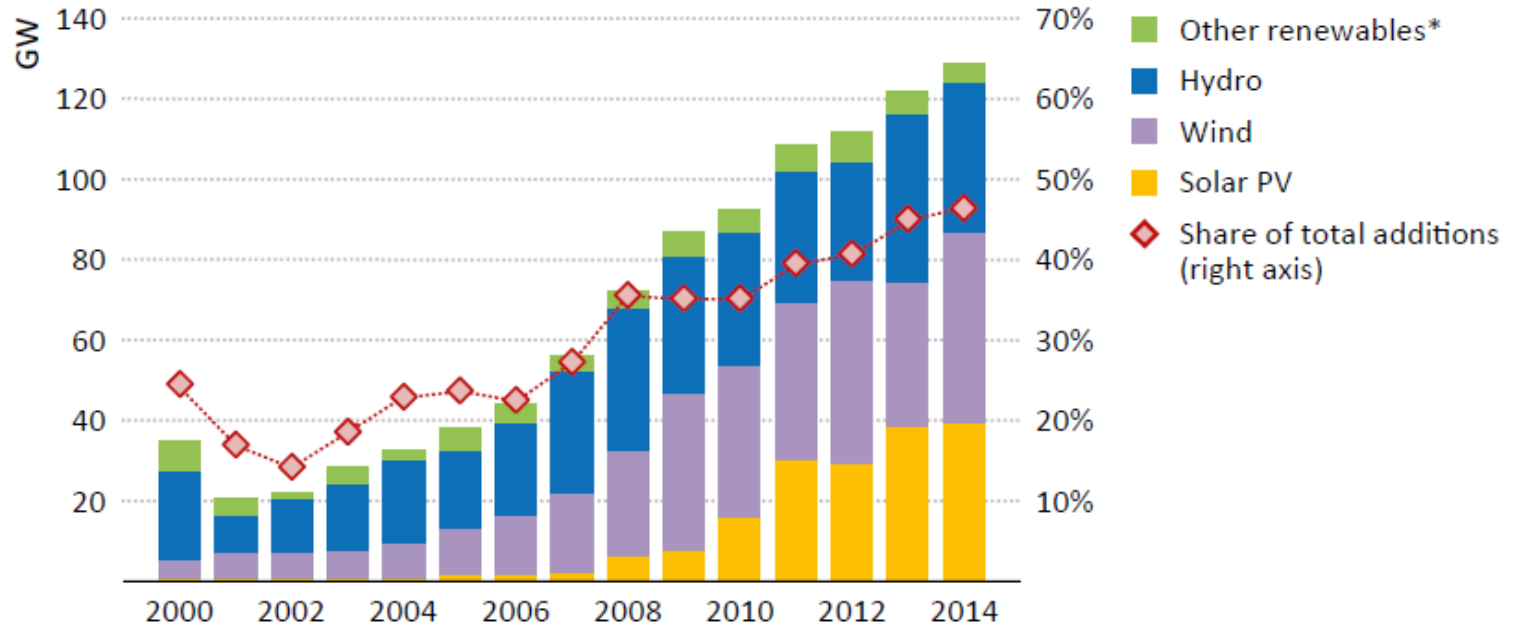


Source: International Energy Agency

*Estimate using preliminary data for 2014.



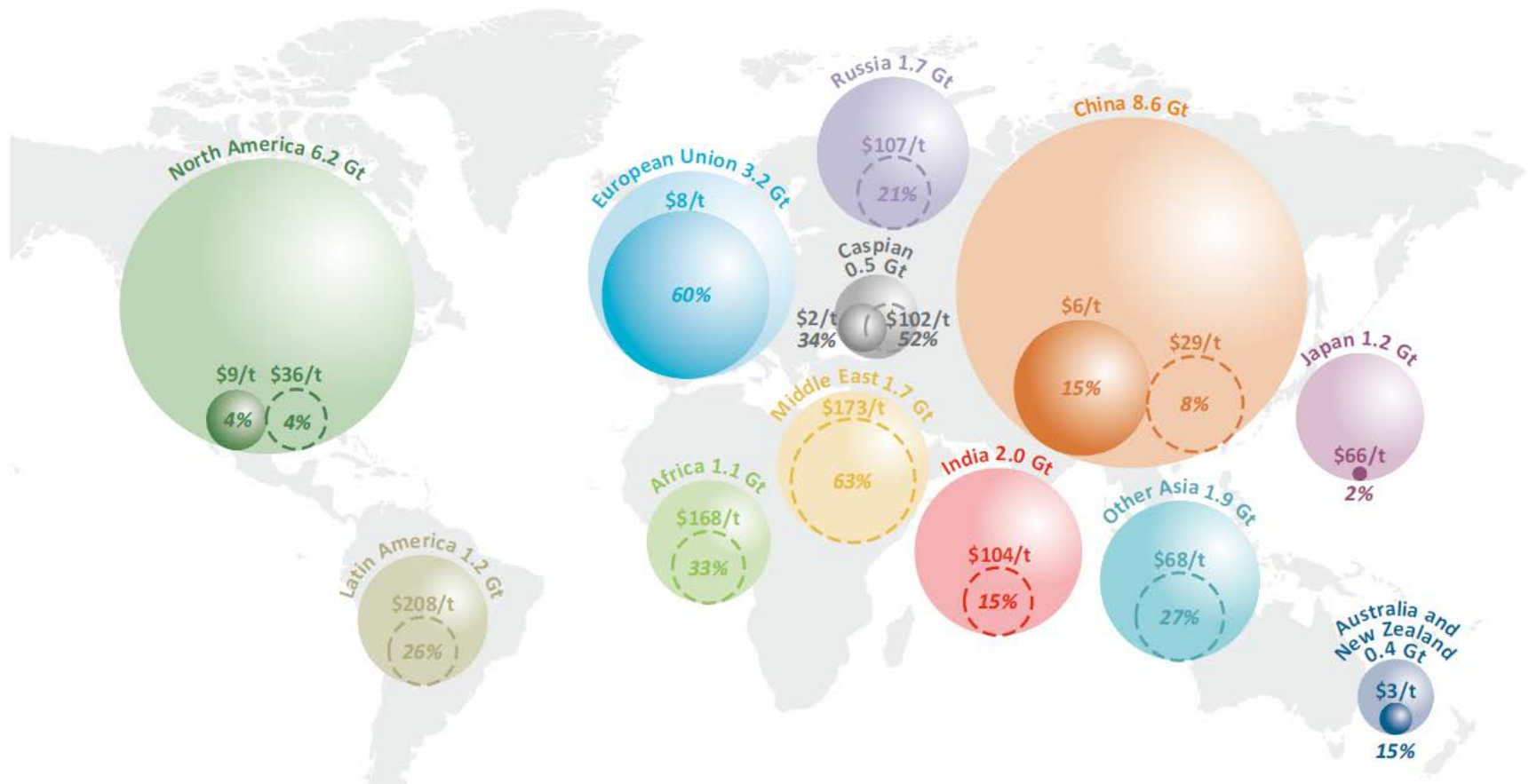
Global Renewable Power Addition – and share of total additions



* Includes geothermal, marine, bioenergy and concentrating solar power.

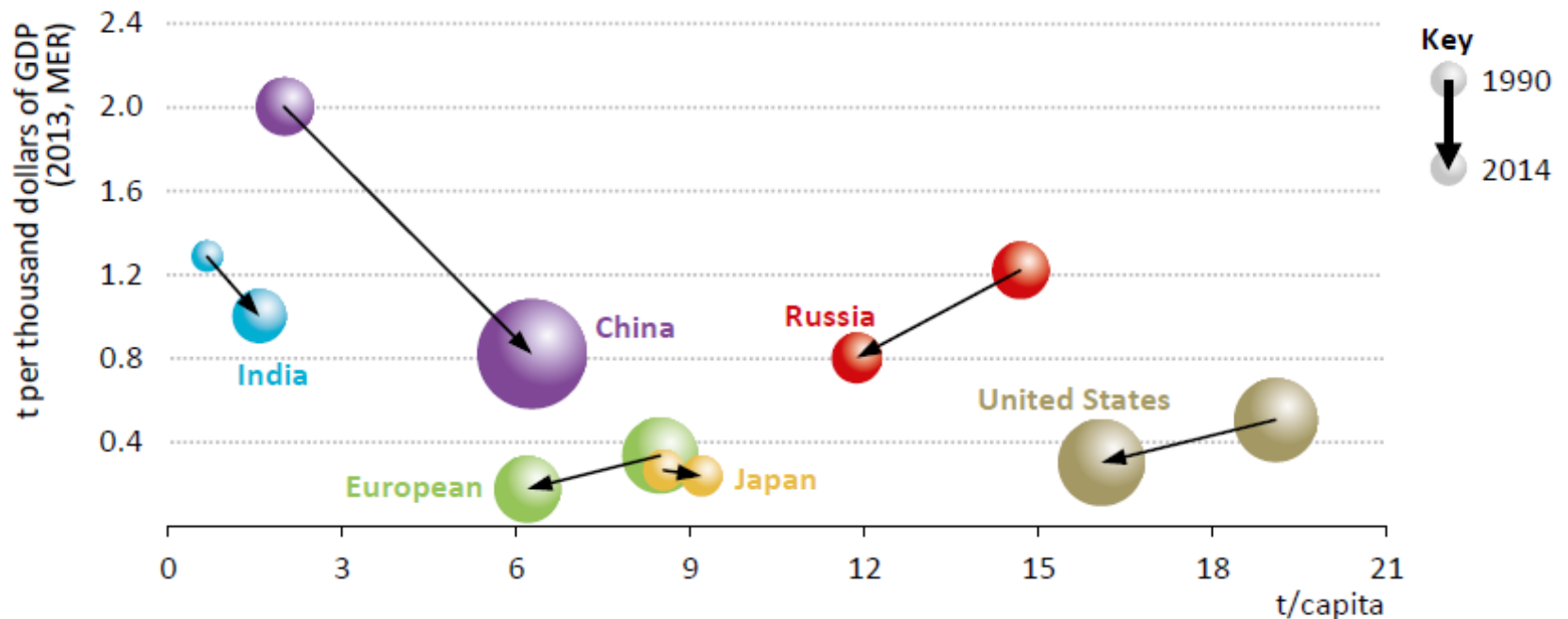


Energy-related CO2 emissions in selected regions





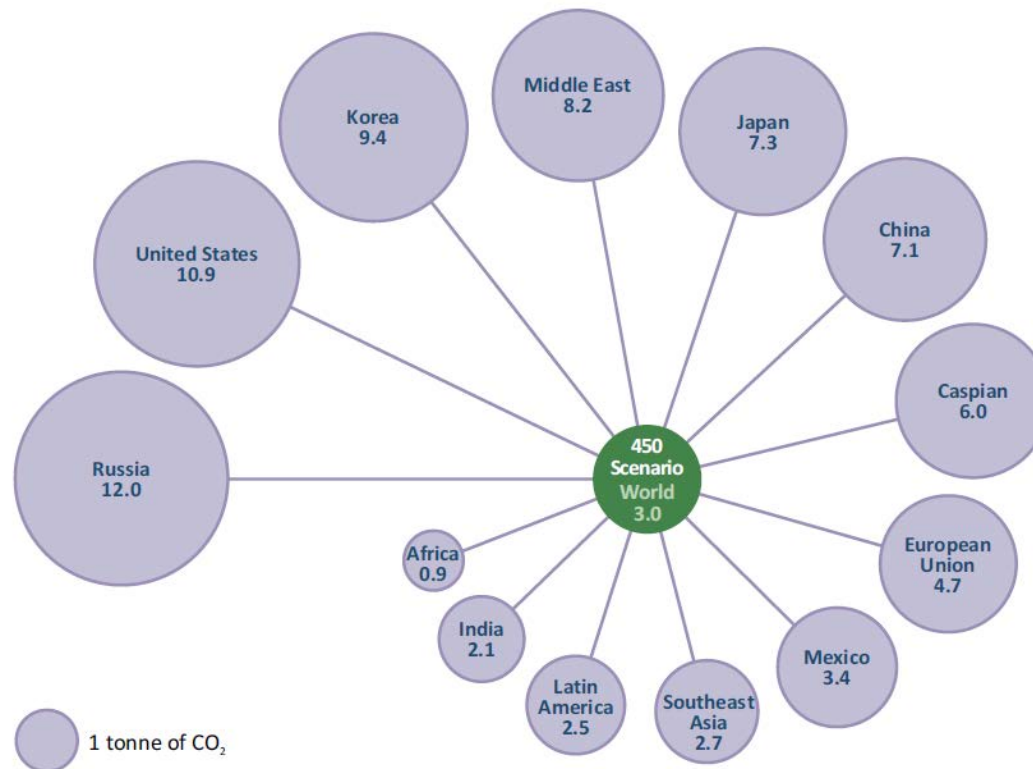
Energy-related CO2 emissions per capita and per unit GDP



Notes: Bubble area indicates total annual energy-related CO₂ emissions. MER = market exchange rate.

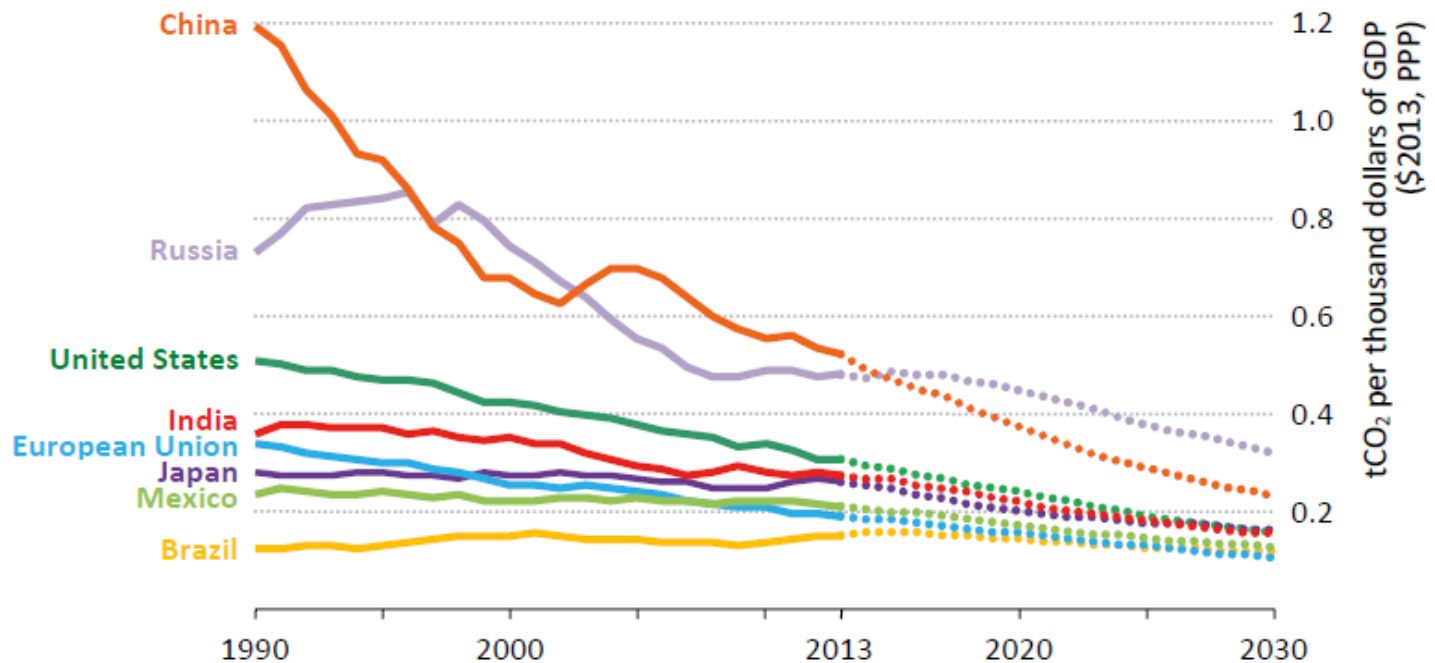


Energy-related emissions per capita – estimated in 2030



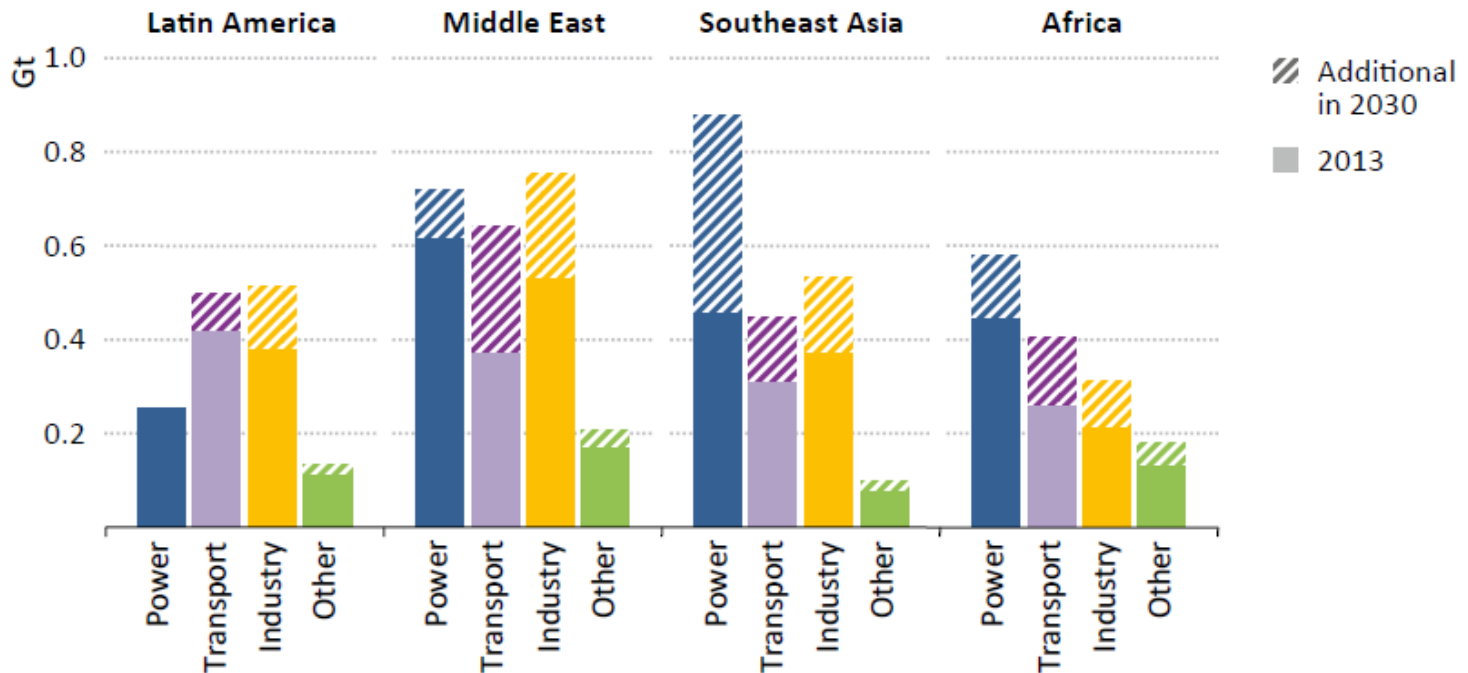


Carbon intensity of selected regions – INDC scenario





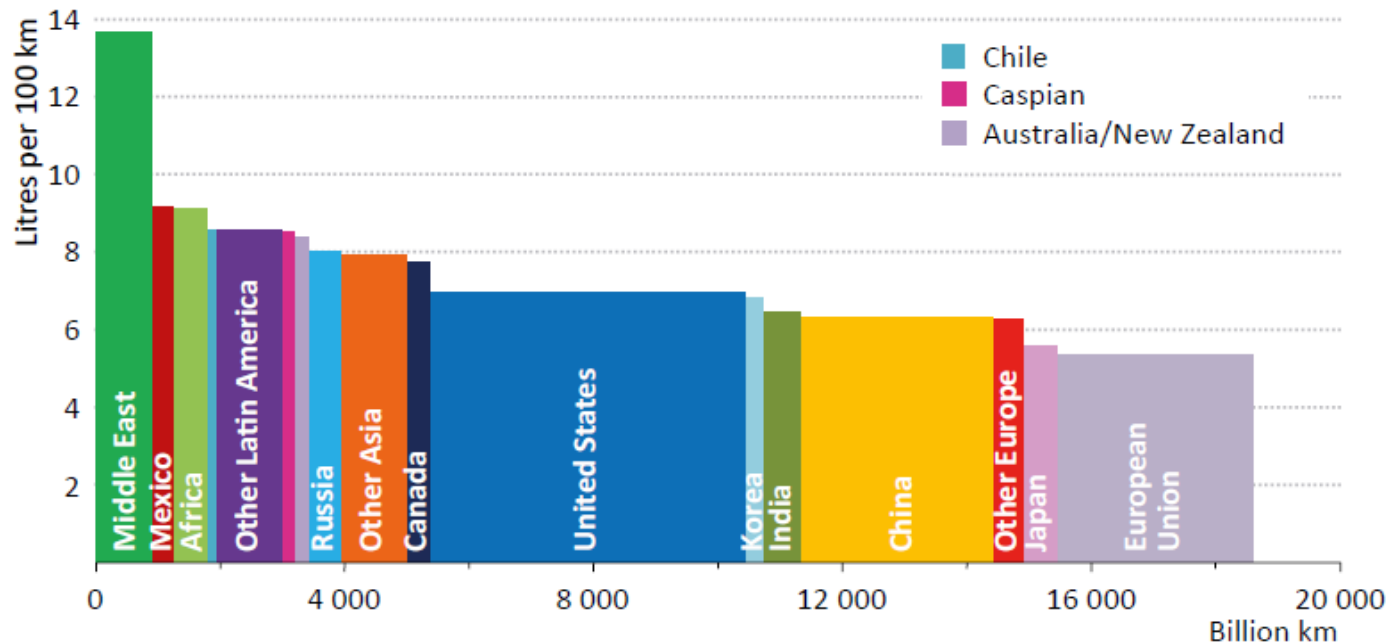
Energy-related CO2 emissions by region and sector – INDC Scenario



Notes: Industry includes emissions from non-energy use, refineries and fossil-fuel supply. "Other" includes buildings and agriculture. Electricity sector emissions in Latin America decline slightly from 2013 to 2030.

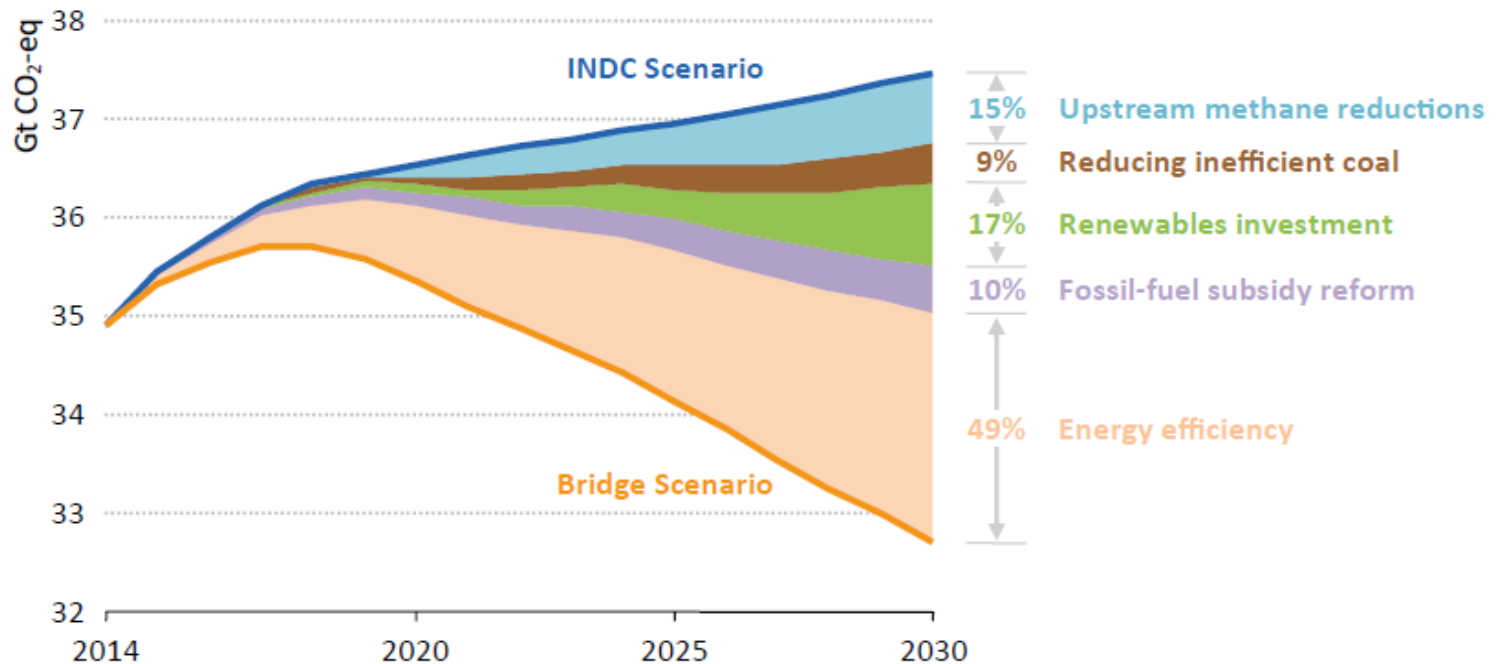


Avg fuel economy of passenger LDVs and km driven, 2025 in the INDC scenario



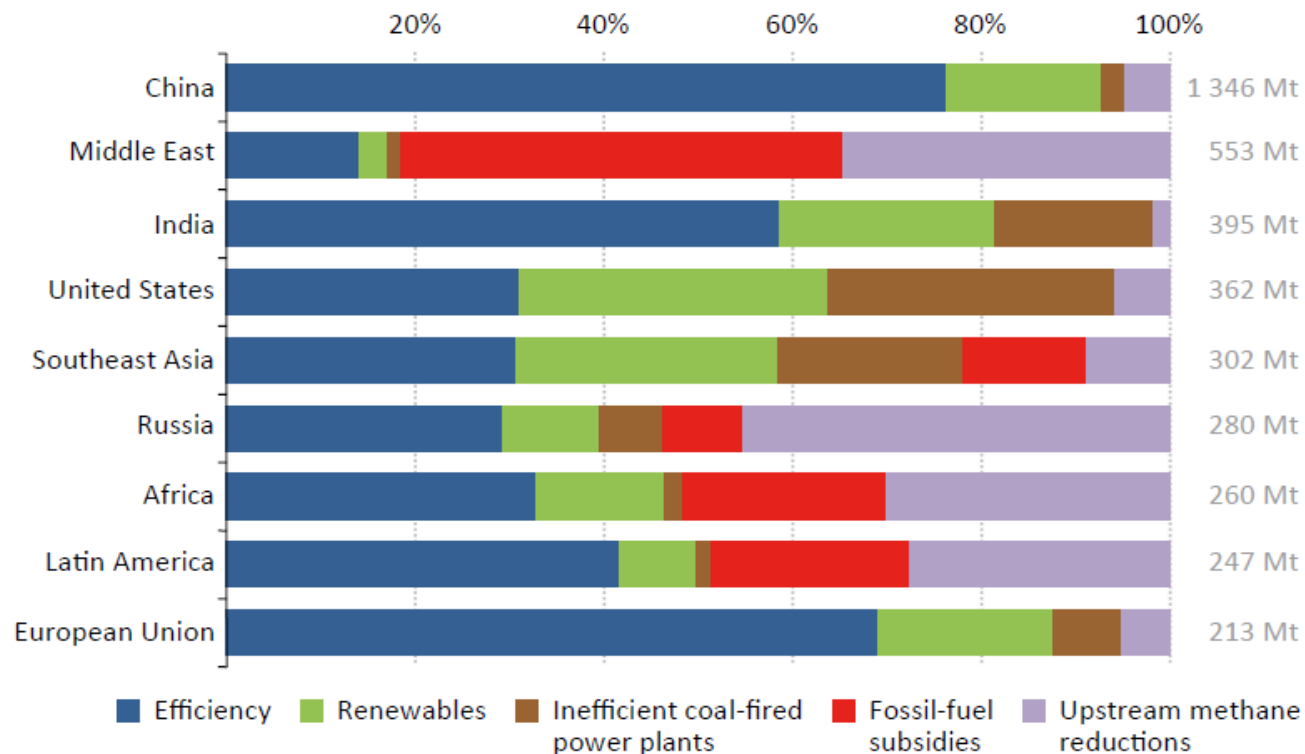


Global energy-related GHG emission reduction – by policy measure



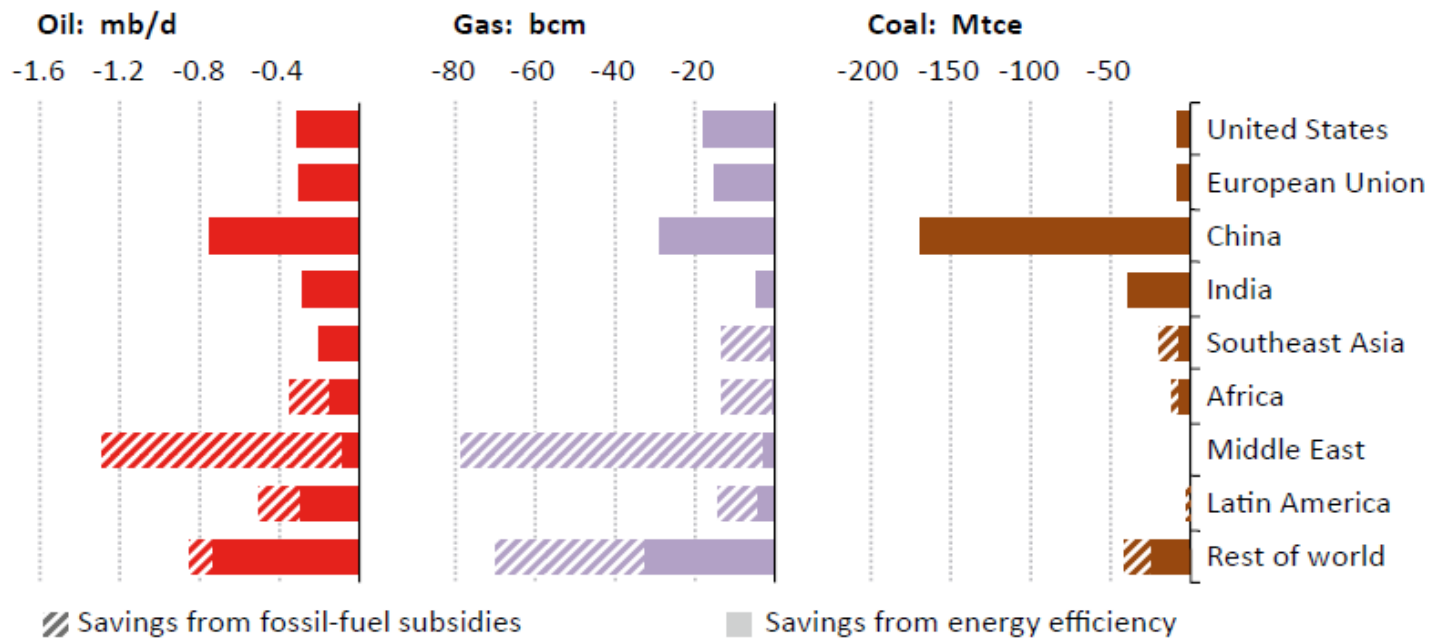


Energy Related GHG emissions reduction by relevant regional strategy in the INDC Bridge strategy, 2030





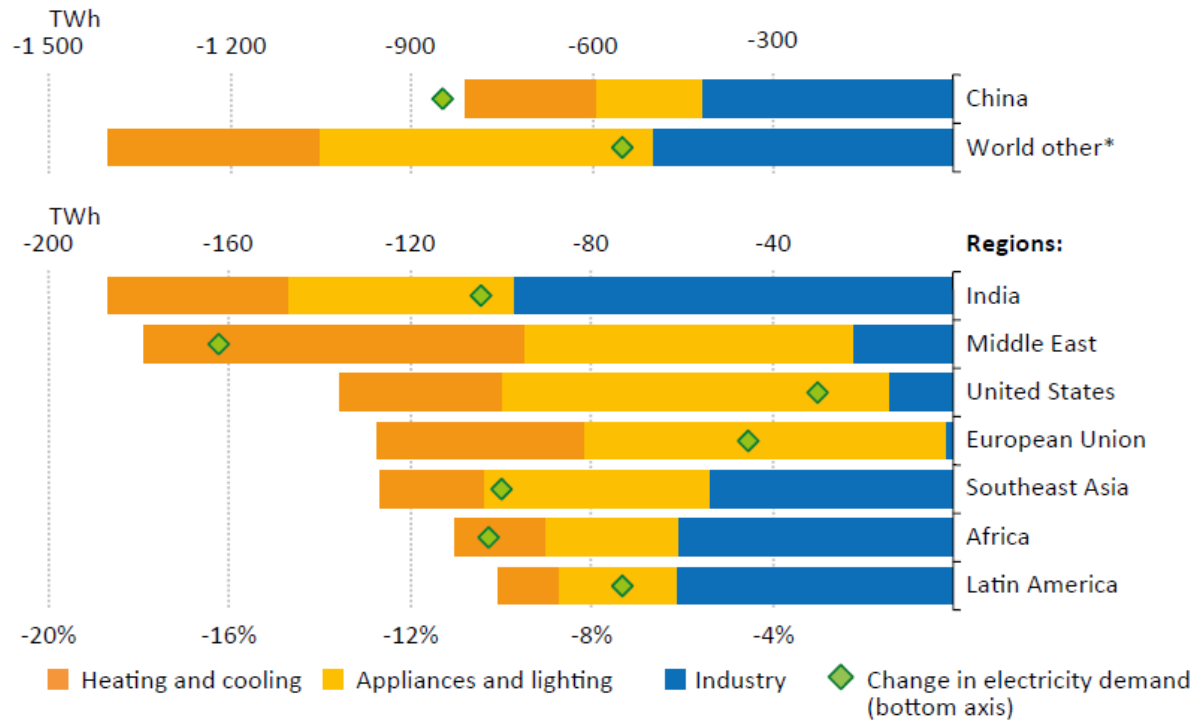
Fossil fuel savings from subsidy reform and energy efficiency – Bridge Strategy in the INDC Scenario, 2030



Notes: mb/d = million barrels per day; bcm = billion cubic metres; Mtce = million tonnes of coal equivalent.



Electricity demand reduction by sector and region in the Bridge strategy, 2030



* World other represents all countries except for China. Note: TWh = terawatt-hour.



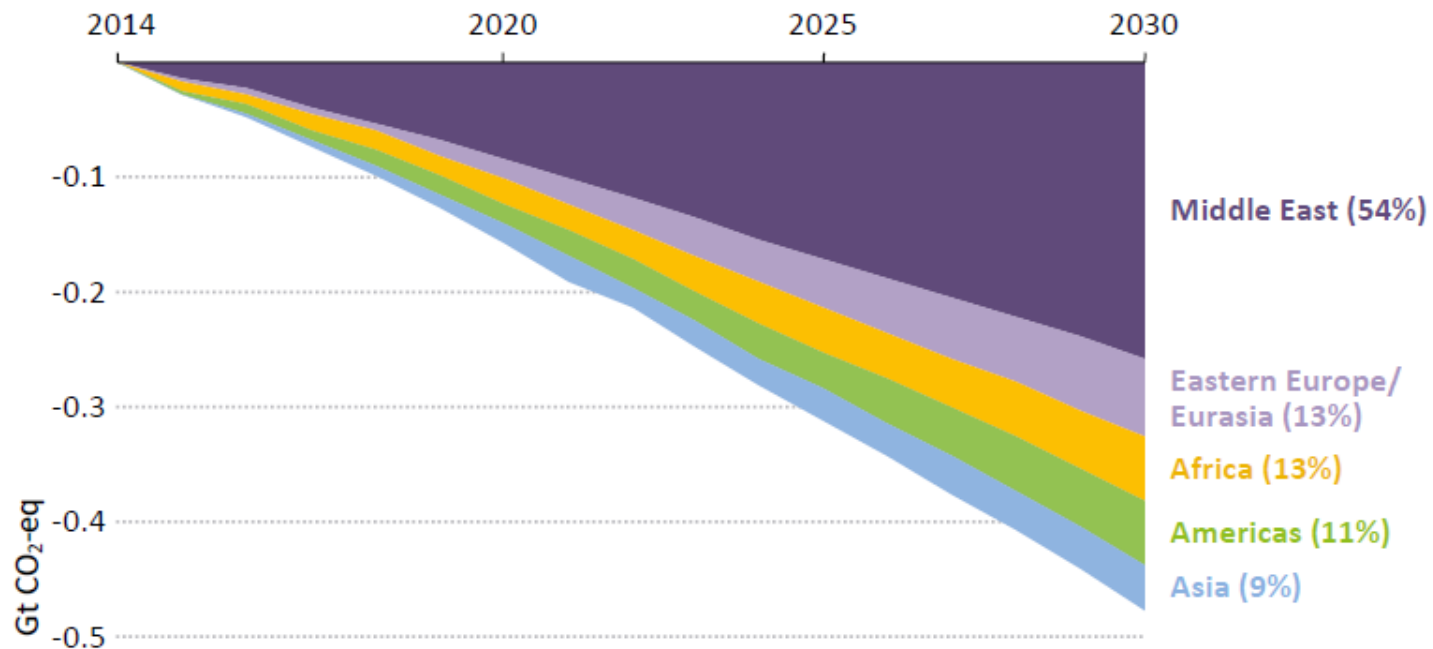
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Country	Main fuels subsidised	Recent developments
China	LPG, natural gas, electricity	In February 2015, the National Development and Reform Commission announced plans to group existing and new industrial gas consumers under a single pricing mechanism.
India	Kerosene, LPG, natural gas, electricity	Stopped subsidising diesel in October 2014, following similar reforms to gasoline in 2010. In January 2015, a cash transfer scheme was introduced for residential LPG consumers with the key objective of stopping the diversion of subsidised cylinders to commercial use.
Indonesia	Diesel, electricity	At the end of 2014, subsidies to gasoline (88 RON) abolished and the diesel subsidy capped at IDR 1 000 (\$0.08) per litre.
Iran	Gasoline, diesel, kerosene, LPG, natural gas, electricity	The parliament approved a 5% increase in gasoline prices for fiscal year 2015-2016. The revised price of regular gasoline will be IRR 7 350 (\$0.27) per litre.
Kuwait	Gasoline, diesel, kerosene, LPG, natural gas, electricity	In January 2015, prices of diesel increased from KWD 0.055 to 0.170 (\$0.59) per litre. At the end of January 2015, prices of diesel and kerosene were cut back to KWD 0.110 following political pressure. Plans to remove subsidies on gasoline and electricity have been postponed.
Malaysia	LPG, natural gas, electricity	In December 2014, subsidies for gasoline (RON95) and diesel were abolished, with prices for both now set monthly to track international levels. In January 2014, electricity tariffs were increased by 15% on average to MYR 0.38 (\$0.12) per kWh. Fuel cost pass-through, based on international gas price movements, was resumed in the same month. In May 2014, natural gas prices were increased by up to 26% for certain users.
Morocco	LPG	Ended gasoline and fuel oil subsidies at the beginning of 2014 and diesel subsidies in January 2015.
Oman	Gasoline, natural gas	In May 2014, plans were announced to gradually reduce fuel subsidies, especially for gasoline. In January 2015, gas prices for industrial consumers were raised by 100% to OMR 0.041 per cubic metre (\$3.01 per million British thermal units). A 3% annual rise is to be introduced for industries.
Thailand	LPG, natural gas, electricity	In October 2014, the price of compressed natural gas for vehicles was increased by THB 1 (\$0.03) per kilogramme. In December 2014, subsidies for LPG were ended.



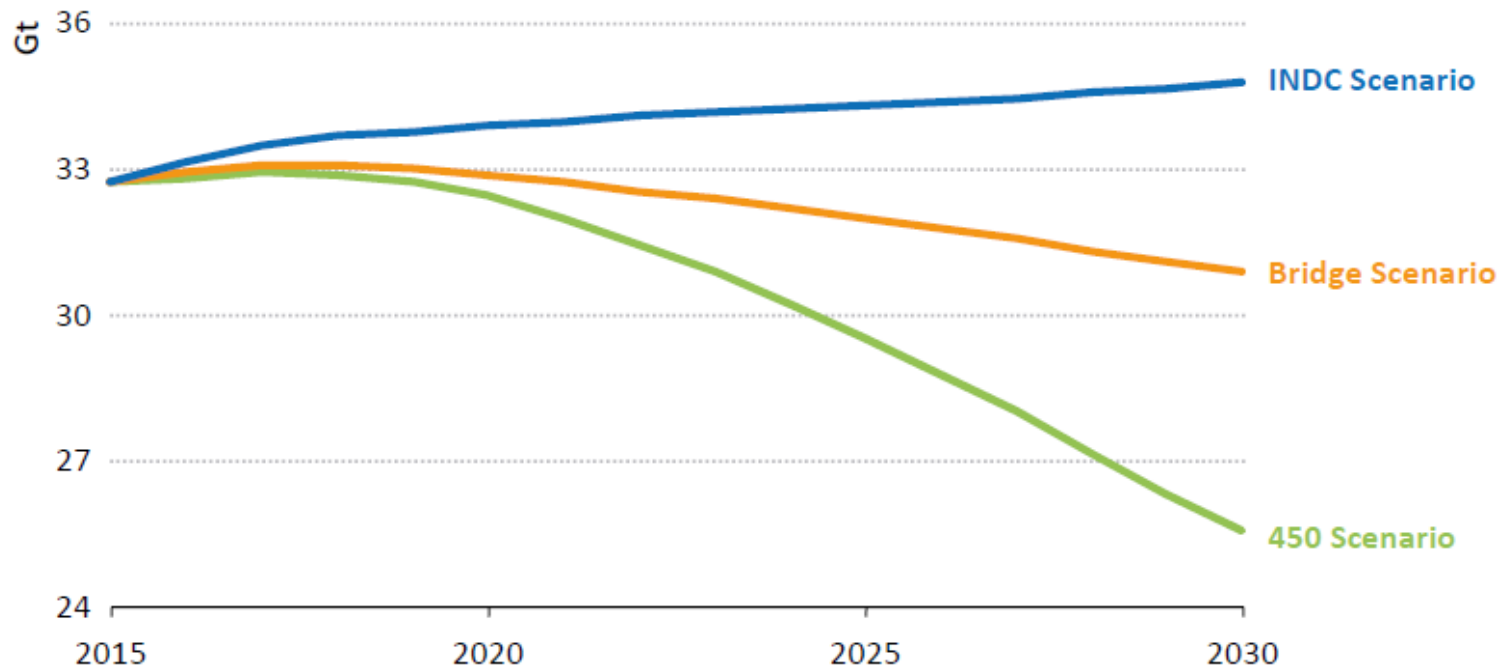
Global GHG emission reductions from subsidy reform, by region



Note: Percentage shows the region's share in cumulative global emissions savings from fossil-fuel subsidy reform.

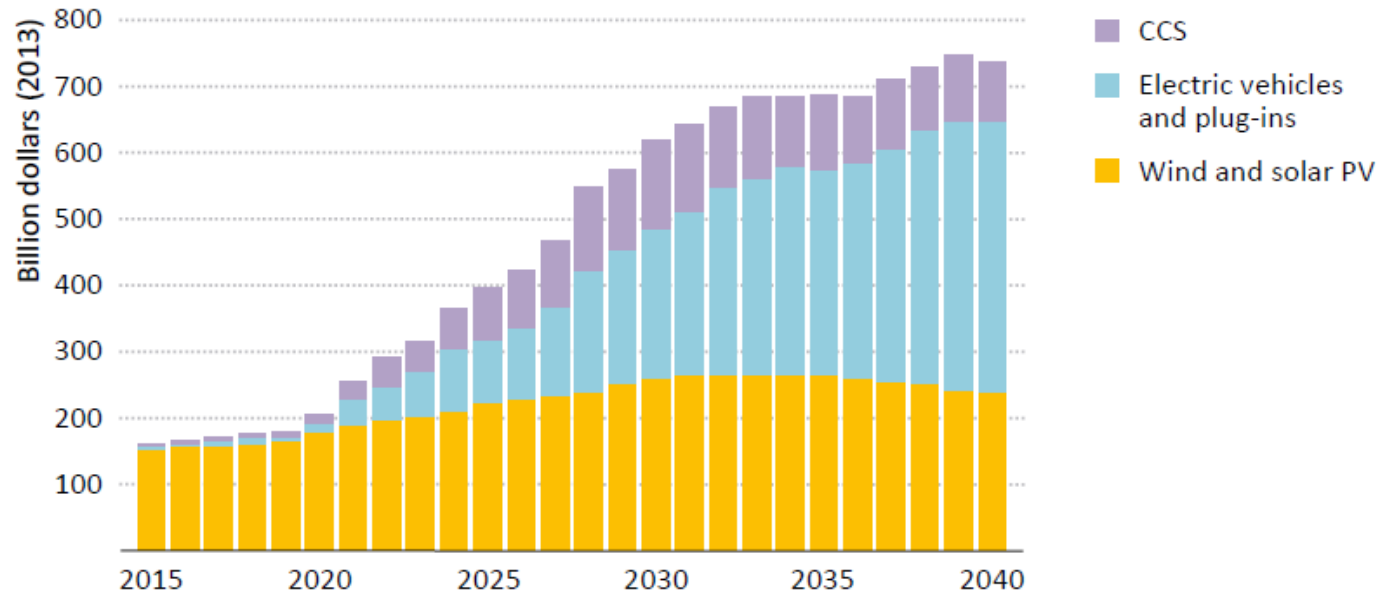


Global energy-related CO₂ emissions by scenario





Global investment in clean technologies under the 450 ppm scenario





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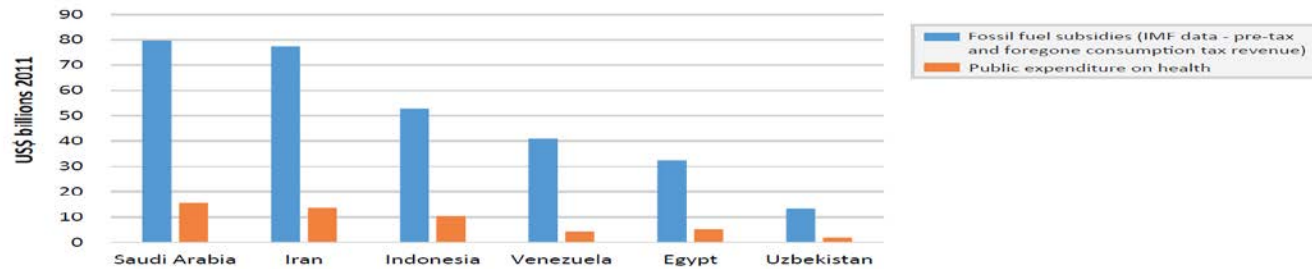
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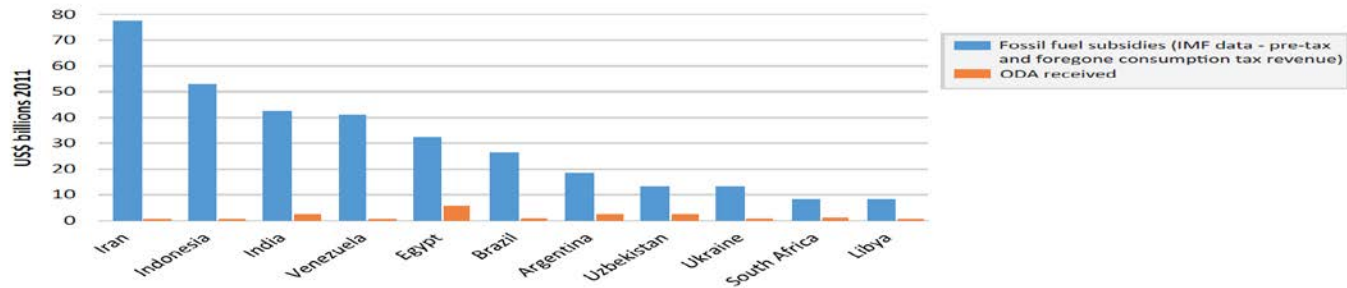
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Public health expenditure compared to fossil fuel subsidies



Source: Coady, et al, 2015 and WHO, 2015.

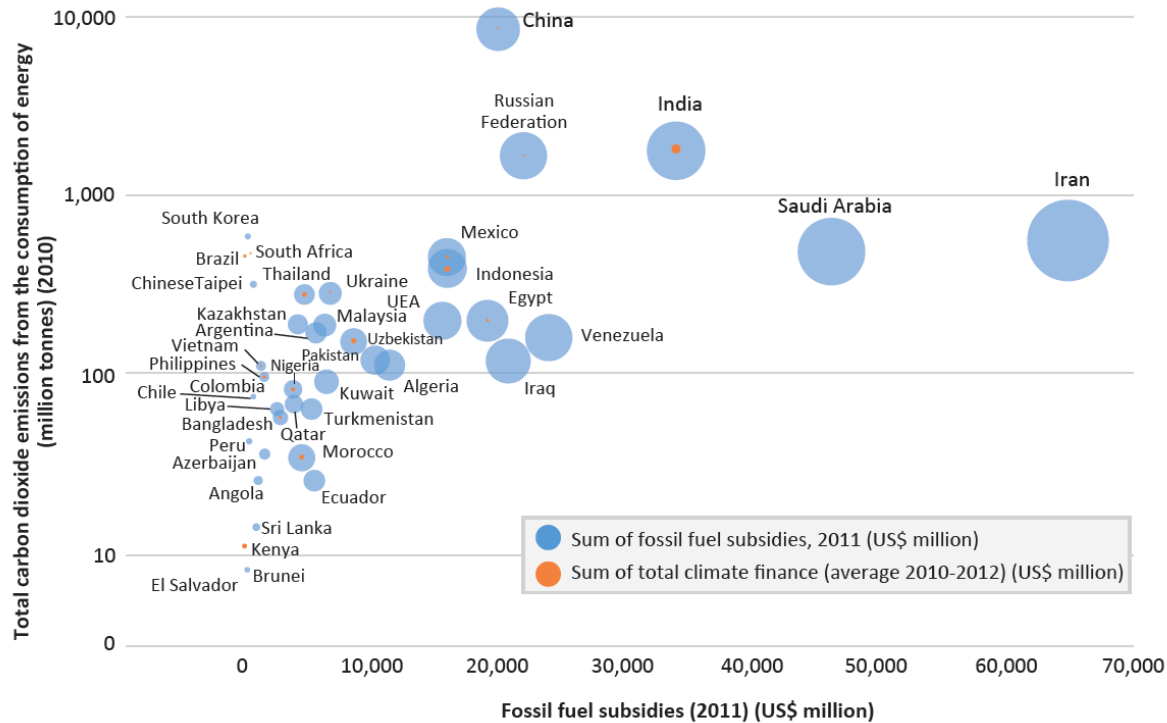
Aid received compared to fossil fuel subsidies



Source: Coady, et al, 2015 and OECD, 2015 (2013 data).



Fossil fuel subsidies, climate finance, and GHG emissions – selected countries

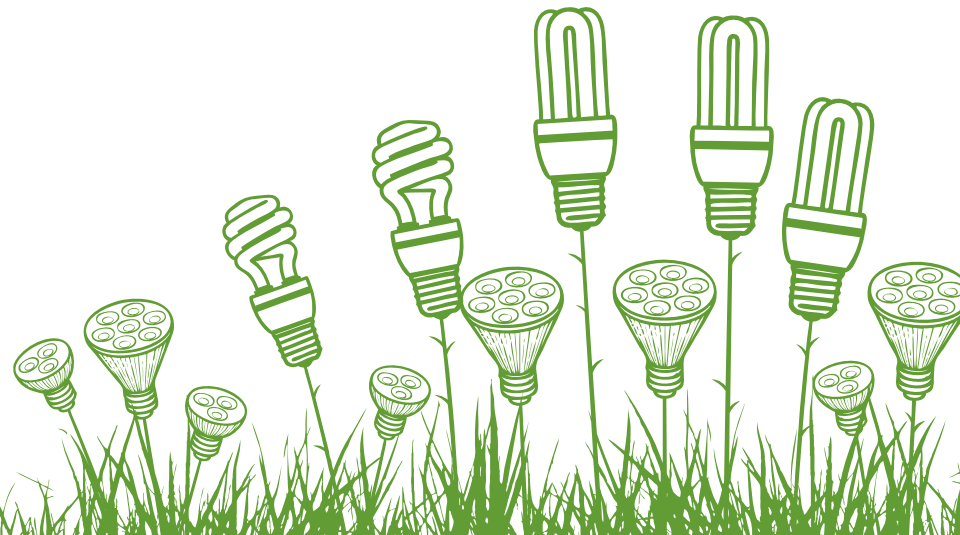


Source: Whitley, 2013.



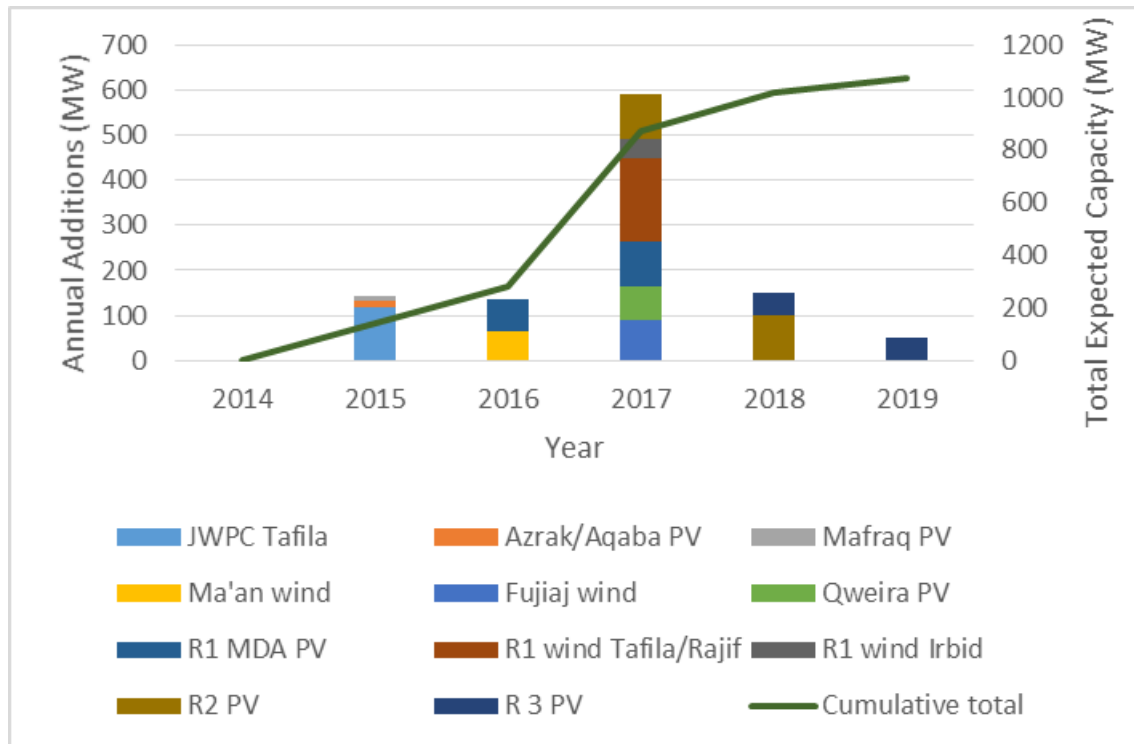
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Jordan





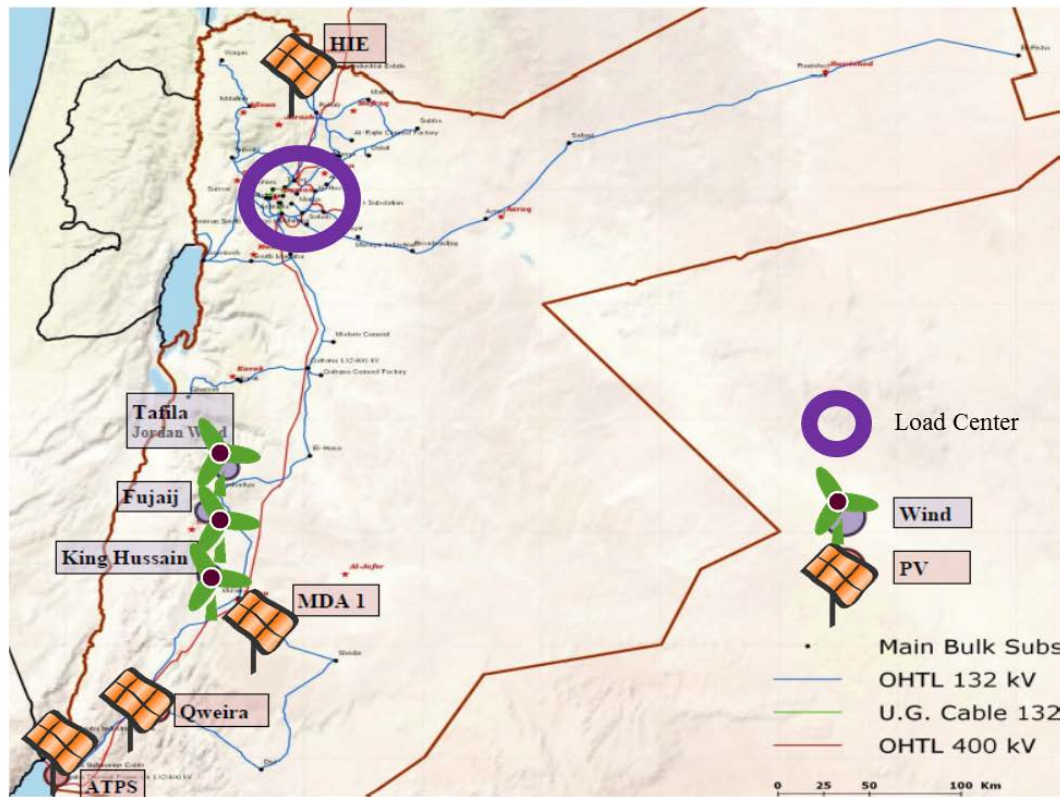
Renewable Power Expansion in Jordan - 2014-2019





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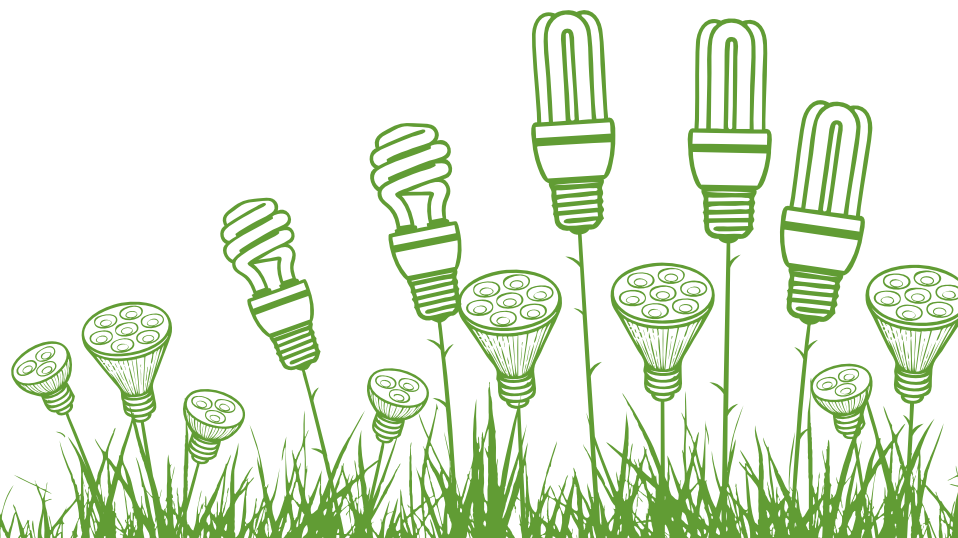


Developer	Size
JORDAN Wind	117MW
Scotec	10 MW
Shamsuna	10 MW
Jordan Solar One	20 MW
MDA 1	170 MW
King Hussien Uni.	66 MW
PV Qweira	75 MW
Fujaij	70 MW
Total PV	275 MW
Total Wind	253 MW



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Lighting





84
PERCENT

of Jordanian homes have
at least one compact
fluorescent lamp

40
PERCENT

of Jordanian homes still
have energy inefficient
incandescent lamps

1.6
PERCENT

Hardly any Jordanian
homes use energy efficient
LED lighting

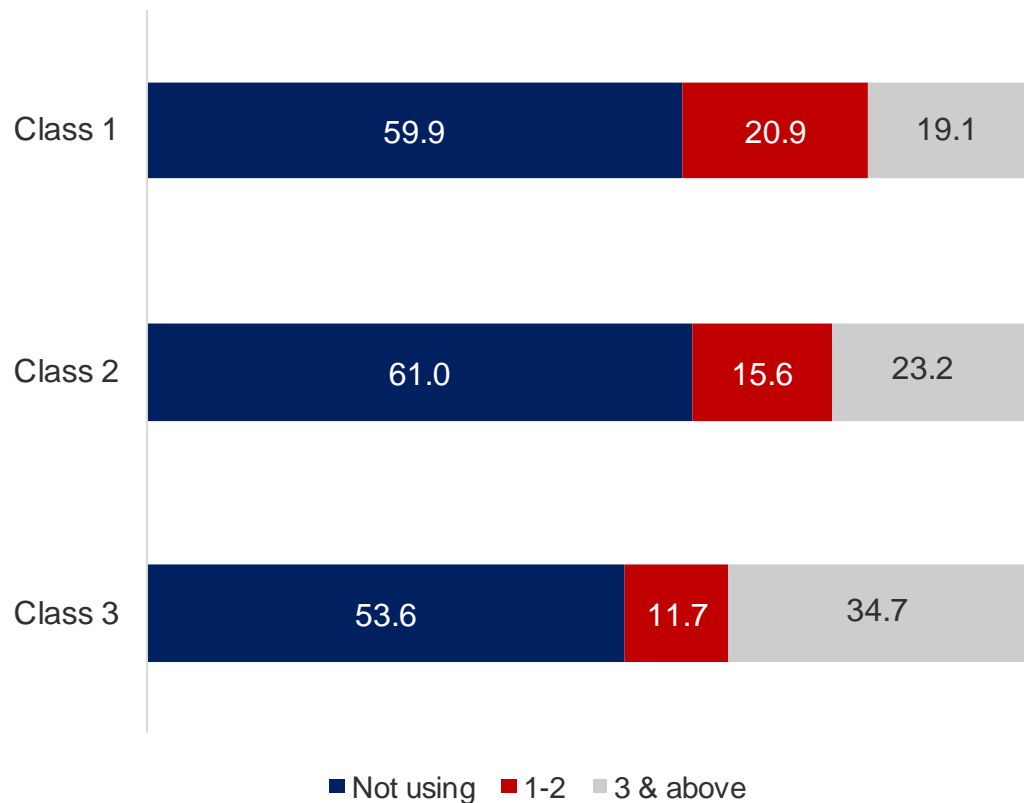
17
MILLION

Total CFLs, FTLs, and
incandescent lamps in
Jordanian homes, or 12
lamps per household

There is a major
opportunity to
replace
Jordan's 17
million CFLs,
FTLs, and
incandescent
lamps with
energy efficient
LEDs



Distribution of incandescent lamps by usage



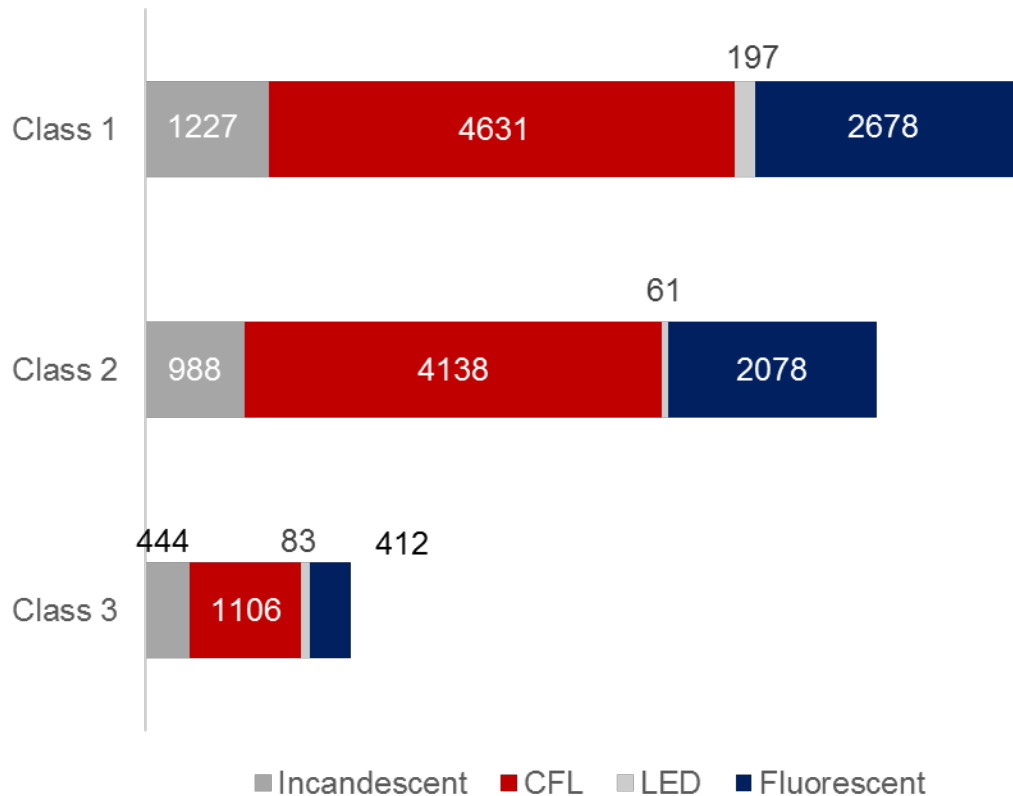
Incandescent lamps are found in over one-third of all households. This represents a significant energy-saving potential.



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Number of lamps by type and usage in Jordanian households (000s)

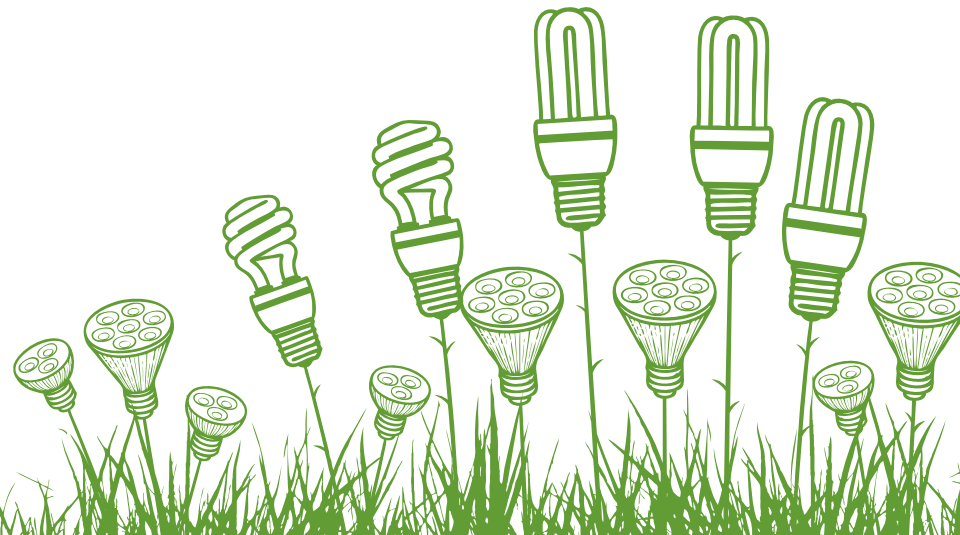


In 2014 there were eight times as many energy-inefficient incandescent lamps as there were energy-efficient LED lamps.



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Appliances





75
PERCENT

of Jordanians surveyed
own one-door refrigerators
ranging from 5-19 ft³

36
PERCENT

of refrigerators are more
than 10 years old, which
are less than half as
efficient as today's models

98
PERCENT

of Jordanian homes own
TVs, washing machines
and refrigerators

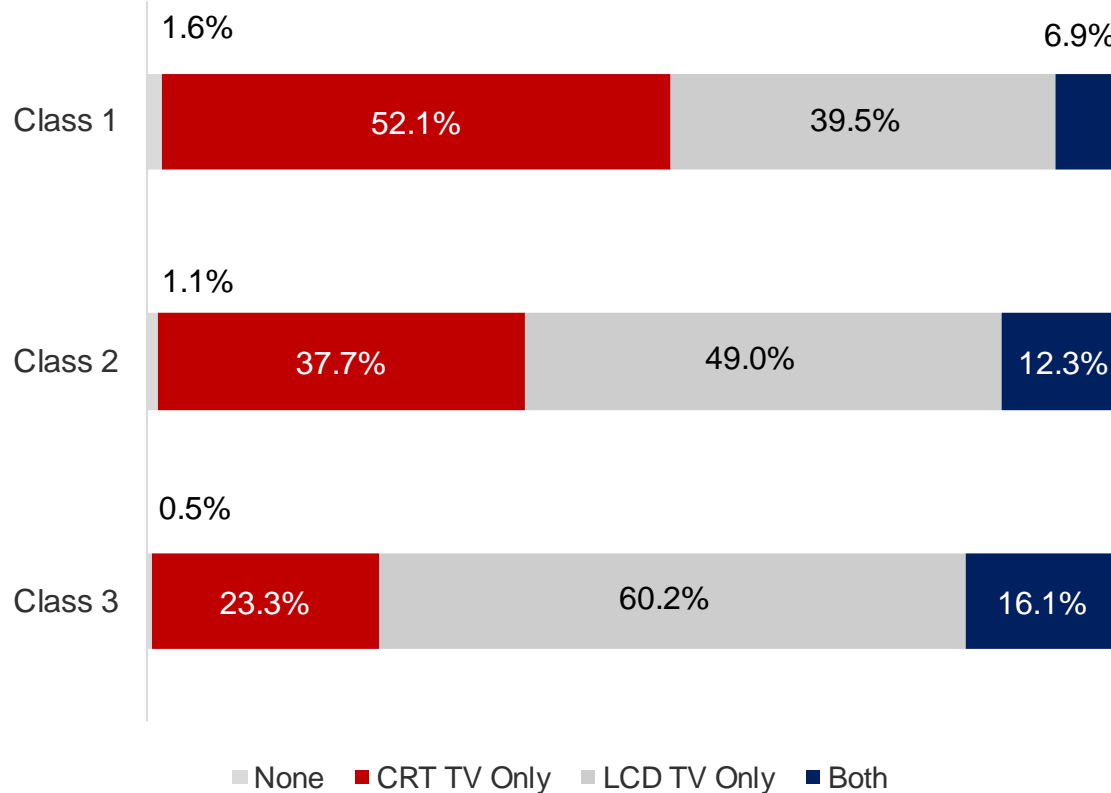
1.4
MILLION

refrigerators in Jordanian
households

There is a major
opportunity to
**replace old
washing
machines and
refrigerators**
with new energy
efficient models



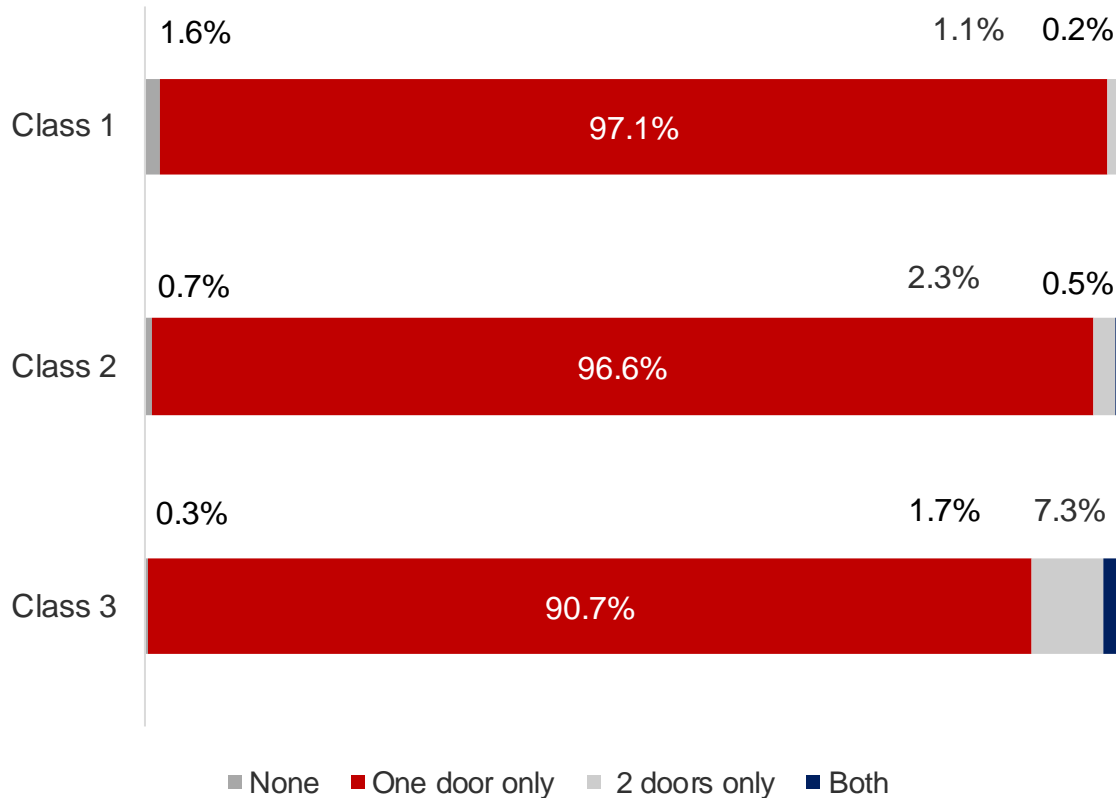
Television ownership by usage



Ownership of older CRT TVs is highest among the lowest-consuming households



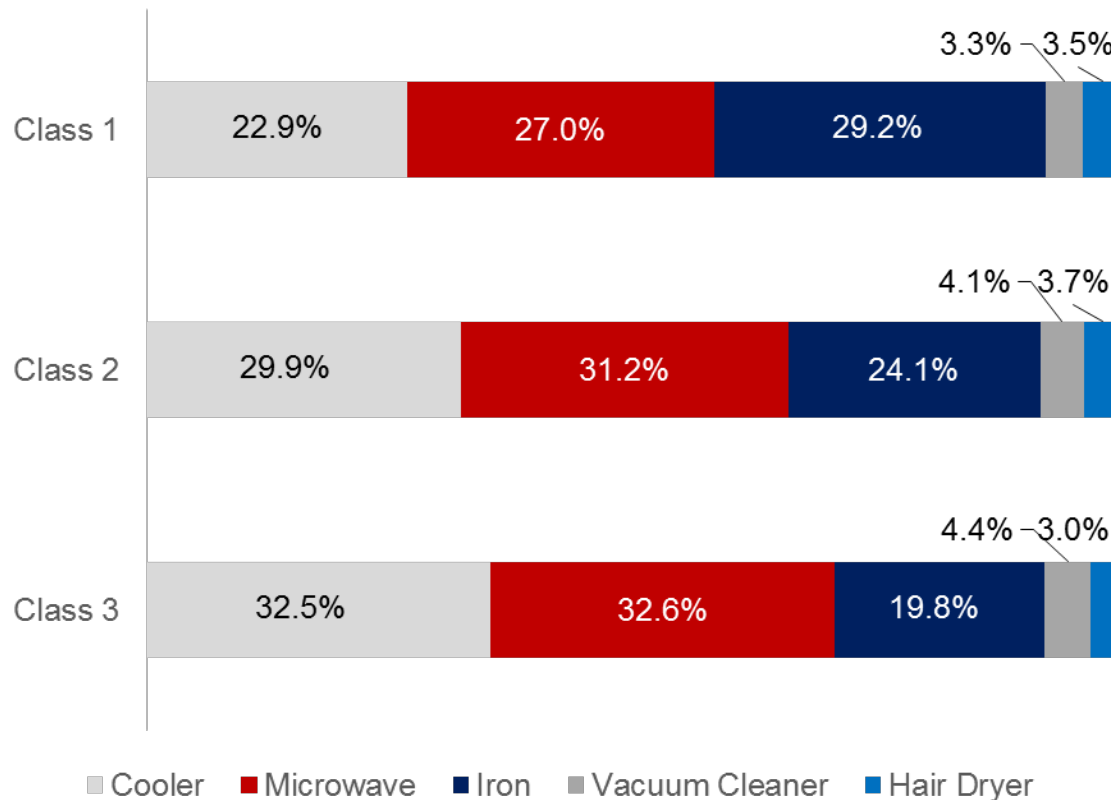
One- and two-door refrigerator distribution by usage



The overwhelming majority of Jordanians own refrigerators with **only one door**



Small household electric appliance holdings by usage



The distribution of small household electric appliances does **not vary** significantly by class



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Water Heating





Water Heaters Summary

61
PERCENT

of Jordanians
surveyed own electric
water heaters

13
PERCENT

of households own solar
water heaters

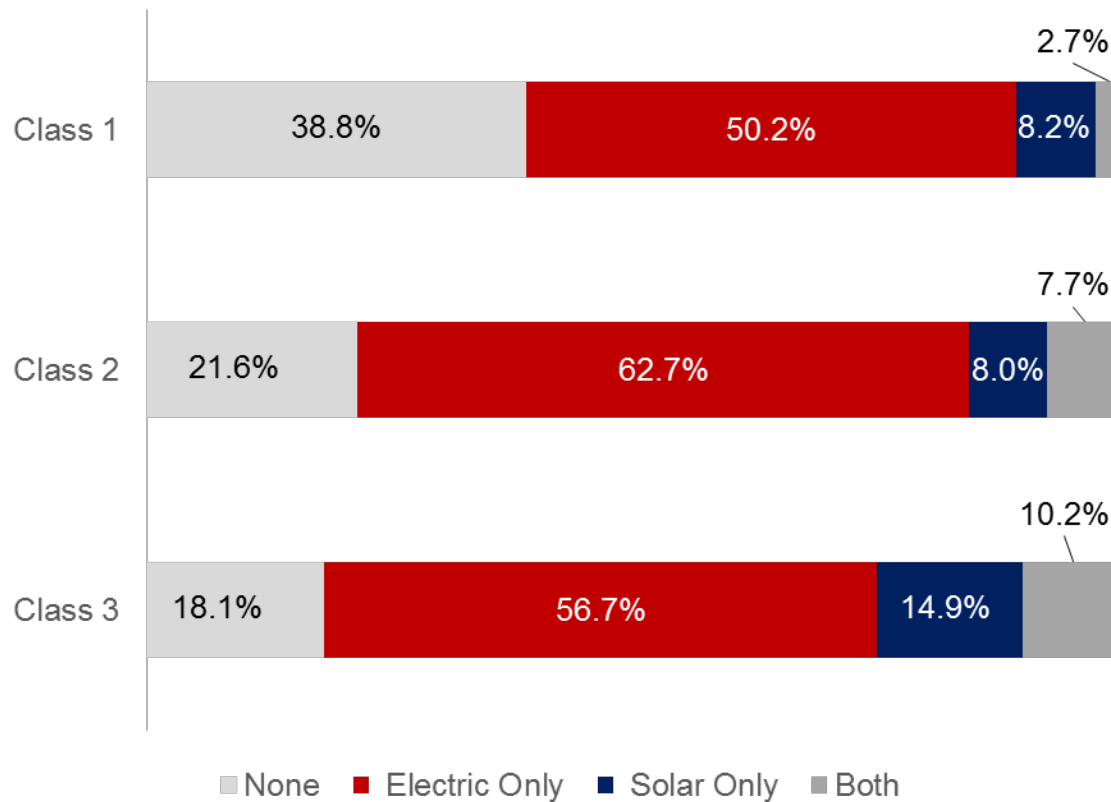
9
PERCENT

of households outside Amman
own solar water heaters

There is a major opportunity to increase the market share of solar water heaters – especially outside of Amman



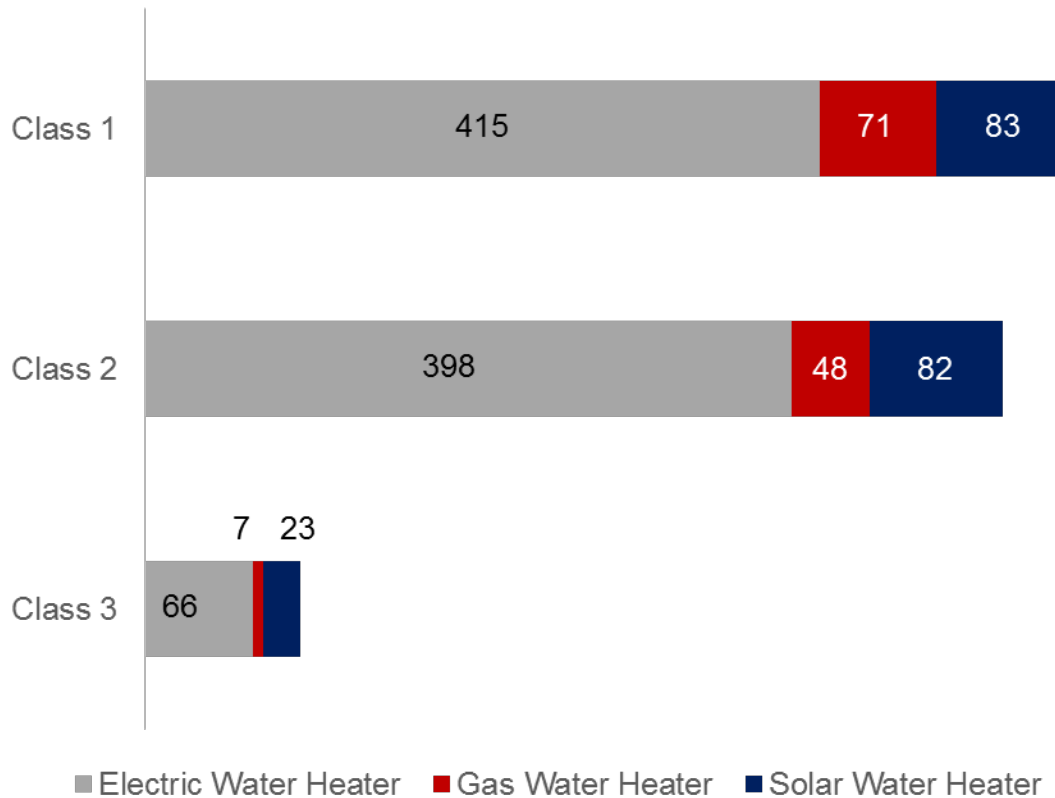
Household distribution for electric and/or solar water heaters



Solar water heater penetration is twice as high for the largest consumer class



Household distribution for electric and/or solar water heaters



Most of the solar water heater market potential is for medium- and lower-usage households



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Heating & cooling





27
PERCENT

of Jordanian households own air conditioning (AC) units

69
PERCENT

of Jordanian households own electric fans

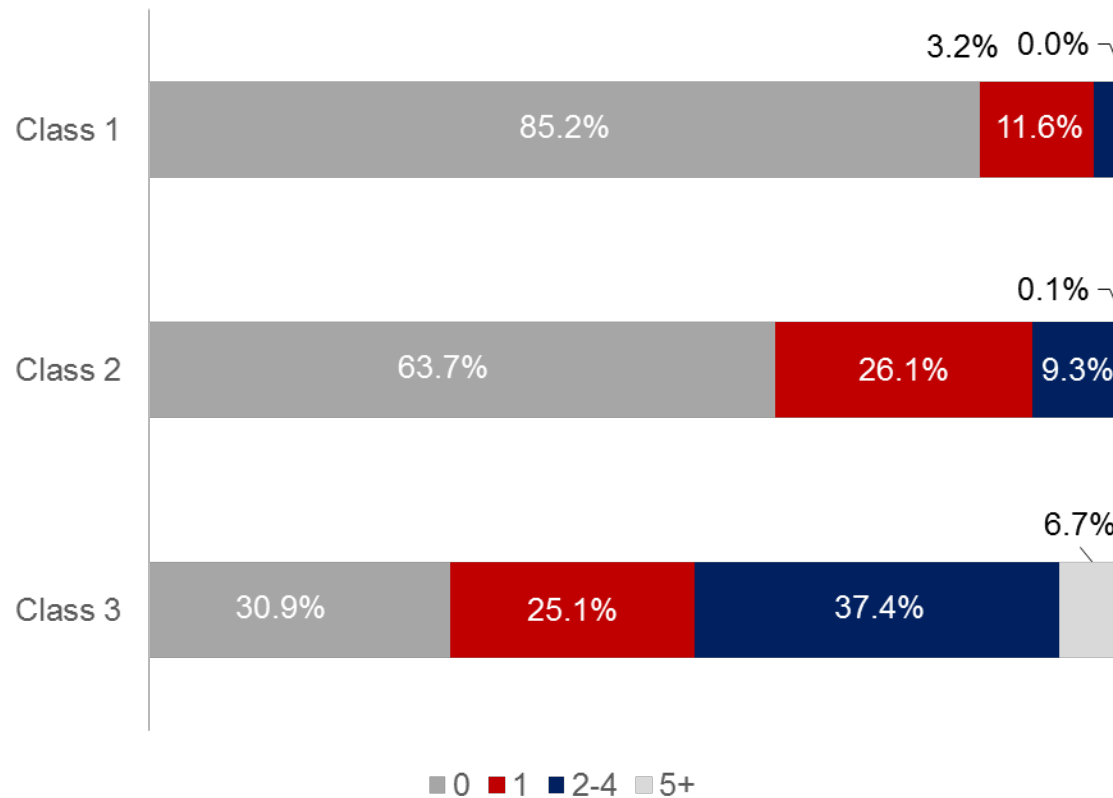
7x

AC ownership rates are 7x higher in high-income households than low-income

Air conditioner use is growing, creating an opportunity to encourage the use of **high-performance AC units** to reduce electricity bills



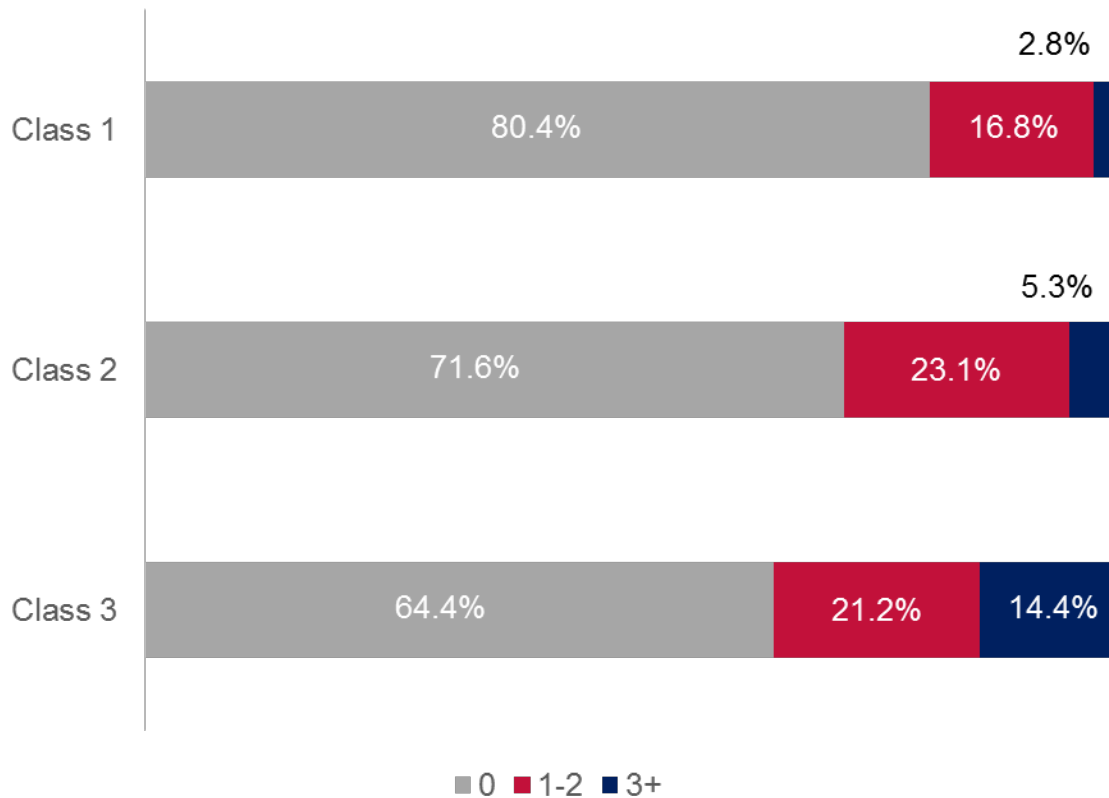
Household distribution for AC units, by number and usage



Very few low-usage households own AC units – compared to two-thirds of the highest-using households



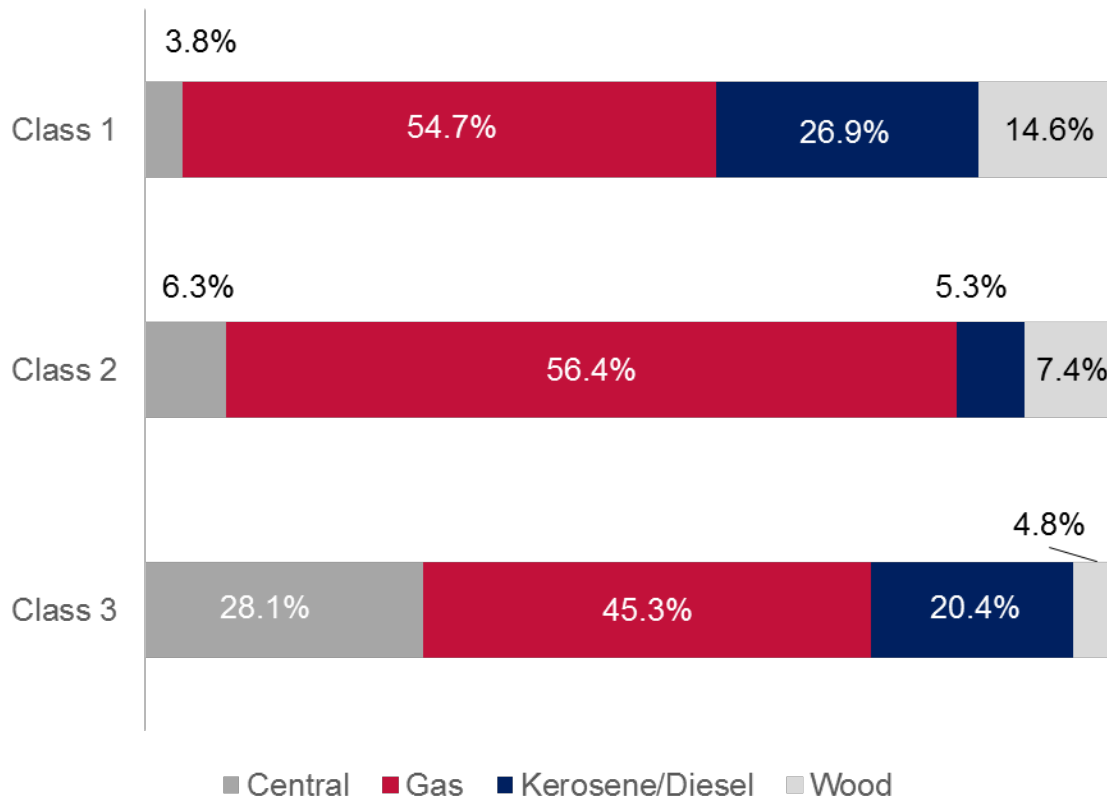
Household electric heater distribution by number and usage



Relatively few households heat with electricity – just one-in-five low-use households increasing to one-third of the highest-using households



Non-electric heating, by type and usage



Gas is the heating fuel of choice, although central heating is important for the largest users



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Energy Efficiency and Consumer Awareness





44
PERCENT

of households believe they can reduce electricity bills through behavioral changes

90
PERCENT

of households report turning off appliances when not in use

38
PERCENT

of households have purchased energy efficient appliances in the past year

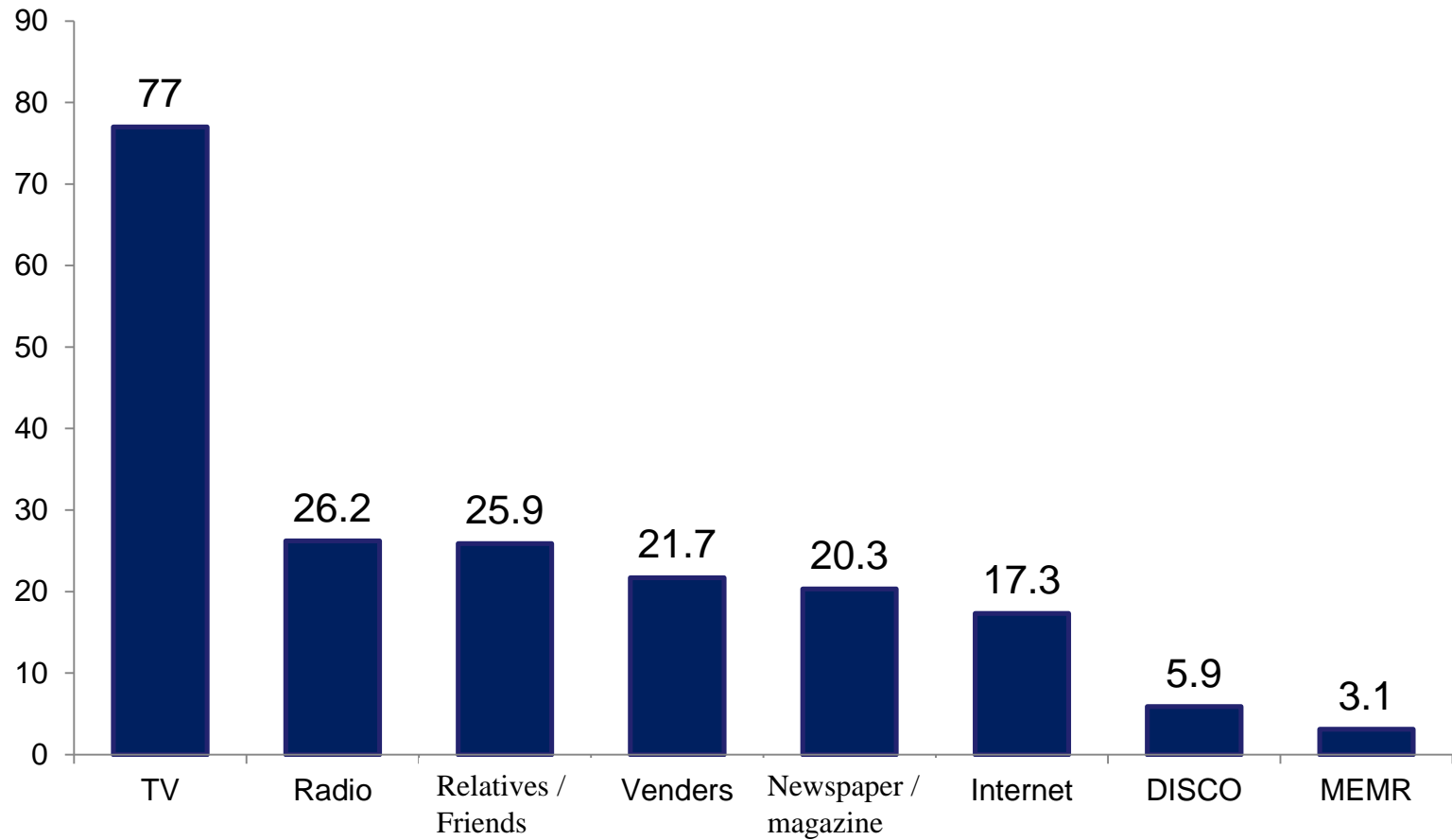
23
PERCENT

of households perform regular maintenance to maintain energy efficiency

Programs to increase awareness should produce additional household energy savings

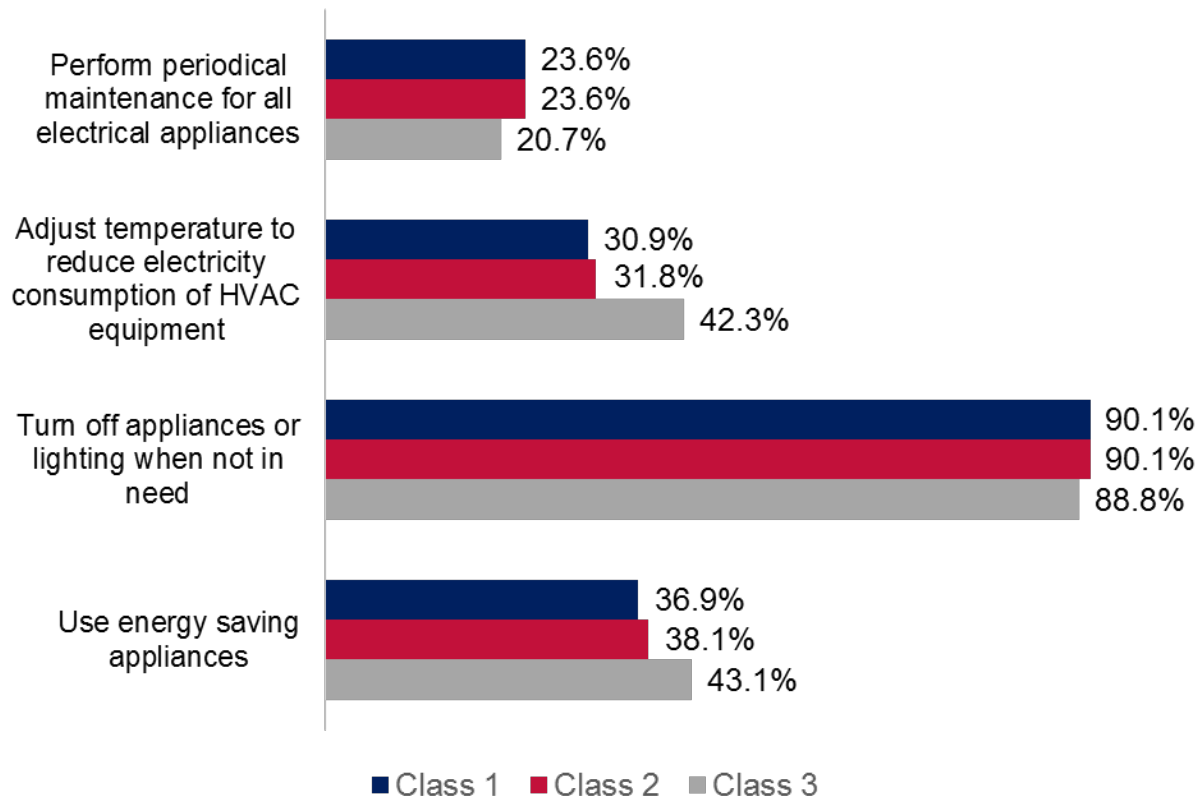


Where have you heard about saving energy? (%)





Self-reported energy saving actions by class



The most common energy-saving action is **turning off appliances when not in use**



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Conclusions & Recommendations





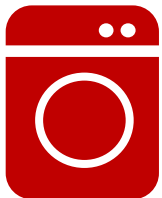
Replace incandescent with LED lighting

40 % of households still use energy-inefficient incandescent lighting and 76% use fluorescents. LED lighting penetration is currently very low (1.6%).



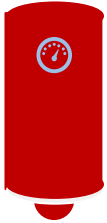
Replace older refrigerators with new models

36 percent of single-door refrigerators are more than ten years old and are less than half as efficient as modern refrigerators.



Replace older washing machines with newer ones

35 percent of top-loading washing machines are more than nine years old and are less than half as energy and water efficient as recent models.



Implement solar water heater programs

61 percent of households own water heaters, but only 13 percent of households own solar water heaters, indicating a significant opportunity to move households toward energy efficient options.



Offer incentives for efficient AC units

While only 27 percent of households own AC units, that represents 573,400 units in Jordanian households. Offering incentives for replacement would bring down the cost of energy efficient units on par with less efficient models.



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THANK YOU