Sustainable Energy Statistics

Uses in support of SDG 7 and country/regional reporting

Rob Smith, Principal
Midsummer Analytics
rob@midsummer.ca

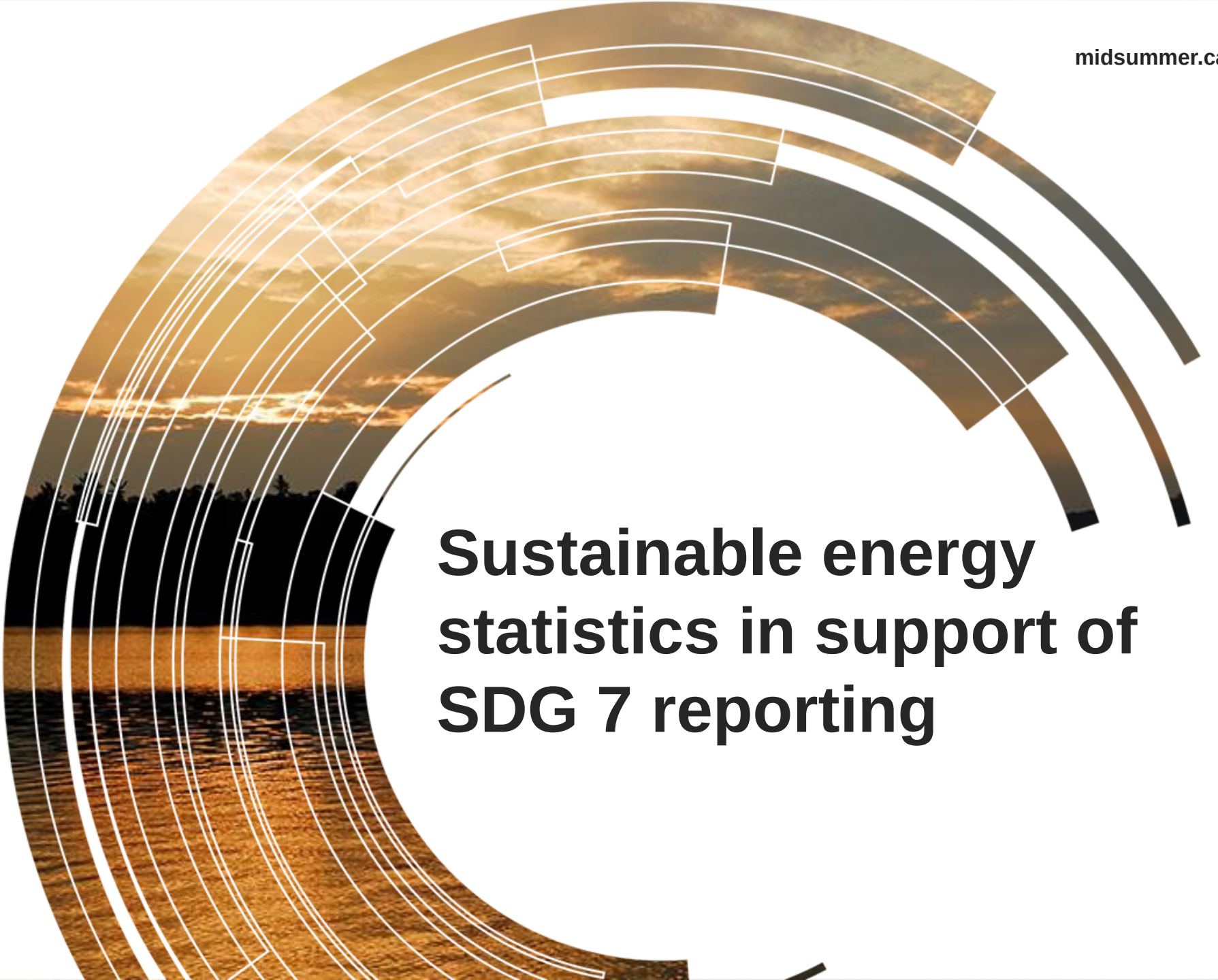
UNECE Workshop on Sustainable Energy
Astana, Kazakhstan
June 13, 2017

Midsummer Analytics

How are sustainable energy statistics used?

- Sustainable energy statistics are reported by nearly every country to varying degrees
- Many different indicators are reported, reflecting differences by country/region in:
  - data availability
  - policy priorities
  - energy issues

midsummer.ca



Sustainable energy statistics in support of SDG 7 reporting

World Bank
Global Tracking Framework

- The ***Global Tracking Framework*** is the official forum for reporting on SDG 7
  - Maintained by the World Bank (http://gtf.esmap.org/)
- An annual report on SDG 7 progress is published (https://goo.gl/1YRPNW)
- On-line tools include
  - Visual country report
  - Timeline analysis of trends
  - Country-by-country results comparator
- Examples of the sustainable energy reporting in the GTF are provided in the following slides

Country summaries

Example of Kazakhstan, 2014

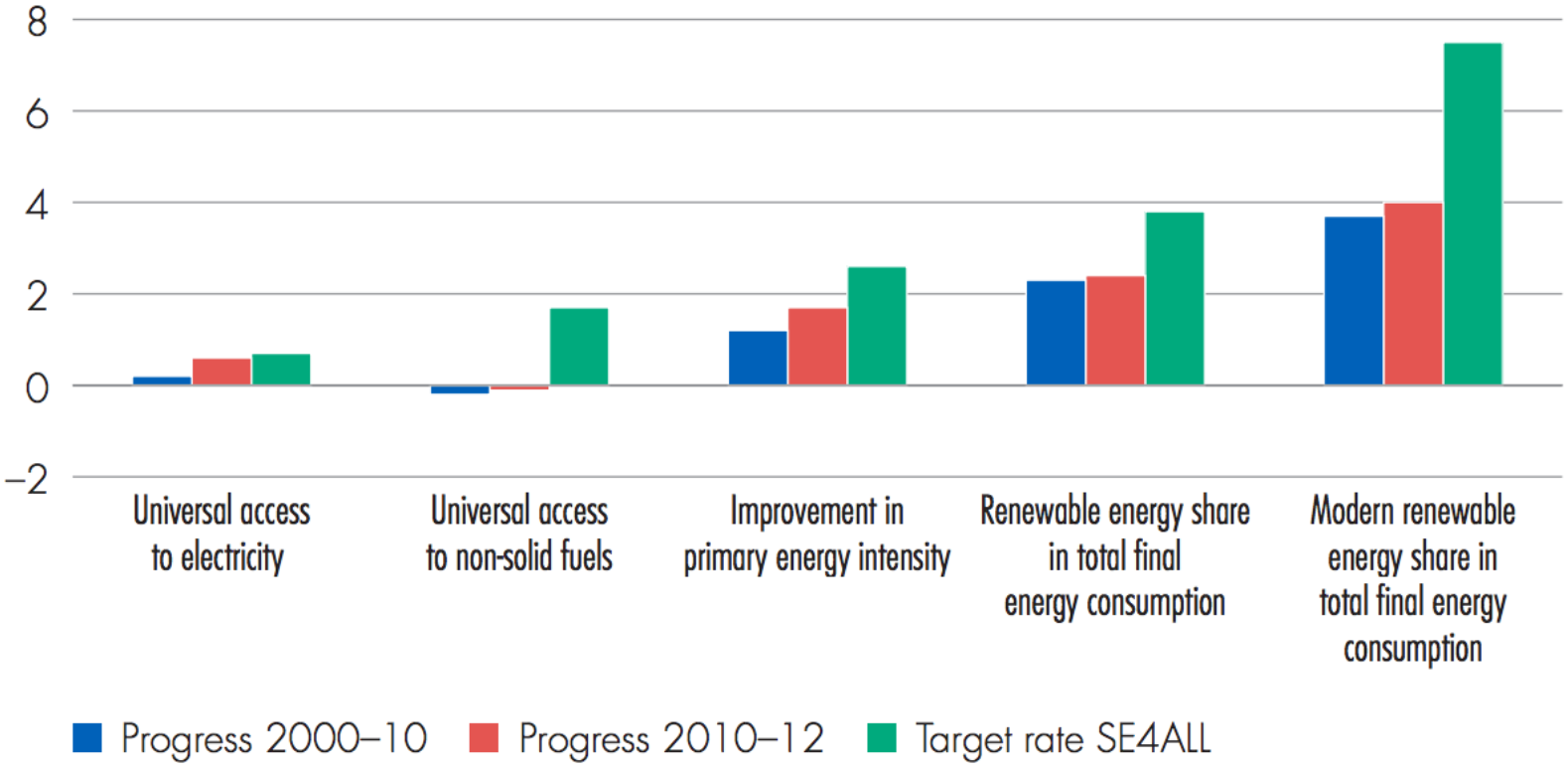
Kazakhstan

Region	Europe, North America and Central Asia
Subregion	Eastern Europe, Caucasus, and Central Asia
Income Group	Upper middle income
GDP Per Capita ($US)	11,580
Population	17,544,126

Source: Global Tracking Framework, Country Reports (http://gtf.esmap.org/countries)

Tracking global progress on SDG 7

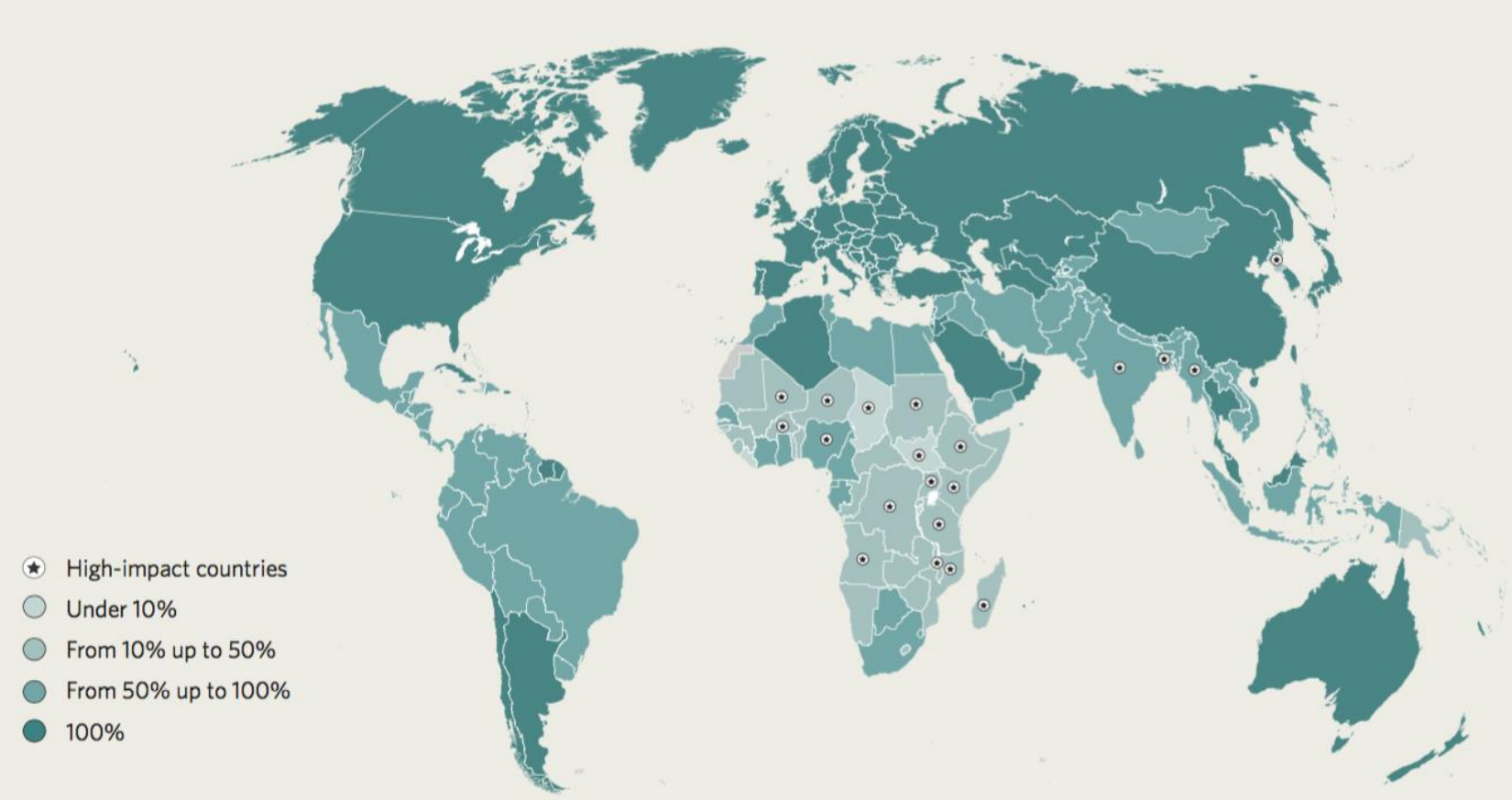
Annual growth rates by SDG 7 indicator



Source: Global Tracking Framework, 2017 Report (https://goo.gl/1YRPNW)

Visual comparison of country results

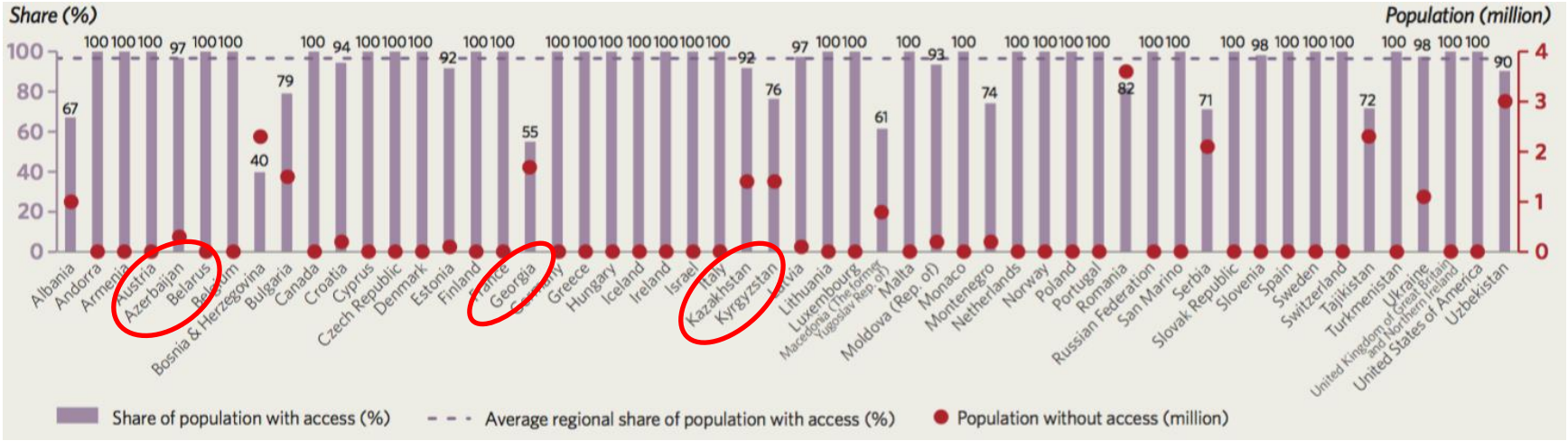
Access to electricity, all countries, 2014



Source: Global Tracking Framework, 2017 Report (https://goo.gl/1YRPNW)

Intra-regional comparisons

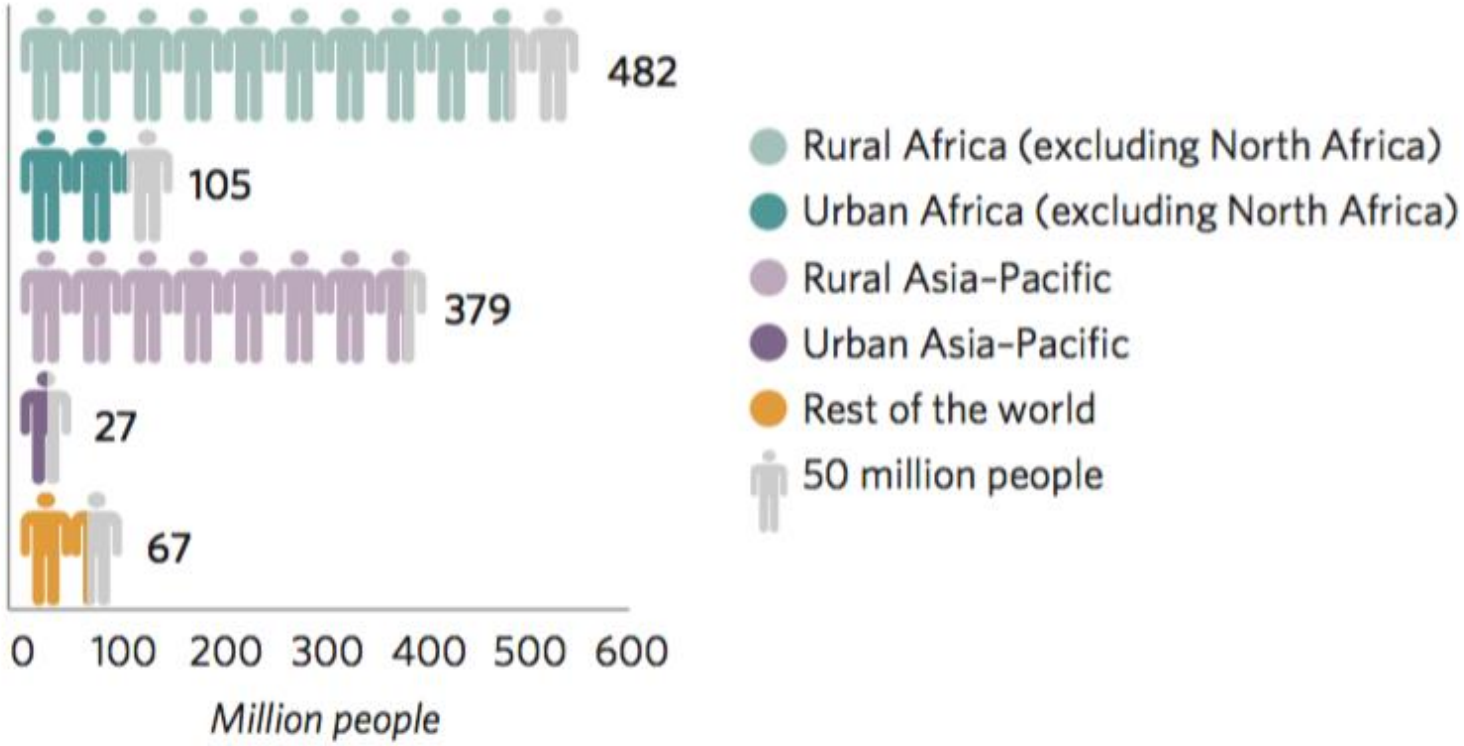
Population with/without access to clean fuels and technologies for cooking and population, Europe, N. America and Central Asia Region, 2014



Source: Global Tracking Framework, 2017 Report (https://goo.gl/1YRPNW)

Inter-regional comparisons

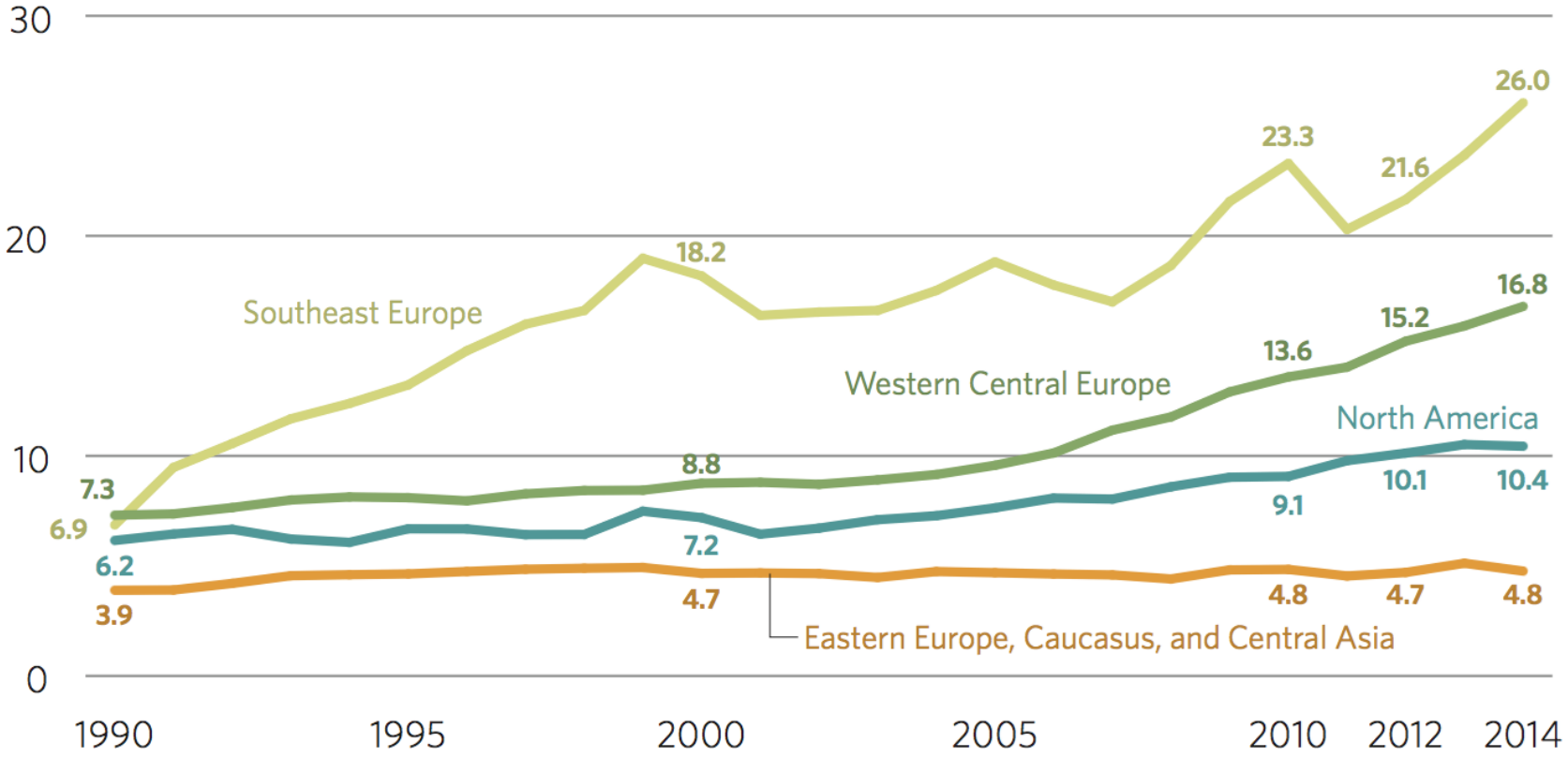
People without access to electricity by region, 2014



Source: Global Tracking Framework, 2017 Report (https://goo.gl/1YRPNW)

Sub-regional comparisons

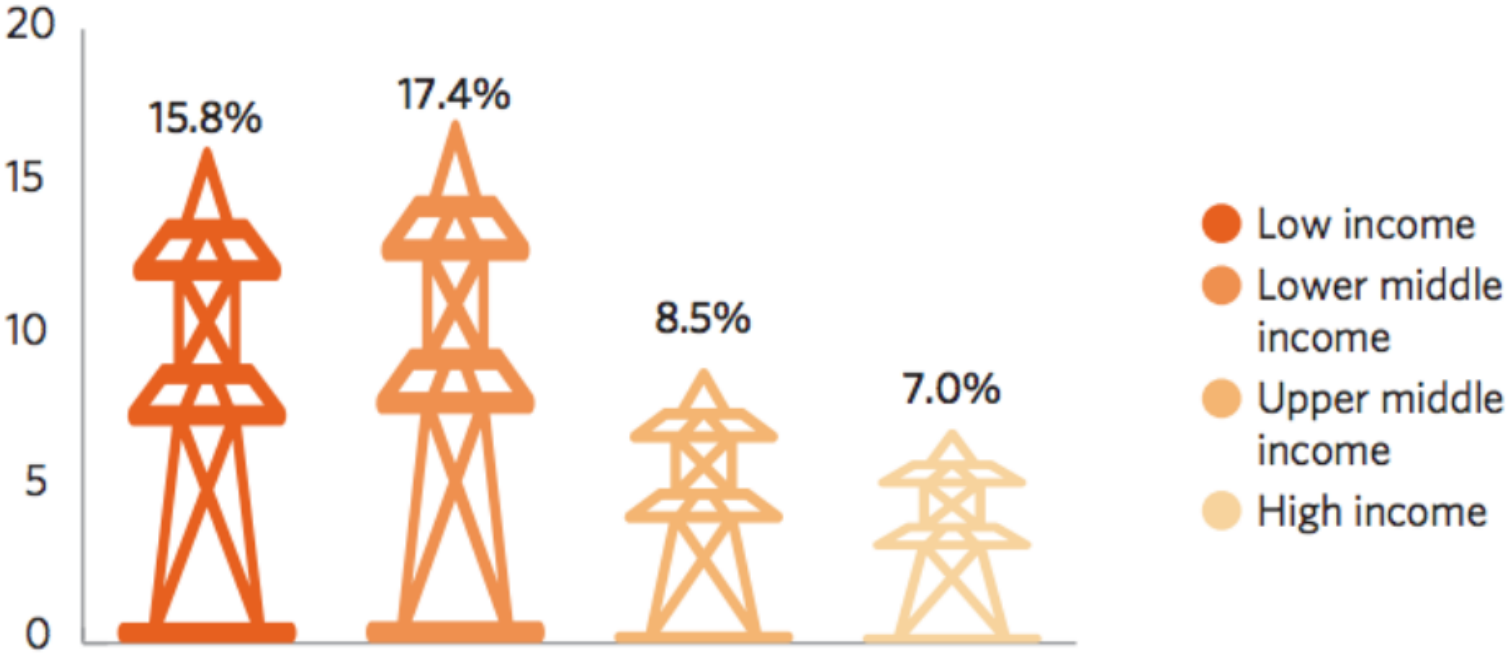
Share of renewable energy consumption in total energy consumption, regions of Europe, N. America and Central Asia, 2014



Source: Global Tracking Framework, 2017 Report (https://goo.gl/1YRPNW)

Comparing across income groups

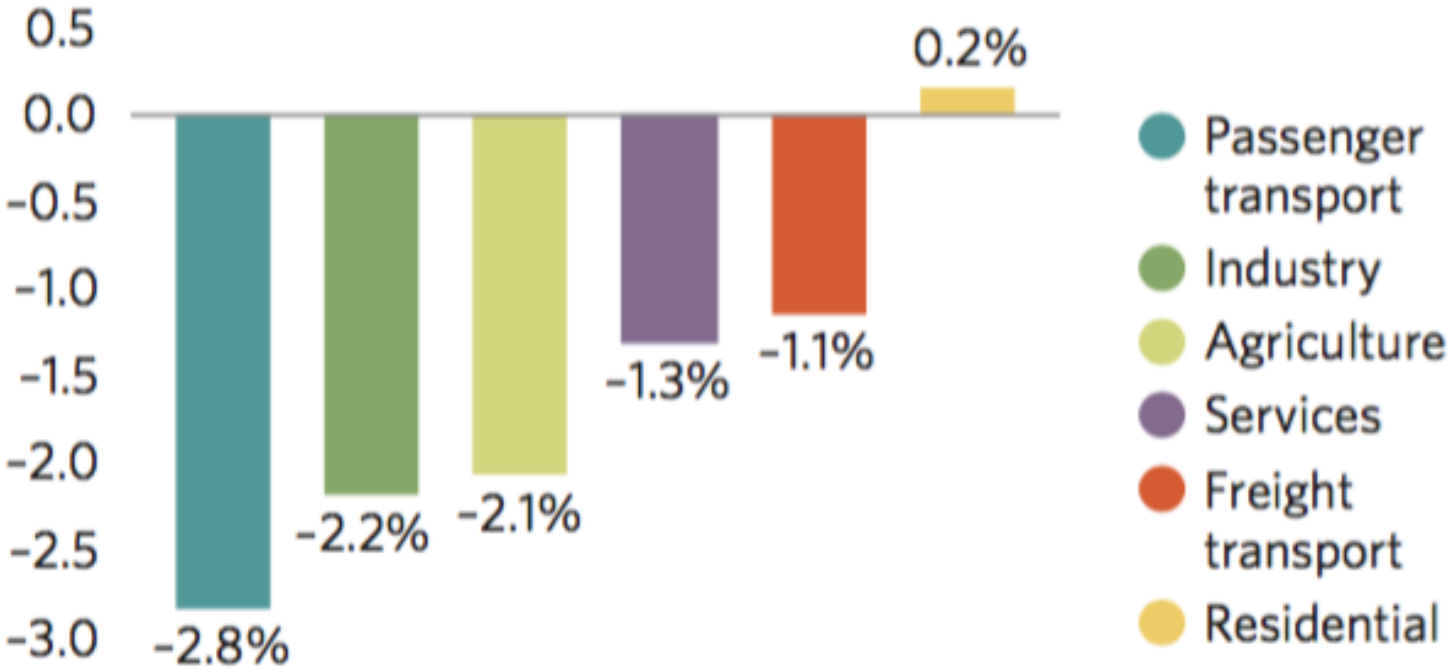
Losses in electricity distribution by income group, 2014



Source: Global Tracking Framework, 2017 Report (https://goo.gl/1YRPNW)

Comparing across industry groups

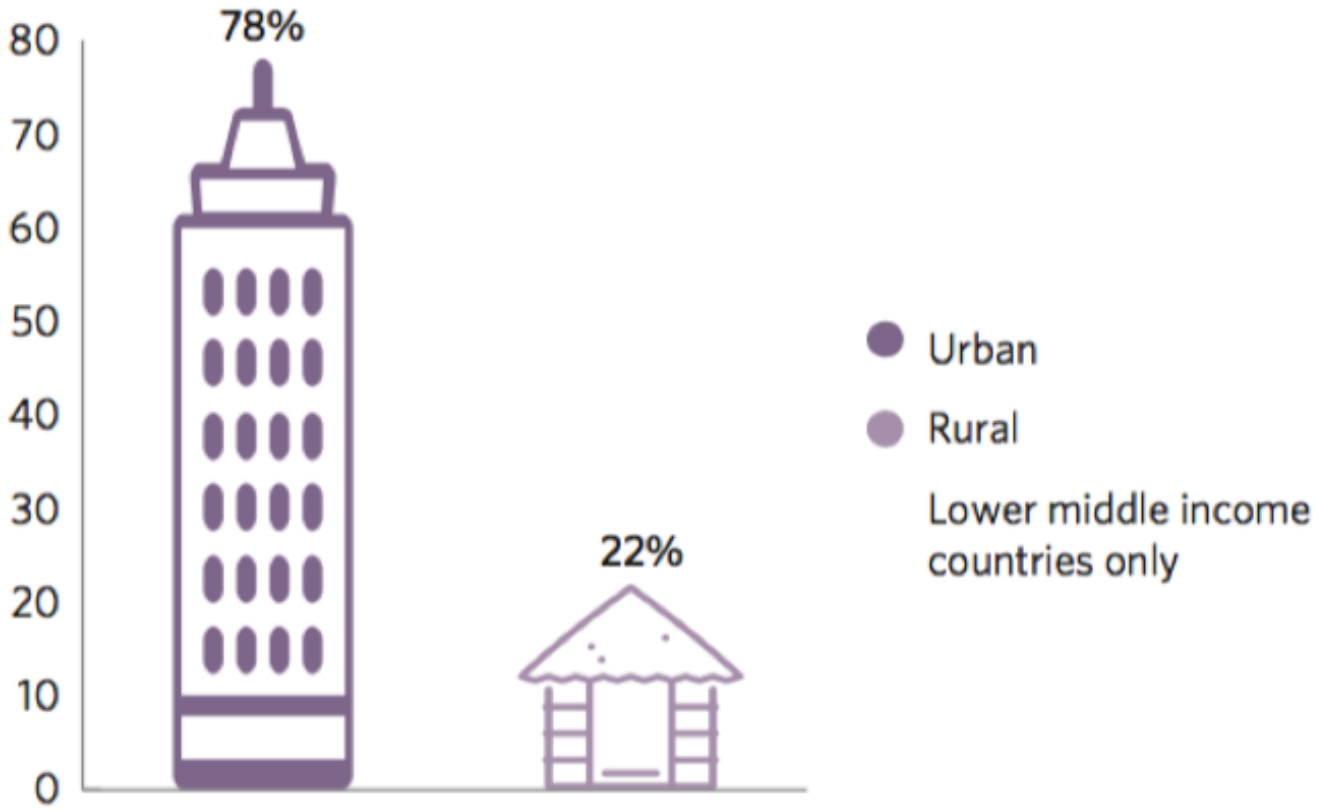
Compound annual growth rate of final energy intensity, global, 2012-2014



Source: Global Tracking Framework, 2017 Report (https://goo.gl/1YRPNW)

Comparing rural and urban areas

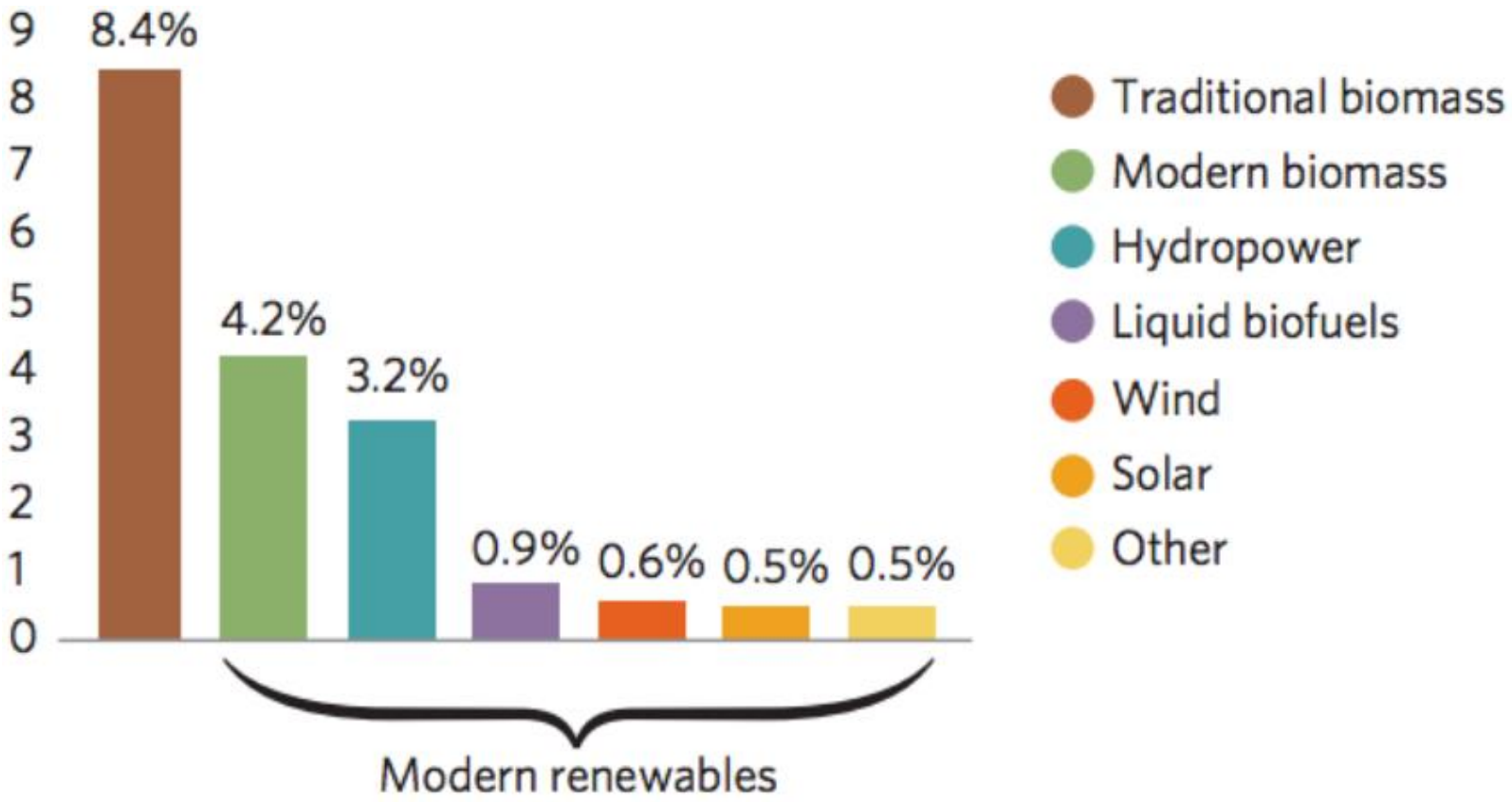
Population with access to clean cooking, global, 2014



Source: Global Tracking Framework, 2017 Report (https://goo.gl/1YRPNW)

Comparison across energy types

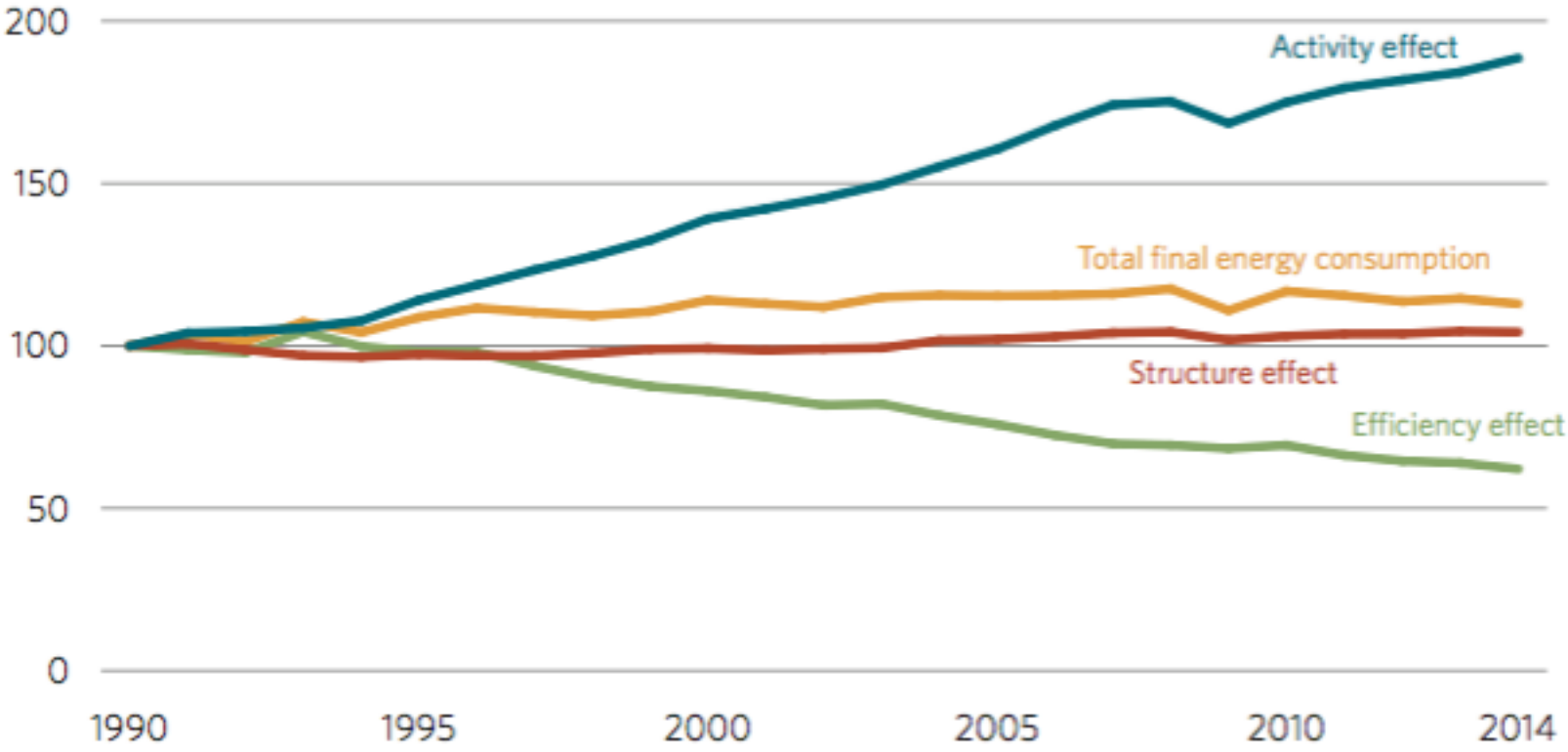
Renewable share of total final energy consumption, global, 2014



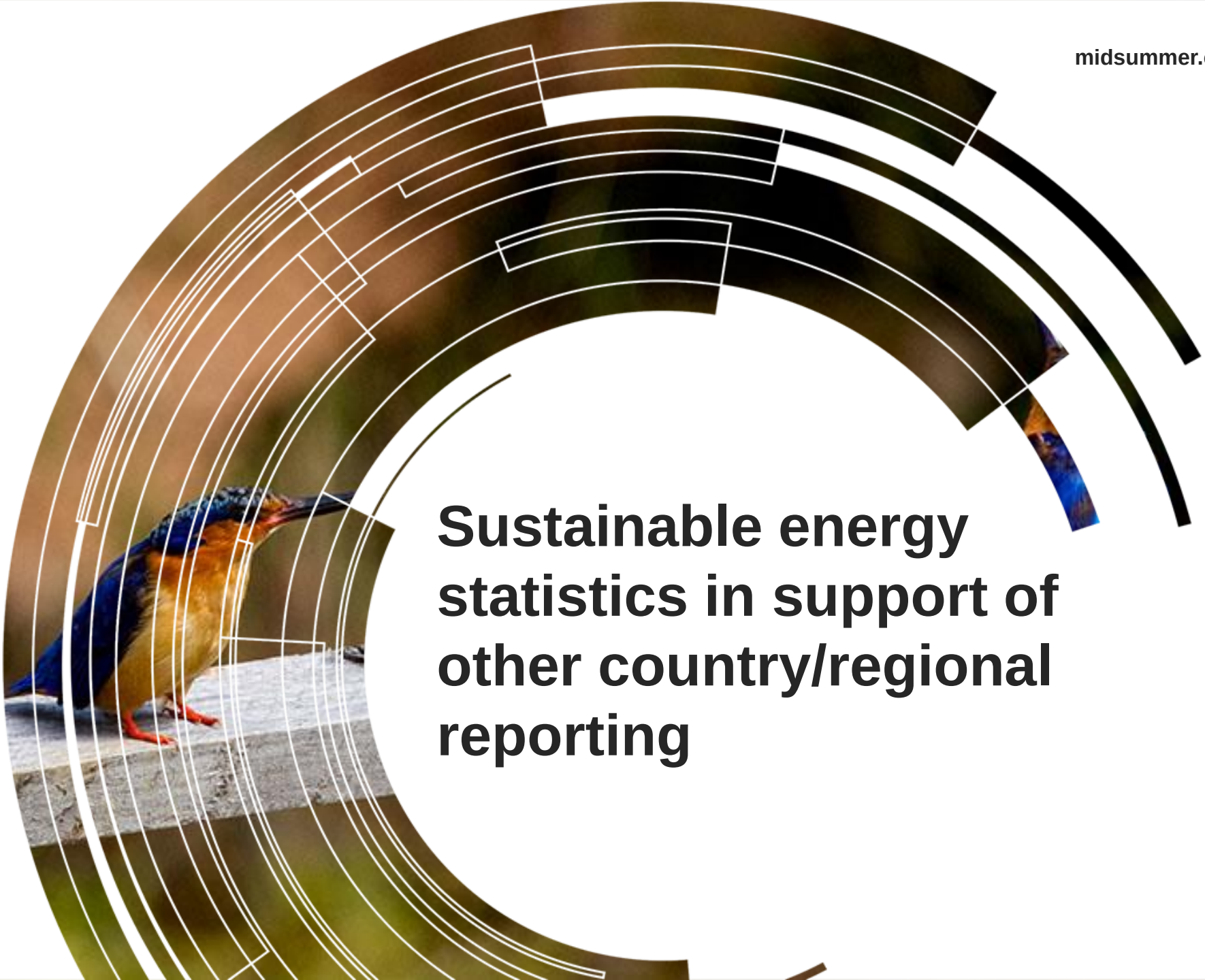
Source: Global Tracking Framework, 2017 Report (https://goo.gl/1YRPNW)

Understanding drivers of energy consumption (decomposition analysis)

Decomposition of trends in global total energy consumption: Activity, structure, and efficiency effects, 1990–2014 (index, 1990 = 100)



Source: Global Tracking Framework, 2017 Report (https://goo.gl/1YRPNW)

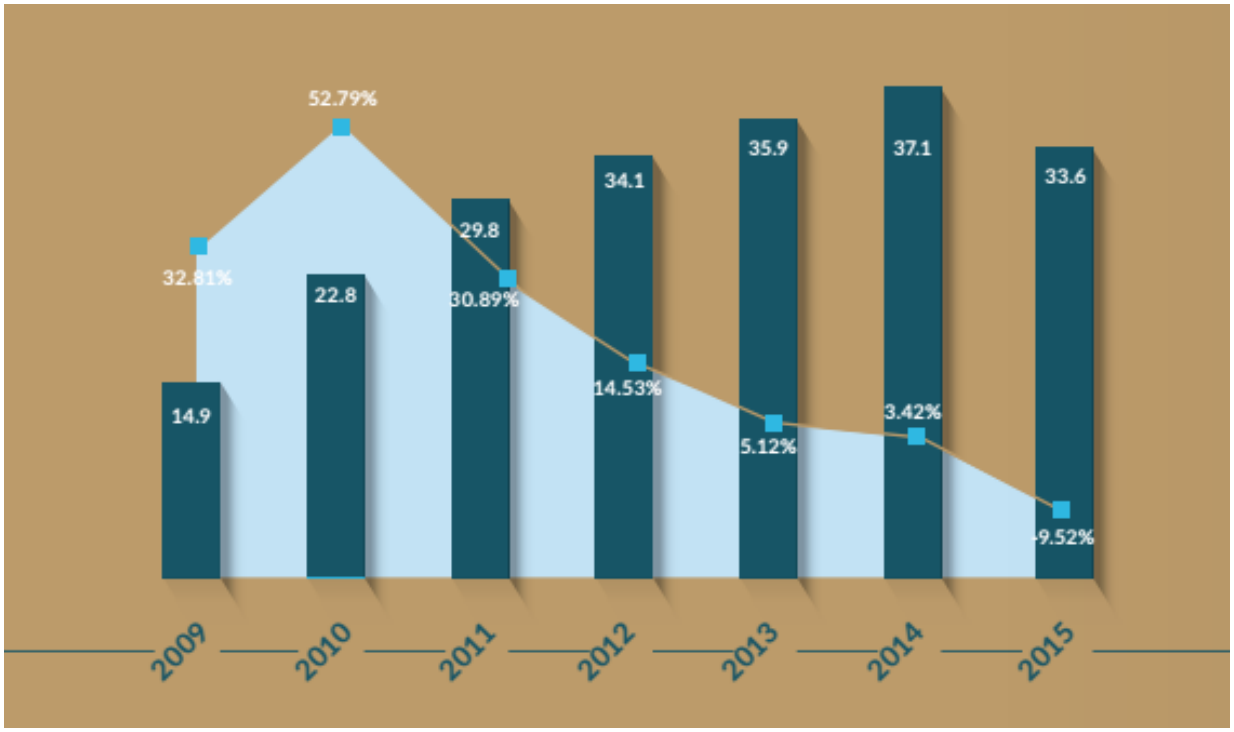


Sustainable energy statistics in support of other country/regional reporting

Examples from Azerbaijan, Belarus, Georgia, Kazakhstan and Kyrgyzstan

Sustainability of non-renewable energy

Azerbaijan State Oil Fund – Value ($US billions) and annual growth, 2009-2015



- Investing rents from non-renewable resource extraction ensures wealth is maintained for future generations

Source: State Oil Fund Annual Report, 2015 (http://www.oilfund.az/uploads/Annual_Report_2015_ENG.pdf)

Primary energy production

Primary energy production, by type, Belarus, 2005-2015

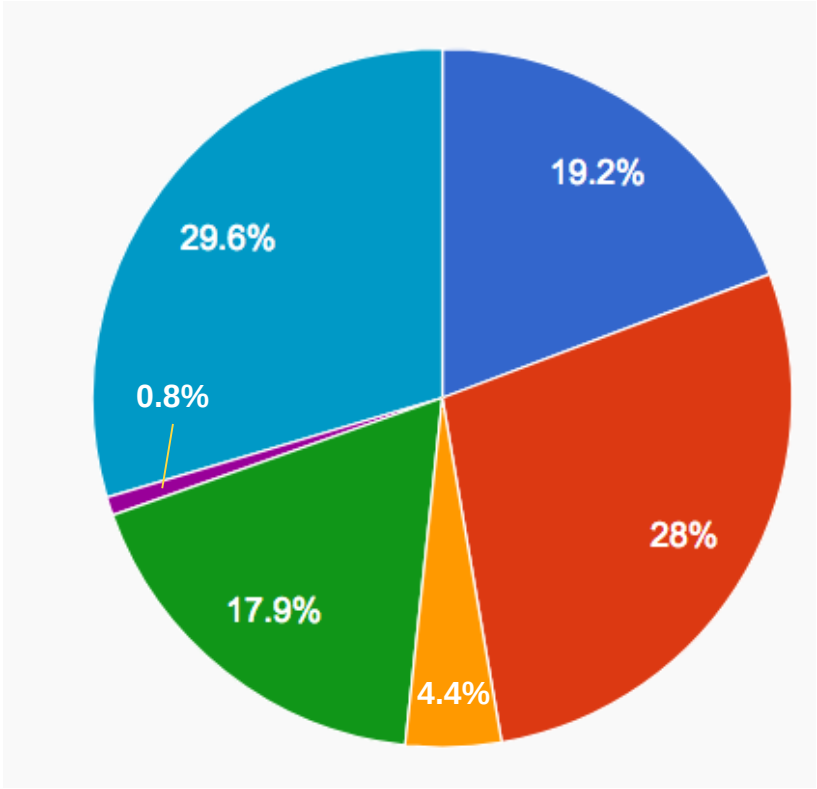
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Fuel peat, 1000 t	2 307	2 125	2 502	2 361	2 216	2 352	2 704	2 679	2 269	1 433	1 015
Crude oil including natural gas liquid, 1000 t	1 785	1 780	1 760	1 740	1 720	1 700	1 681	1 660	1 645	1 645	1 645
Associated gas, Mm^3	228	219	201	203	205	213	222	218	228	222	225
Biogas, 1000 tce	–	–	–	–	–	3,1	4,3	6,2	13,1	12,7	13,5
Firewood, 1000 solid m^3	4 739	5 370	5 537	5 508	5 010	5 437	6 292	6 173	6 150	5 896	5 064
Other natural fuel, 1000 tce	378	408	429	476	456	495	528	539	526	569	594
Wind, hydro and solar energy, GWh	37	37	36	40	46	46	46	78	146	132	140

- Belarus uses a wide range of primary energy types
- But the use of different units of measure in this table makes it hard to know the relative importance of each
- Is peat use considered renewable?

Source: National Statistical Commission of Belarus (https://goo.gl/qA6IK6)

Imports versus domestic energy supply

Electricity production and imports, Georgia, March 2017



- "Regulator" hydro plants
- "Seasonal" hydro plants
- "Deregulator" hydro plants
- Thermal power plants
- Wind power
- Imports

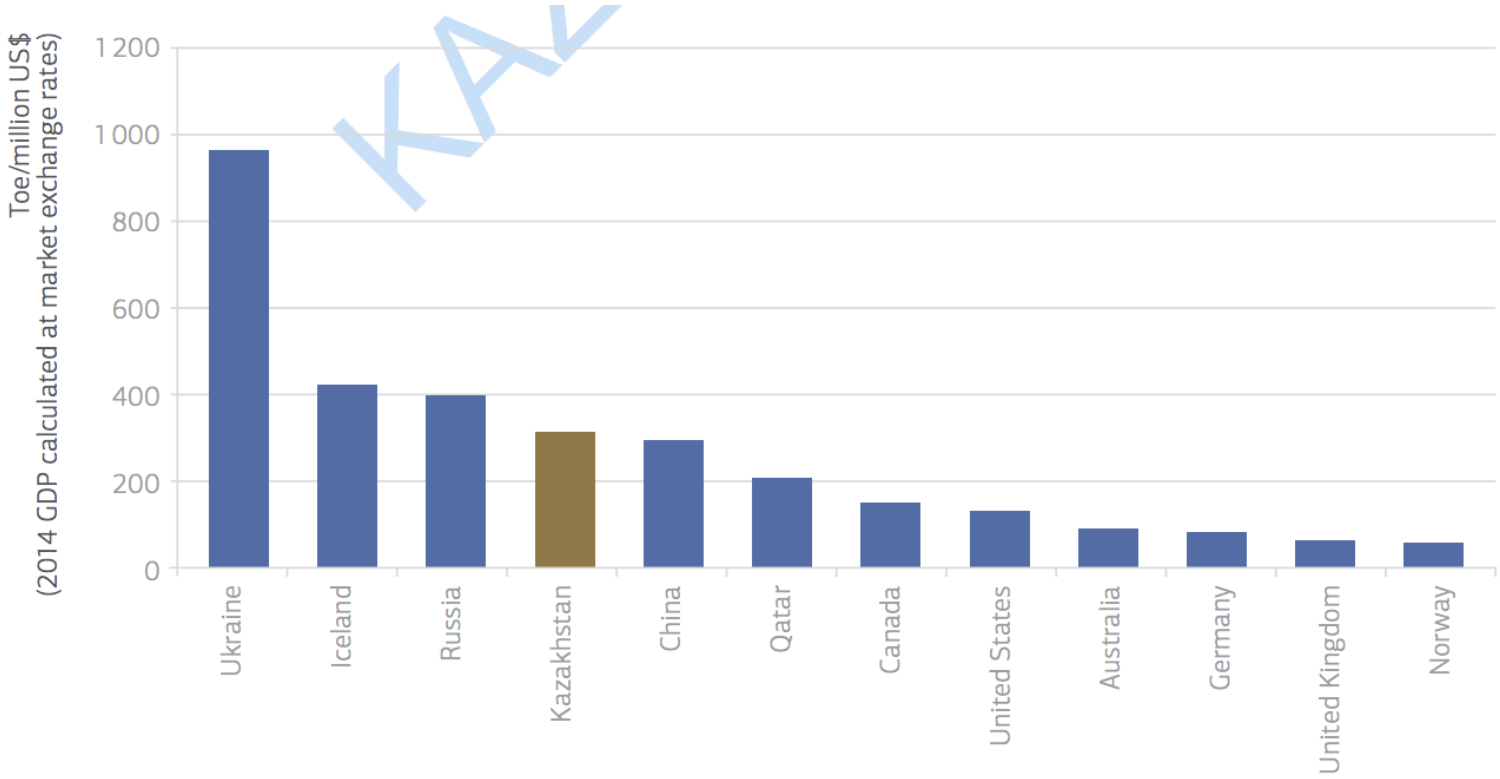
- Renewable sources

- Georgia's domestic electricity production is highly renewable
- But imports are a large sharge of domestic supply
  - Are they also renewable?

Source: Ministry of Energy of Georgia (http://www.energy.gov.ge/statistic.php?lang=eng)

Selected country comparisons

Energy intensity, Kazakhstan and various energy-producing countries, 2014



Source: Kazenergy (http://kazenergy.com/images/NationalReport15_English.pdf)

Comparing energy prices by city

Average consumer price of A-95 gasoline by city, Kyrgyzstan, June 2017 (soms/litre)

Kyrgyz Republic	**41.44**
Karakol city	42.00
Balykchy city	40.67
Kerben city	43.50
Toktogul city	-
Djalal-Abad city	41.36
Chaek, Jumgal region	41.00
Naryn city	40.50
Isfana city	-
Batken city	43.90
Kara-Suu city	42.33
Nookat city	41.25
Uzgen city	41.00
Pokrovka, Manas region	42.00
Talas city	42.00
Kara-Balta city	40.55
Tokmok city	40.50
Bishkek city	41.41
Osh city	41.85

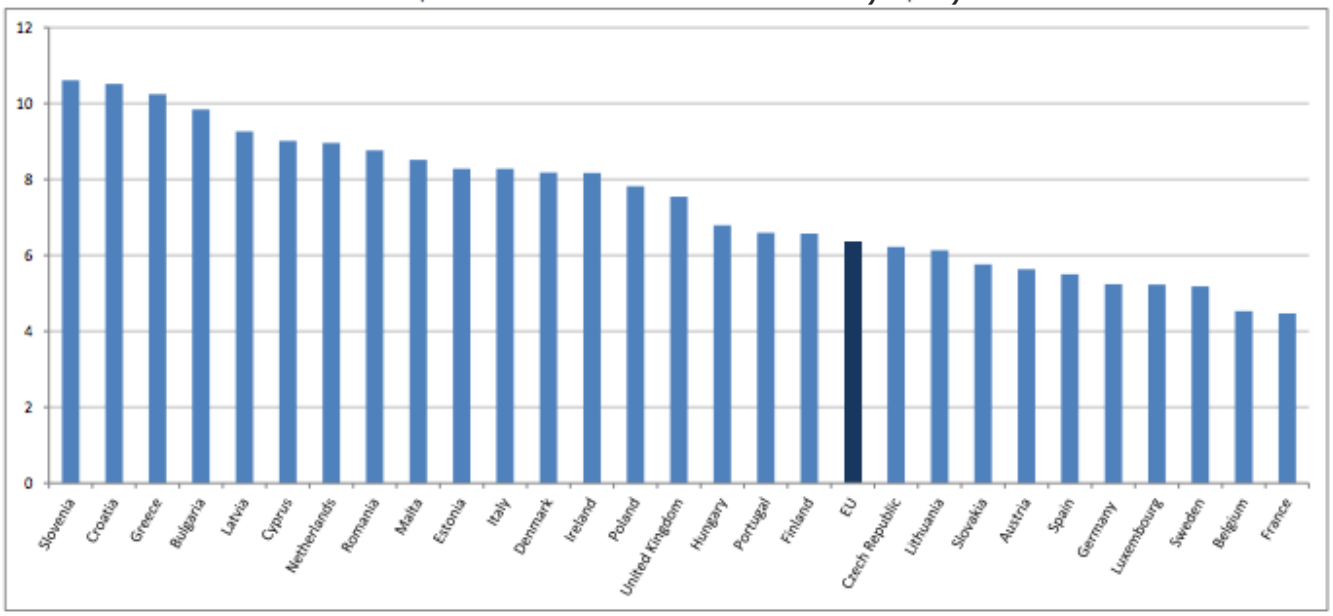
- Comparing energy prices across cities is an important element of equity of access to energy
- Prices in Kyrgyzstan are relatively constant, ranging from 98% to 106% of the national average

Source: National Statistical Committee of Kyrgyzstan (https://goo.gl/8092XP)

Examples from Europe

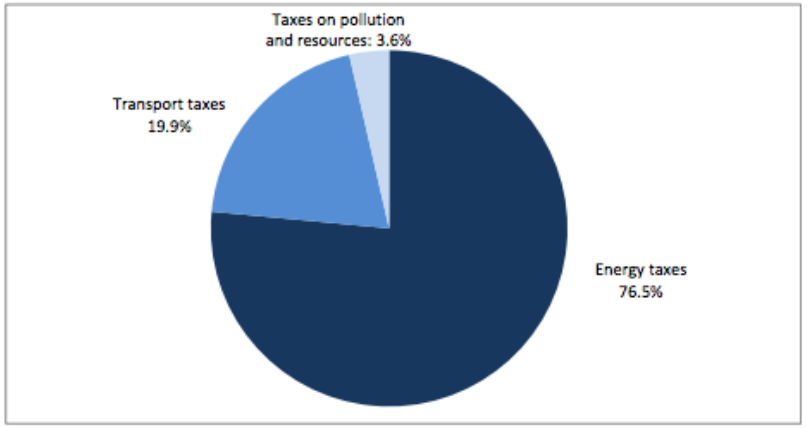
Breakdown of environmental taxes

Share of environmental taxes in total taxes, EU, 2014



- The EU "Roadmap to a Resource Efficient Europe" recommends environmental taxes be 10% of total tax revenues
- Very few states have achieved that goal

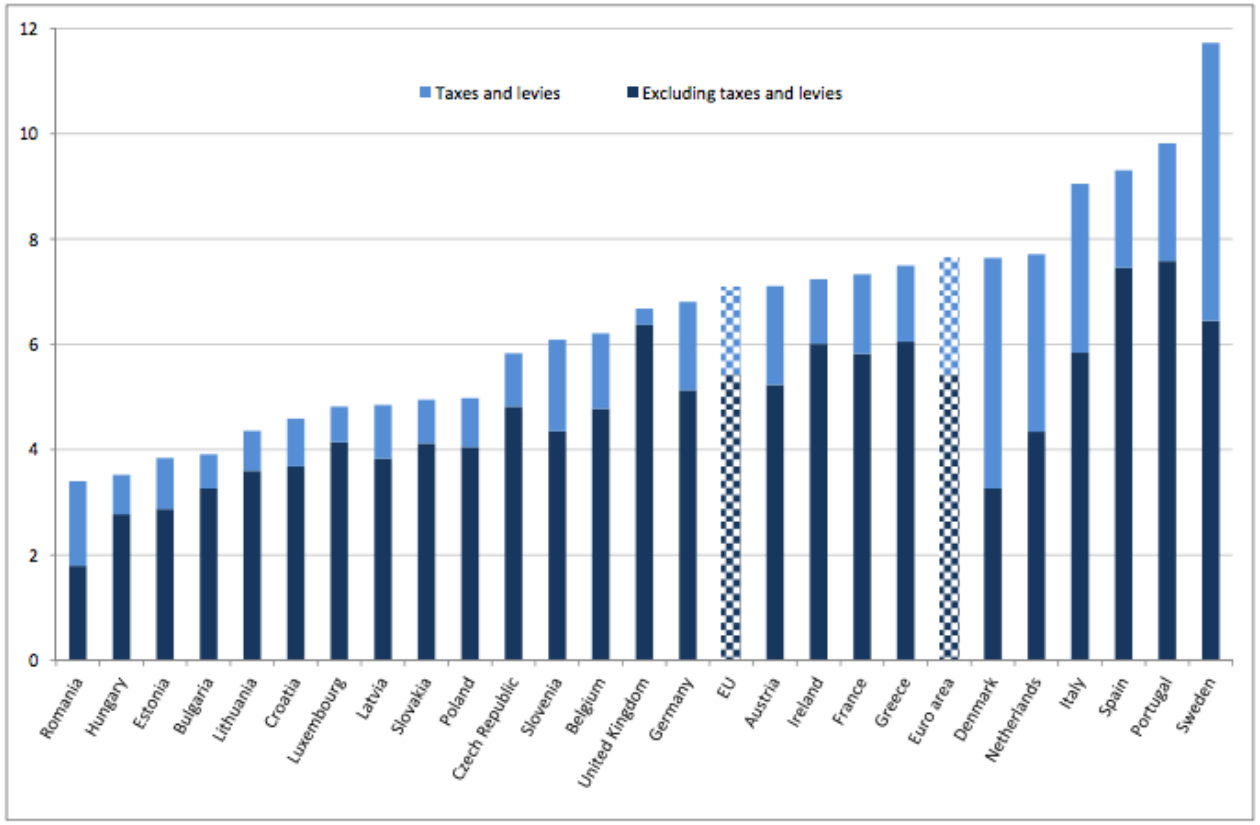
Revenue by category of environmental taxes in the EU, 2014



Source: Eurostat (https://goo.gl/KLHsVl)

Analysis of tax content of energy prices

Average natural gas price for households per 100 kWh, EU, 2015 (euros/100 kWh)

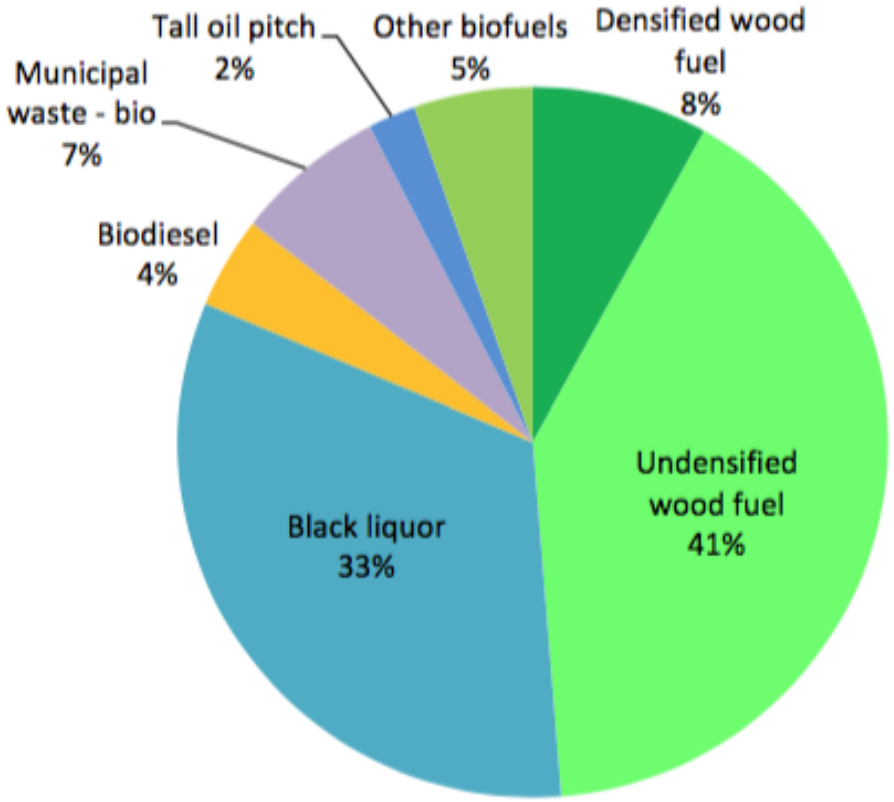


- The share of taxes in energy prices varies greatly by country
- The UK has almost no tax on natural gas
- Denmark has a tax of more than 50%

Source: Eurostat (https://goo.gl/x84JJD)

Biomass energy use

Biomass energy use, Sweden, 2013

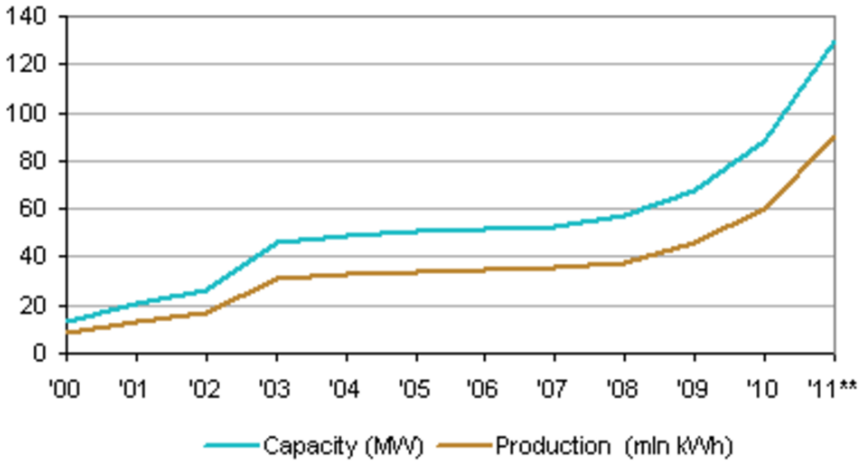


- At the beginning of the 1990s, Sweden introduced a carbon tax and higher energy taxes
  - biomass was exempt from both, which contributed to a sharp increase in the use of
- Undensified wood fuel includes fuelwood
- Densified wood fuel includes charcoal and wood pellets
- “Other biofuels” encompasses other solid biofuels, bioethanol, vegetable and animal oils, other liquid biofuels and biogas

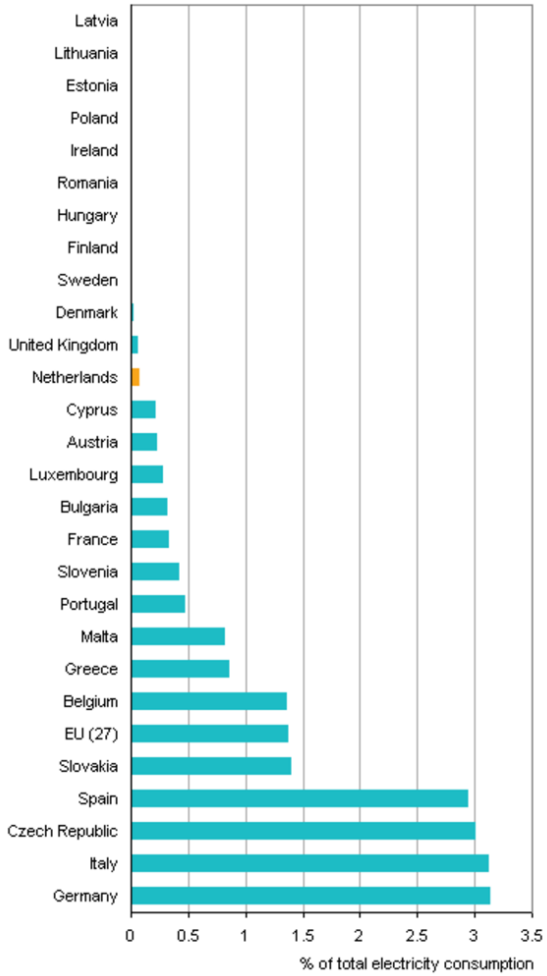
Source: Swedish Energy Agency (https://goo.gl/x84JJD)

Solar power production

Solar power capacity and production, Netherlands, 2000-2011



- Generation of solar electricity is not prominent in the Netherlands
- Germany, Spain, Italy and the Czech Republic have the highest shares and the highest subsidies
- In the Netherlands, the United Kingdom and ten other EU countries, solar electricity accounted for less than 0.1 percent of total electricity consumption.



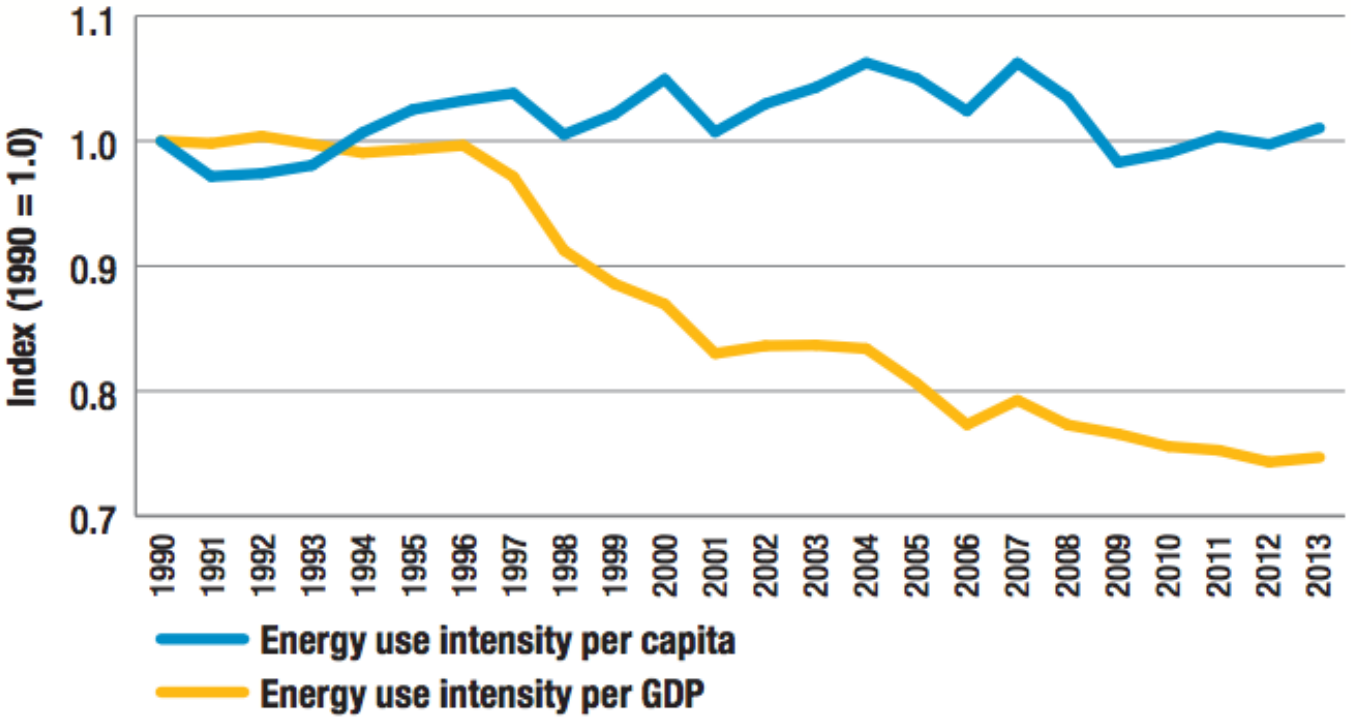
Solar power share of total energy consumption, EU, 2011

Source: Statistics Netherlands (https://goo.gl/tVMrl7)

Examples from Canada

Comparing energy intensity in different ways

Total secondary energy use intensity per capita and per unit of GDP, Index, Canada, 1990–2013

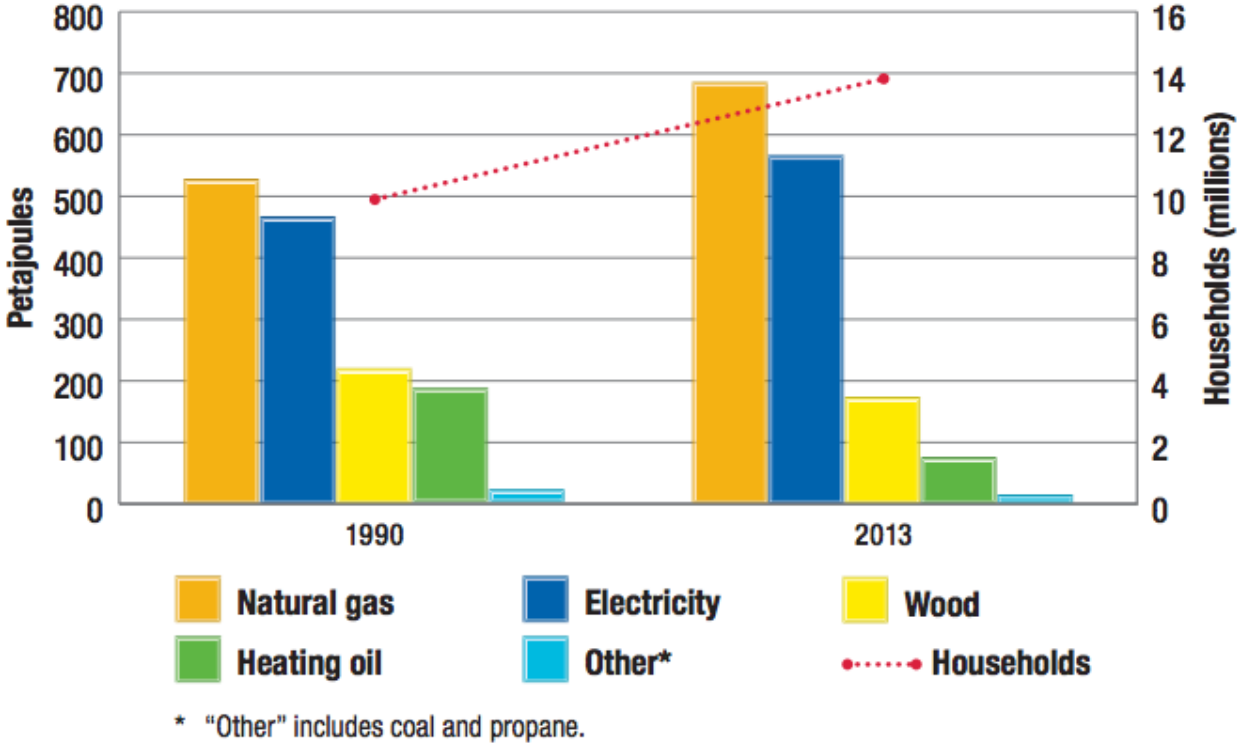


- The upward trend in per capita energy use reflects:
  - increasing use of electronic goods
  - increasing ownership of passenger light trucks
  - and increasing distance and weight of goods transported by heavy trucks

Source: Natural Resources Canada (https://goo.gl/L8xt86)

Understanding household energy use

Residential energy use by fuel type and number of households, Canada, 1990 and 2013

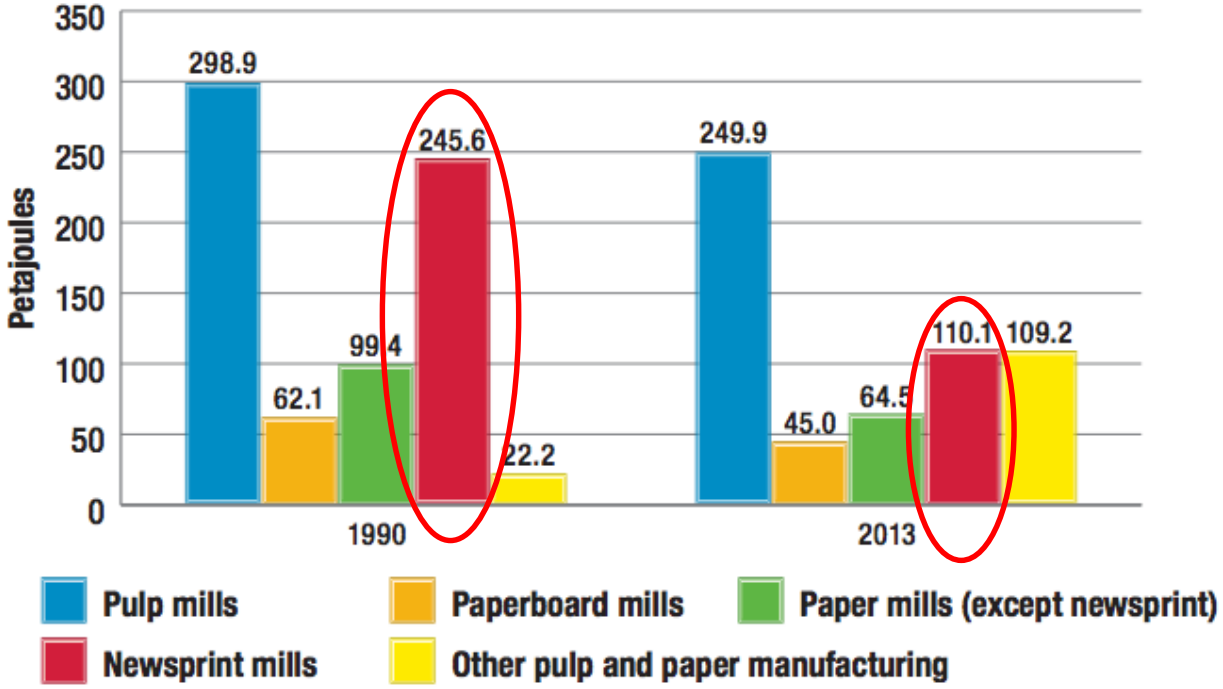


- Natural gas and electricity together accounted for 82.5 percent of all residential energy use in 2013, compared to 70 percent in 1990
- Heating oil saw its share decrease from 13 percent to 5 percent over the period
- The increase in natural gas and electricity share largely reflected the increased availability of natural gas and lower natural gas prices relative to oil
- It was also in part the result of relatively higher efficiency ratings for gas and electric furnaces

Source: Natural Resources Canada (https://goo.gl/L8xt86)

Industrial energy intensity by technology type

Energy consumption by subsector of the pulp and paper industry, Canada, 1990 and 2013



- Newsprint mills reduced their energy use dramatically
- This is mainly because of reductions in their output and not because of increases in energy efficiency

Source: Natural Resources Canada (https://goo.gl/L8xt86)

Thank you

rob@midsummer.ca
+1-613-716-5230
Skype: smitrob1965

Midsummer Analytics