

# **Renewable Energy in the context of Circular Economy - Implication towards Sufficiency Economy & SDGs**

**By: Upendra Tripathy, Director General,  
International Solar Alliance**

# TEN TYPES OF TEAS.....

## life hacks

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10 Teas to try when you...

Have a headache = Ginger Tea

Have bad breath = Black Tea

Have the jitters = Passion Flower Tea

Have allergy sniffles = Nettle Tea

Have 3pm cravings = Green Tea

Feeling unintelligent = Ginkgo Tea

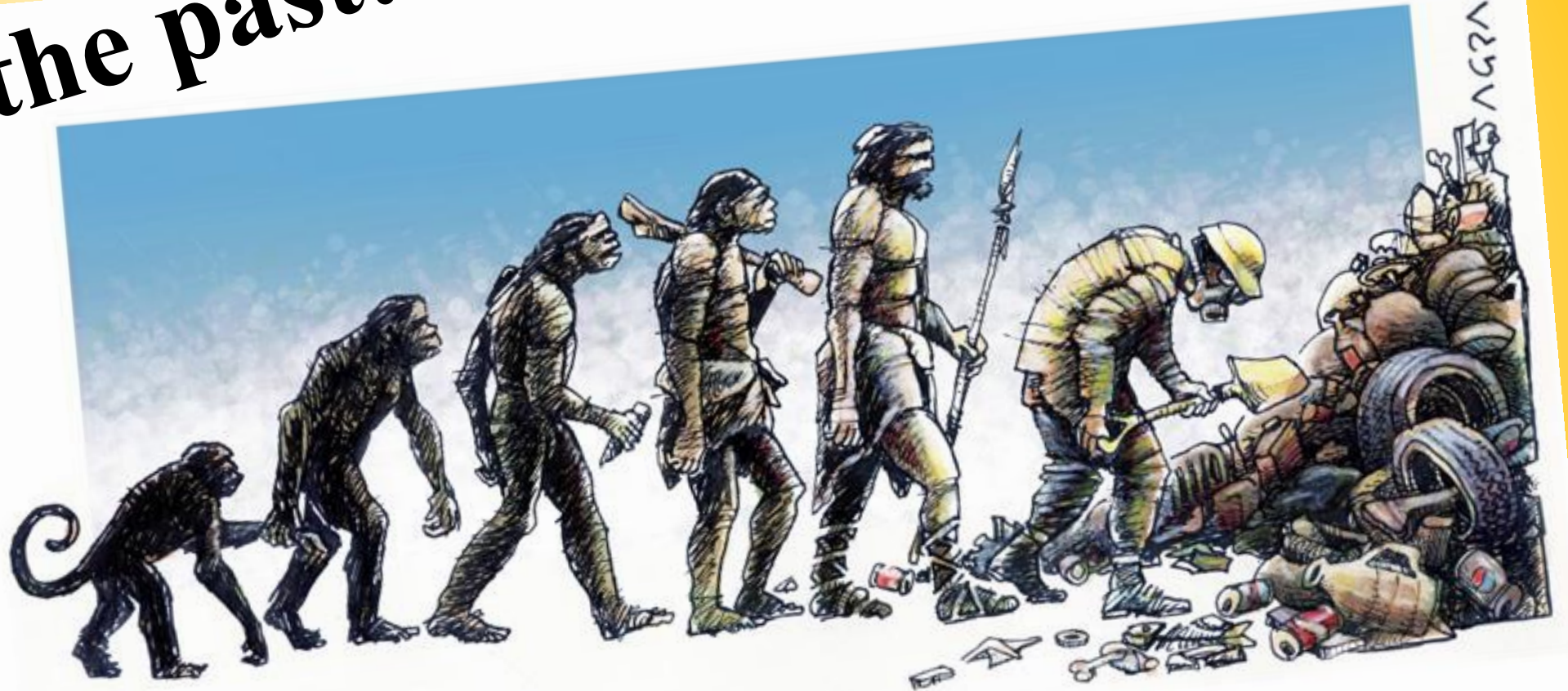
Want to sleep = Valerian Tea

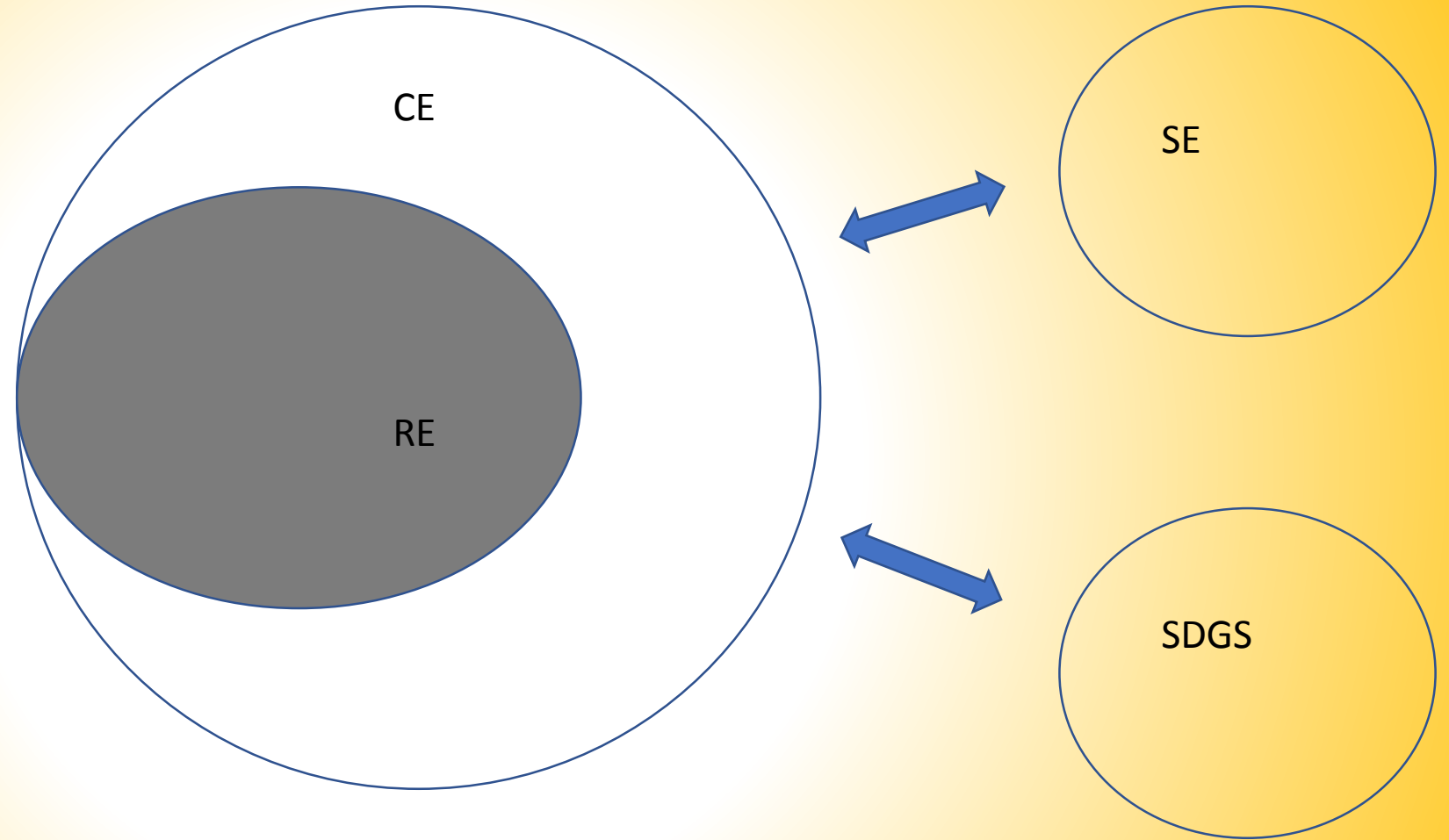
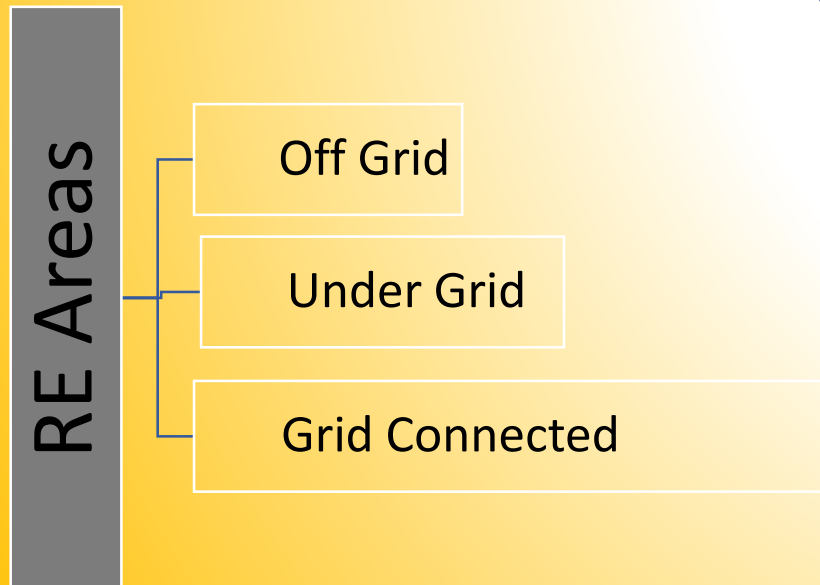
Have a sweet tooth = Licorice Tea

Have belly woes = Peppermint Tea

Want faster calorie burn = Oolong Tea

# Back to the past!



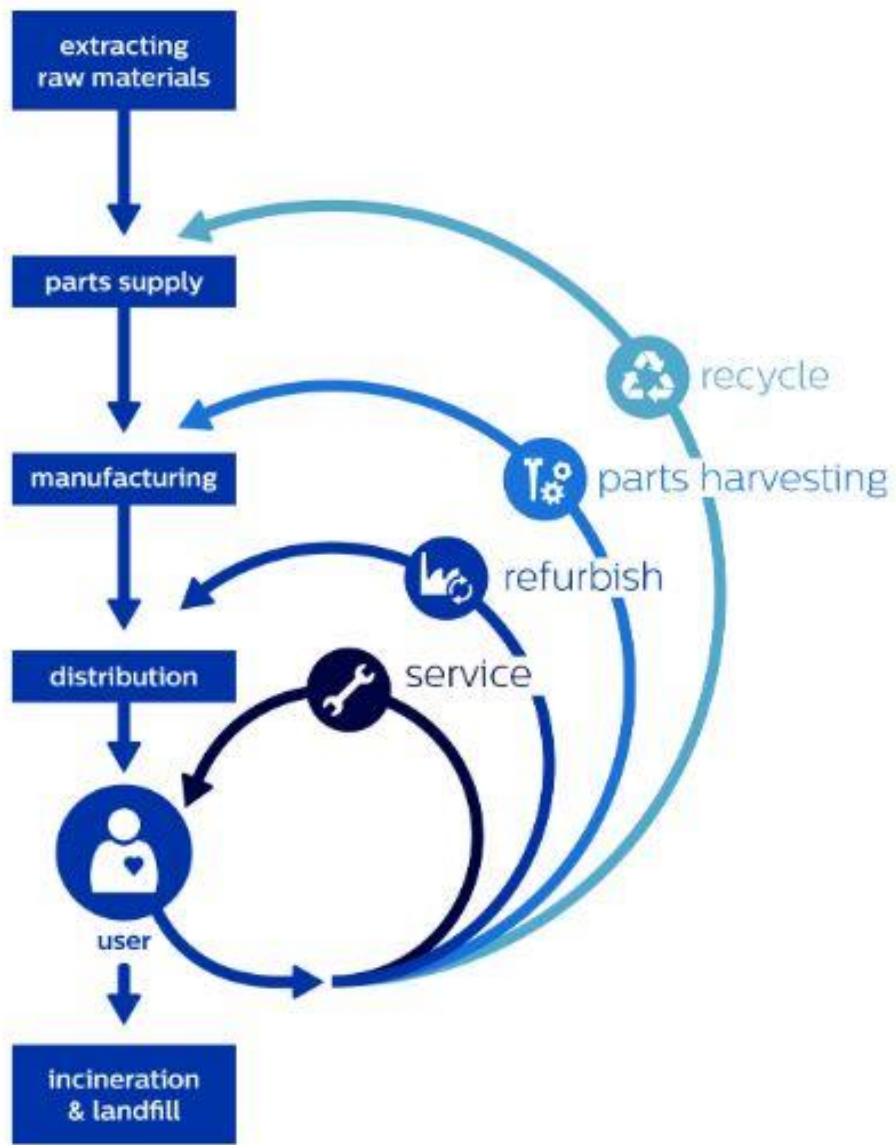




# **RENEWABLE ENERGY IN THE CONTEXT OF CIRCULAR ECONOMY – IMPLICATION TOWARDS SUFFICIENCY ECONOMY & SDGS: THE TEN POINT PROPOSITION.**

**AS SHARE OF RE GOES UP IN THE GLOBAL ENERGY BASKET:**

- 1. SHARE ENERGY FROM DIRTY SOURCES WILL GO DOWN.**
- 2. WASTE GENERATION FROM DIRTY SOURCES AND ALLIED SECTOR WILL GO DOWN.**
- 3. CIRCULAR ECONOMY WILL GROW FOR ECONOMIC AND PSYCHOLOGICAL REASONS.**
- 4. CIRCULAR ECONOMY WILL FURTHER REDUCE GENERATION OF WASTES.**
- 5. IN CIRCULAR ECONOMY, WASTE WILL BE A SOURCE OF WEALTH.**
- 6. SDG GOALS WILL BE ACHIEVED BETTER AND FASTER.**
- 7. RE GENERATION WILL BE MORE DISTRIBUTED AND STORAGE BASED.**
- 8. TECHNOLOGIES WILL DRIVE DOWN COST AND ENHANCE EFFICIENCY.**
- 9. SUFFICIENCY ECONOMY WILL HAVE A BOOST AND EASIER TO REACH OUT.**
- 10. INCREASE IN SHARE OF RE WILL BE DIRECTLY PROPORTIONAL TO (A) WORTH OF WASTES, (B) SIZE OF CIRCULAR ECONOMY, (C) REALIZATION OF SUFFICIENCY ECONOMY, (D) ACHIEVEMENT OF SDG GOALS; AND INVERSELY PROPORTIONAL TO (E) VOLUME OF WASTES GENERATED GLOBALLY.**



# the circular economy

## Which of the following TEN statements is not TRUE about Circular Economy?

- Circular Economy aims at resolving the problem of dwindling economic resources by treating economic waste as a useful economic resource.
- A circular economy is an alternative to a traditional linear economy (make-use-dispose)
- A Circular Economy keeps resources in use for as long as possible.
- A Circular Economy extracts the maximum value from resources in use, and then recovers and regenerates products and materials at the end of each service life.
- A Circular Economy minimizes the use of natural resources and environmental problems and regards Earth as a closed system rather than an open ended sewerage.
- Circular Economy is to convert the conventional linear relationship of “Resource-Product-Waste & Emission” between into a circular relationship of “Resource-Product- Resource”,
- Circular Economy reinvents economy and makes it more sustainable and competitive, benefits businesses, industries, and citizens alike.
- Circular Economy by embedding the 3R principles (Reduce, Reuse, and Recycling) into
- production and consumption process, minimizes the use of raw materials and primary energy input and reduce the load on natural sinks.
- To date, NO COUNTRY has taken measures to promote the circular economy, including Europe, the USA, Japan, China, India, Austria, Germany, and the Netherlands.







## Which of the following 5 statements is NOT True about the Sufficiency Economy?

**SE is based on reasonableness (or wisdom); moderation; prudence; knowledge and morality; interests of all stakeholders; long-term and sustainable profitability; knowledge and virtue as guidelines in living.**

**SE is a practical image of the philosophy in the famous book - Small is Beautiful by E.F. Schumacher**

**SE, according to Thailand's National Economic and Social Development Board: “.....a way of life based on patience, perseverance, diligence, wisdom and prudence is indispensable in creating balance and in coping appropriately with critical challenges arising from extensive and rapid socioeconomic, environmental, and cultural changes in the world.”**

**SE, according to the Oxford Business Group's 2016 report on Thailand says "the sufficiency economy concept puts sustainability at its very core" and "is now seen as an important contributor to the UN's international development goals...advancing a different approach from short-term shareholder value-centred ideas of economic development."**

**Self-sufficiency economy (localism) offers the idea of responsible production in order to protect the environment and conserve scarce resources. The philosophy holds that the rich can consume as many resources as they like so long as their consumption does not incur debt, and that the poor should consume resources without borrowing.**

# The Economist January 5th-11<sup>th</sup> 2019: the House made of wood!

Buildings produce a huge amount of carbon. Using more wood would be greener:





INTERNATIONAL  
SOLAR  
ALLIANCE



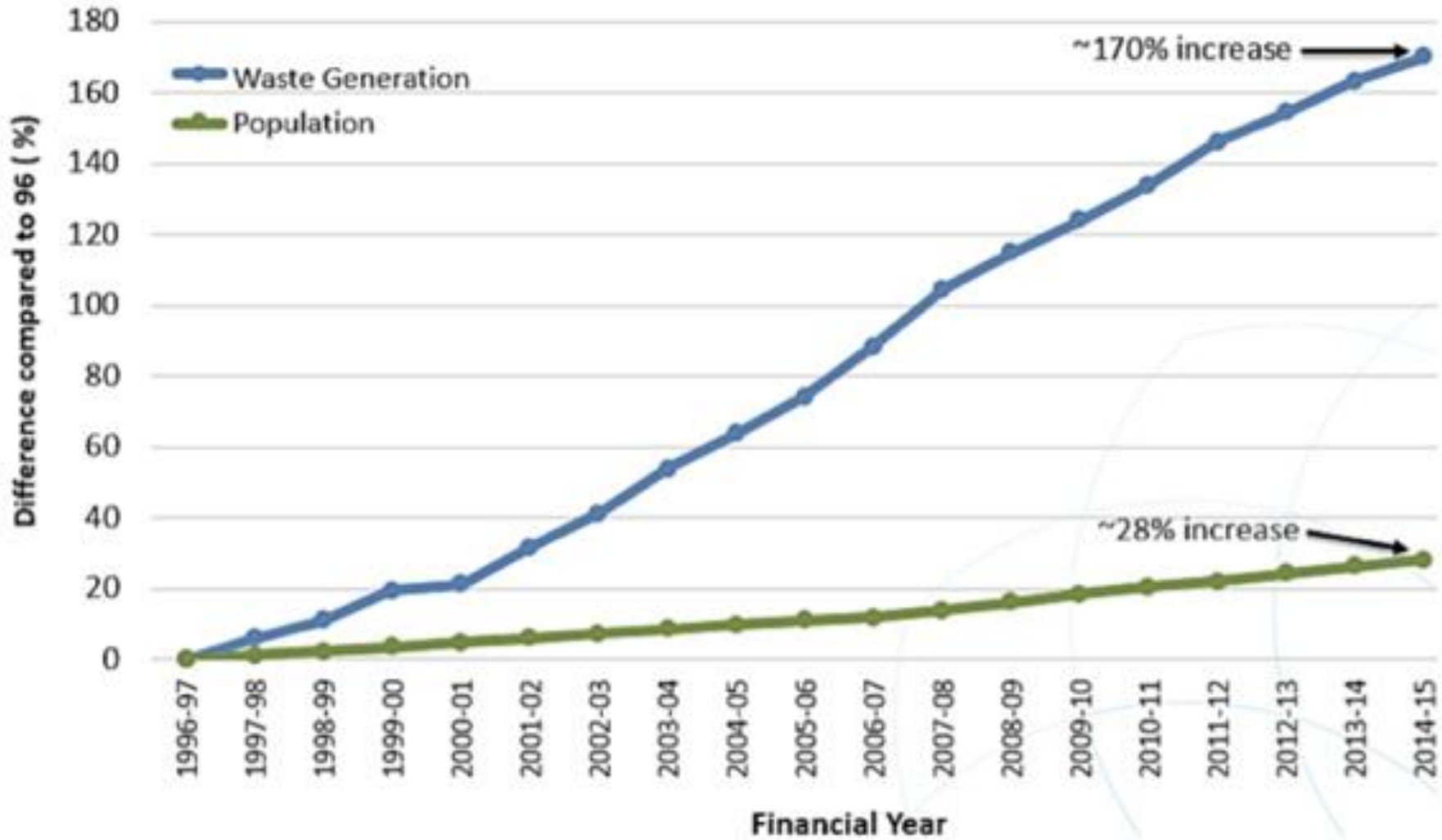
# SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD

<b>1</b> NO POVERTY 	<b>2</b> ZERO HUNGER 	<b>3</b> GOOD HEALTH AND WELL-BEING 	<b>4</b> QUALITY EDUCATION 	<b>5</b> GENDER EQUALITY 	<b>6</b> CLEAN WATER AND SANITATION 
<b>7</b> AFFORDABLE AND CLEAN ENERGY 	<b>8</b> DECENT WORK AND ECONOMIC GROWTH 	<b>9</b> INDUSTRY, INNOVATION AND INFRASTRUCTURE 	<b>10</b> REDUCED INEQUALITIES 	<b>11</b> SUSTAINABLE CITIES AND COMMUNITIES 	<b>12</b> RESPONSIBLE CONSUMPTION AND PRODUCTION 
<b>13</b> CLIMATE ACTION 	<b>14</b> LIFE BELOW WATER 	<b>15</b> LIFE ON LAND 	<b>16</b> PEACE, JUSTICE AND STRONG INSTITUTIONS 	<b>17</b> PARTNERSHIPS FOR THE GOALS 	



- 1. SDGs in words:**
- 2. No poverty**
- 3. Zero hunger**
- 4. Good health and well-being**
- 5. Quality education**
- 6. Gender equality**
- 7. Clean water and sanitation**
- 8. Affordable clean energy**
- 9. Decent work and economic growth**
- 10. Industry, innovation and infrastructure**
- 11. Reduced inequalities,**
- 12. Sustainable cities and communities**
- 13. Responsible consumption and production**
- 14. Climate action**
- 15. Life below water**
- 16. Life on land**
- 17. Peace, justice and strong institutions**
- 18. Partnership for the goals**





**E-Waste: annual generation 50 Million Tons.  
80 % to landfill. 120 Million Tons by 2050.**  
<https://www.downtoearth.org.in/waste>

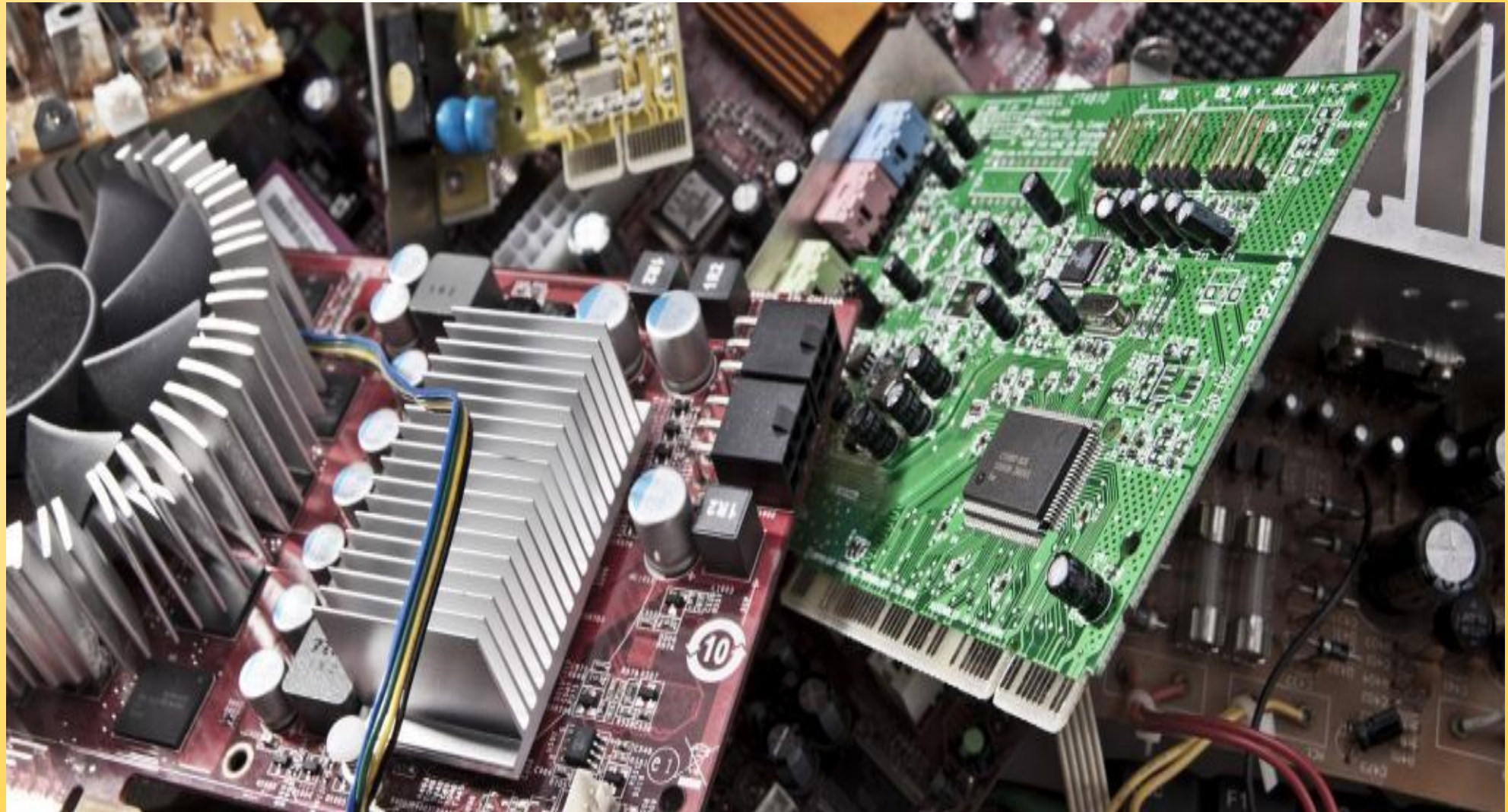
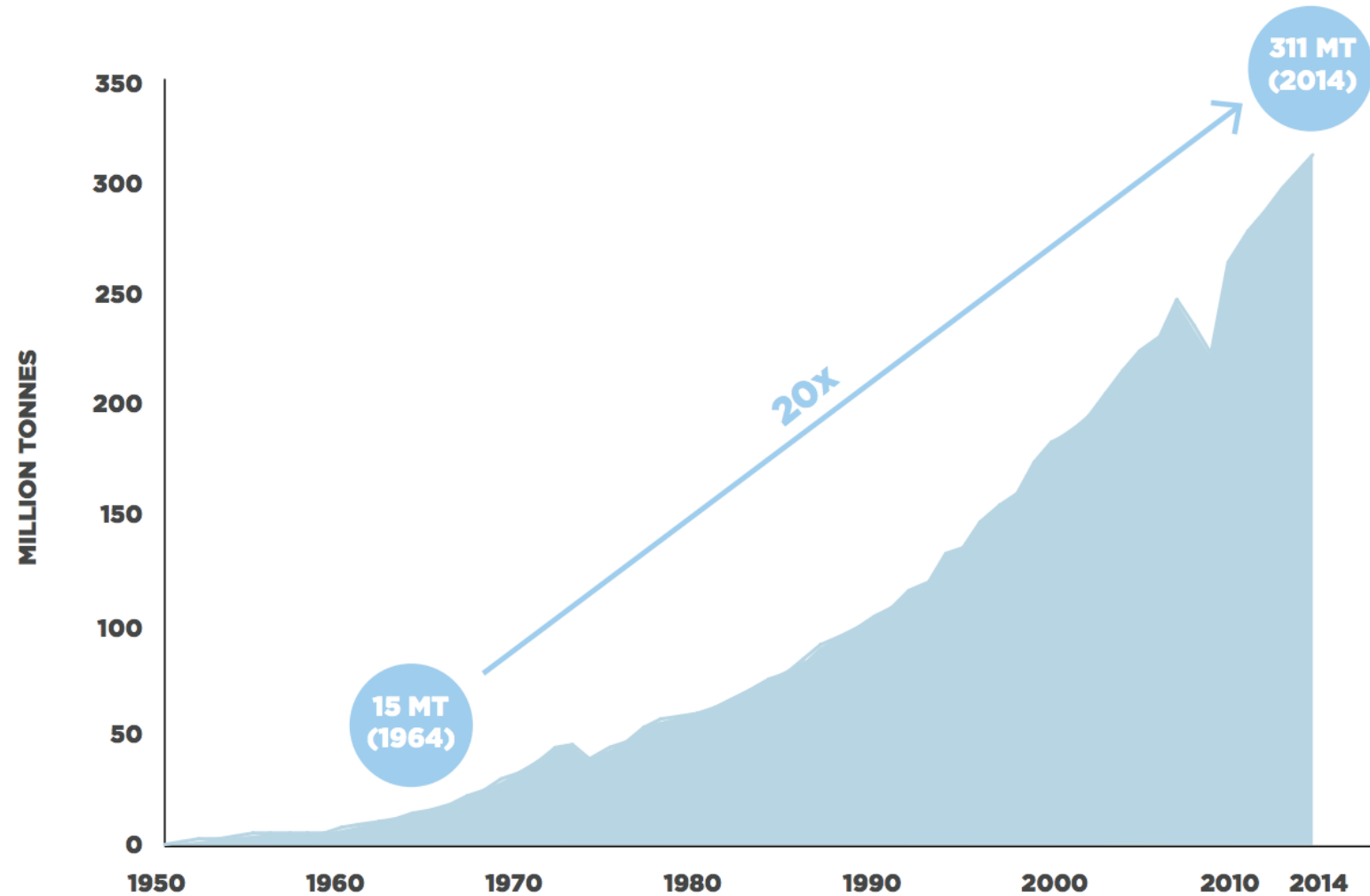




Figure 1: Growth in Global Plastics Production 1950–2014



Note: Production from virgin petroleum-based feedstock only (does not include bio-based, greenhouse gas-based or recycled feedstock)  
Source: PlasticsEurope, Plastics – the Facts 2013 (2013); PlasticsEurope, Plastics – the Facts 2015 (2015).

## **Contribution of circular economy to SDGs and its outcomes:**

- **The overall aims of SDGs include thriving lives and livelihood, Improving food security and water security,**
- **Universal clean energy, healthy clean productive ecosystem, and to build sustainable societies (Griggs et al., 2013).**
- **By implementation of circular economy, a part of SDGs can be accomplished to benefit economy, society and environment and to achieve human well beings for both current generation and later generations (Source: UNCRD)**

## **2016-2020 guide plan for circular development system in China by National Development and Reform Commission (NDRC, 2016)**

- **Parameters:**
  - Circular production**
  - Circular industry**
  - Circular agriculture**
  - Reduce consumption**
  - Reduce emission**
  - Improve resource efficiency**
  - Promote green life**
  - 3R in Waste management**
  - Increase resource productivity by 15 % on 2015 base**
  - Utilization of industrial solid waste by 73 %**
  - Utilization of straw by 85 %**
  - National & provincial Industrial parks (75% and 50 % respectively) to implement Circular economy.**
  - Output from recycling industries to reach \$ 450 Billion.**



## **Disturbing the equilibrium: Role of humans in carbon balance.**

There are both natural and human sources of **carbon dioxide emissions**. Natural sources include decomposition, **ocean** release, animal and plant respiration, organic matter decomposition, forest fires, and volcanic eruptions.

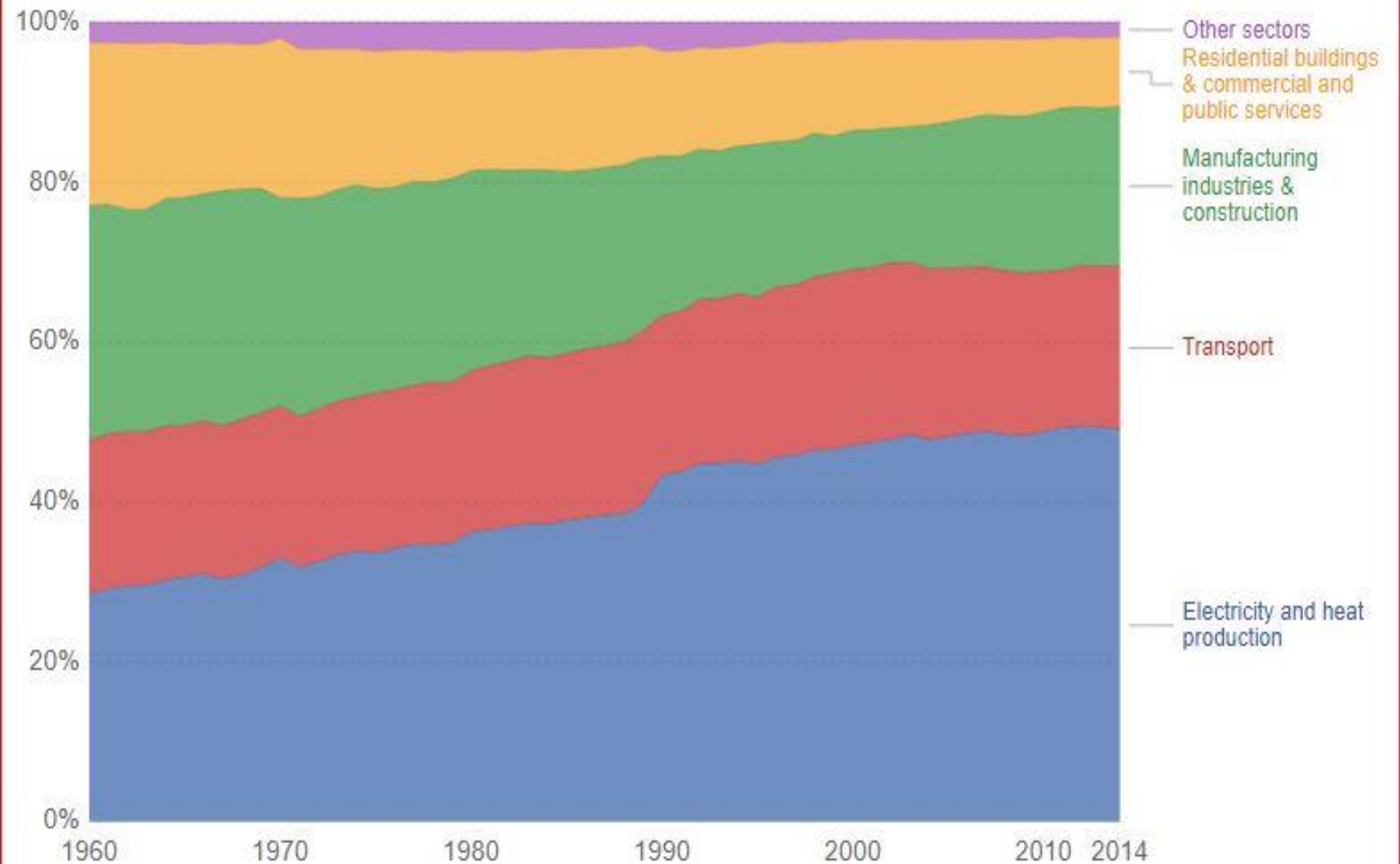
Human sources come from activities like industrial production (burning of coal, oil, natural gas), deforestation, transportation, construction in infrastructure sector, cooling and heating in buildings.

Human have disturbed the natural carbon balance. This is because natural sinks remove around the same quantity of carbon dioxide from the atmosphere than are produced by natural sources. This had kept carbon dioxide levels balanced and in a safe range. But human sources of emissions have upset the natural balance by adding extra carbon dioxide to the atmosphere without removing any.

## Carbon dioxide (CO<sub>2</sub>) emissions by sector or source, World

Share of carbon dioxide (CO<sub>2</sub>) emissions from fuel combustion by sector or source.

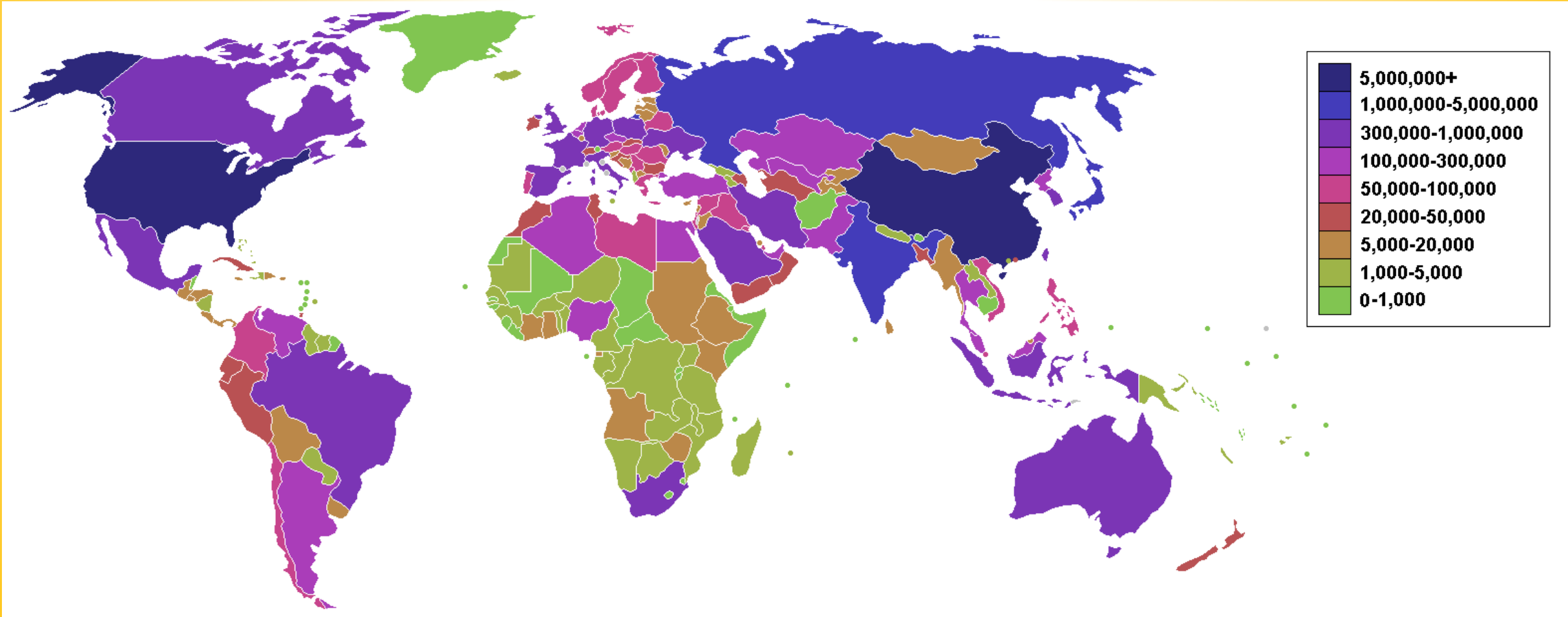
Our World  
in Data



Source: International Energy Agency (IEA) via The World Bank

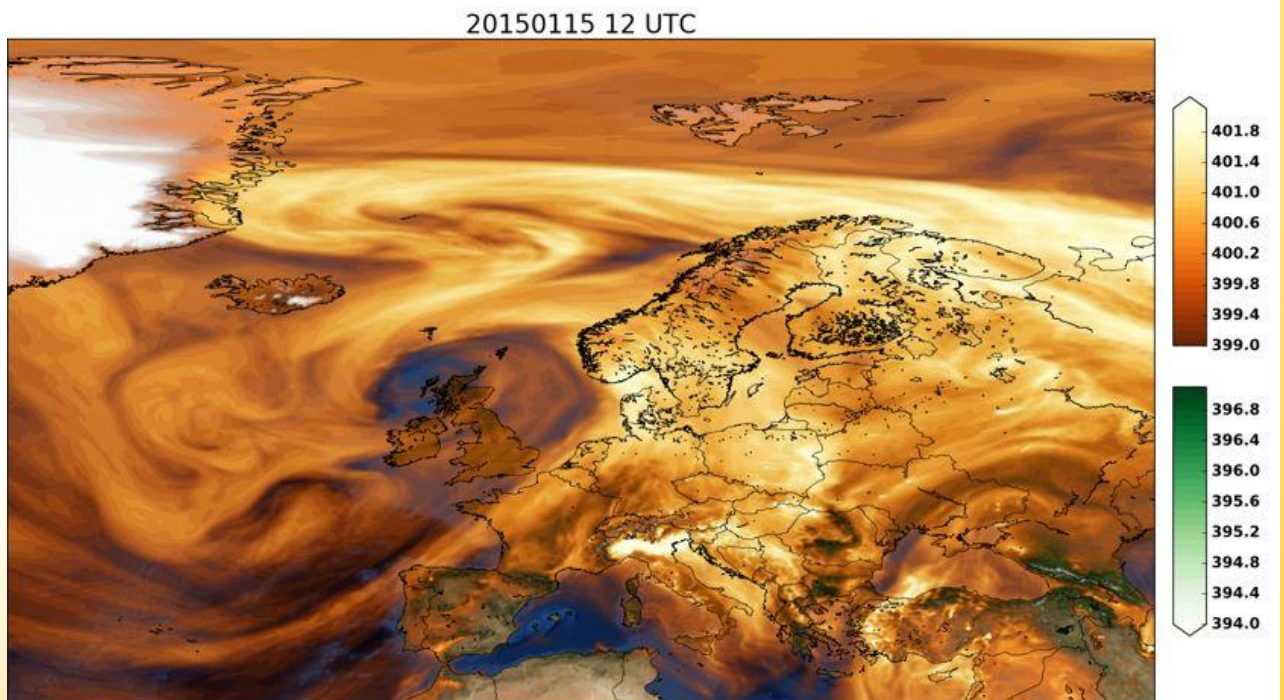
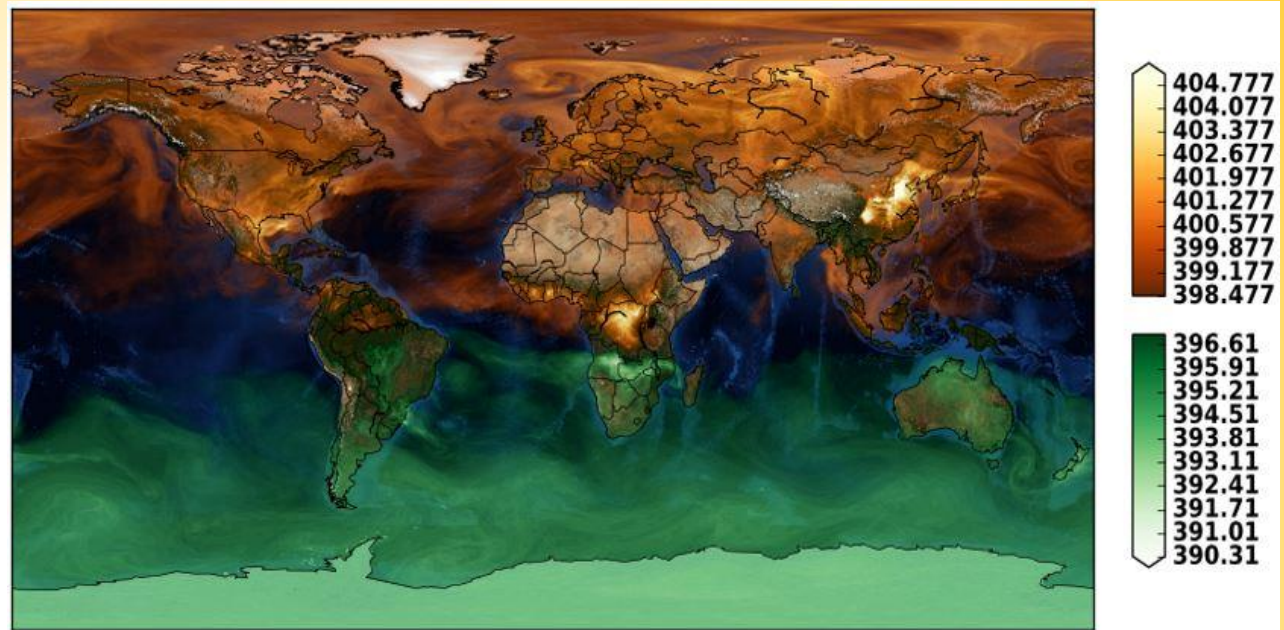
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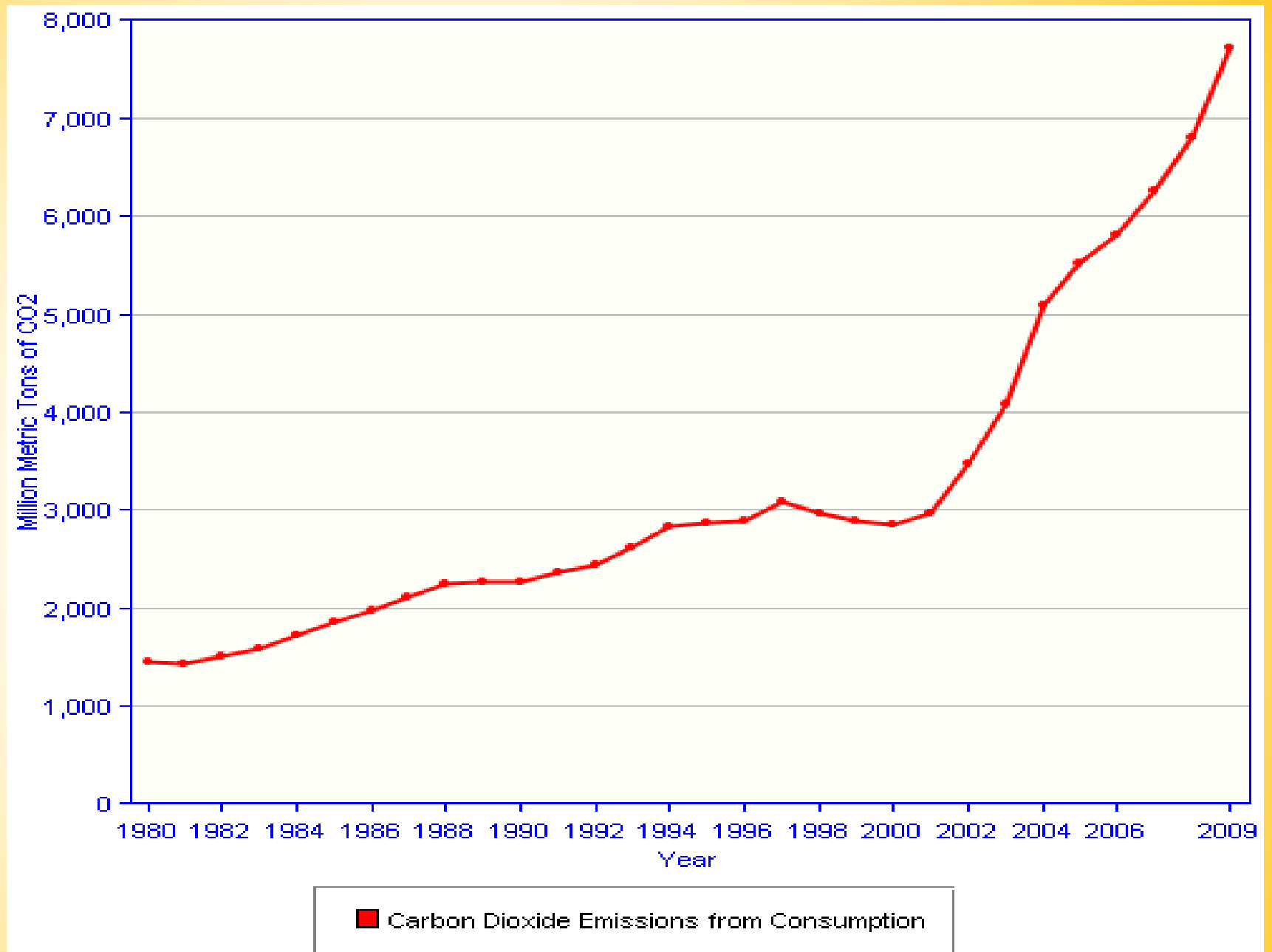
**Countries by carbon dioxide emissions in thousands of tonnes per annum, via the burning of fossil fuels (blue the highest and green the lowest) <https://en.m.wikipedia.org>**





**Figure 1: Spatial distribution of column-averaged dry molar fraction  $X_{CO_2}$  [ppm] on 15 January 2015 over the globe (upper panel) and over Europe (lower panel). Values above and below the global mean in reds and greens respectively (see colour bar). (source:<https://www.che-project.eu>)**

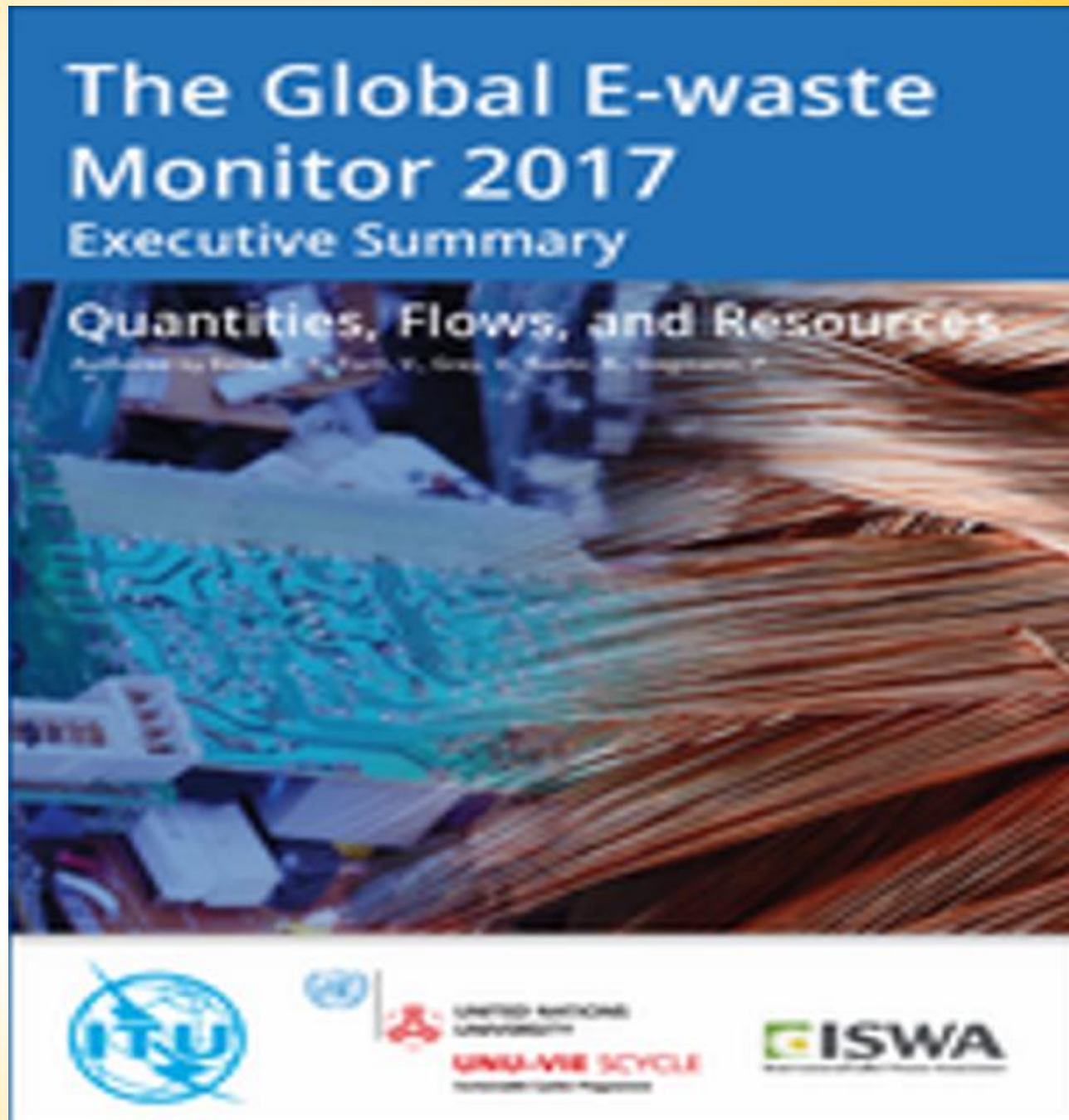






**By: International  
Telecommunication Union (ITU)**

- **The German Ministry of Economic Cooperation and Development (BMZ) acting through the German International Cooperation (GIZ)**
- **United Nations University (UNU),  
and**
- **International Solid Waste Association (ISWA)**





## **BIGBELLY'S WI-FI-ENABLED, SOLAR-POWERED BINS COULD LEAD TO SMARTER CITIES MOBILE TECHNOLOGY**

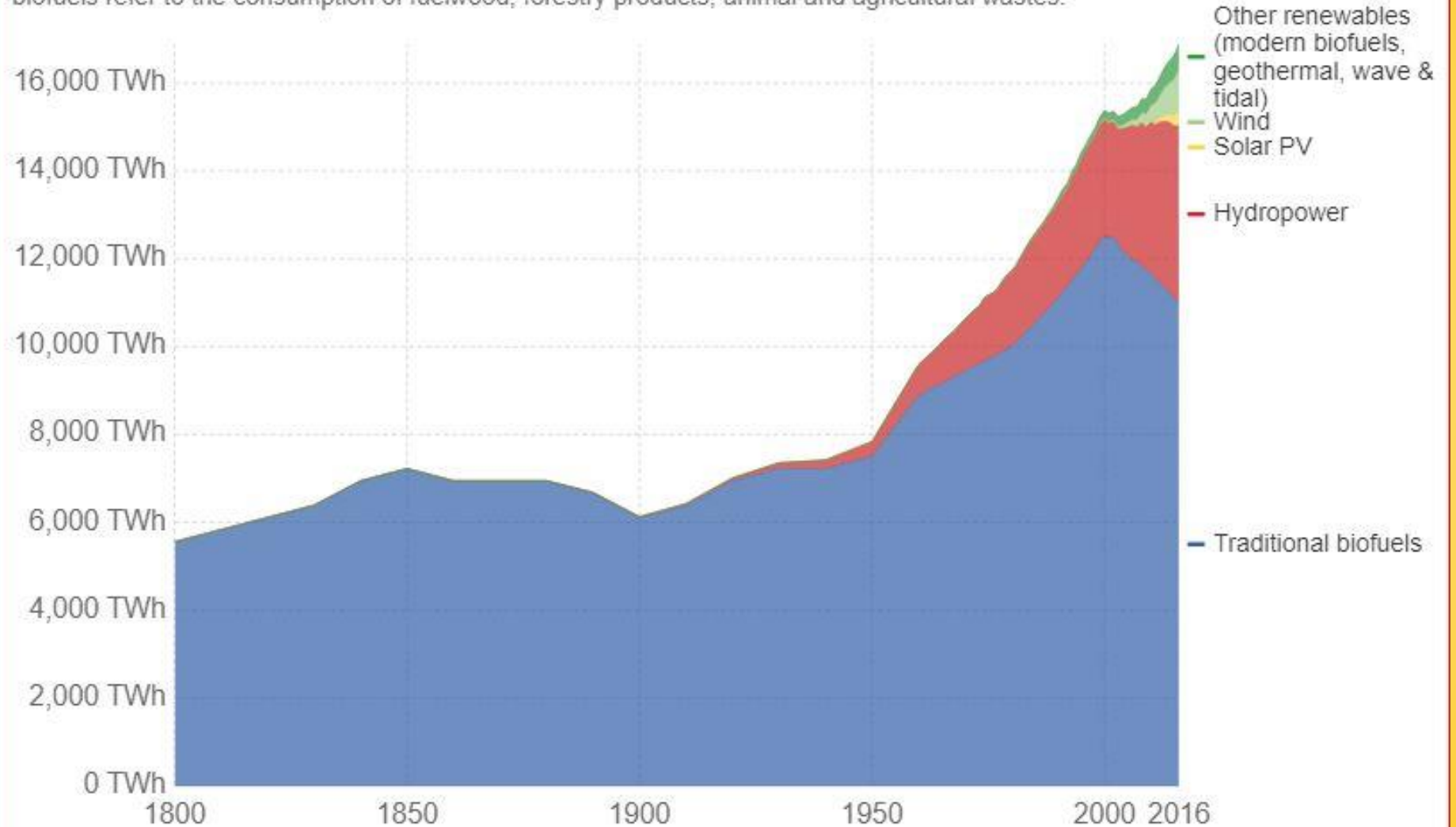




## Global renewable energy consumption, terawatt-hours

Our World  
in Data

Total renewable energy consumption over the long-term, measured in terawatt-hours (TWh) per year. Traditional biofuels refer to the consumption of fuelwood, forestry products, animal and agricultural wastes.



Source: Global Energy Production by Source - Vaclav Smil (2017), BP Statistical Review of Global Energy  
OurWorldInData.org/renewables • CC BY-SA

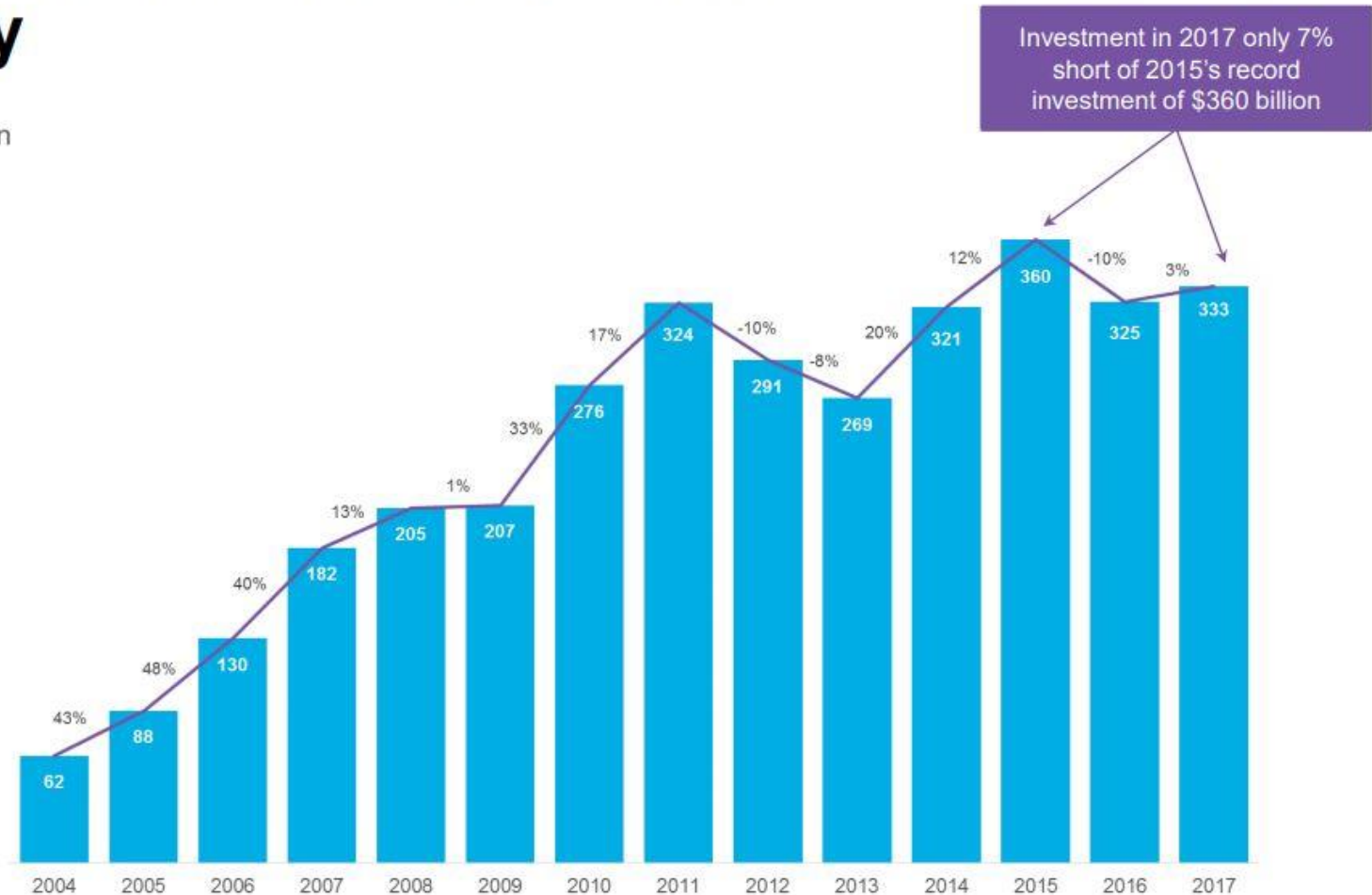


Annual Trends, New Investment

# Global New Investment in Clean Energy

2004 – 2017

\$bn



Version WF18.01  
All values nominal

Source:  
Bloomberg New Energy Finance

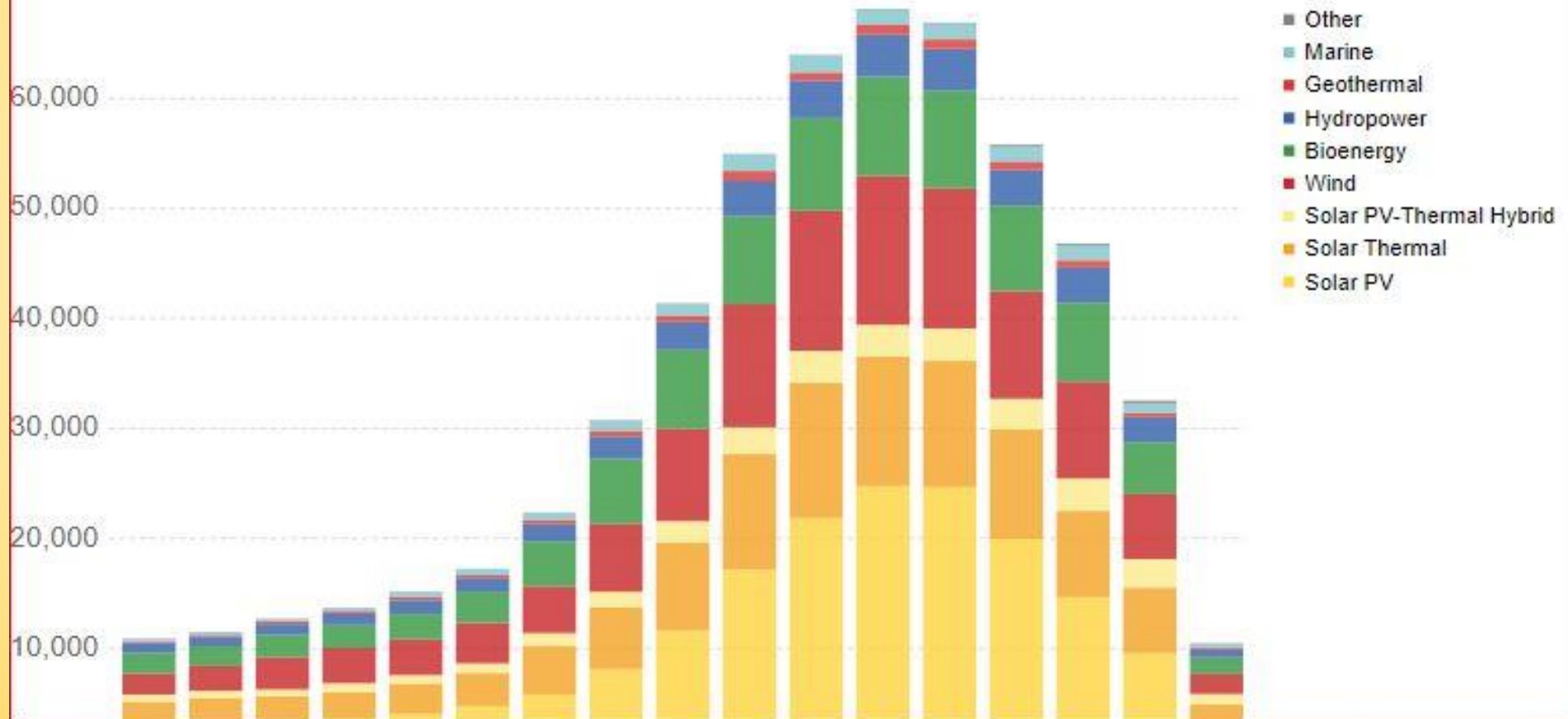




## Number of patents filed for renewable energy technologies, World

Our World  
in Data

Global number of patents filed under each renewable technology category per year. Note that figures for 2014-16 may be subject to a time lag; processing times of patent applications vary and some patents submitted over this period may not yet be recorded in statistics. These figures will be updated with time if additional patent applications are recorded.



Annual Trends, New Investment

# Global New Investment in Clean Energy by Sector

2004 – 2017

\$bn

Solar moves from third biggest sector in 2006, behind wind and biofuels, to the biggest sector in most quarters by 2011



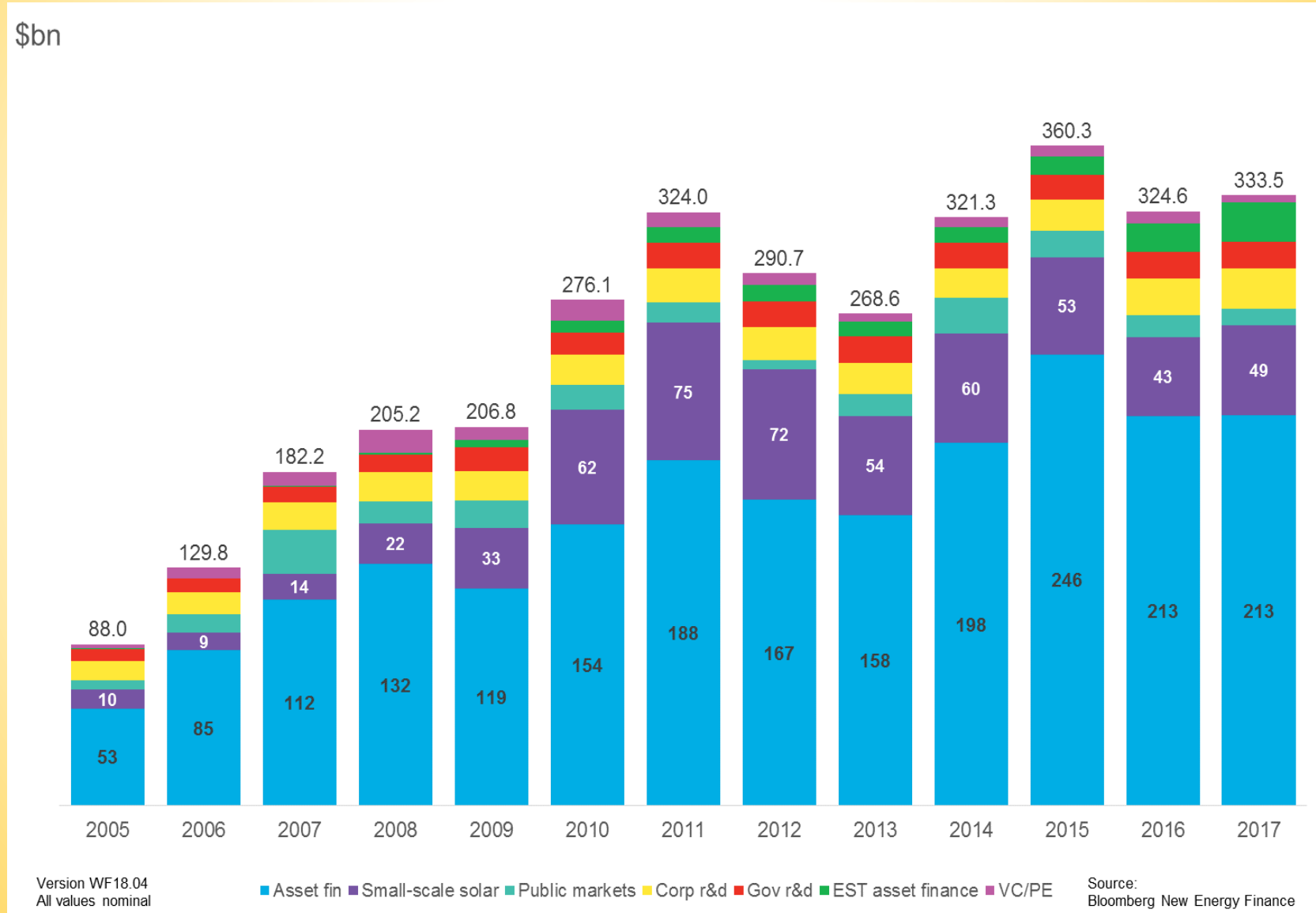
Version WF18.01  
All values nominal

■ Solar ■ Wind ■ Energy smart technologies ■ Bioenergy ■ Other

Source:  
Bloomberg New Energy Finance

# Global New Investment in Clean Energy by Asset Class

2005 – 2017





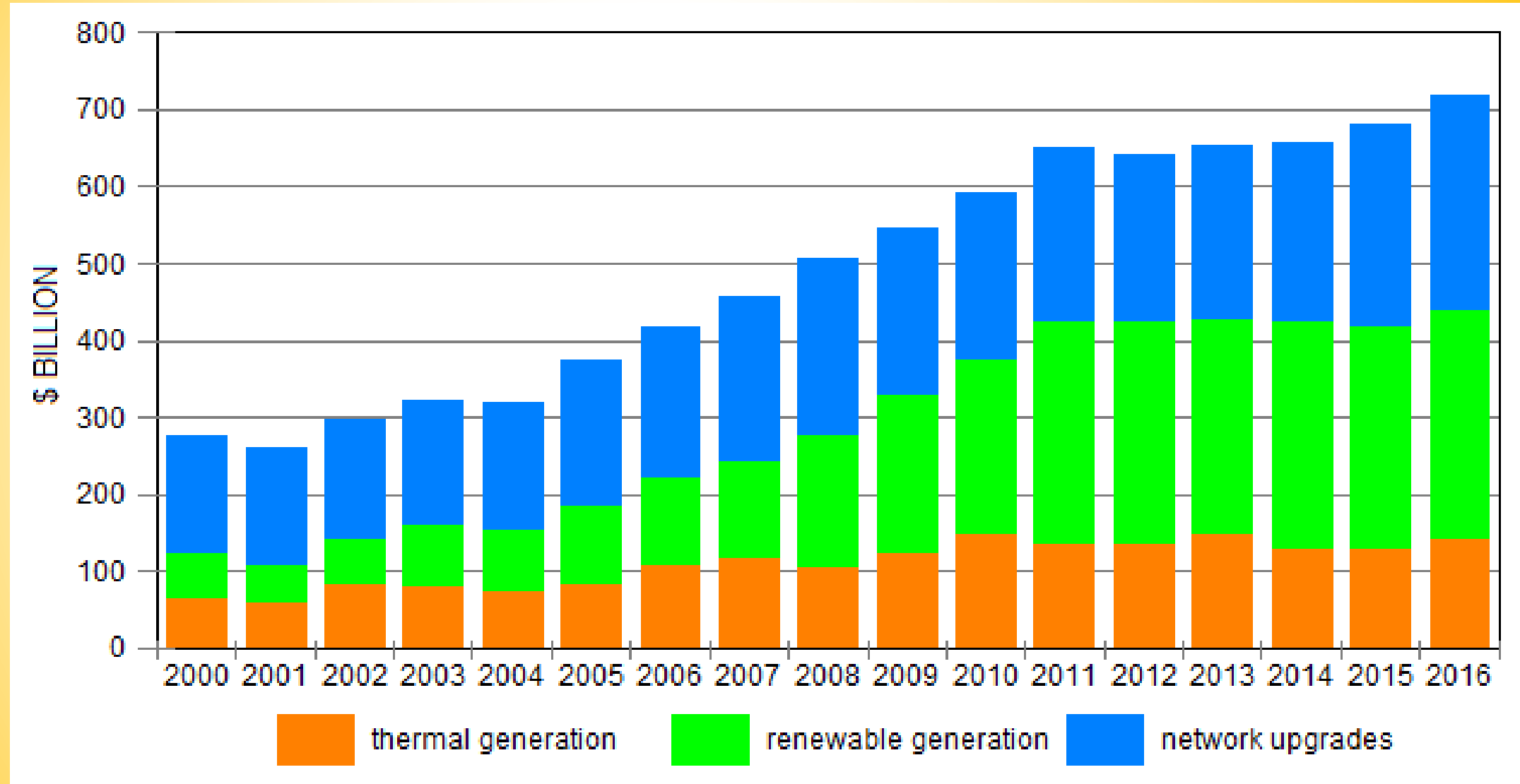
# NEX vs NASDAQ & S&P 500 2015 – 2018 YTD



Values as of July 4, 2018, all indexes rebased to 100 on Jan 1, 2015

— NEX — NASDAQ — S&P 500

Source: Bloomberg New Energy Finance



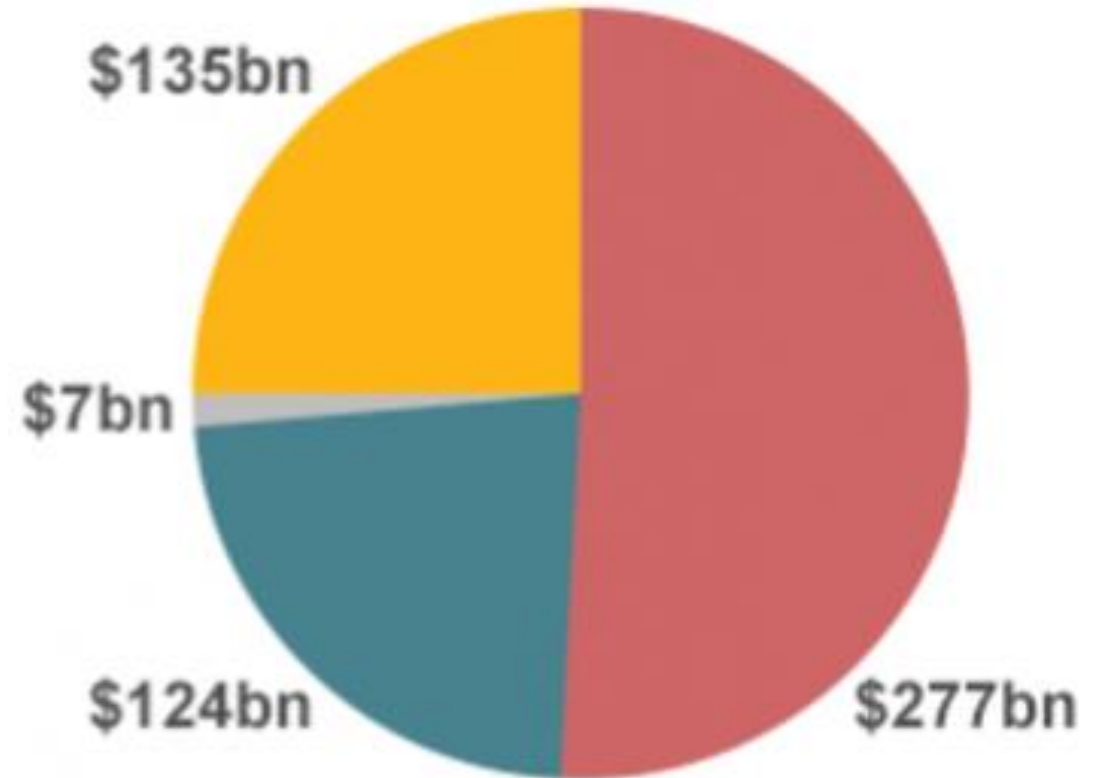


## Global fuel subsidies, 2012

- Oil
- Electricity\*
- Natural Gas
- Coal



Global renewable subsidies  
**\$101bn**



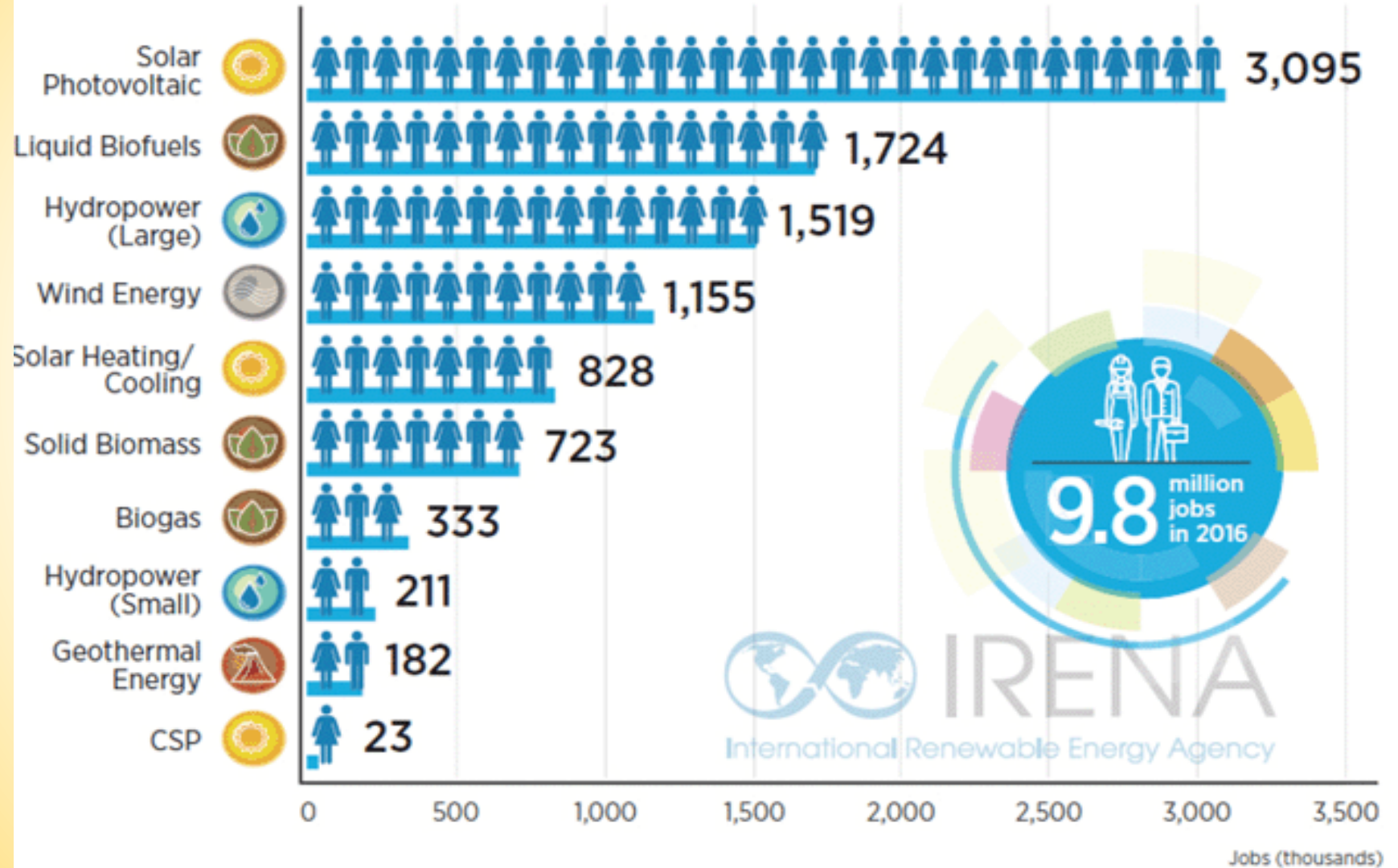
Global fossil fuel subsidies  
**\$544bn**

\*Fossil fuels used to generate electricity

Source: IEA

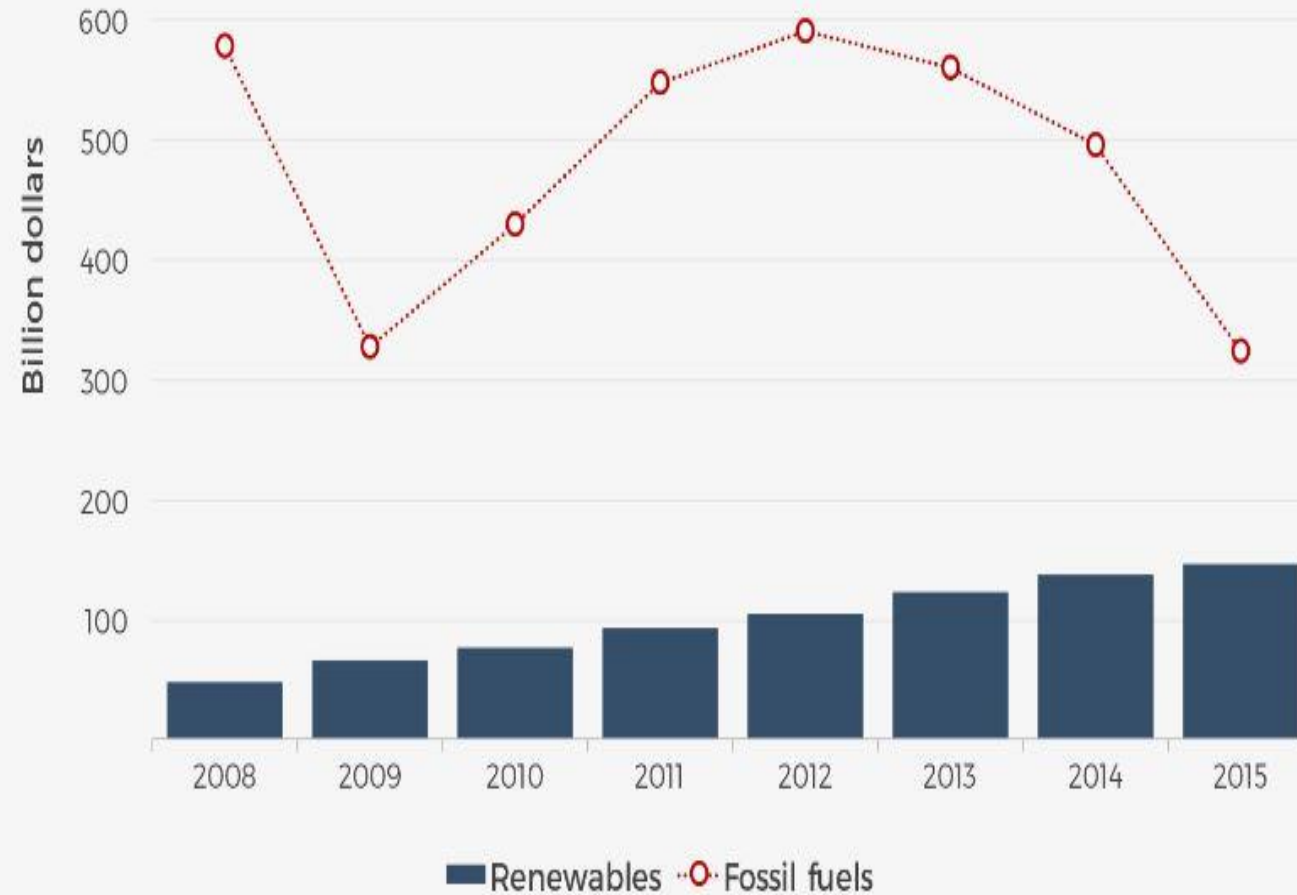


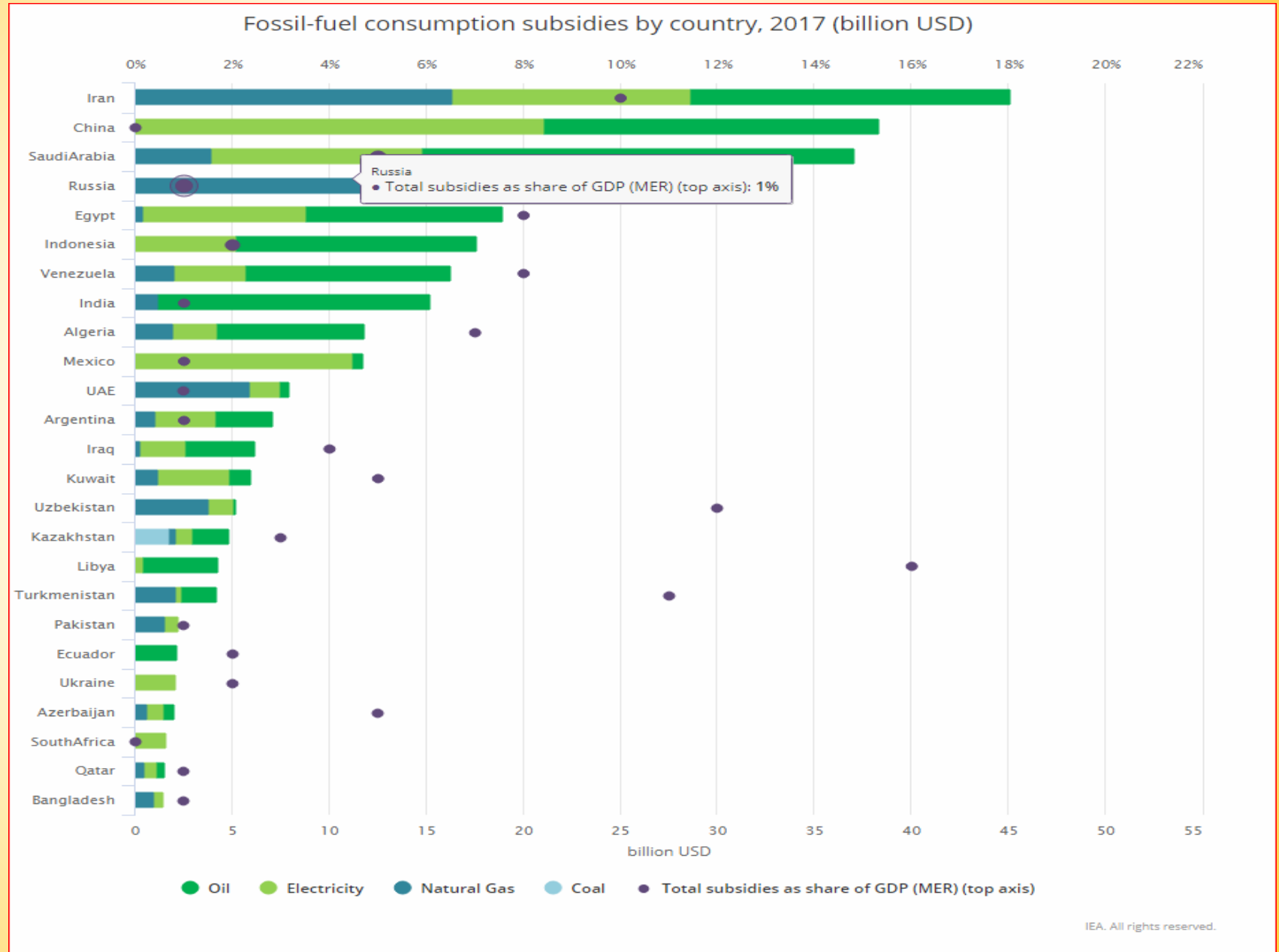
FIGURE 2: RENEWABLE ENERGY EMPLOYMENT BY TECHNOLOGY



## Global subsidies for fossil-fuel consumption and renewables

World Energy Outlook 2016

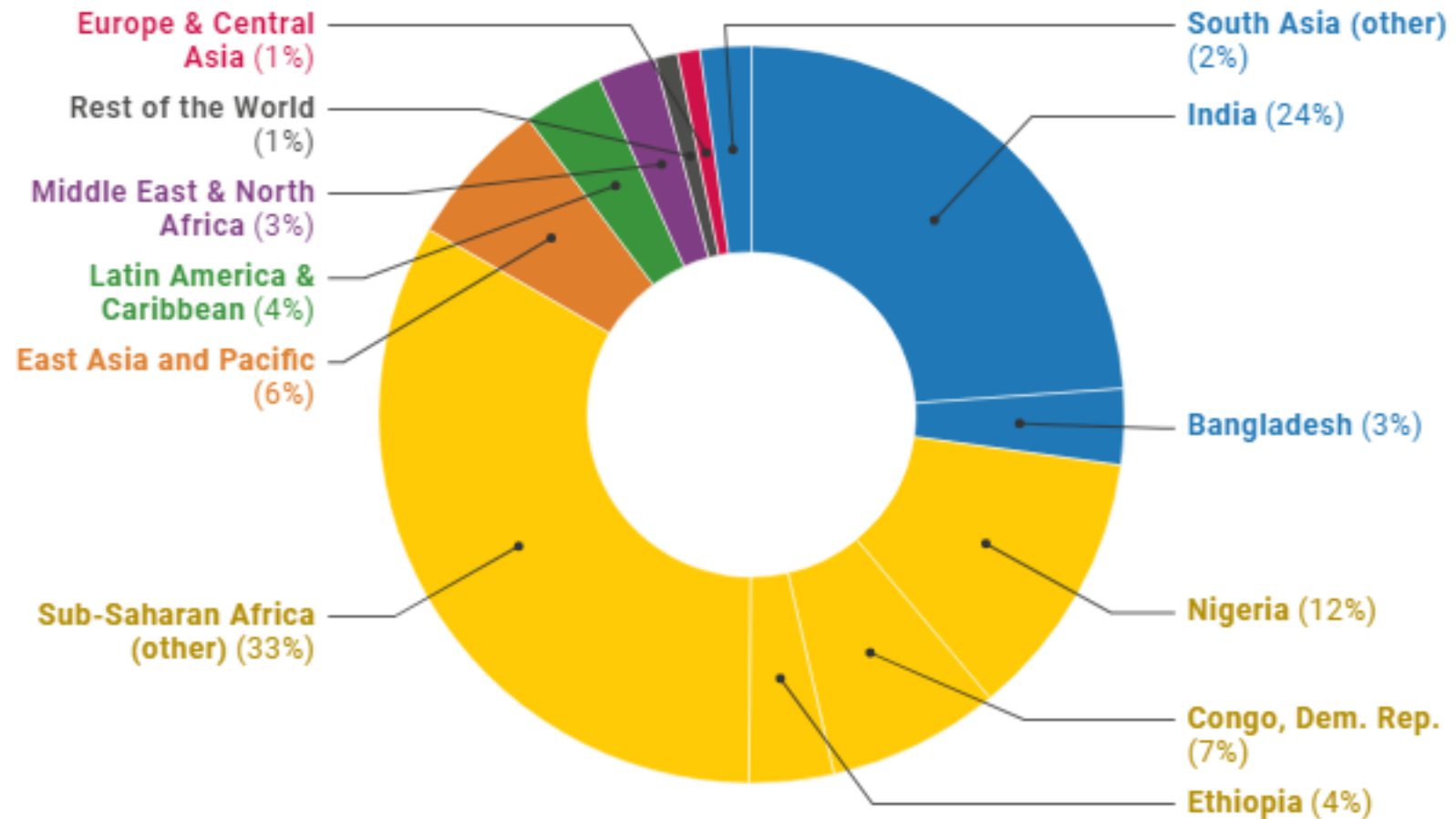






## Half of the world's poor live in just 5 countries

Share of poor people in the world by region or country, 2015



Source: PovcalNet



**Thank you all for your attention!**