EPH – Climate Strategy

March 2020

EPH

EPH has two-pronged strategy regarding sustainability

1

EPH is one of the leading players in **real decarbonization** of the conventional power plants

- We are **decommissioning** the most carbon intensive sources
- We are **investing** and **actively converting** conventional sources to low-carbon or to fully renewable

2

EPH, operating already 1.4 GW of **renewable** resources and 0.9 GW of **storage** capacities, invests into **further development** and **growth** of **renewables**

EPH approach towards growth in the renewable generation

General Trend in Renewables

- Primar growth in renewables in Europe has been seen in **wind and solar** build. These are **intermittent** in nature and do not guarantee **security of supply**
- Volatile generation from wind and sun also brings problems of its own, for example, introduces additional demands on the grid that in turn **increase grid fees**

Current EPH Presence

- **Conversion:** We have invested about €400 million into coal to biomass conversion of 420 MW Lynemouth power plant located in the UK
- **Acquisition:** We have recently acquired 3 biomass plants located in Italy with a total capacity of 80 MW, biomass, wind and solar plants acquired in France (245 MW)
- **Other:** some EPH coal fired plants located in Germany, Slovakia and the Czech Republic use solid biomass and waste for co-firing

Unique EPH Approach to Energy Transition

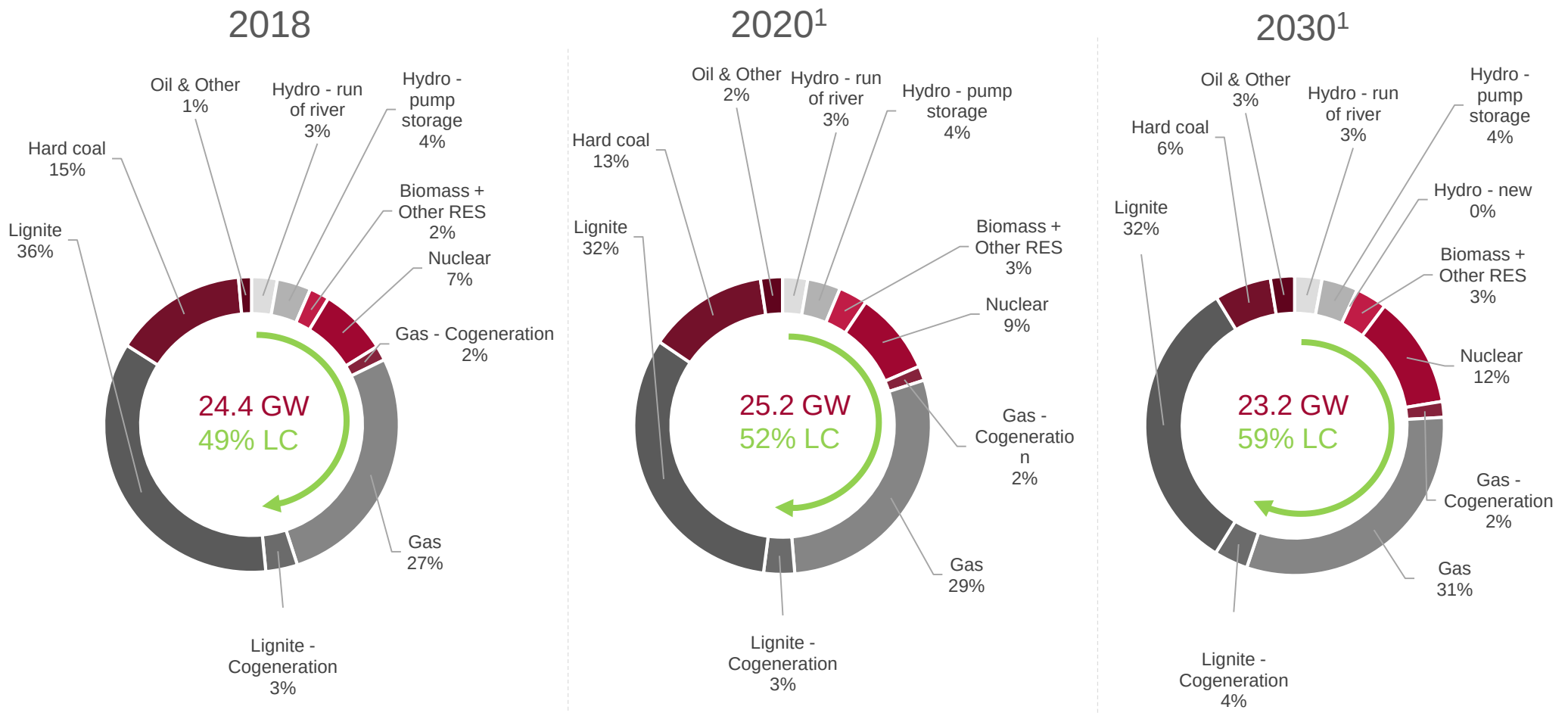
- As opposed to general trend of intermittent renewables, **EPH renewable generation strategy** is based on **controllable energy sources**
- **EP New Energies** (“EPNE”) is emerging as new sub-holding within EPH that bundles all holding activities in the following areas:
  - **Biomass** and **biogas** generation
  - **Waste to energy**
  - **Conversions** of older coal to modern biomass plants
  - **Batteries** and other
- We believe this is the right way to support the ongoing energy transition in a sustainable and efficient manner

Development Pipeline

- **Conversions:** We are preparing additional projects to rebuild older EPH coal units into biomass
- **Acquisitions:** EPH is very active in pursuing numerous M&A opportunities, with numerous projects in the pipeline
- **Other:** EPH is working on projects for further expansion in **biomass co-firing** as well as accessing opportunities for **large scale battery storage** construction adjacent to EPH portfolio power plants

EPH: Increasing share of low carbon and/or fully carbon free capacity over the time

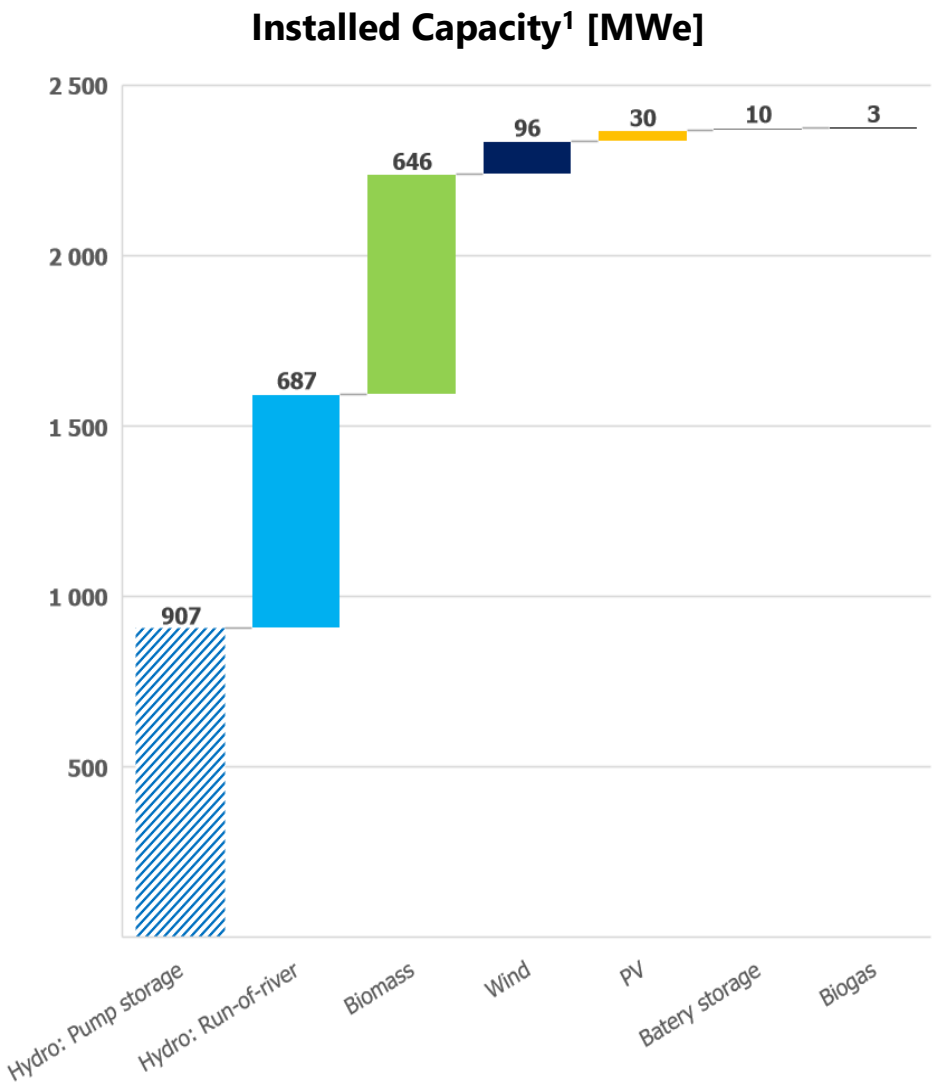
Total Operated Capacity



- **Increasing share of low carbon and carbon free capacity**
  - 2018 almost 49%, 2020 above 52%, 2030 almost 59%
  - Hard coal decreasing
  - Lignite decreasing

1 We present 2015 – 2018 real data and 2019 – 2030 are based on budget and long-term outlook, this period could be rethought based on actual development and technical aspects of our plants.

EPH operates **1,400+ MWe of renewable power** generation capacity, mostly non-intermittent, and **900+ MWe** in pumped **storage**



Historically, EPH favored non-intermittent RES

- We've focused on **controllable RES** so far, namely hydro and biomass
- Our **perception of risk of subsidy schemes** was higher than of some other players, hence, we invested into the projects that less rely on subsidy schemes

We are getting more main-stream now

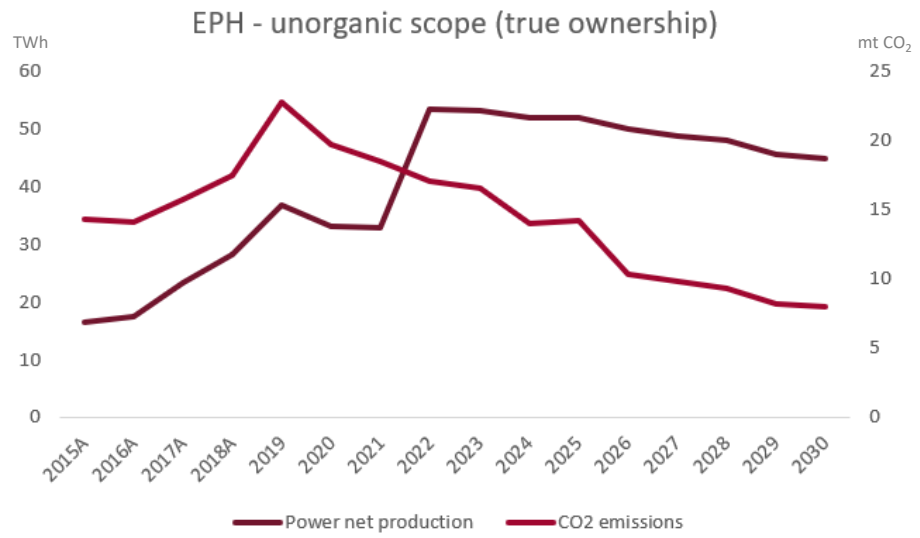
- Due to the market dynamics, subsidies play in the economy of the projects comparatively **smaller** role now
- Our companies, esp. LEAG and MIBRAG, own **significant** land usable for RES (36 thousands hectares), while land is becoming a constrained resource
- Our **strong cash flows** allow significant investments to be made in RES development

1. Installed capacity as of 20 July 2019, which includes capacity of the newly acquired Uniper's activities in France and newly acquired assets in Northern Ireland

Our Achievements and Plans: More Detailed View

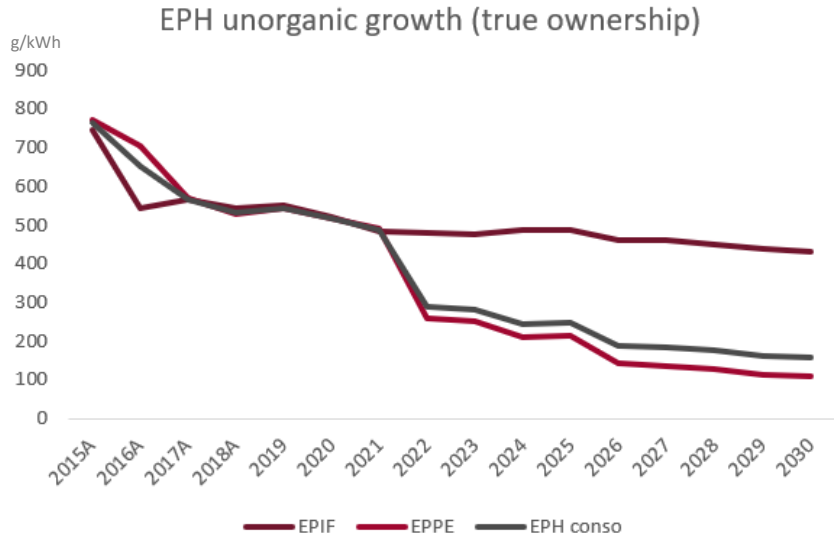
Power production and CO_2 emission development – unorganic growth

Absolute power production and emissions: consolidated ownership (2015 – 2030[1])



- 2015 acquisition of Eggborough (coal) and EP Produzione (gas) caused increase in emissions
- 2016 Buschhaus power plant in security stand-by (no production)
- 2017 acquisition of two gas and one coal plant and smaller biomass stations, mainly coal increases emissions in the following years
- 2018 decommissioned Eggborough, Lynemouth biomass power plant started production
- 2019 acquisition of France portfolio (coal and gas) caused increase in emissions we consolidate
- 2022 increase in power production due to SE acquisition (nuclear share increase)
- Ongoing CO_2 savings due to lower power production and changes in infrastructure

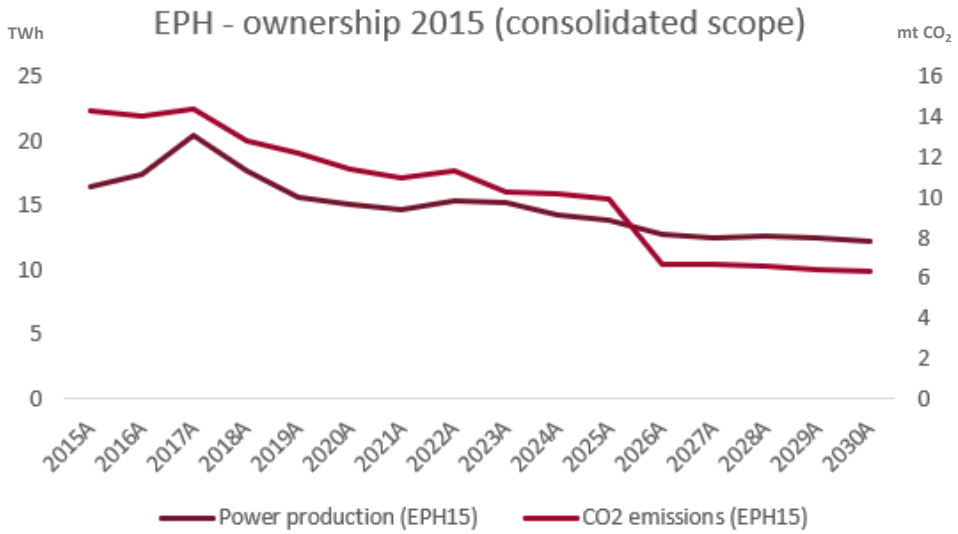
Emission intensity: consolidated ownership (2015 – 2030[1])



- **Emission intensity should drop significantly in the next decade**
  - This s a result of hard coal and lignite power plants phase-out mainly in the EPPE subholding:
    - Mehrum
    - JTSD
    - France portfolio
  - No production from Eggborough and HSR
  - Slovenské elektrárne and its almost completely emission free production consolidated from 2022

Power production and CO_2 emission development – organic growth

Absolute power production and emissions consolidated ownership (2015 – 2030[1]): portfolio 2015



- **EPH's portfolio 2015[2] is saving between 2015 and 2030 more than 60 mt or 50% of emissions produced**
  - Eggborough decommissioned the coal plant in 2018
  - JTSD Group (lignite plants):
    - Buschaus voluntarily placed to security stand-by (no generation) in 2016
    - Deuben closure planned in 2023
  - Lower production from coal due to phase-out

1 We present 2015 – 2018 real data and 2019 – 2030 are based on budget and long-term outlook, this period could be rethank based on actual development and technical aspects of our plants.
2 To see a development of our portfolio excluding influence of the acquisitions we present portfolio in EPH ownership as at the end of 2015 (EPH15 or EPH's portfolio 2015).

Portfolio 2015: overview

- **EPIF**[3]

- **EPPE**

3 Eustream, NAFTA, SSP – Distribúcia and SPP Storage are non-energy producing companies, but they do report emissions. Epet (EP Energy Trading) supplies final custommers with power and gas, no power or emissions produced.
Plzeňská energetika is a part of Plzeňská teplárenská after marge concluded in 2018.

EPH is one of the leading players in real decarbonisation having actively implemented measures leading to abatement of 26 mt CO_2 emissions per annum since 2013

Country	Company	Plant	Capacity (GW)	Savings ($mtCO_2$)	Fuel	Note
UK	EPL	Eggborough	2.0	11.5	Coal	EPH decommissioned plant in 2018, saving 12 mt CO2 p.a. developing 2 GW CCGT
UK	LPL	Lynemouth	0.4	2.7	Coal	EPH executed biomass conversion saving 3 mt CO2 p.a. and further 2 mt indirectly
DE	HSR	Buschaus	0.4	2.7	Lignite	Voluntarily placed to security stand-by (no generation) in 2016, saving 3 mt CO p.a.
DE	MGB	Mumsdorf	0.1	0.8	Lignite	EPH decommissioned plant in 2013, saving 1 mt CO2 p.a.
EPH - closures / conversions			**2.9**	**17.7**		
CZK	EOP	Opatovice	0.4		Lignite CHP	All three plants are highly efficient CHPs utilised for public district heating; EPH invested into DeSOx and DeNox equipment reducing emissions significantly; Ongoing considerations for conversion to gas
CZK	UE	Komorany	0.2			
CZK	PE	Plzenska Energetika	0.1			
EPH - Czech CHP fleet			**0.7**			
DE	KWM	Mehrum	0.7		Coal	Closure foreseen in coming years
DE	MGB	Deuben & Wahlitz	0.1		Lignite CHP	CHPs utilised for industrial purposes
ITA	FS	Fiume Santo	0.6		Coal	Must-run infrastructure, ongoing discussion for gas or biomass conversion
EPH - Other coal plants			**1.4**			

Country	Company	Plant	Capacity (GW)	Savings ($mtCO_2$)	Stake	Fuel	Note
DE	LEAG	Jänschwalde E+F	1.0	7.8	50%	Lignite	Voluntarily placing units to security stand-by in 2018 and 2019, saving 8 mt CO p.a.
Non-consolidated - closures			**1.0**	**7.8**			
DE	LEAG	Remaining units	7.1		50%	Lignite	Operation foreseen in line with decision of German coal commission
DE	SAALE	Schkopau Stake	0.4		100%	Lignite	Operation foreseen in line with decision of German coal commission
SK	SE	Vojany	0.2		66%	Coal	Closure foreseen in coming years
SK	SE	Novaky	0.3		66%	Lignite	Operates under state regulation, closure foreseen in 2023
Non-consolidated - EPH pro rata			**4.3**				

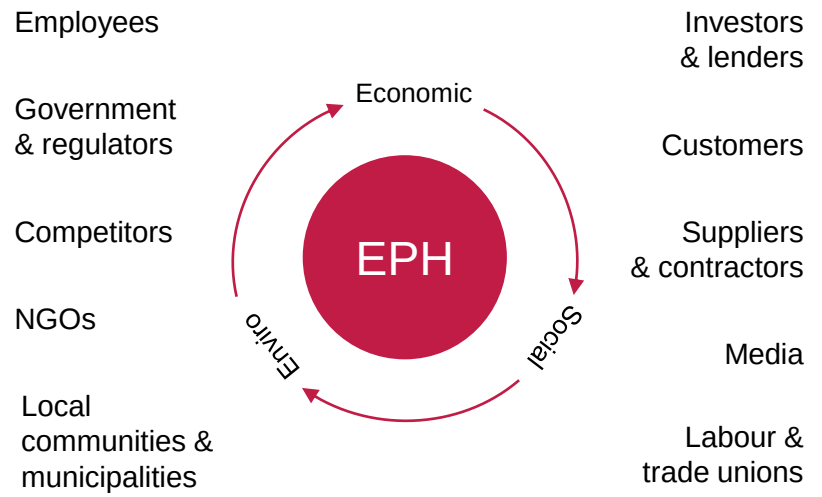
1. Note: Capacities listed in GW, savings are presented in million tons of CO2 per annum

EPH is committed to responsible operations of its entire portfolio

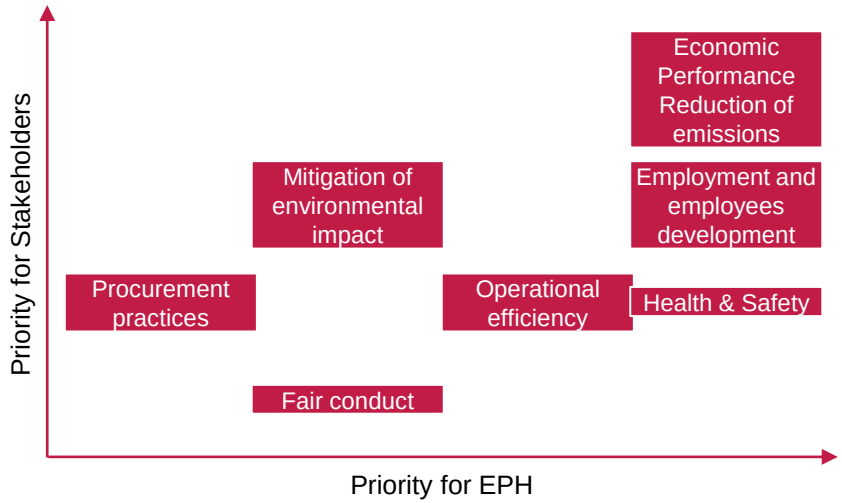
EPH Approach to Sustainability

- EPH is fully committed to responsible operations of its entire portfolio, while meeting interests of our key stakeholders and we stand ready to meet our liabilities including:
  - Liabilities associated with recultivations of the mining sites, bolstering biodiversity and restoring both forest and agricultural land
  - Honouring commitments to our employees, emphasizing health and safety at work, as well as personal development
  - Delivering returns to investors while adhering to all valid legal and environmental regulations
- Large portion of EPH EBITDA comes from energy infrastructure assets that are bundled under **EP Infrastructure and carry negligible CO_2 footprint**
- The core business of our second pillar, **EP Power Europe,** is power generation, whereas:
  - We are dedicated to meet strict environmental targets in operating of all our conventional capacities
  - We continuously invest in our plants and make use of innovative technologies gaining additional operational efficiencies while we stand ready to decommission technology that becomes obsolete
  - Our recent acquisitions focus on controllable renewables (e.g. biomass) with a very low CO_2 footprint

Our Key Stakeholders

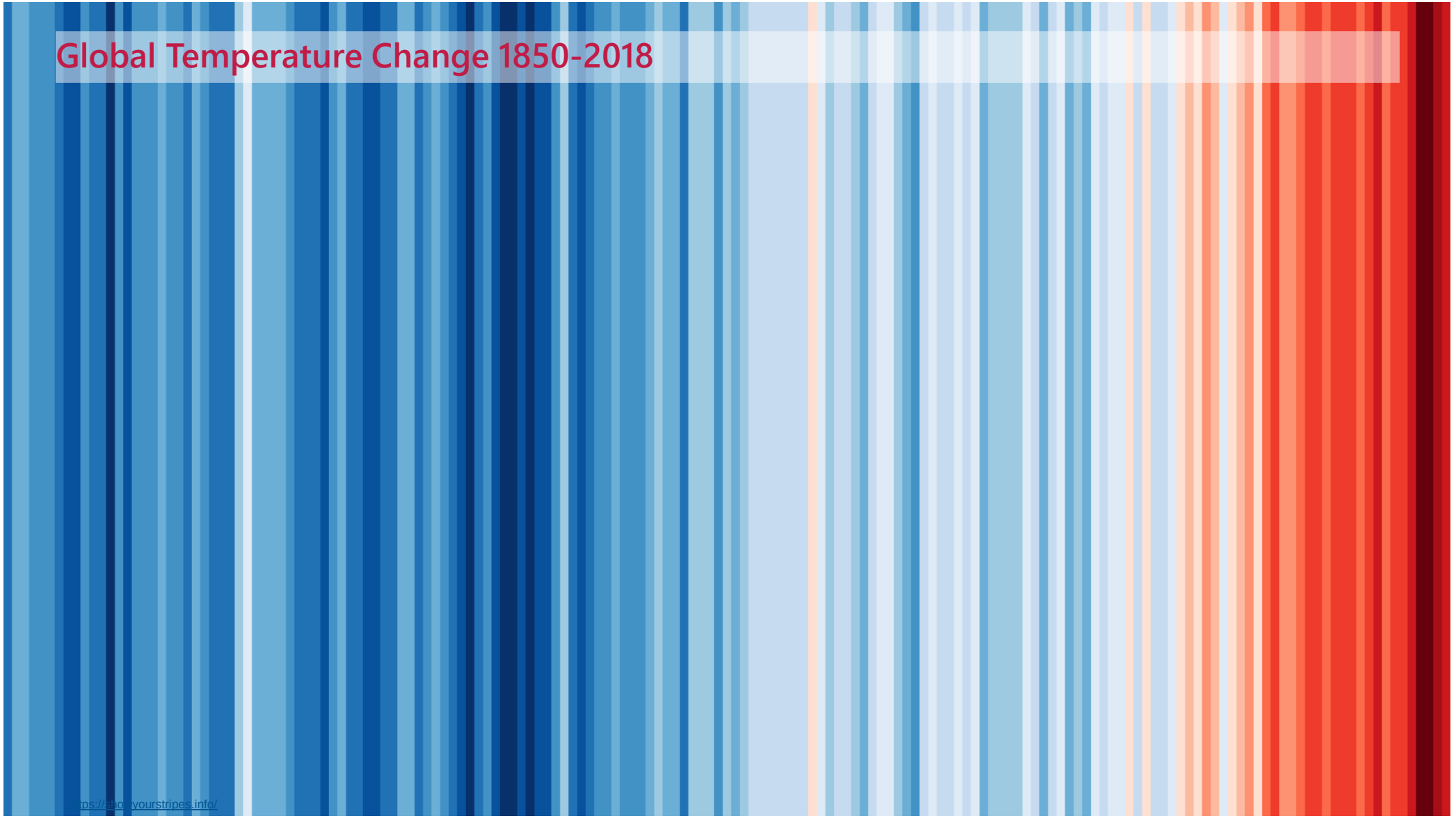


EPH Materiality Matrix



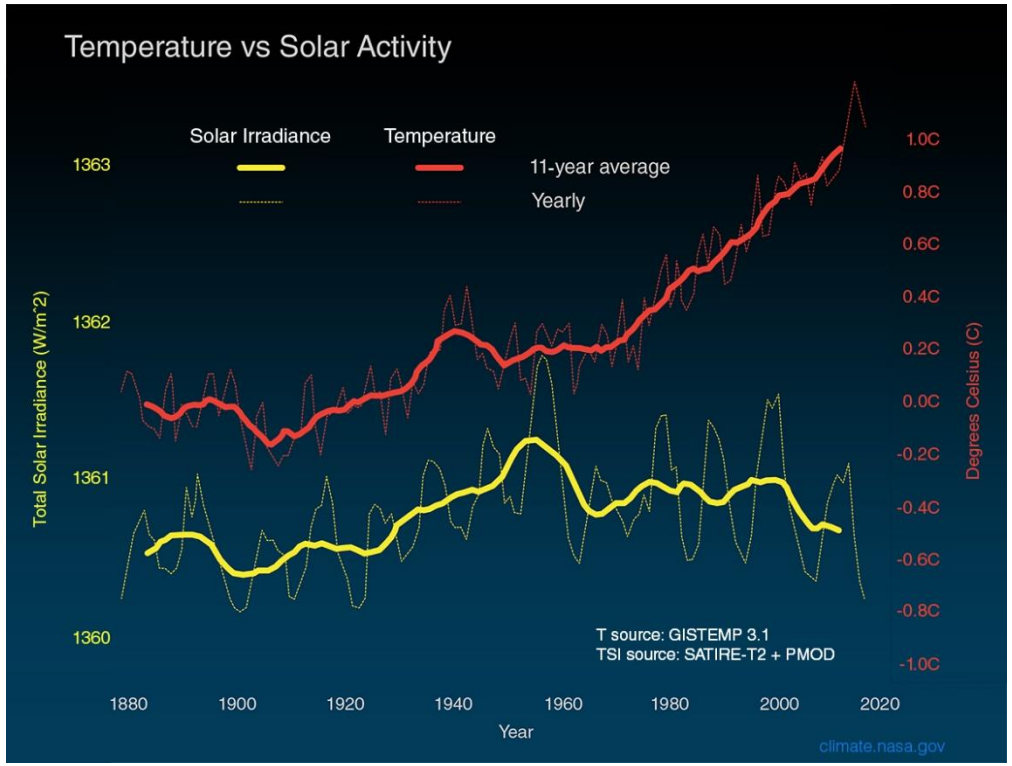
EU Green Deal and the World reality

Global Temperature Change 1850-2018



https://showyourstripes.info/

Current global warming cannot be explained by changes in energy from the Sun

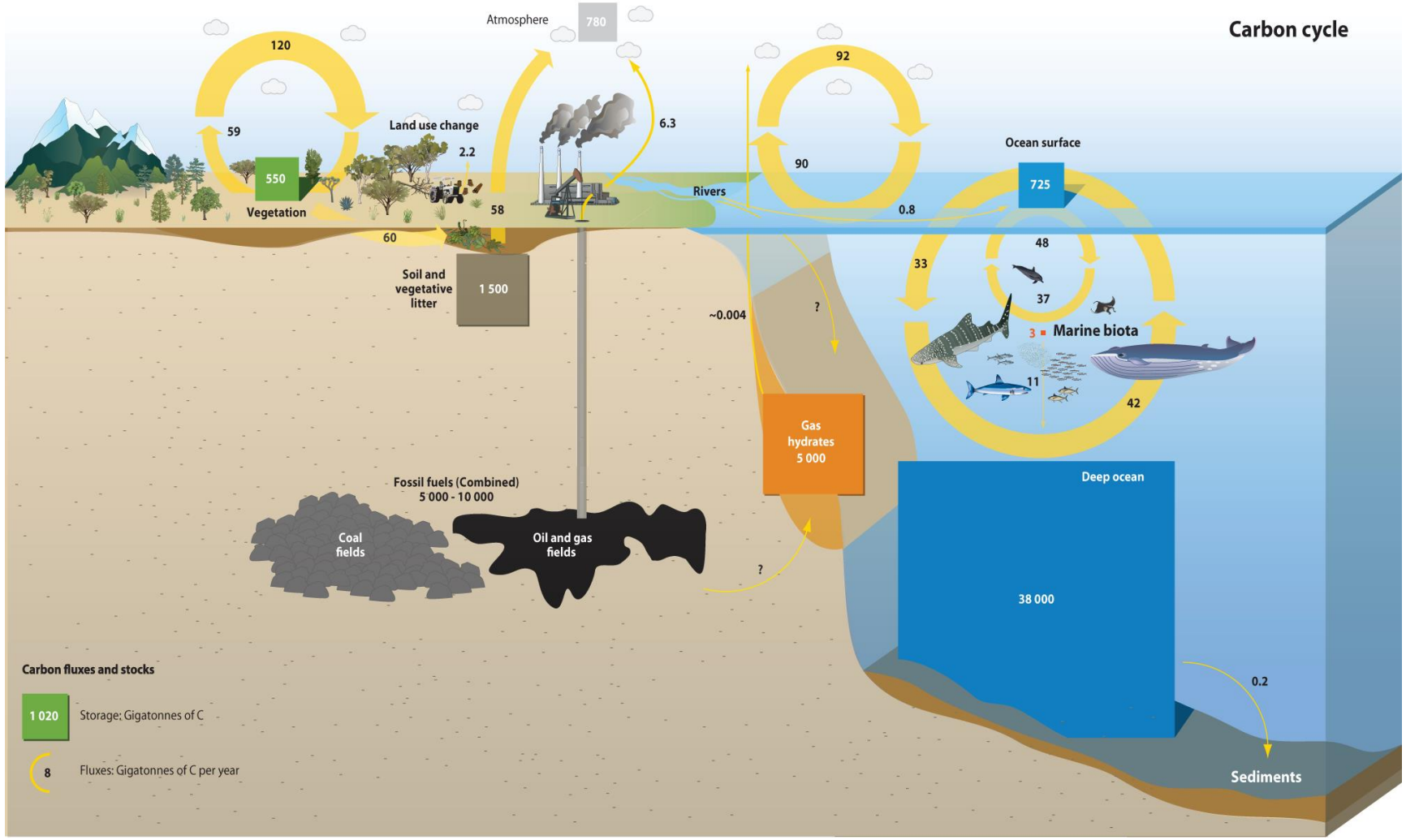


https://climate.nasa.gov/causes/

- It's reasonable to assume that changes in the Sun's energy output would cause the climate to change, since the Sun is the fundamental source of energy that drives our climate system.
- Indeed, studies show that solar variability has played a role in past climate changes. For example, a decrease in solar activity coupled with an increase in volcanic activity is thought to have helped trigger the Little Ice Age between approximately 1650 and 1850, when Greenland cooled from 1410 to the 1720s and glaciers advanced in the Alps.
- But several lines of evidence show that current global warming cannot be explained by changes in energy from the Sun:
  - Since 1750, the average amount of energy coming from the Sun either remained constant or increased slightly.
  - If the warming were caused by a more active Sun, then scientists would expect to see warmer temperatures in all layers of the atmosphere. Instead, they have observed a cooling in the upper atmosphere, and a warming at the surface and in the lower parts of the atmosphere. That's because greenhouse gases are trapping heat in the lower atmosphere.
  - Climate models that include solar irradiance changes can’t reproduce the observed temperature trend over the past century or more without including a rise in greenhouse gases.

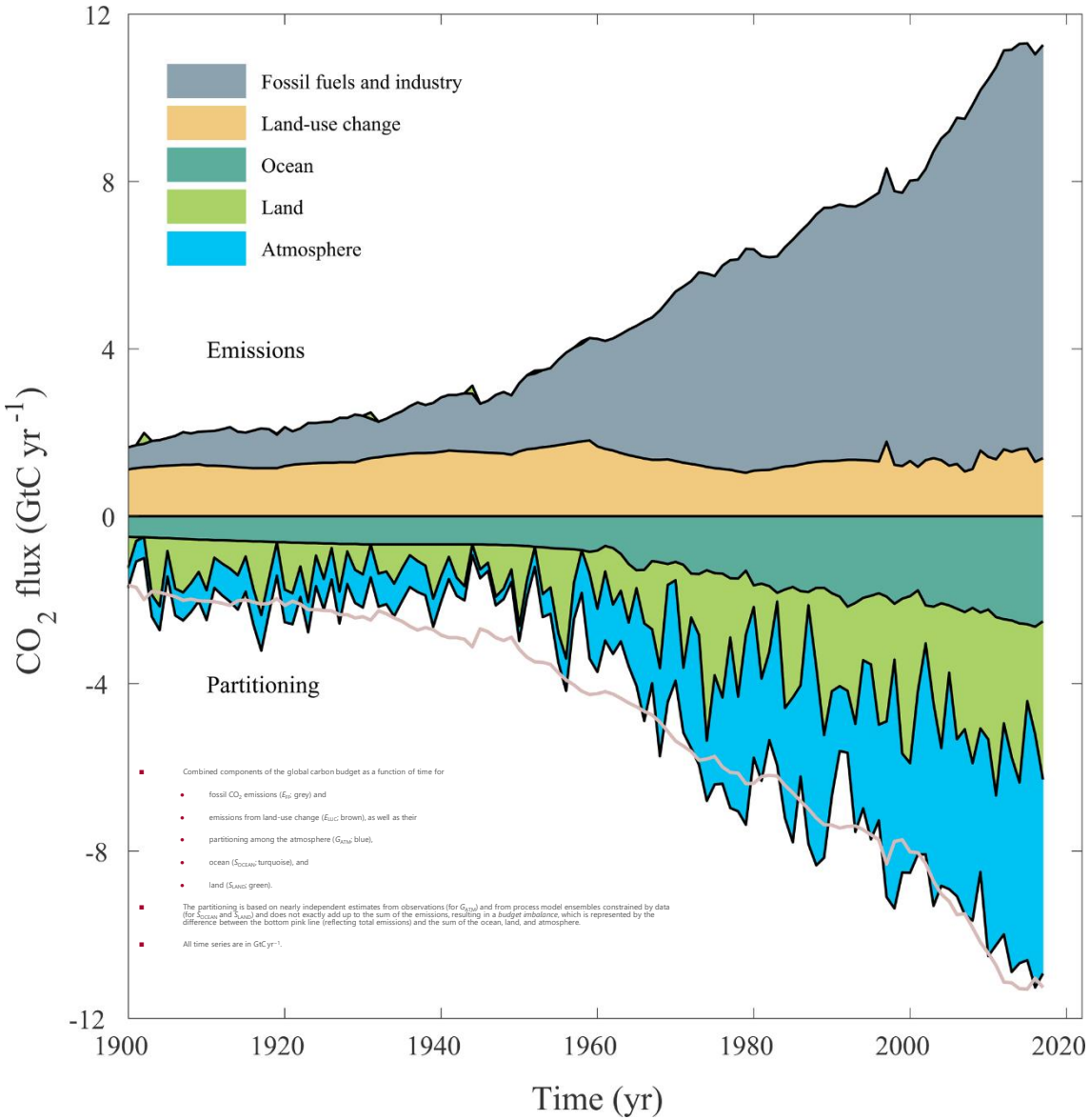
Global Carbon Cycle: Annual Carbon Emissions are at the level of 215 GtC = 790 GtCO2 of it, man-made emissions are 38 GtCO2

1 GtC = 3.67 GtCO2eq



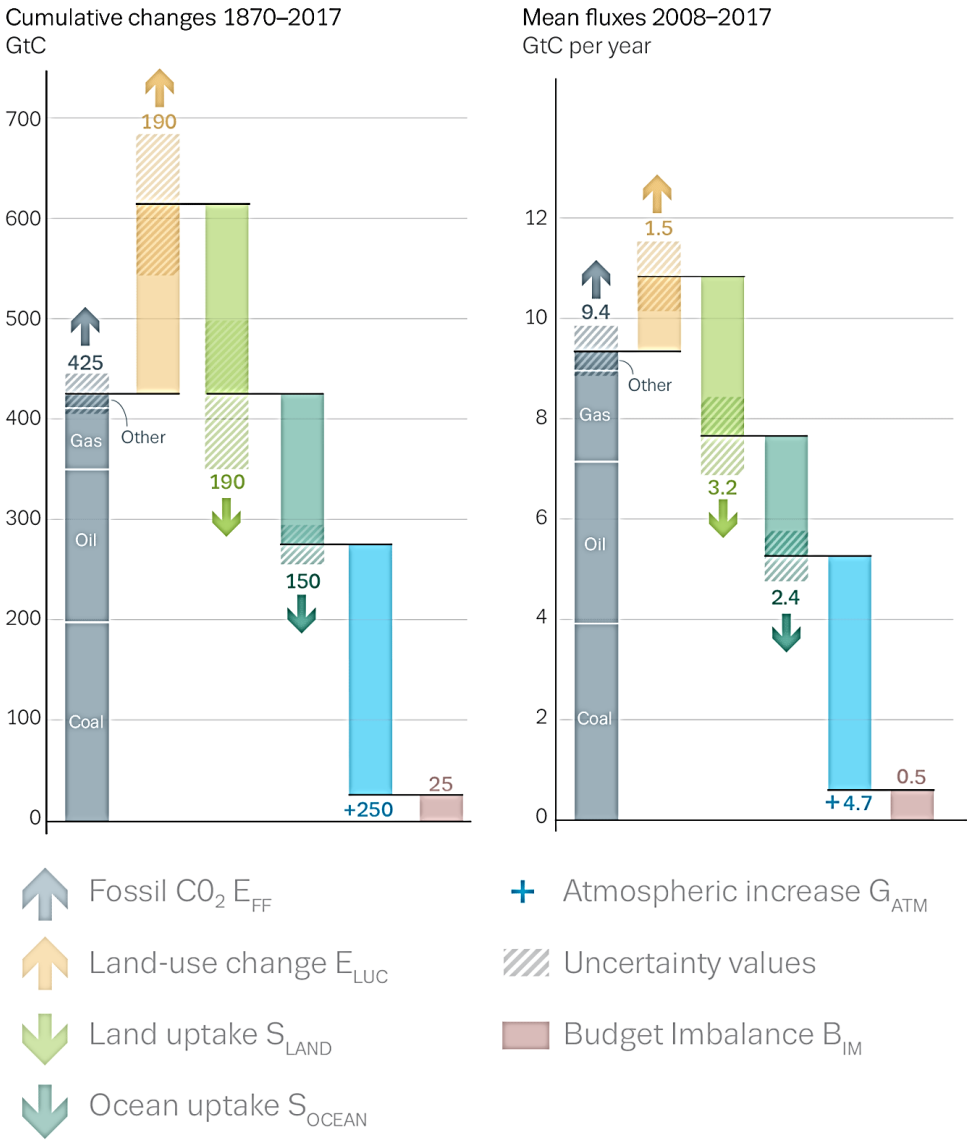
http://www.grida.no/resources/6614 (GRID-Arendal was established in 1989 to support environmentally sustainable development by working with UN Environment and other partners. We communicate environmental knowledge that strengthens management capacity and motivates decision-makers to act.)

While the nature manages to balance roughly a half of the fossil fuel emissions, the remaining half cumulates in the atmosphere (blue part)

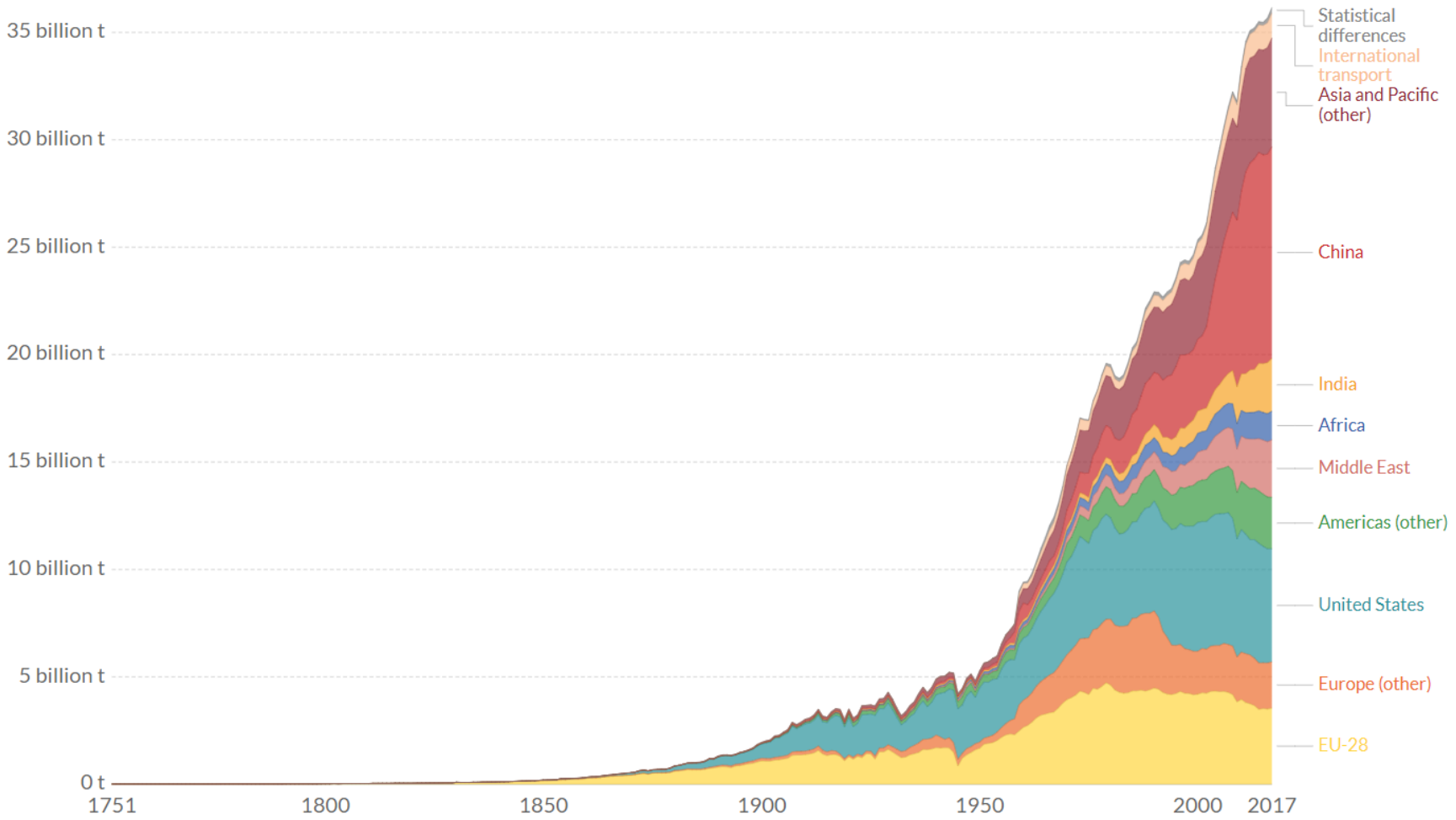


https://www.earth-syst-sci-data.net/10/2141/2018/

Anthropogenic carbon flows



Annual total CO_2 emissions, by world region



Source: Carbon Dioxide Information Analysis Center (CDIAC); Global Carbon Project (GCP)
Note: The difference between the global estimate and the sum of national totals is labeled "Statistical differences".
OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY

https://ourworldindata.org/grapher/annual-co-emissions-by-region

As EU is deploying great amount of efforts and funds to climate change prevention, we are trying to communicate greater focus on (a) efficiency and effectiveness of using these funds while (b) seeking win-win solutions for European industry and wellbeing.

1. Focus political actions on creating a visionary **regulatory framework** relying on **market-driven** mechanisms. At the same time avoid selecting/supporting concrete technologies. **Carefully choose** among all available carbon reduction actions, **decide upon cost per ton** of CO_{2E} abated.
2. Stay **realistic**, avoid the trap of relying on technologies that do not exist today, or are significantly uneconomical.
3. **Abandon strict territorial approach** - concentration of CO_2 in the atmosphere is a global phenomenon. Enable European investments to GHG reductions beyond European borders.
4. Shift from percentage reduction targets to emission reduction **targets measured in real amounts** (megatons of CO_{2E}).
5. Create a **market** with **negative GHG emissions** / GHG reductions.
6. Climate change prevention shall go hand in hand with **fostering the EU economy** and industry. Seek **win-wins** for climate and economic growth / wellbeing.
7. Focus on **natural carbon capture** mechanism. To fight most effectively the increasing CO_2 concentration, we should consider influencing selected parts of the complete carbon cycle which handles -both ways- much bigger fluxes of CO_2.

Thank you