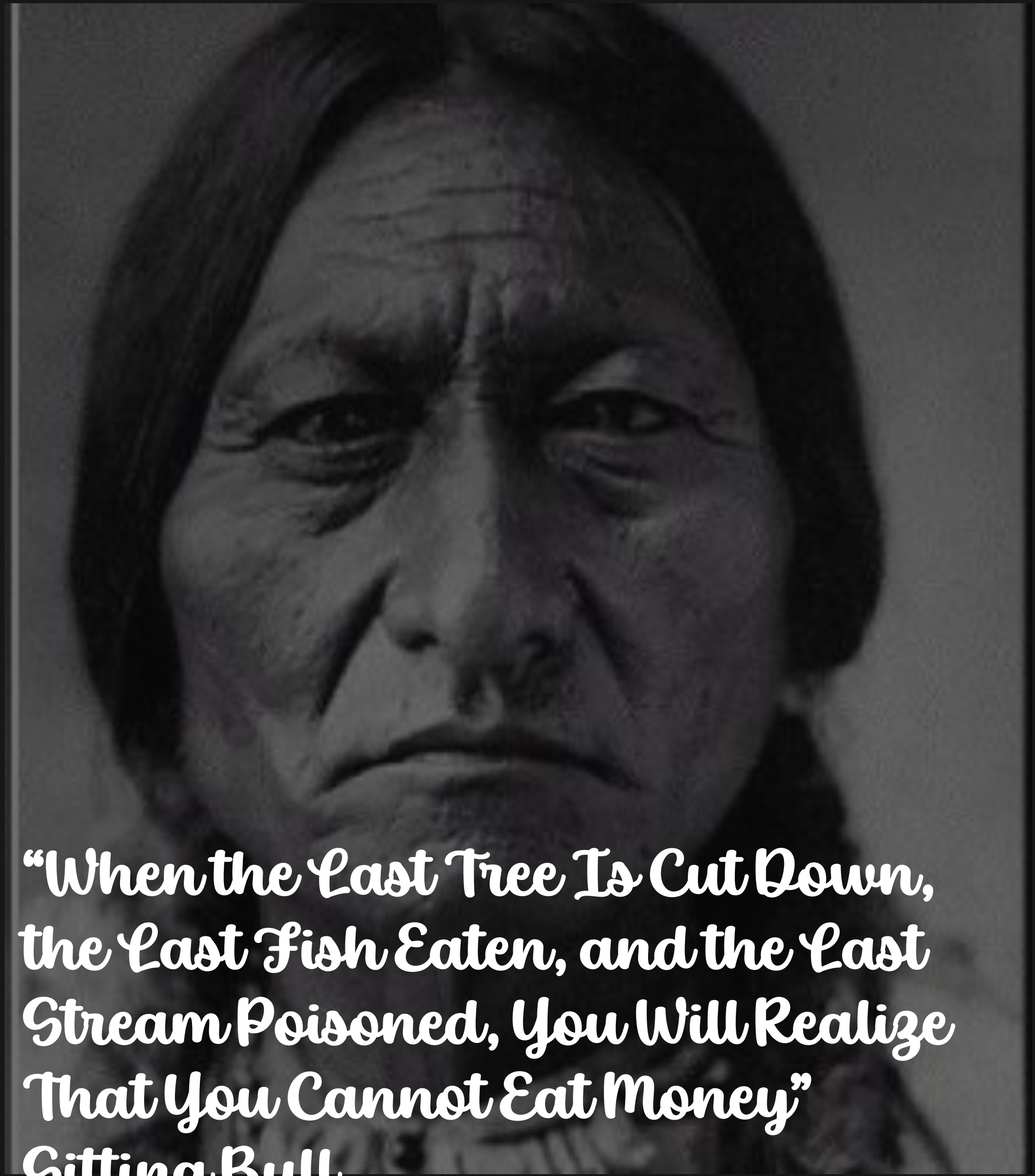
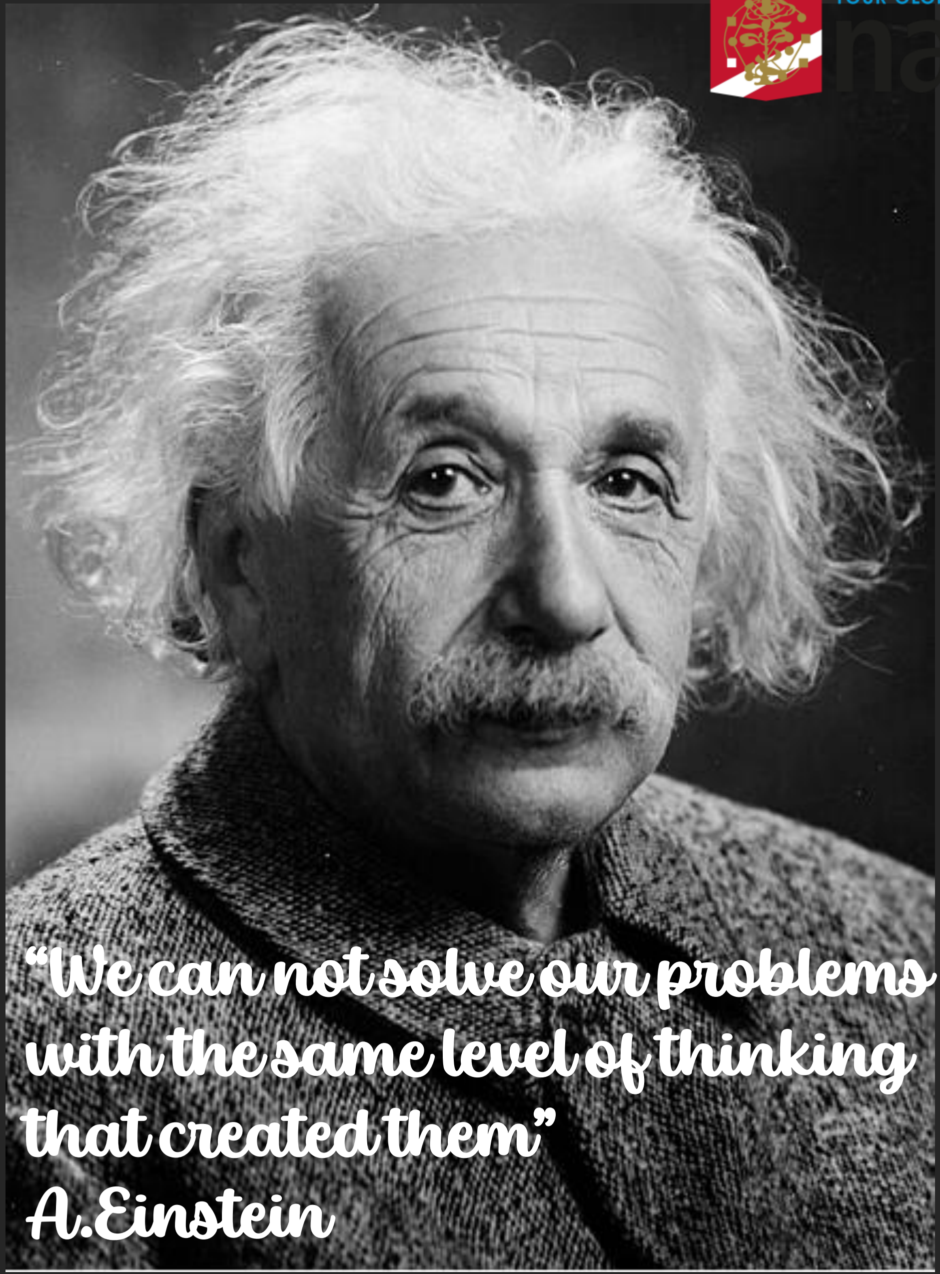
Energy Mix : A change towards what?

Limits and potentials of renewables & Carbon Capture

OEC, NOV. 1, 2023


“When the Last Tree Is Cut Down, the Last Fish Eaten, and the Last Stream Poisoned, You Will Realize That You Cannot Eat Money”
Sitting Bull

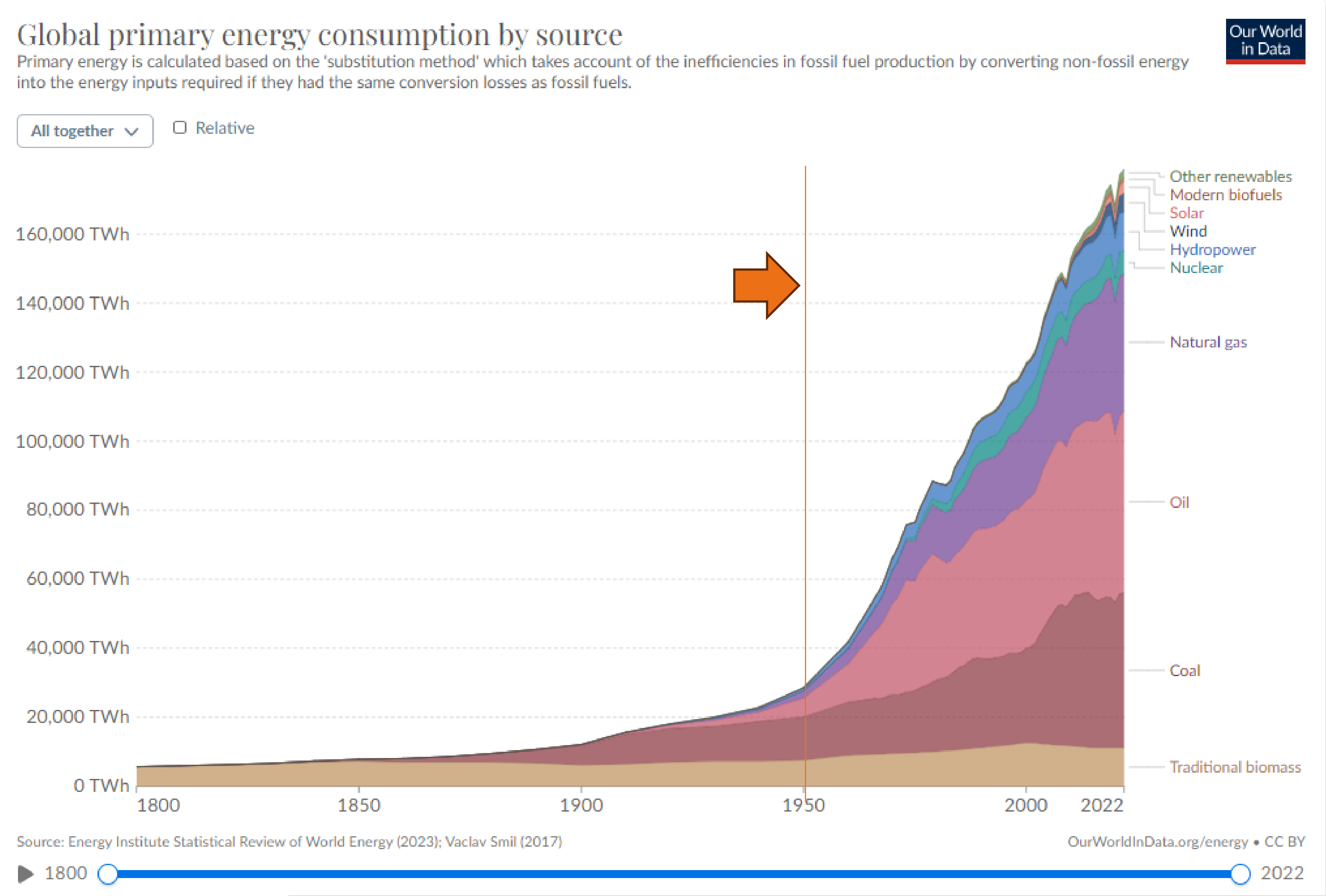

“We can not solve our problems with the same level of thinking that created them”
A.Einstein

Warning and limits

- The presentation focuses on future Electric Production
- CO2 emission : it does not consider other gas (methane, PFC, etc.)
- Presentation will focus on Renewables Electric Technologies : this is only one part of the picture
- Typically, Ammonia and/or H_2 production is not covered
- Constraints linked to Grid issues are not covered
- Constraints linked to mineral supplies are not covered
- All datas used are public

Sources used

Energy World Consumption 2022



2022
in terawatt-hours

Other renewables	2,414 TWh	1%
Modern biofuels	1,199 TWh	1%
Solar	3,448 TWh	2%
Wind	5,488 TWh	3%
Hydropower	11,300 TWh	6%
Nuclear	6,702 TWh	4%
Natural gas	39,413 TWh	22%
Oil	52,970 TWh	30%
Coal	44,854 TWh	25%
Traditional biomass	11,111 TWh	6%
Total	178,899 TWh	77%

Very strong dependence on fossil energies (Still)

World Population Growth

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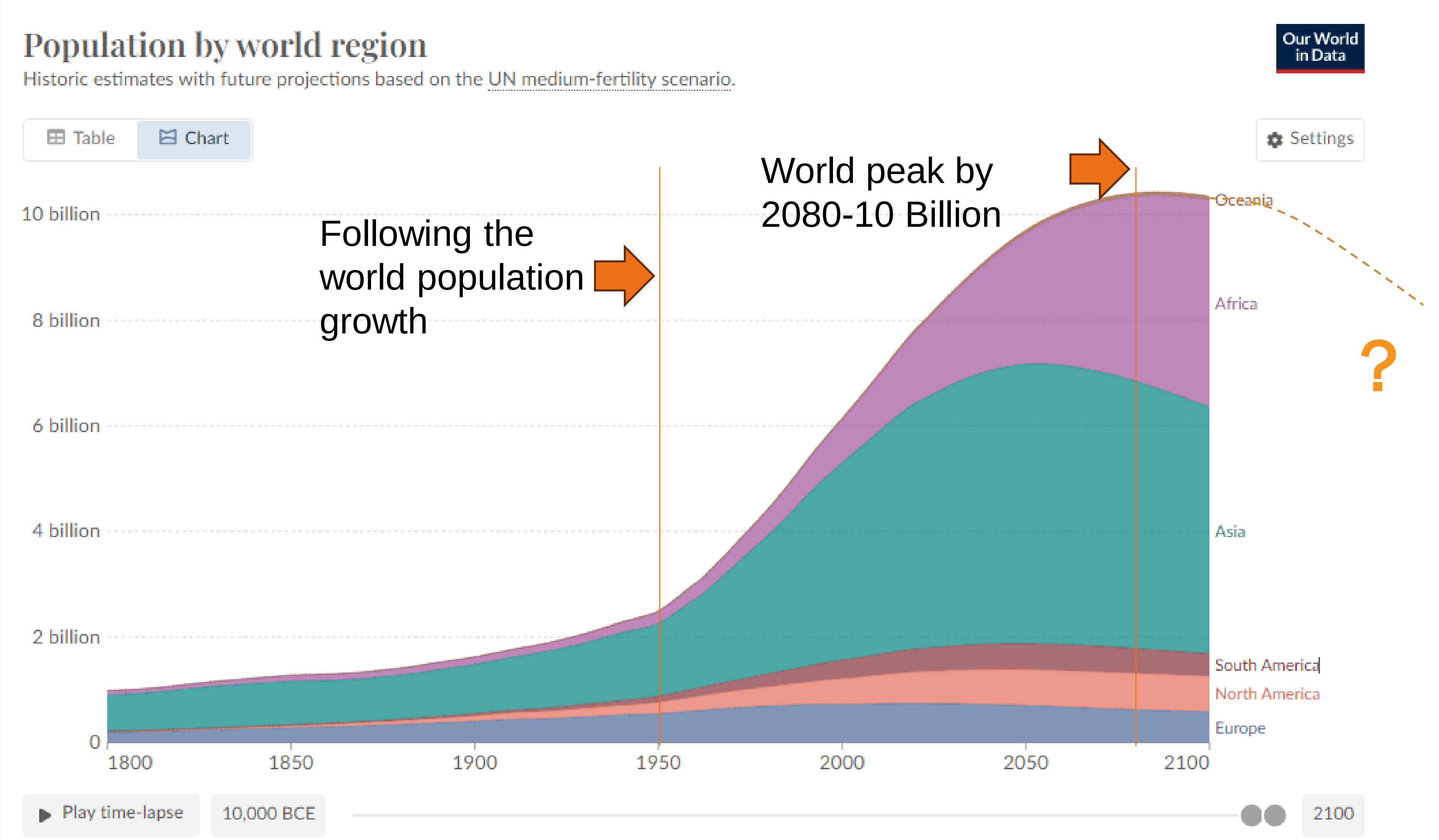
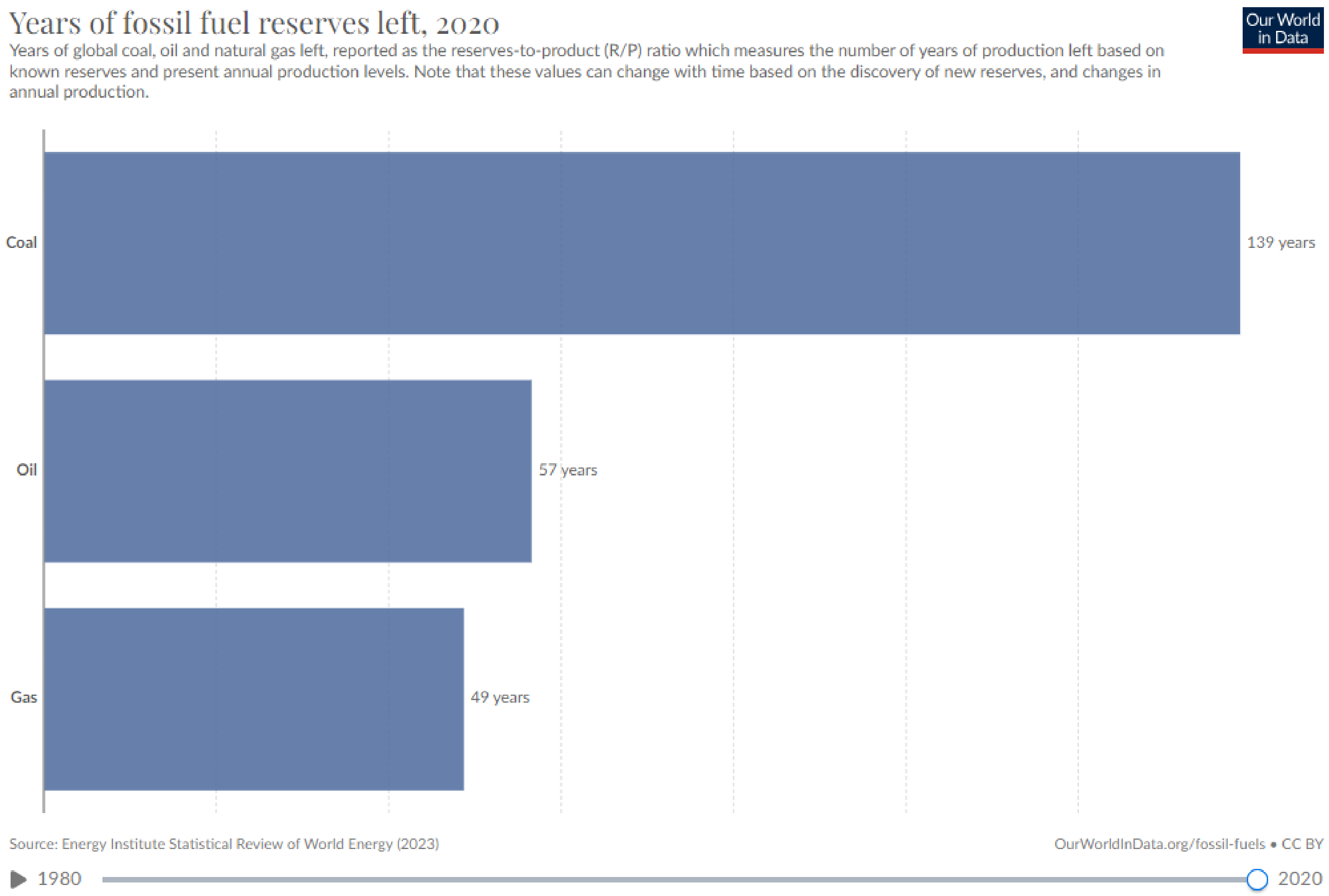
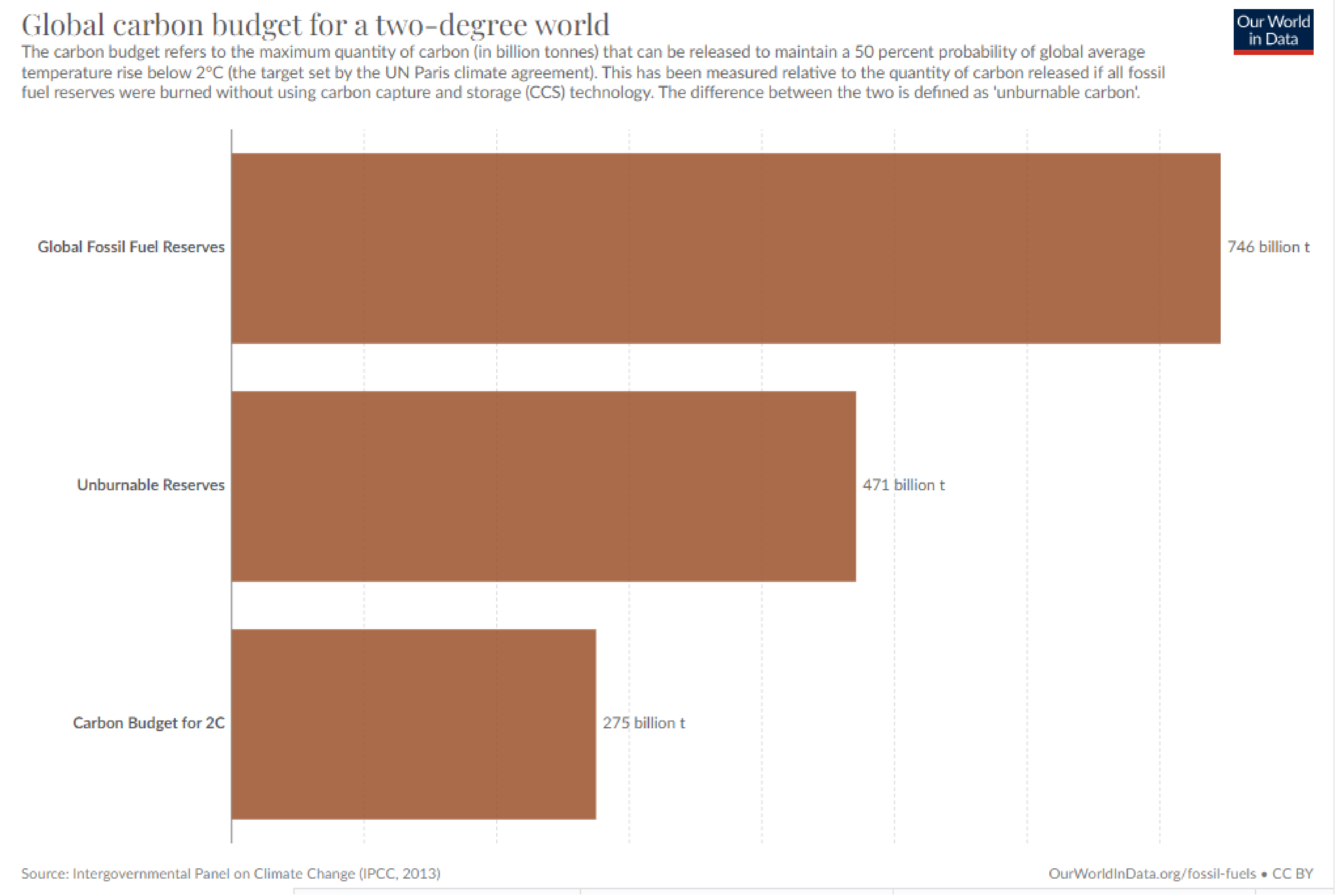


Is it sustainable? Fossil proven reserves



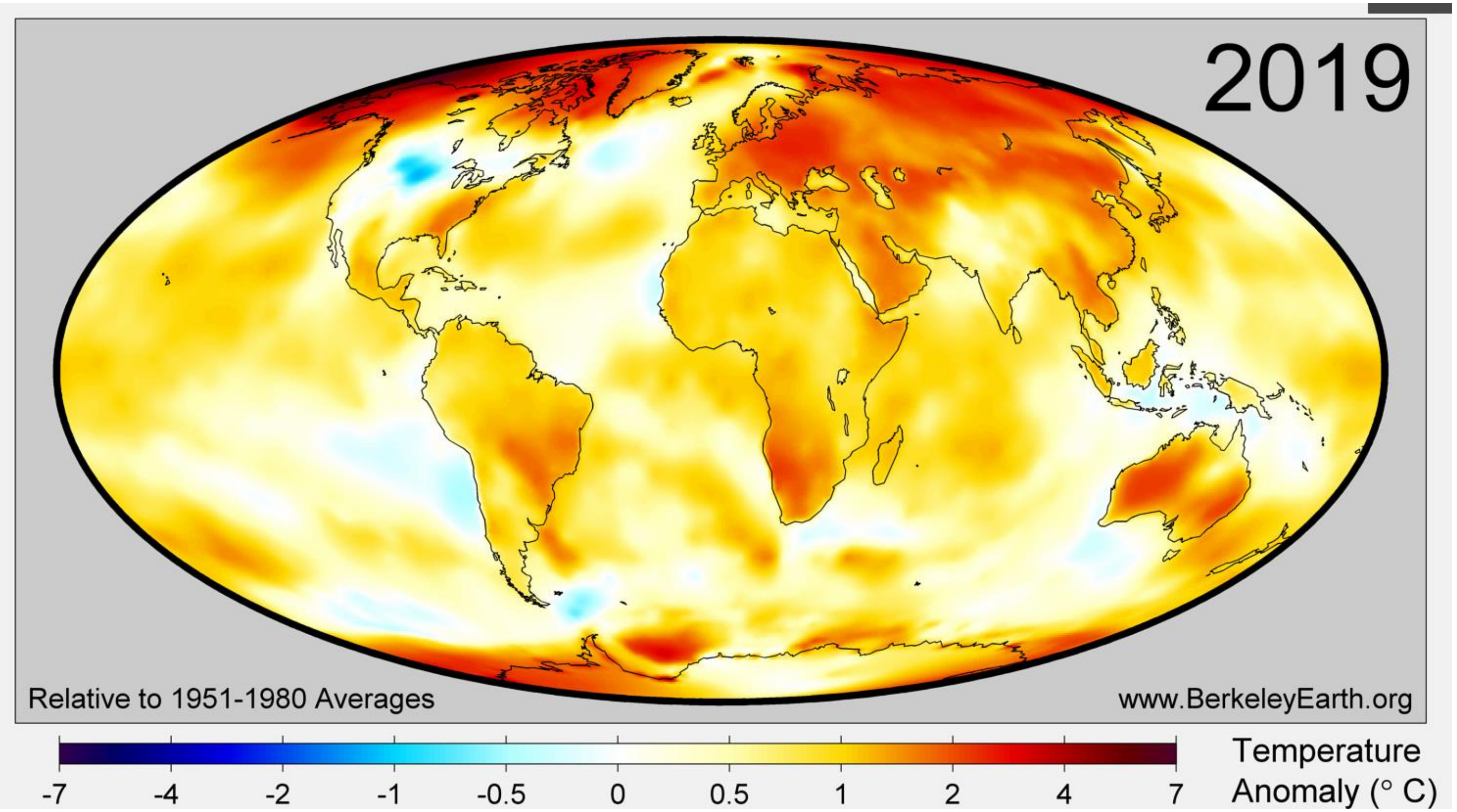
There are 50 years of proven reserves for Oil & Gas and more than 100 years for coal

Is it sustainable? Climate Change



But only 1/3 can be (still) burnt to avoid important climate change

Global warming is a problem for who?



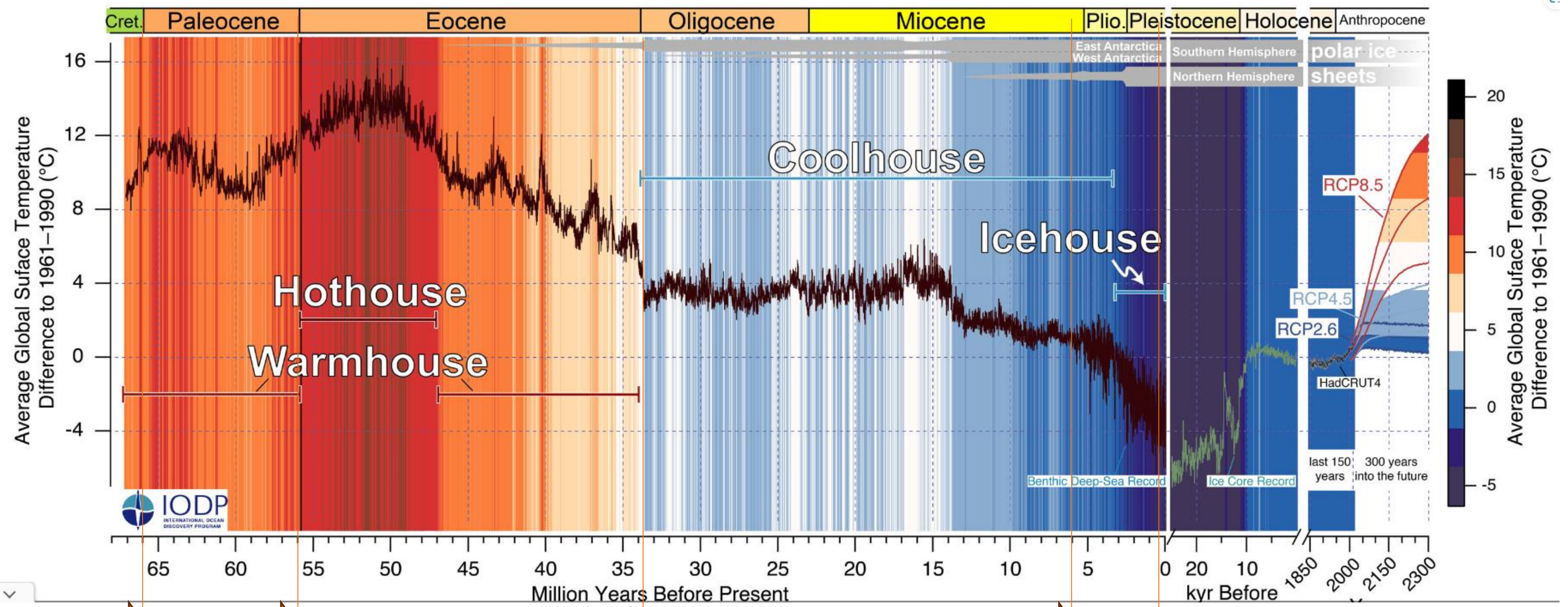
The temperature increase is significantly more sensitive in :

- Norhern hemisphere : Central Europe, Greenland, Siberia, Arctic
- Australia
- Antartica

This doesn't take into account unpredictible events :

- Hailstorms
- Heavy rains
- Wildfires

Global warming is a problem for who?



End of dinosaurus

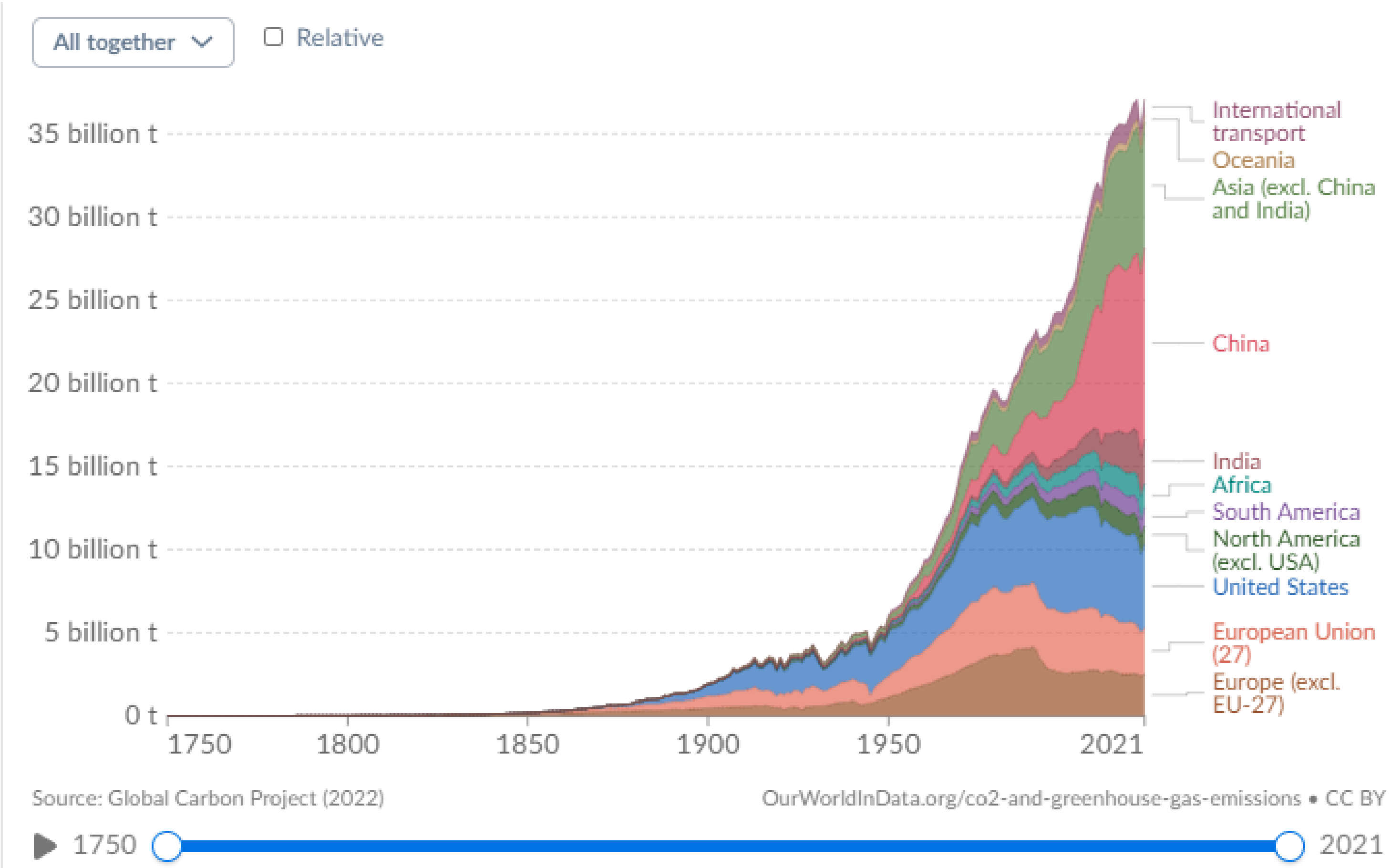
Mammal spread

Massive Life Extinction

Australopithecus

Homo Sapiens

CO2 emissions by world region

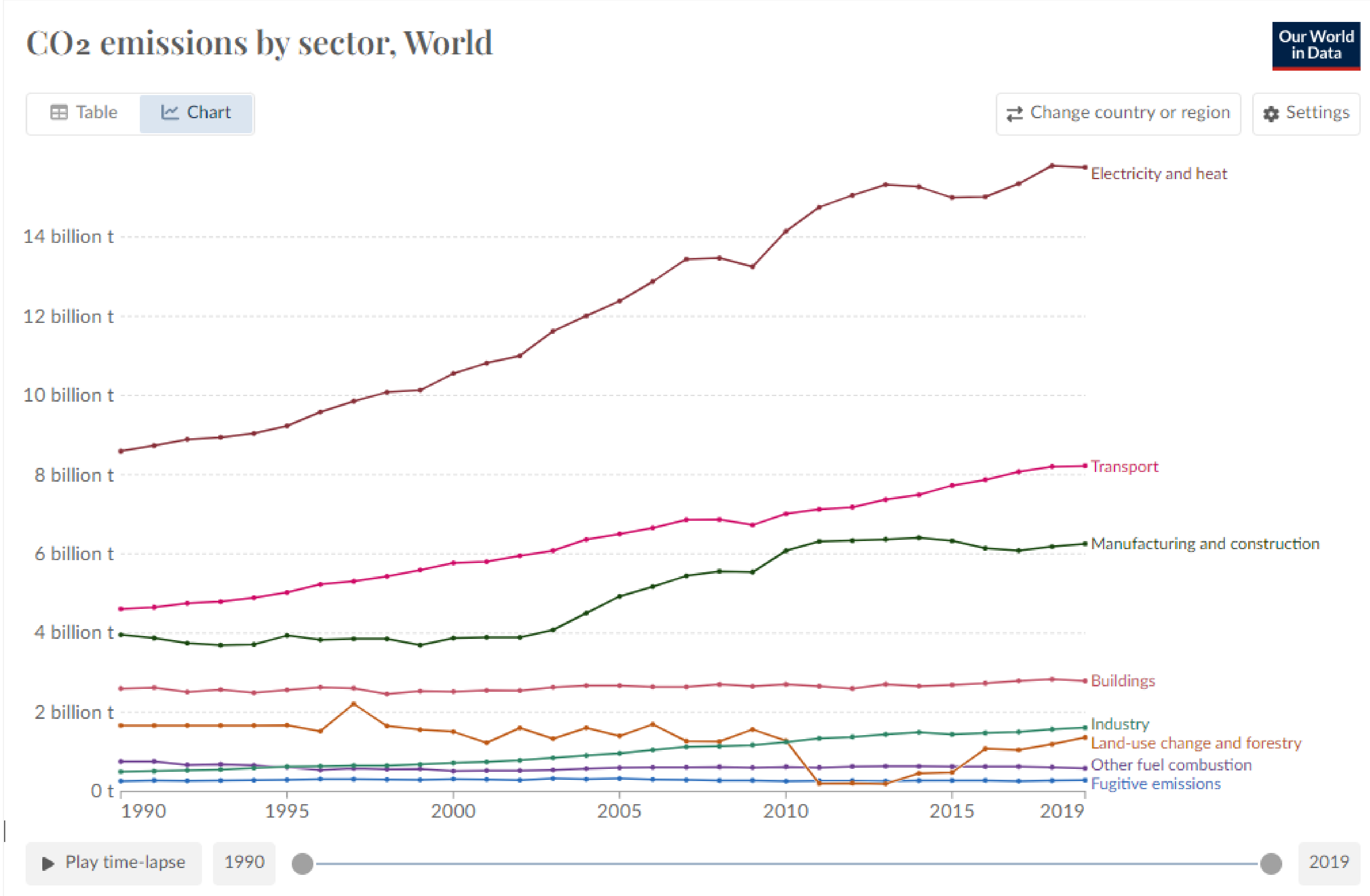


2021 in tonnes		
International transport	1.02 billion t	2,7%
Oceania	443.19 million t	1,2%
Asia (excl. China and India)	7.51 billion t	20,2%
China	11.47 billion t	30,9%
India	2.71 billion t	7,3%
Africa	1.45 billion t	3,9%
South America	1.07 billion t	2,9%
North America (excl. USA)	1.13 billion t	3,0%
United States	5.01 billion t	13,5%
European Union (27)	2.79 billion t	7,5%
Europe (excl. EU-27)	2.51 billion t	6,8%
Total	37.12 billion t	44,4%

Europe has started to decrease its CO2 emissions but represents 14% of the total emissions (EU-27 + others)

44% of CO2 world emissions are USA and China; +20% for other Aisian countries (excl. India : Korea, Japan, …)

CO_2 emissions by sector



2019
in tonnes

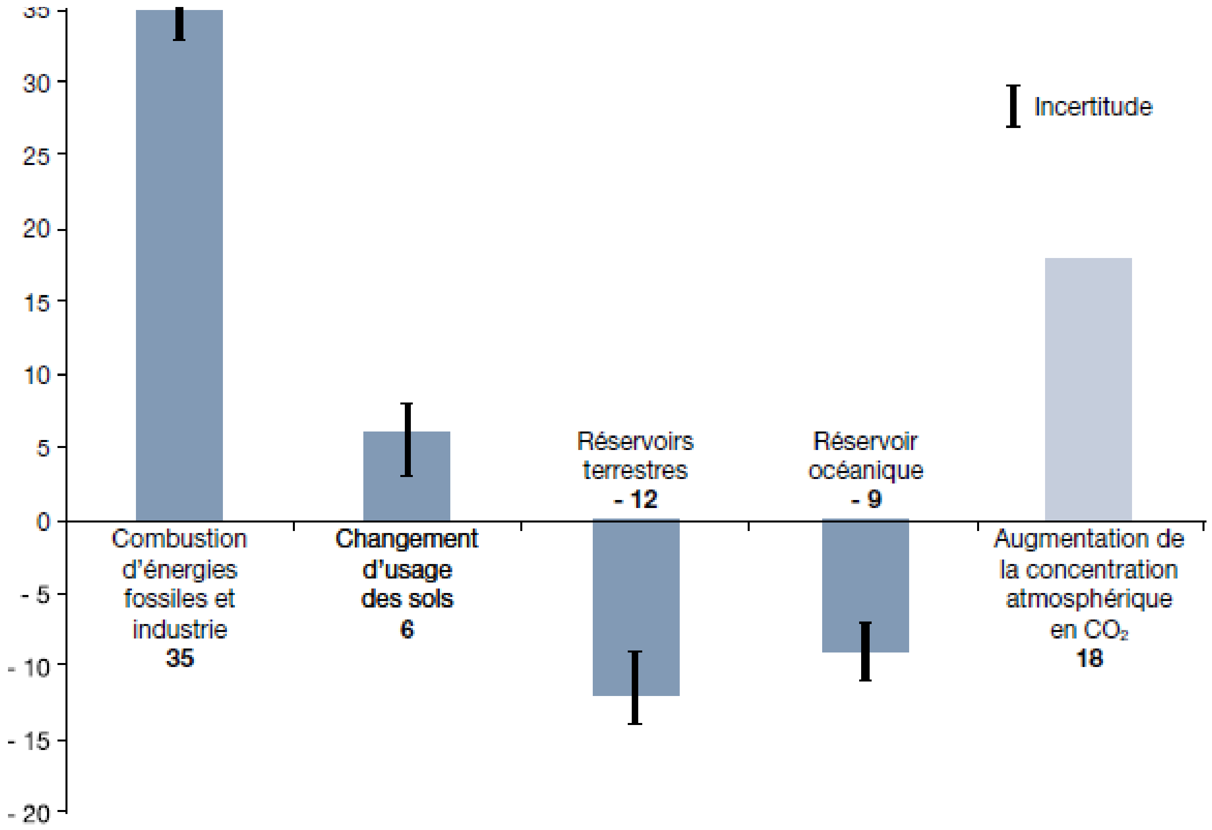
Electricity and heat	15.76 billion t	42,8%
Transport	8.22 billion t	22,3%
Manufacturing and construction	6.25 billion t	17,0%
Buildings	2.79 billion t	7,6%
Industry	1.61 billion t	4,4%
Land-use change and forestry	1.36 billion t	3,7%
Other fuel combustion	588.90 million t	1,6%
Fugitive emissions	282.83 million t	0,8%
Total	36 billion t	

43% of total CO2 emissions are made for Electricity and Heat

CO_2 balance

Excess of CO2 emissions and storage capacity

Average Human Annual emissions for the period 2009-2018 (emissions and absorption by natural sources and oceans)
In Gt CO2

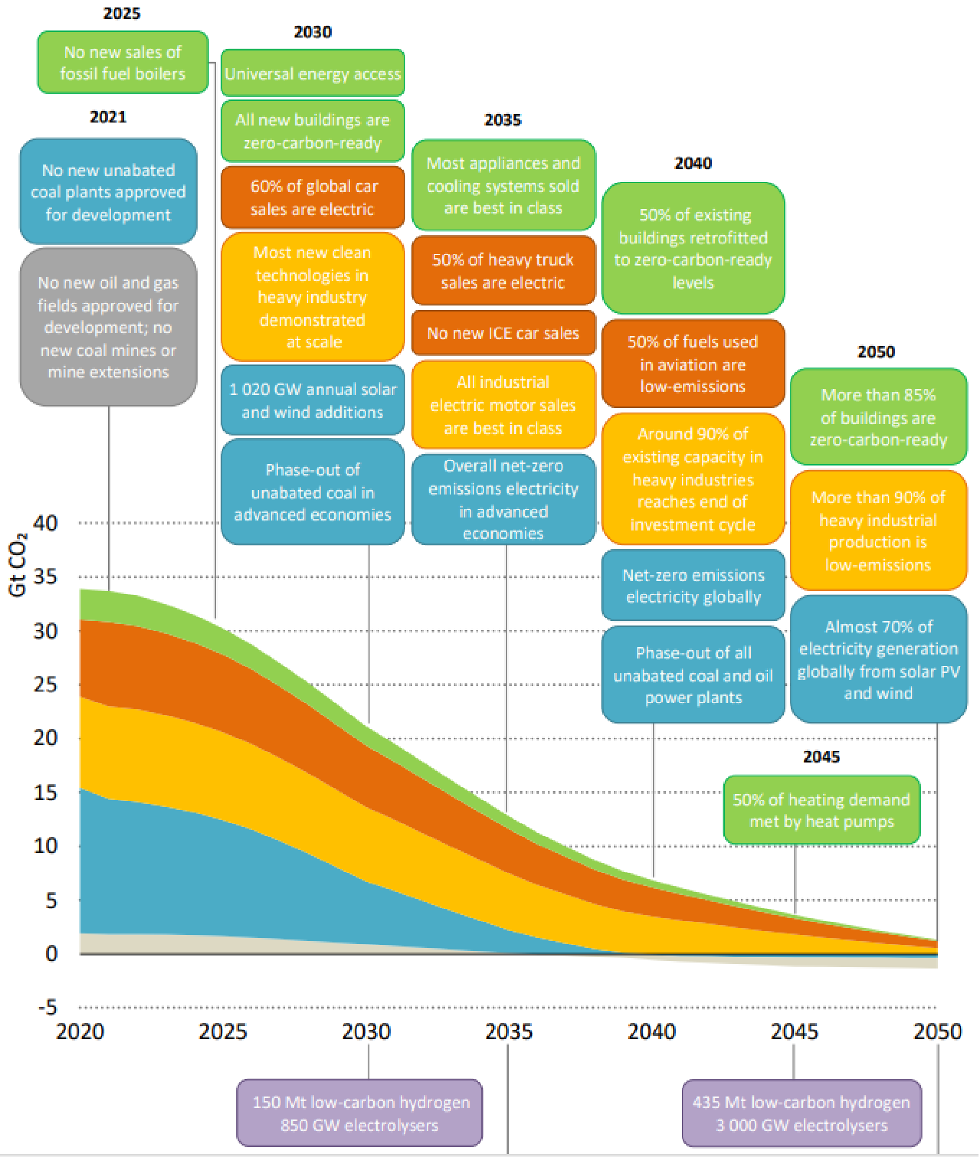


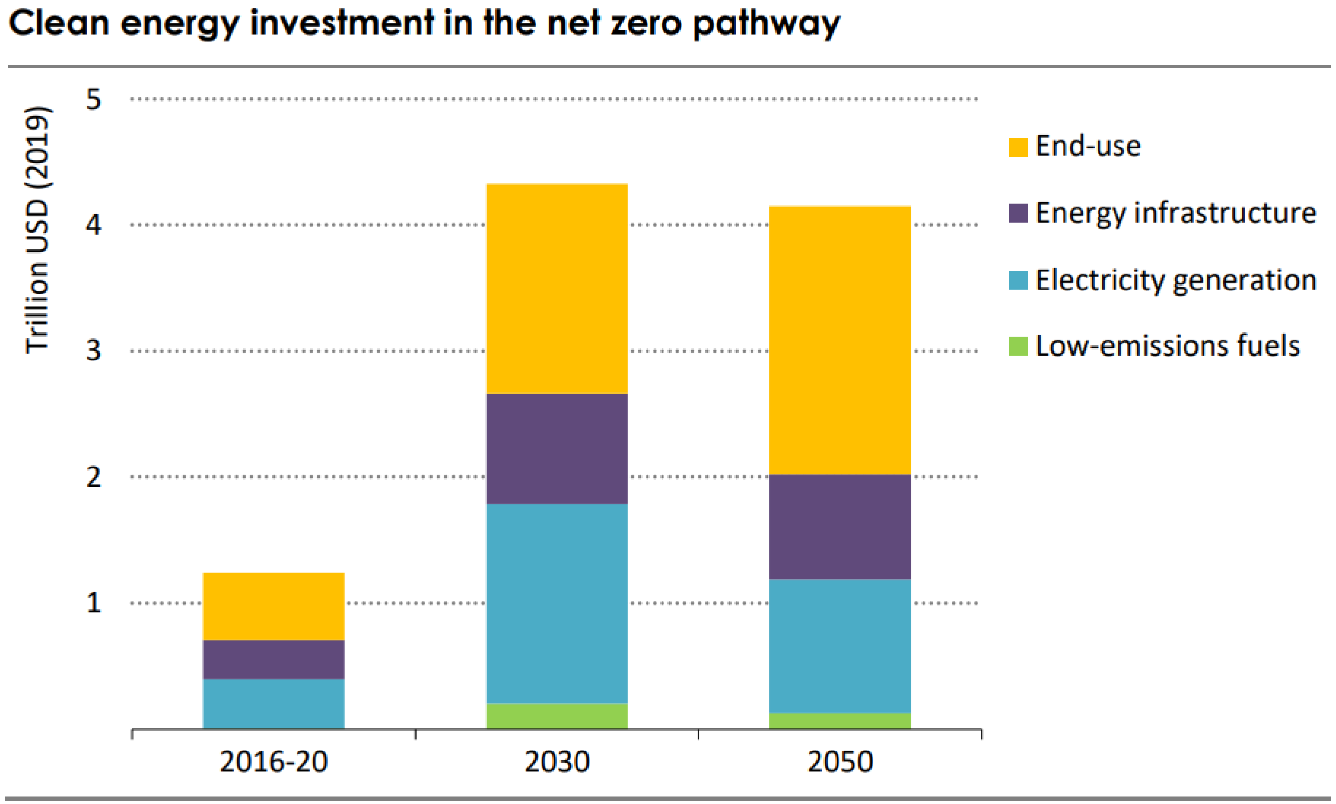
Note : l'incertitude pour l'augmentation de la concentration atmosphérique en CO_2 est très faible (± 0,07 Gt CO_2/an) et n'a pas été représentée sur le graphique.
Source : *The Global Carbon Project, Global Carbon Budget, 2019*

To keep climate « as is », world CO2 emissions has to be divided by 2!

This doesn't mean CO2 reduction in the atmosphere!

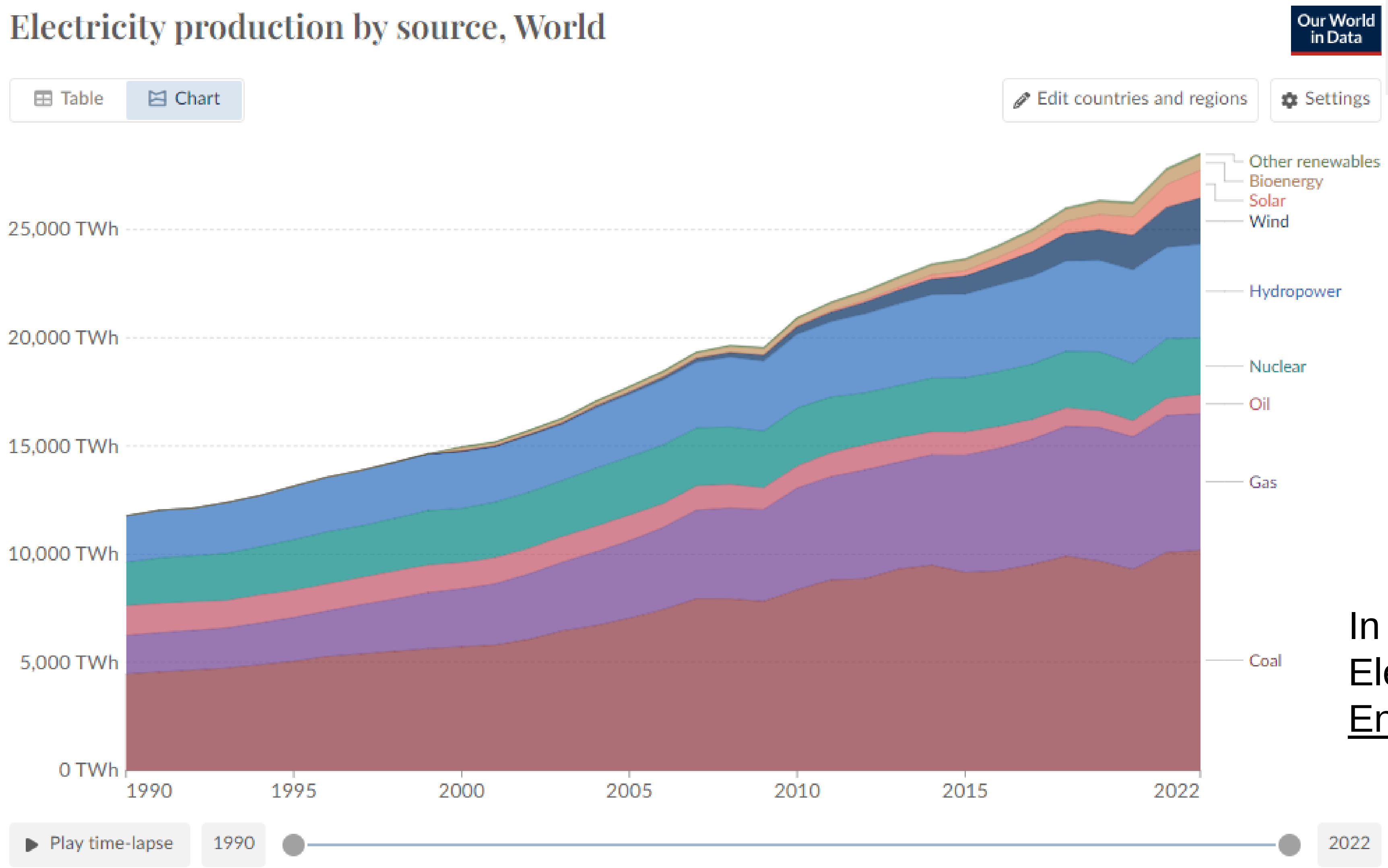
IPCC Net Zero Emission (NZE)





World GPD is estimated approx. USD 104 Trillion/year

Electricity Production Mix (2022)



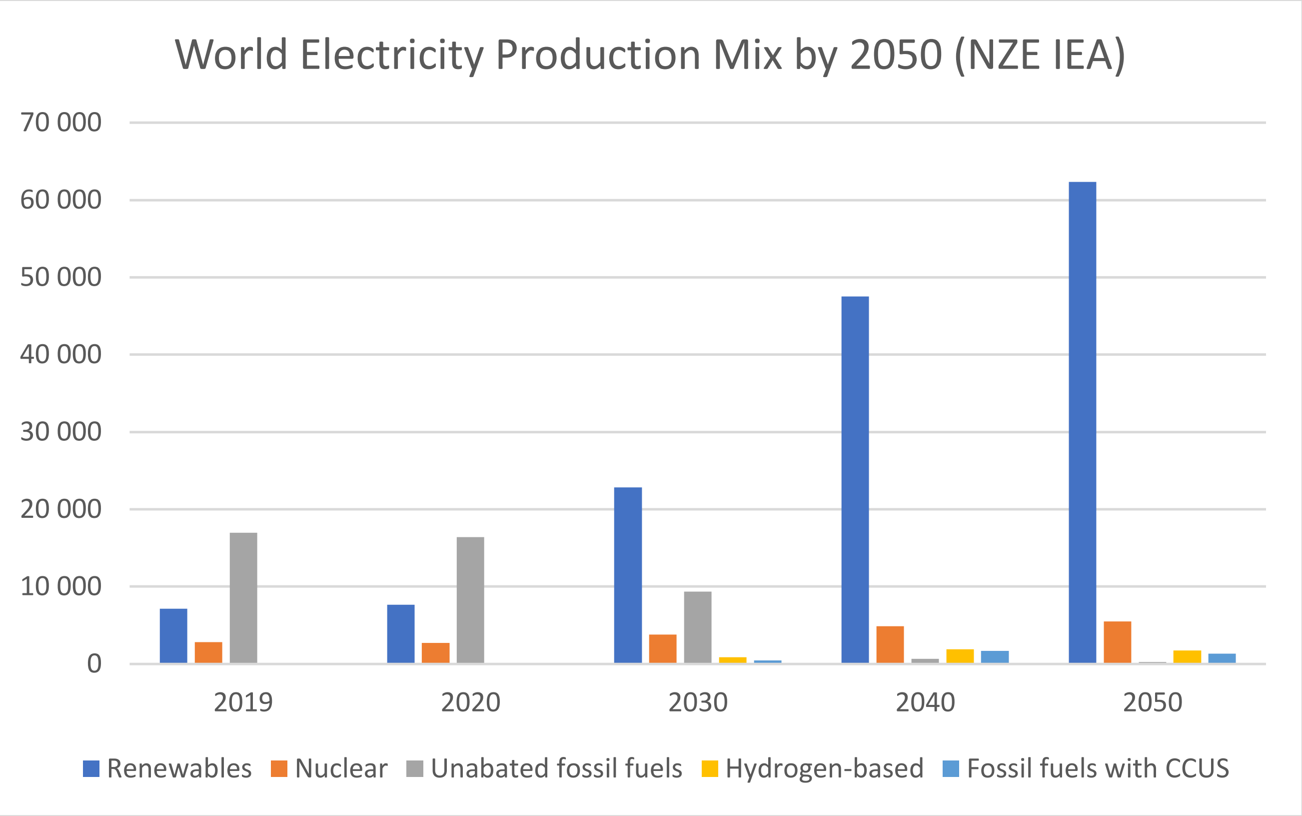
2022

in terawatt-hours

Other renewables	99.74 TWh
Bioenergy	677.57 TWh
Solar	1,289.27 TWh
Wind	2,139.23 TWh
Hydropower	4,326.76 TWh
Nuclear	2,610.04 TWh
Oil	884.98 TWh
Gas	6,309.46 TWh
Coal	10,190.71 TWh
Total	28,527.76 TWh

In 2022, **57%** of 28 576 TWh world Electricity is produced with Fossil Energy

World Electricity Production (NZE)



By 2050, NZE IEA scenario is predicting a huge increase in Electricity production (x2.65) 71 164 TWh with a mix where Renewables jump from **28% to 87,5% (x8)**

	Electricity Generation (TWh)						
Date	**2019**	**2020**	**2022**	**2030**	**2040**	**2050**	
Total generation	**26 922**	**26 778**	**28 525**	**37 316**	**56 553**	**71 164**	**x factor**
Renewables	**7 153**	**7 660**	**8 531**	**22 817**	**47 521**	**62 333**	**8**
Solar PV	665	821	1289	6 970	17 031	23 469	**29**
Wind	1 423	1 592	2 139	8 008	18 787	24 785	**16**
Hydro	4 294	4 418	4 326	5 870	7 445	8 461	**2**
Bioenergy	665	718	677	1 407	2 676	3 279	**5**
of which BECCS	-	-		*129*	*673*	*842*	
CSP (Concentrated Solar Panels)	14	14		204	880	1 386	**99**
Geothermal	92	94	100	330	625	821	**9**
Marine	1	2		27	77	132	**66**
Nuclear	**2 792**	**2 698**	**2 610**	**3 777**	**4 855**	**5 497**	2
Hydrogen-based				**875**	**1 857**	**1 713**	
Fossil fuels with CCUS	**1**	**4**		**459**	**1 659**	**1 332**	333
Coal with CCUS	1	4		289	966	663	
Natural gas with CCUS				170	694	669	
Unabated fossil fuels	**16 941**	**16 382**	**17 384**	**9 358**	**632**	**259**	0,016
Coal	9 832	9 426	10 190	2 947			
Natural gas	6 314	6 200	6 309	6 222	626	253	
Oil	795	756	885	189	6	6	

X2,65

LCOE per type of renewables

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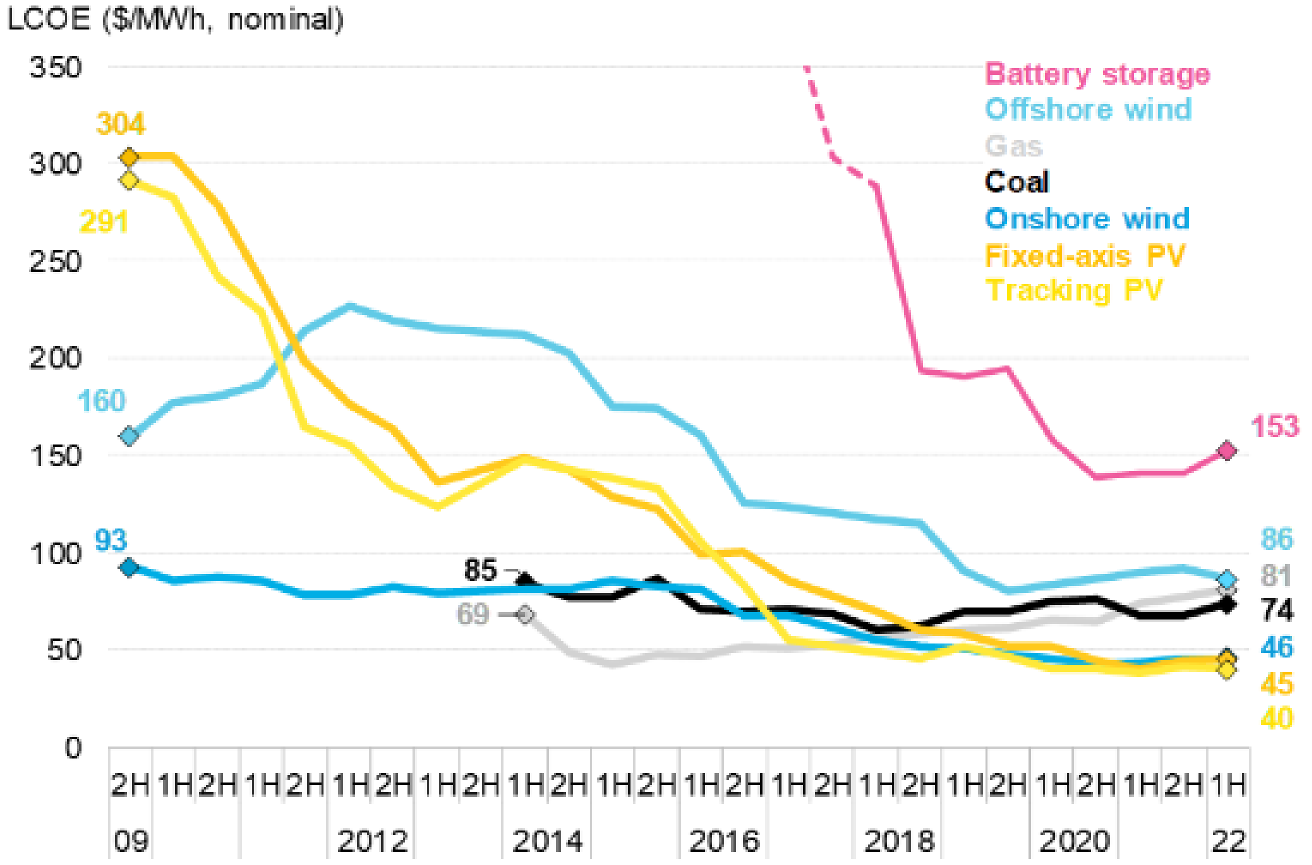
Figure 1: Global levelized cost of electricity benchmarks, 2009-2022



Source: BloombergNEF. Note: The global benchmark for PV, wind and storage is a country-weighted average using the latest annual capacity additions. The storage LCOE is reflective of a utility-scale Li-ion battery storage system with four-hour duration running at a daily cycle and includes charging costs.

$$LCOE = \frac{\text{NPV of Total Costs Over Lifetime}}{\text{NPV of Electrical Energy Produced Over Lifetime}}$$

$$LCOE = \frac{\sum \frac{(I_t + M_t + F_t)}{(1 + r)^t}}{\sum \frac{E_t}{(1 + r)^t}}$$

It :	The initial cost of investment expenditures
Mt :	Maintenance and operations expenditures
Ft :	Fuel expenditures (if applicable)
r :	Discount rate of the project The total output of the power-generating asset will include:
Et :	The sum of all electricity generated
t :	Lifetime of the investment (wind : 20 years, nucelar 40-50 years

Renewables are now competitive with fossil energy
Off Shore wind will remain expensive
PV is now cost efficient

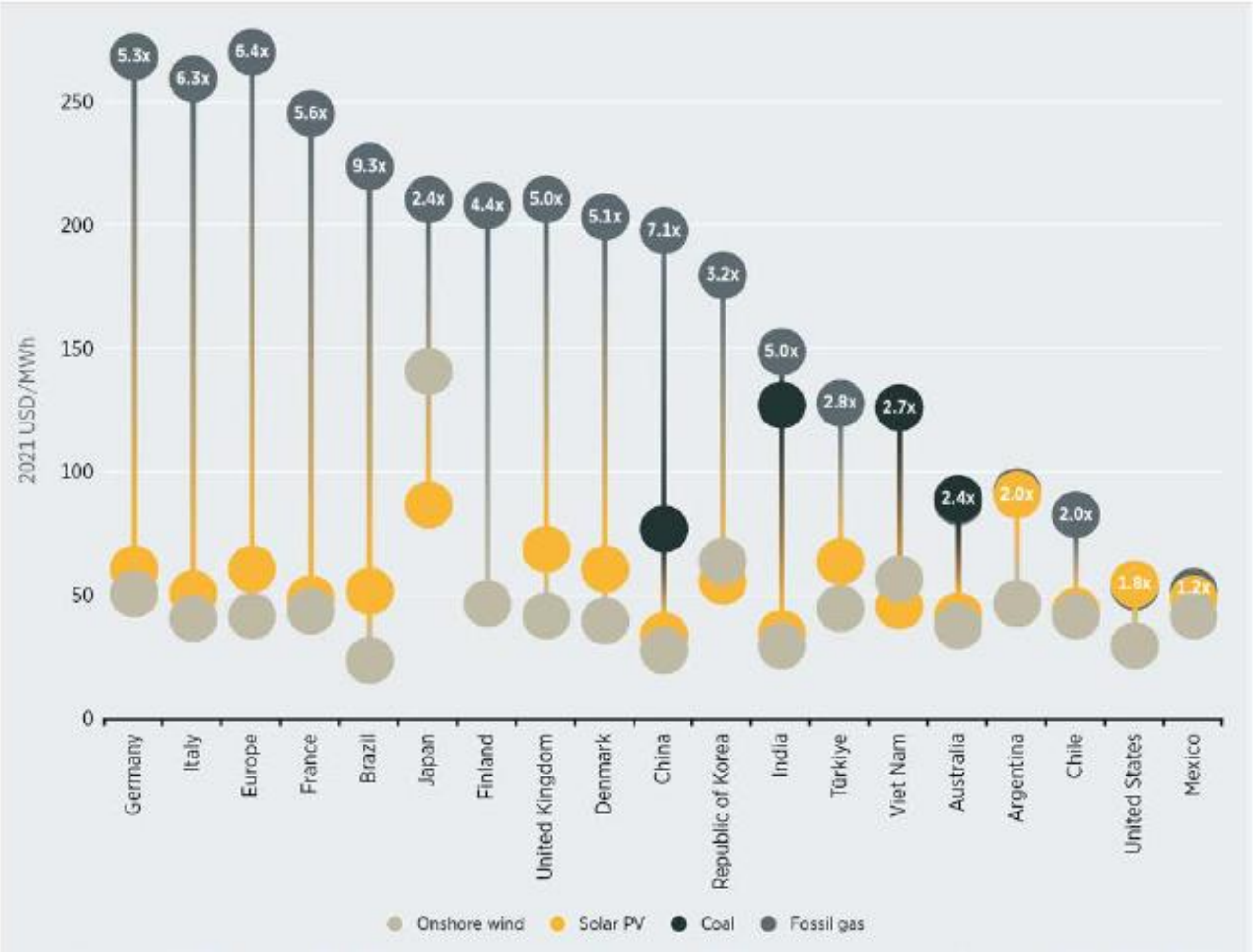
Solar PV+On Sh. Wind vs Fossil

TABLE 2.3: CAPEX FOR A UTILITY-SCALE PV POWER PLANT VALUE FOR 19 SELECTED COUNTRIES IN 2018

Country Name	CAPEX [$/kWp]	Country Name	CAPEX [$/kWp]
Canada	2,427	Republic of Korea	1,326
Russia	2,302	Saudi Arabia	1,267
Japan	2,101	Turkey	1,206
South Africa	1,671	Indonesia	1,192
Australia	1,554	Germany	1,113
United States	1,549	France	1,074
Brazil	1,519	China	879
Mexico	1,541	Italy	870
Argentina	1,433	India	794
United Kingdom	1,362	Global Weighted Average	1,210

Source: IRENA [17].

Figure 1.7 Fuel-only generation costs for coal and fossil gas for 2022 relative to the LCOE of new solar PV, onshore and offshore wind power projects commissioned in 2021, by country



LCOE per type of renewables

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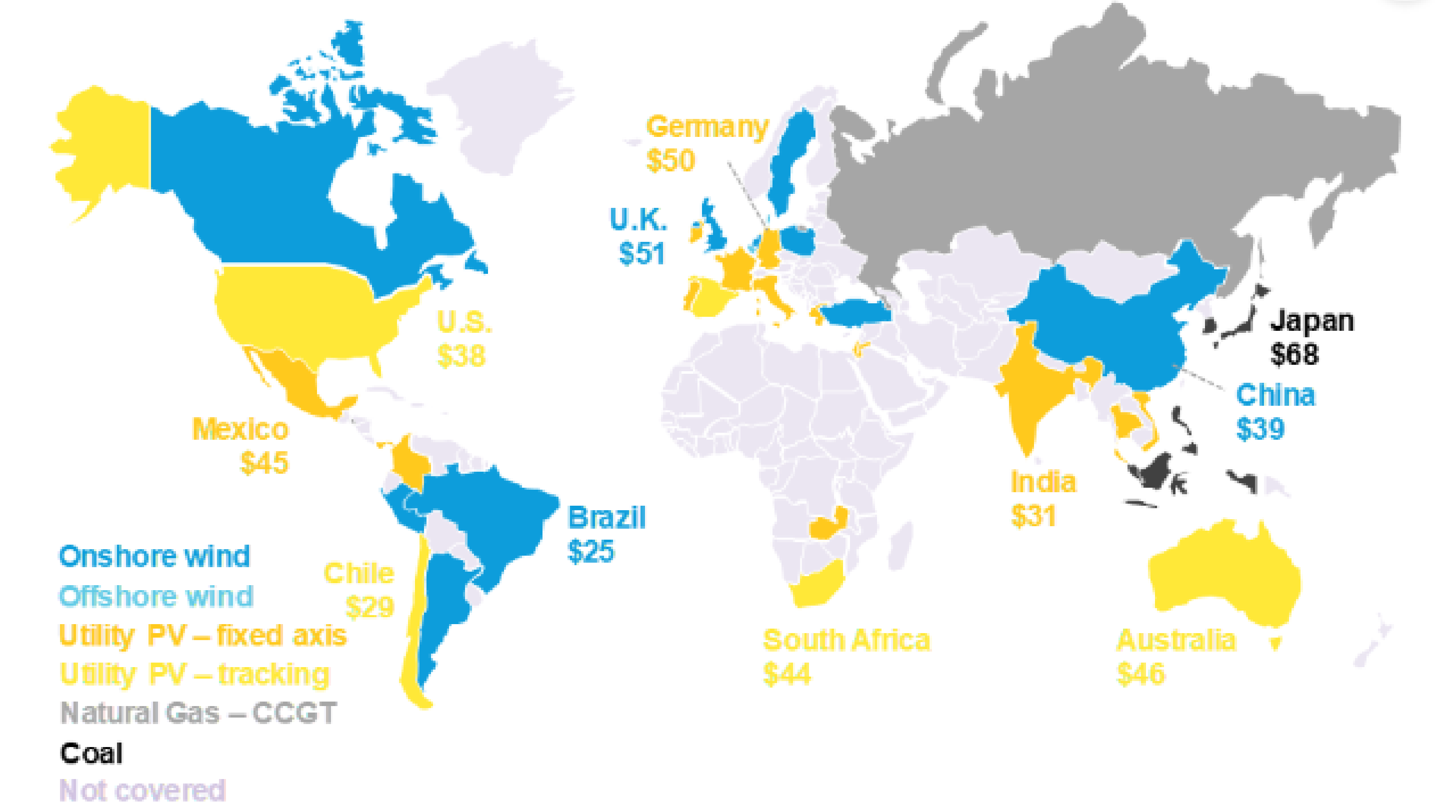
Figure 2: Markets where new-build solar and/or wind are cheaper than new-build coal- and gas-fired power, 1H 2022

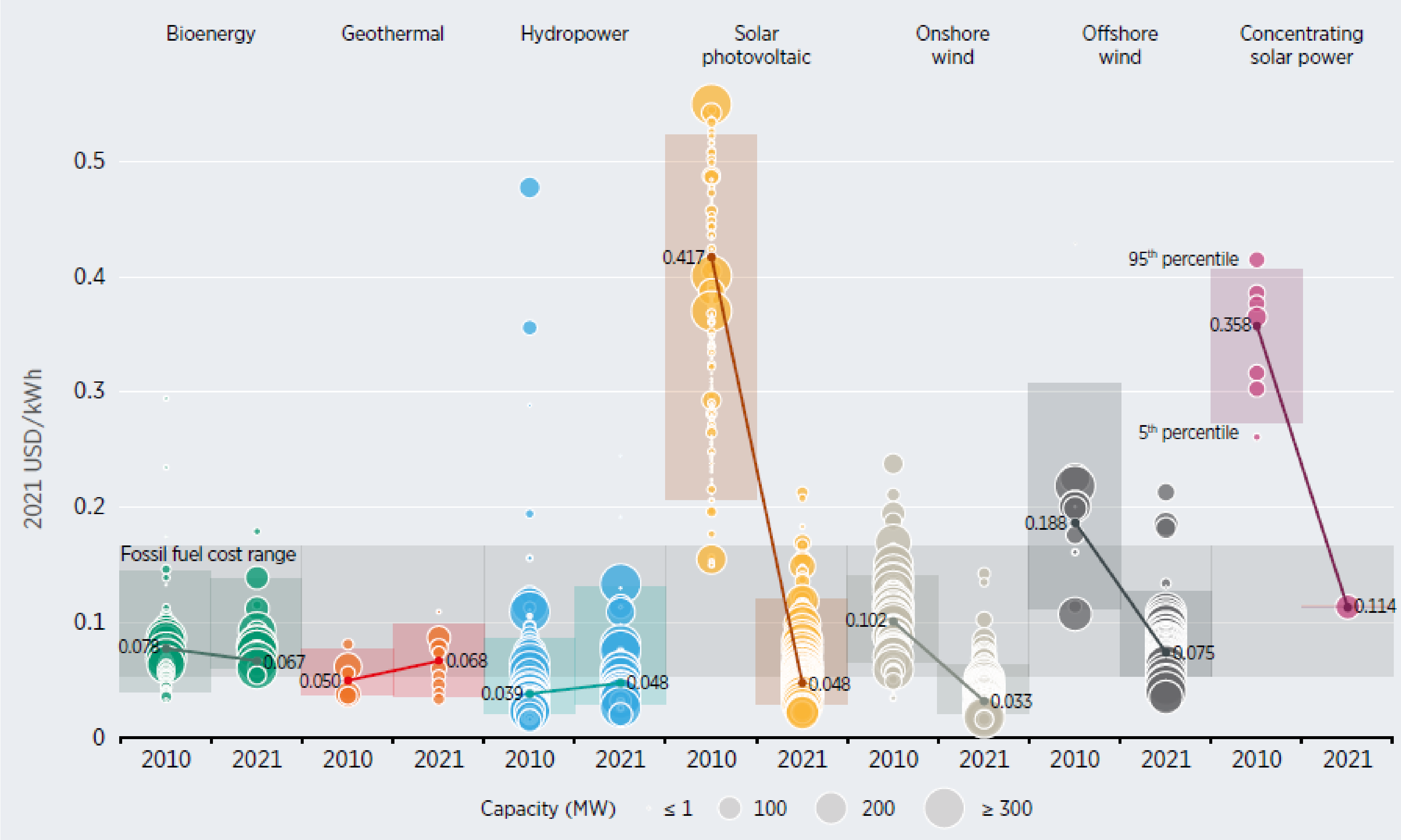


Source: BloombergNEF. Note: The map shows the technology with the lowest LCOE for new-build plants in each country where BNEF has data. The dollar numbers denote the per-MWh benchmark levelized cost of the cheapest technology. All LCOEs are in nominal terms. Calculations exclude subsidies, tax-credit or grid connection costs. CCGT is combined-cycle gas turbine.

Renewables are now competitive with fossil energy for Electricity production. Type of Renwables dépend on natural available sources

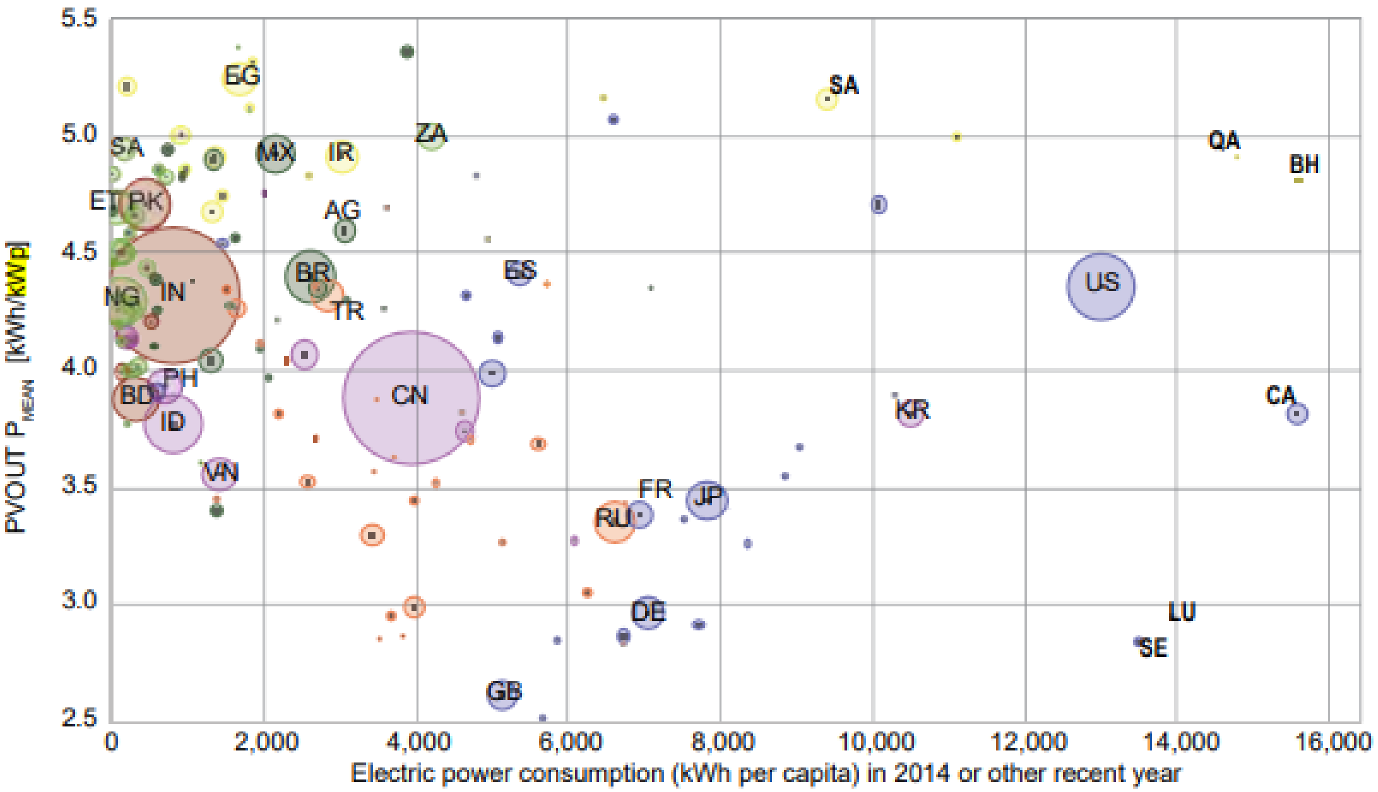
Renewables Competitiveness

Figure 1.2 Global weighted average LCOEs from newly commissioned, utility-scale renewable power generation technologies, 2010-2021



	Levelised cost of electricity (2021 USD/kWh)			ratio with Fossil
	2010	2021	Percent change	2021
Bioenergy	0,078	0,067	-14%	0%
Geothermal	0,05	0,068	34%	1%
Hydropower	0,039	0,048	24%	-28%
Solar PV	0,417	0,048	-88%	-28%
CSP	0,358	0,114	-68%	70%
Onshore wind	0,102	0,033	-68%	-51%
Offshore wind	0,188	0,075	-60%	12%
fossil fuel	0,078	0,067	-14%	

Solar PV



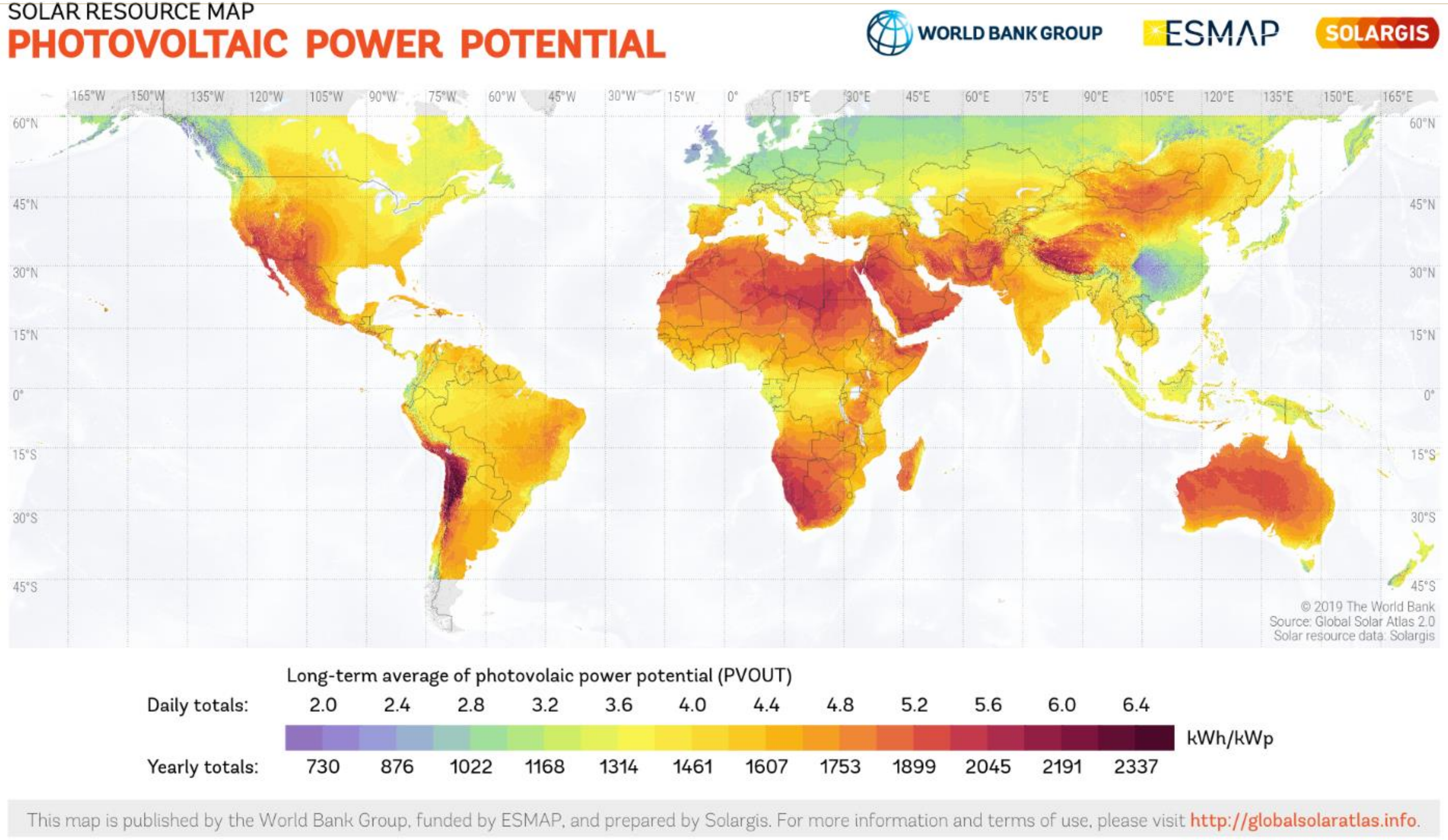
PROS

- CO2 friendly (pay back footprint CO2 in 3-4years)
- Reliable
- Cost effective
- Simple to implement, especially in zones with <u>limited Grid</u>

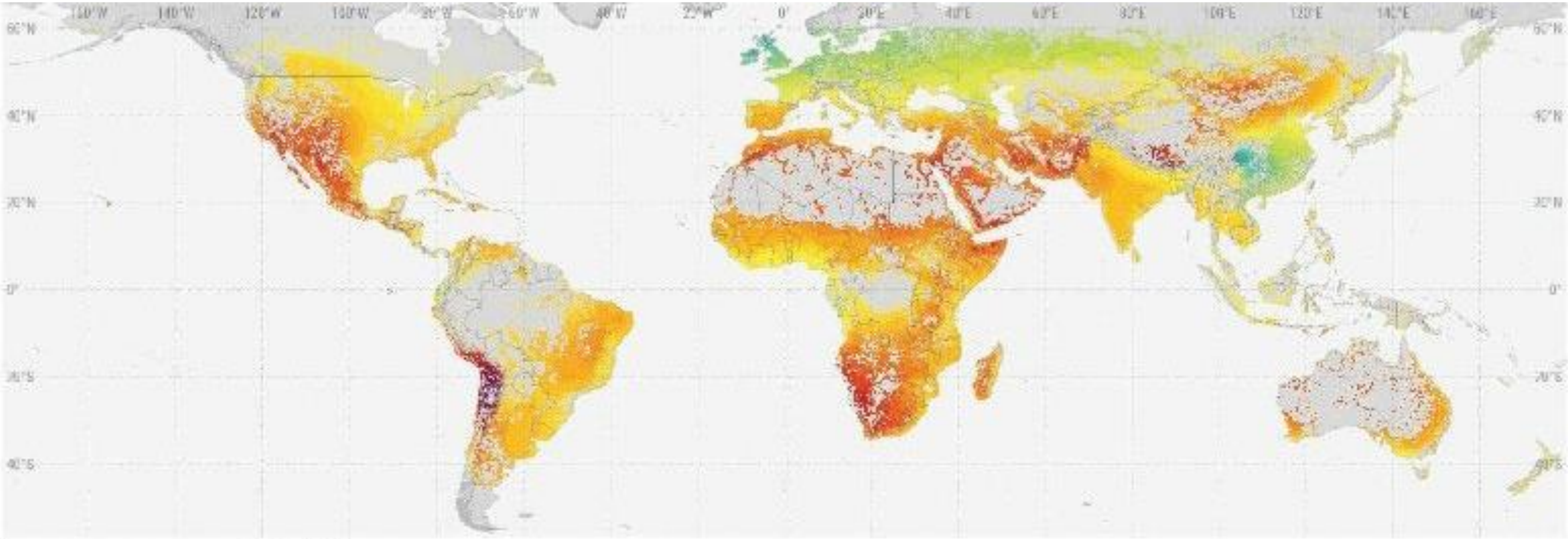
CONS

- Depend on lattitude
- To be coupled with storage capacity (batteries)
- kWh/Kwp is very interesting in countries where Electricity demand is limited
- High potential regions are isolated (Sahara, salt deserts, etc.)

Solar PV / where for who?



Solar PV / where for who?



Long-term average of PVOUT

Daily totals:	1.8	2.2	2.6	3.0	3.4	3.8	4.2	4.6	5.0	5.4	5.8	6.2
Yearly totals:	657	803	949	1095	1241	1387	1534	1680	1826	1972	2118	2264

kWh/kWp

Excluded zones

Unfortunately, kWh/Kwp is very interesting in countries where Electricity demand is limited

CSP (Concentrating Solar Power)

Supcon Delingha 50MW CSP Plant (146 Gwh annual production)

CSP (Concentrating Solar Power)

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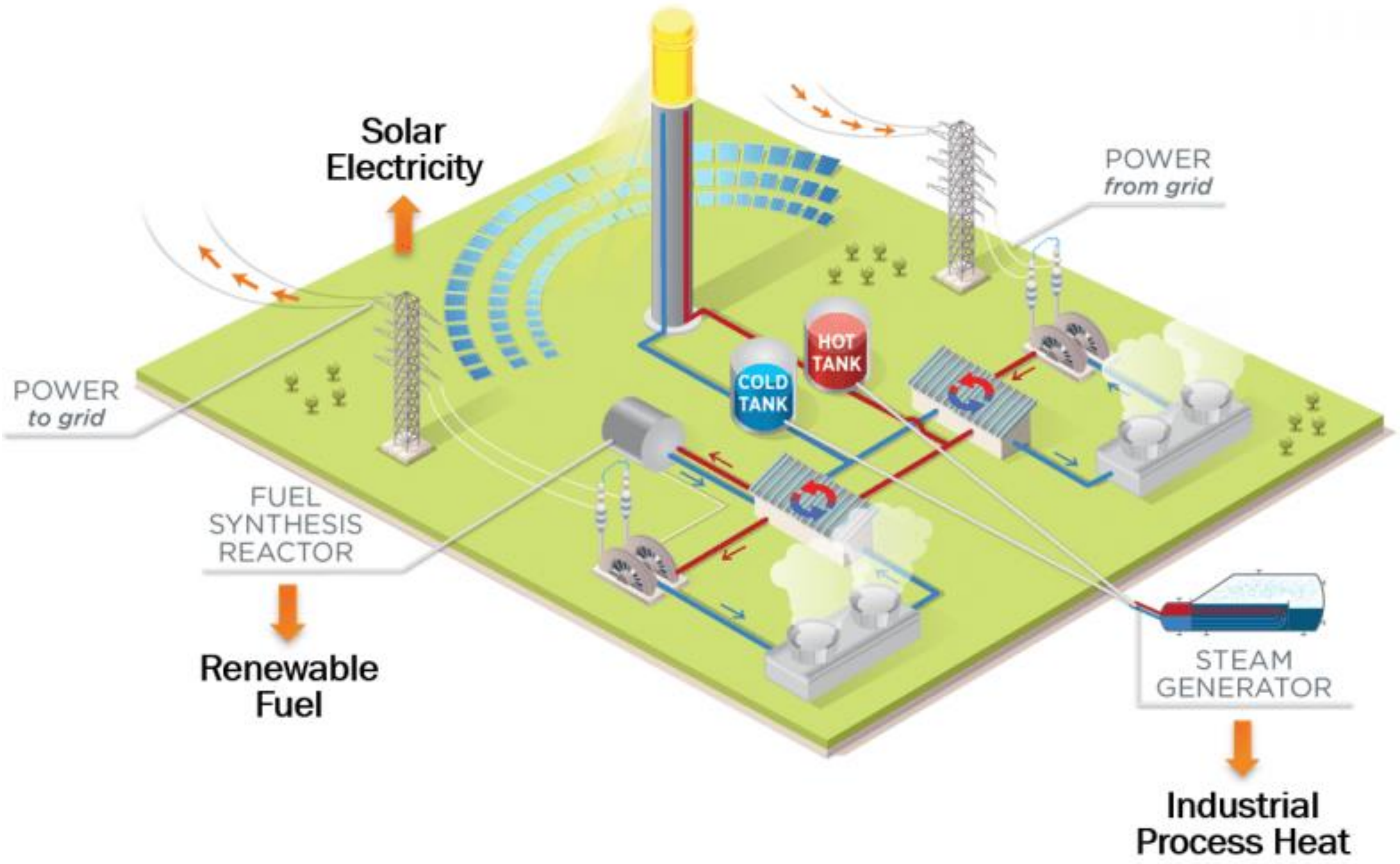


Pros

- Technology proven but needs to be improved to become competitive
- Possible to implement big factories
- Possible to store Energy
- Electricity + Heat delivery

Cons

- Expensive and not competitive (as of today)
- Dedicated to specific environnement (dry)
- Grid issues to connect plants

Supcon Delingha 50MW CSP Plant (146 Gwh annual production)

CSP different technologies

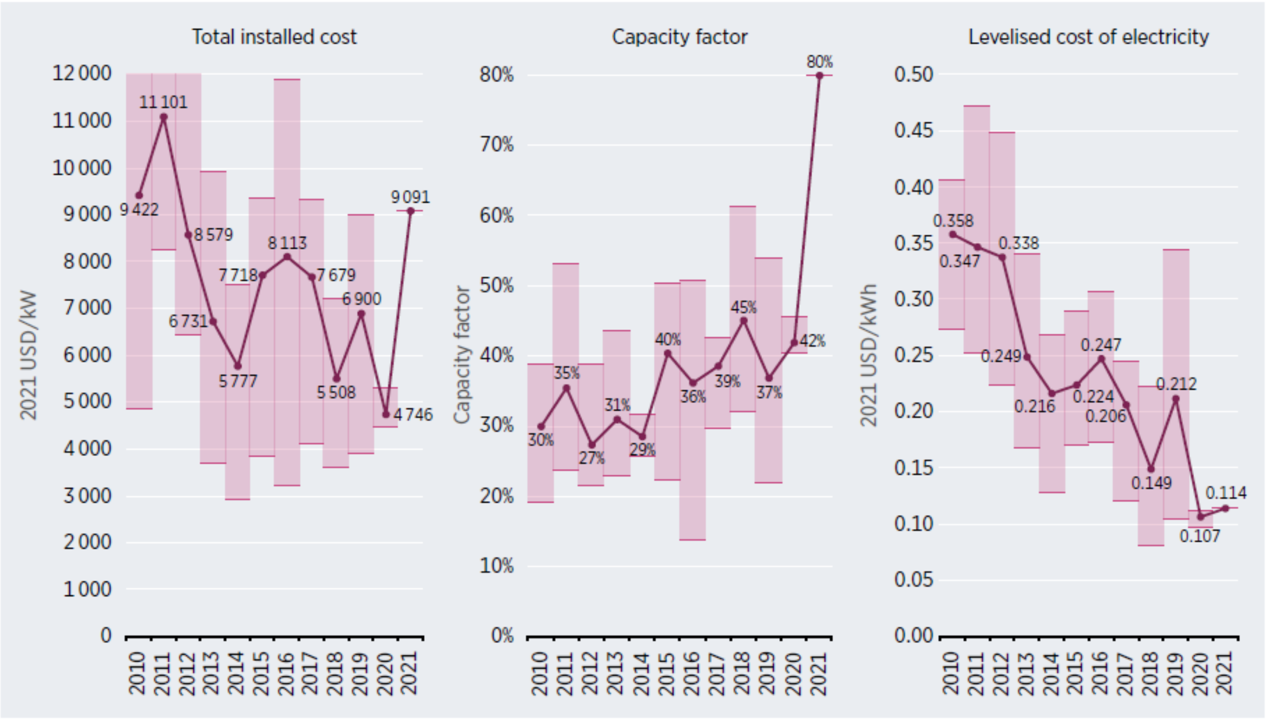


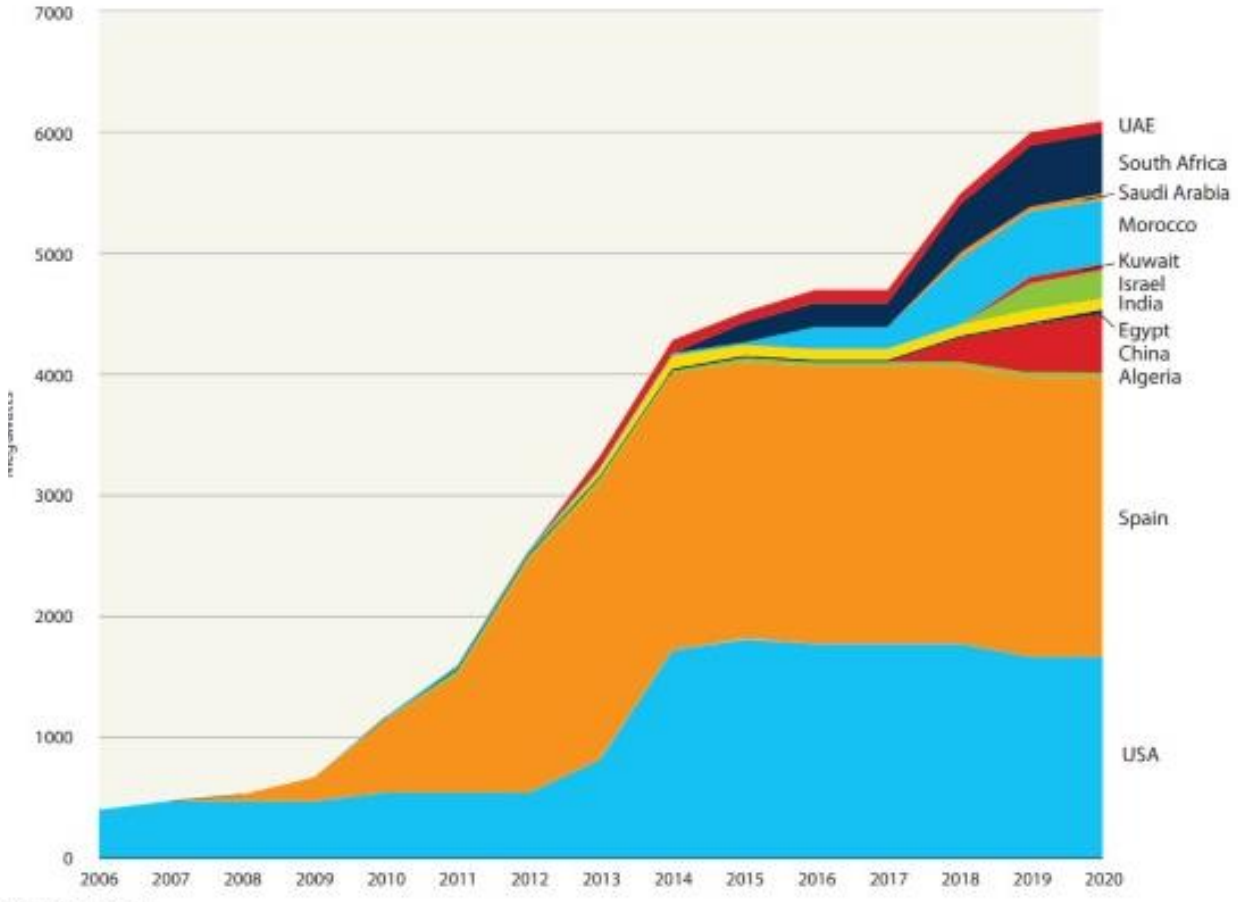

	Parabolic Trough	Solar Tower	Linear Fresnel	Parabolic
Typical capacity (MW)	10–300	10–200	10–200	0.01–0,025
Maturity	Commercially proven	Commercially proven	Recent commercial project	Demonstration projects
Technology development risk	Low	Medium	Medium	Medium
Operating temperature (°C)	350–400	250–565	250–350	550–750
Plant peak efficiency (%)	14–20	23–35a	18	30
Annual solar to electricity efficiency (%)	11–16	7–20	13	12–25
Annual capacity factor (%)	25–28 (no TES)	55 (10 h TES)	22–24	25–28
	29-43 (7 h TES)			
Concentration factor	10–80	>1,000	>60	Up to 10,000
Receiver/absorber	Absorber attached to collector, moves with collector, complex desig	External surface or cavity receiver, fixed	Fixed absorber, no evacuation secondary reflector	Absorber attached to co
Storage system	Indirect two-tank molten salt at 380°C (d*T* = 100 K)	Direct two-tank molten salt at 550°C (d*T* = 300 K)	Short-term pressurized steam storage (<10 min)	No storage for Stirling di
Hybridization	Yes and direct	Yes	Yes, direct (steam boiler)	Not planned
Grid stability	Medium to high (TES or hybridization)	High (large TES)	Medium (back-up firing possible)	Low
Cycle	Superheated Rankine steam cycle	Superheated Rankine steam cycle	Saturated Rankine steam cycle	Stirling
Steam conditions (°C/bar)	380–540/100	540/100–160	260/50	n.a.
Maximum slope of solar field (%)	<1–2	<2–4	<4	10 or more
Water requirement (m^3/MW h)	3 (wet cooling)	2–3 (wet cooling)	3 (wet cooling)	0.05–0.1 (mirror washing
	0.3 (dry cooling)	0.25 (dry cooling)	0.2 (dry cooling)	
Application type	On-grid	On-grid	On-grid	On-grid/off-grid
Suitability for air cooling	Low to good	Good	Low	Best
Storage with molten salt	Commercially available	Commercially available	Possible, but not proven	Possible but not proven

Supcon Delingha 50MW CSP Plant (146 Gwh annual production)

CSP (Concentrating Solar Power)

Figure 5.1 Global weighted average total installed costs, capacity factors and LCOE for CSP, 2010-2021





LCOE is not (yet) competitive
High improvements were made in the 10 past years
Efficiency could increase with hugher temperature (goal : 600-800°C) and energy storage

On Shore Wind

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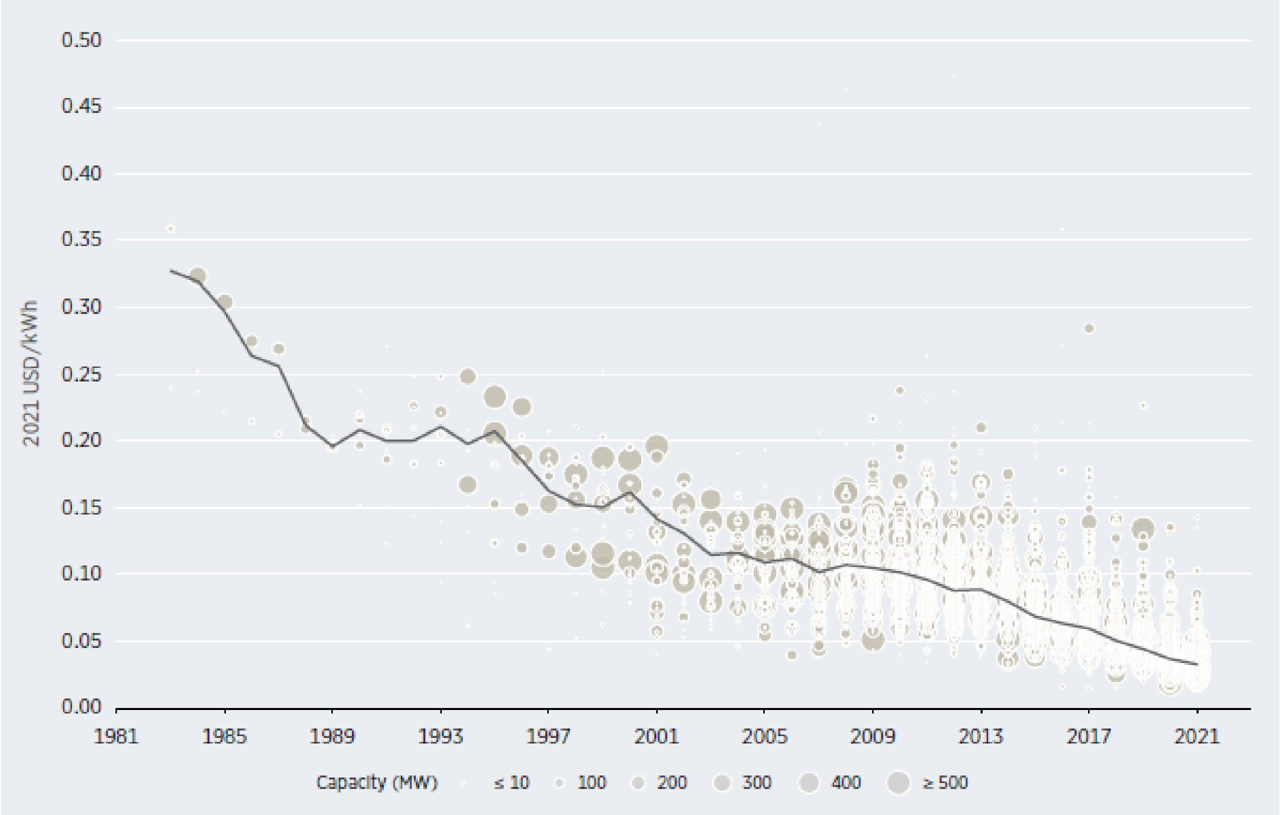
Figure 2.12 LCOE of onshore wind projects and global weighted average, 1984-2021

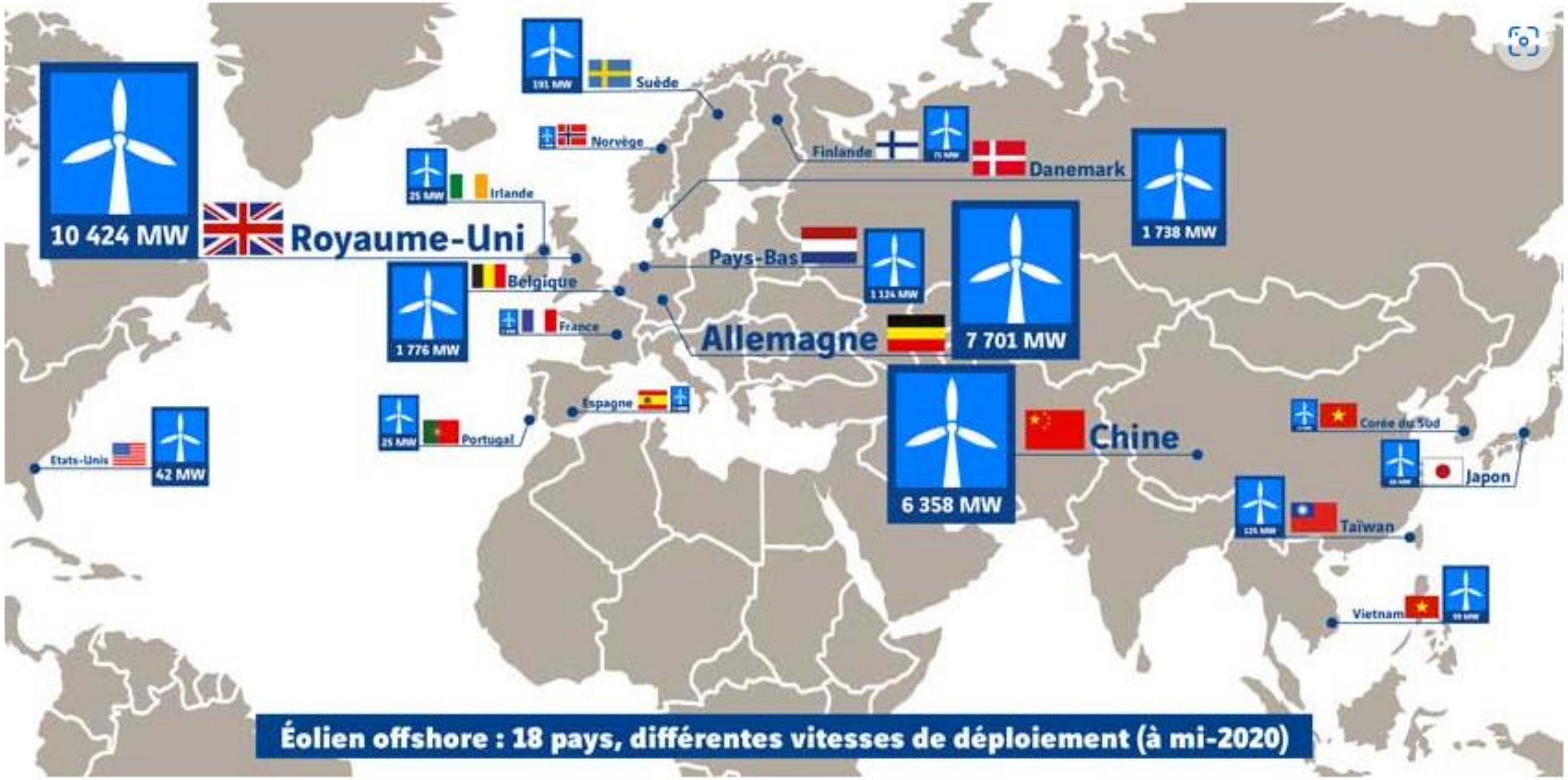


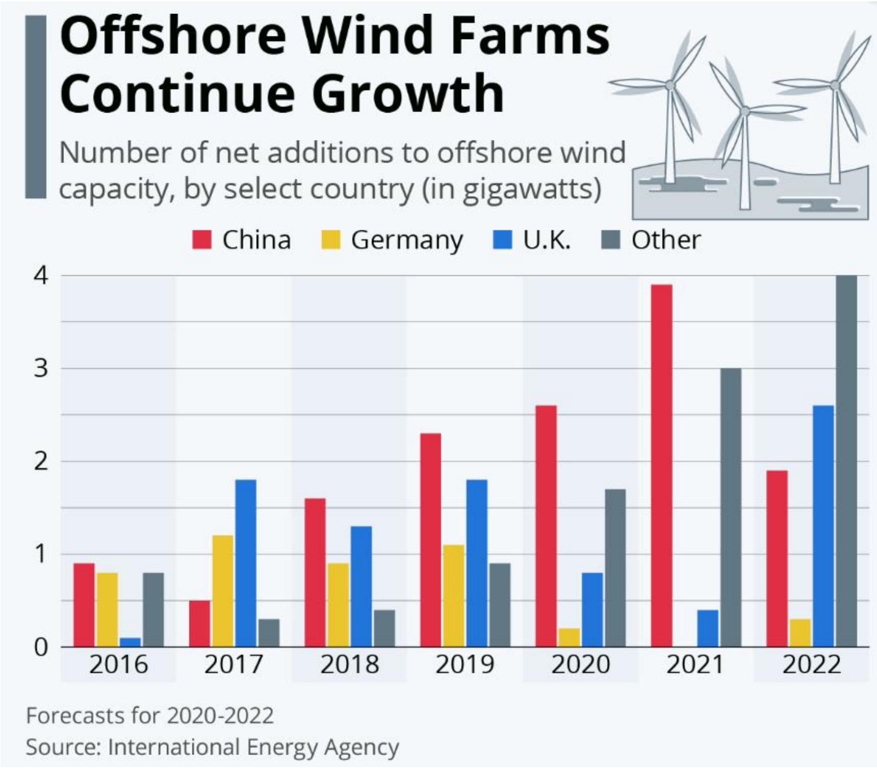
Source: IRENA Renewable Cost Database.

Figure 4.13 Offshore wind project and global weighted average LCOEs and auction/PPA prices, 2000-2024

Source: IRENA Renewable Cost Database.

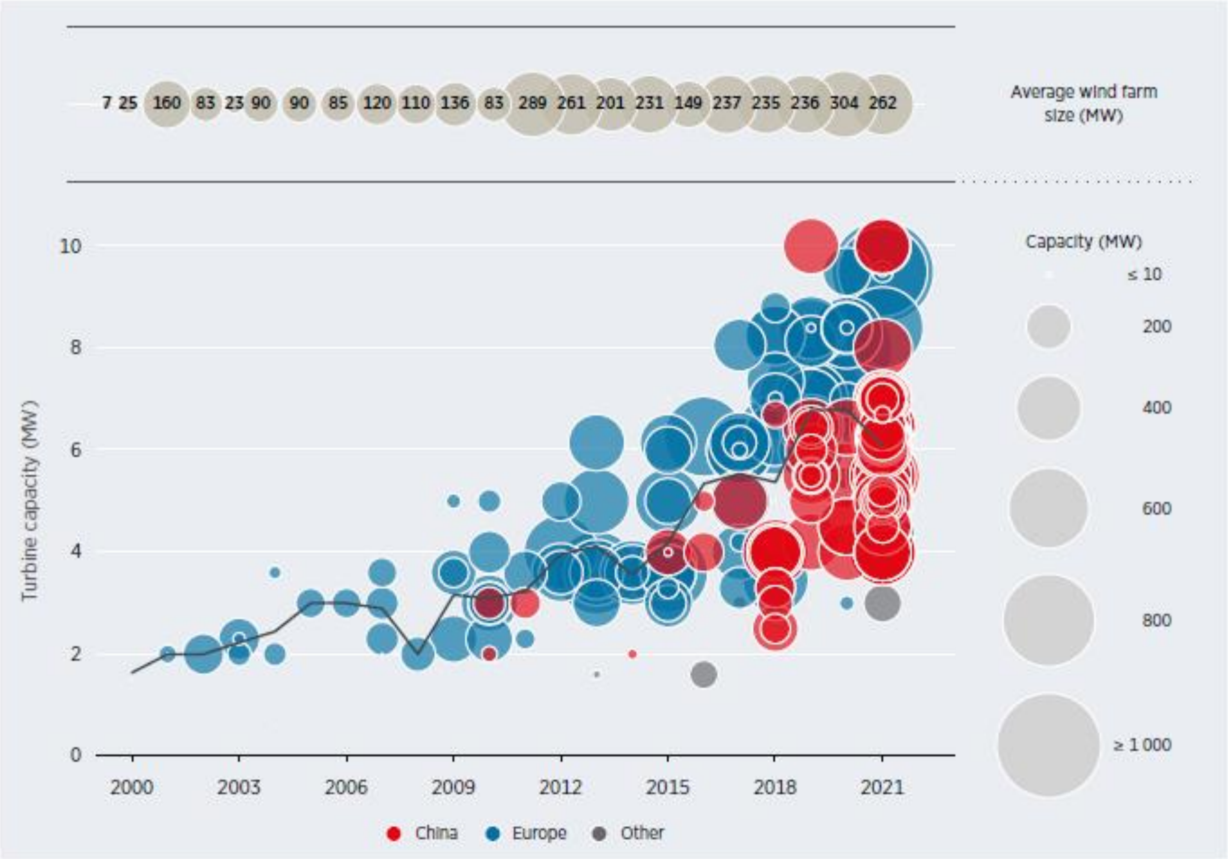
Off Shore Wind – UK First





Off Shore Wind

Figure 4.4 Project turbine size, global weighted average turbine size and wind farm capacity for offshore wind, 2000-2021



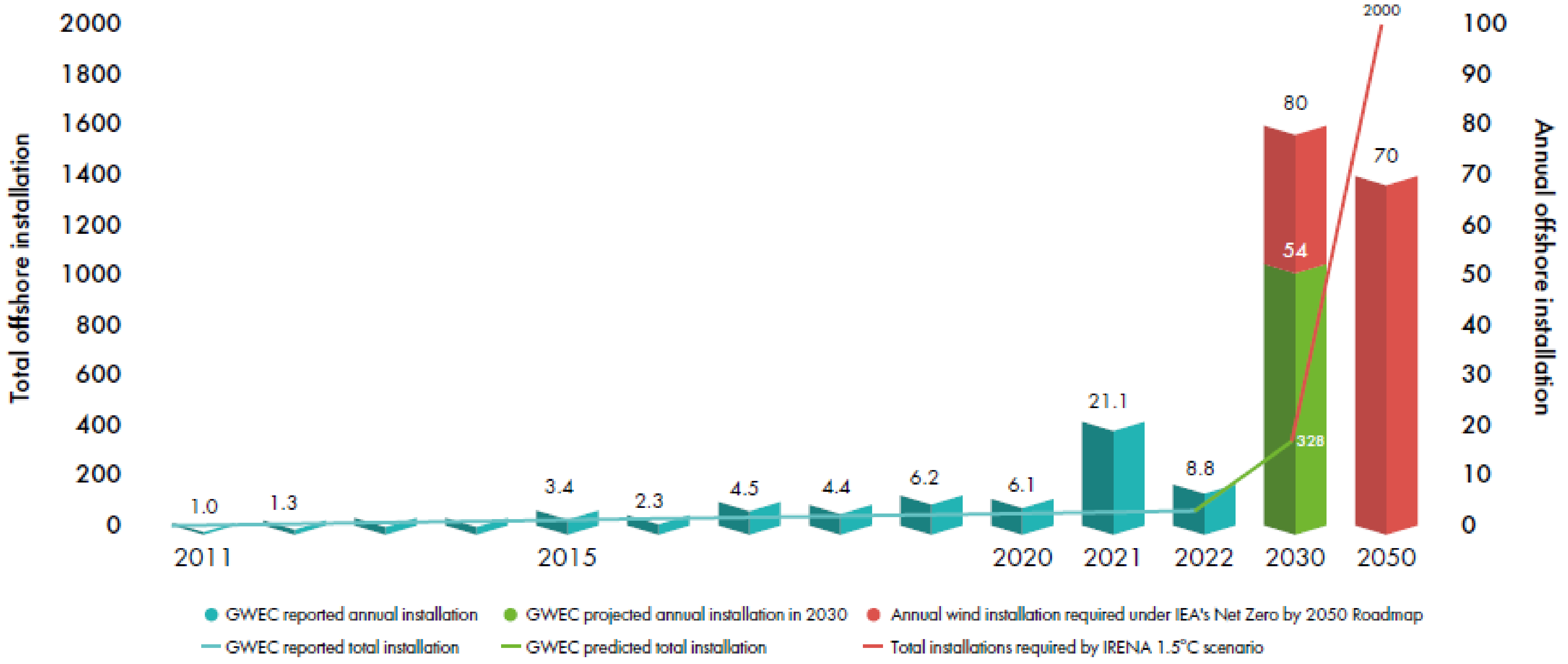
Source: IRENA Renewable Cost Database.

Figure 4.13 Offshore wind project and global weighted average LCOEs and auction/PPA prices, 2000-2024

Source: IRENA Renewable Cost Database.

Off Shore Wind

Closing the offshore wind gap by 2050



Source: GWEC Market Intelligence, IEA Net Zero by 2050 Roadmap (May 2021), IRENA WETO 1.5C Pathway (June 2021)

Off Shore Wind- Potential bottleneck

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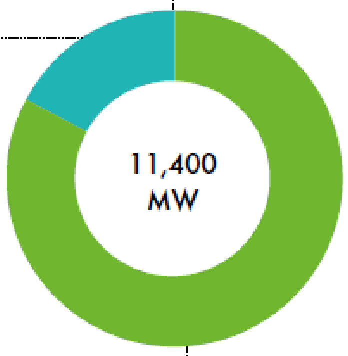
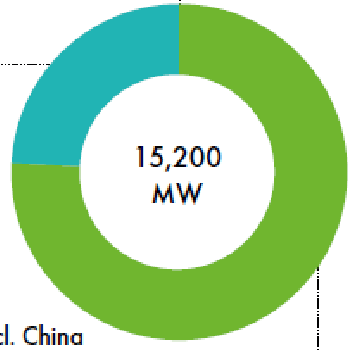
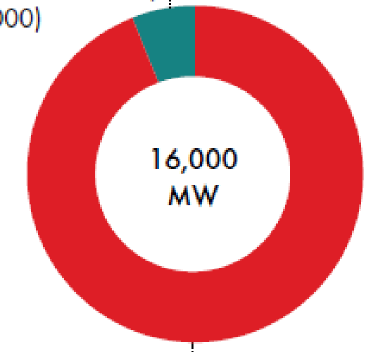
Offshore wind demand and supply benchmark, 2023–2030 (MW)







Source: GWEC Market Intelligence, February 2023

	Demand vs supply analysis 2023-2030 (MW)							
	2023e	2024e	2025e	2026e	2027e	2028e	2029e	2030e
Europe	5148	2916	6527	9598	10808	16225	20465	26400
China	8000	12000	14000	15000	15000	15000	15000	15000
APAC excl. China	1769	1559	2884	2695	3256	5030	5535	6995
North America	533	955	2335	3535	4500	4500	4500	4500
LATAM	0	0	0	0	0	0	0	1350
Global	15450	17430	25746	30828	33564	40755	45500	54245

Source: GWEC Market Intelligence, July 2023

● Sufficient ● Potential bottleneck

Marine – Ocean Energy Potential

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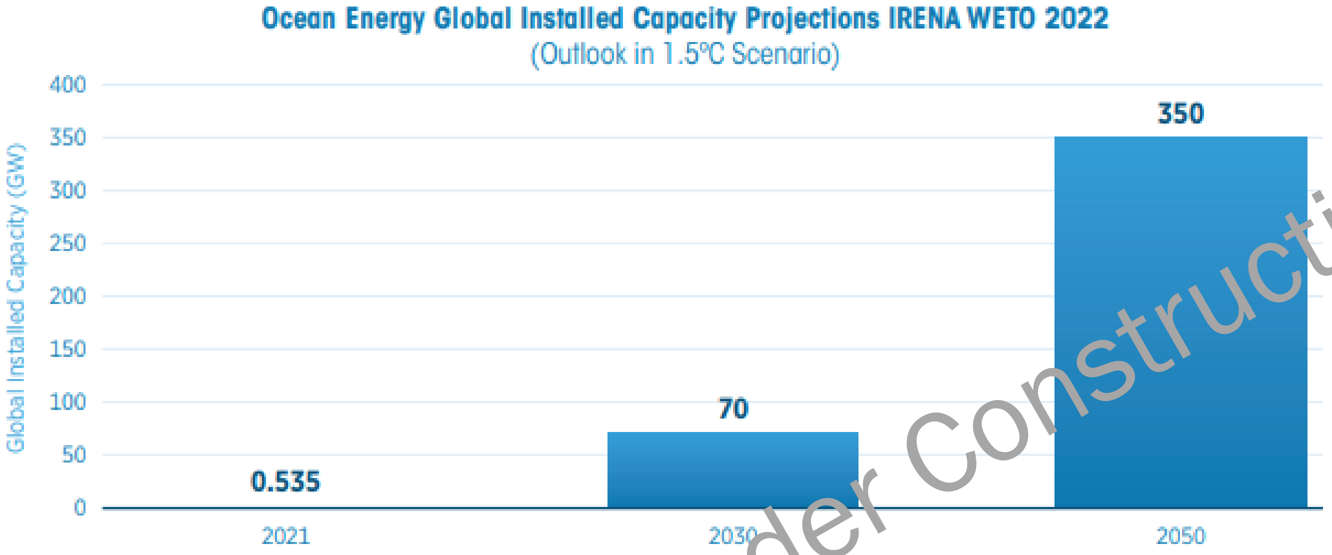
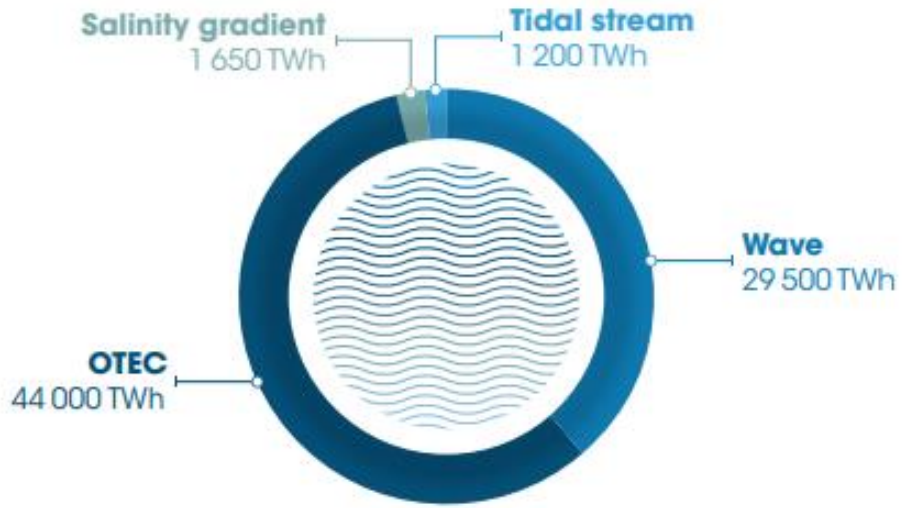
Figure 1 Global ocean energy capacity forecast, 2030 and 2050



Source: IRENA (2022).

Figure 2 Global ocean energy potential



Source: IRENA (2020a), based on Nihous, 2007; Mørk *et al.*, 2010; Skråmestø *et al.*, 2009; OES, 2017.

Marine

Figure 5 Global deployment examples and pilot projects

Notes: UK = United Kingdom; US = United States.

[1] This example was provided by the Representative from Spain to IRENA's Collaborative Framework on Ocean Energy and Offshore

Examples of grant funding programmes:

Regional

- Basque Country's Aid Programme for Investment in the Demonstration and Validation of Emerging Marine Renewable Energy Technologies

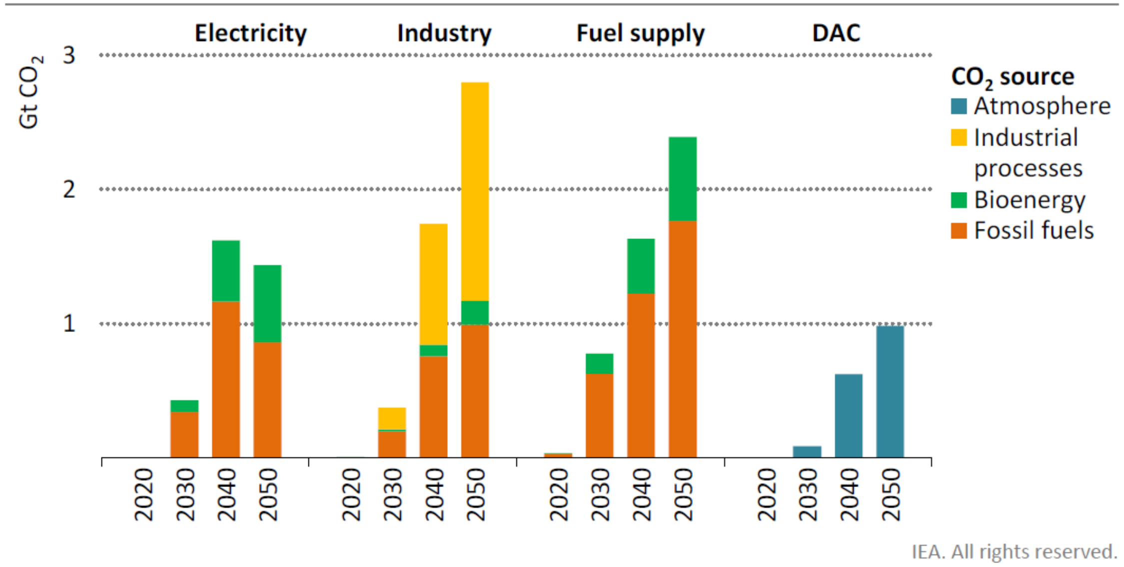
National

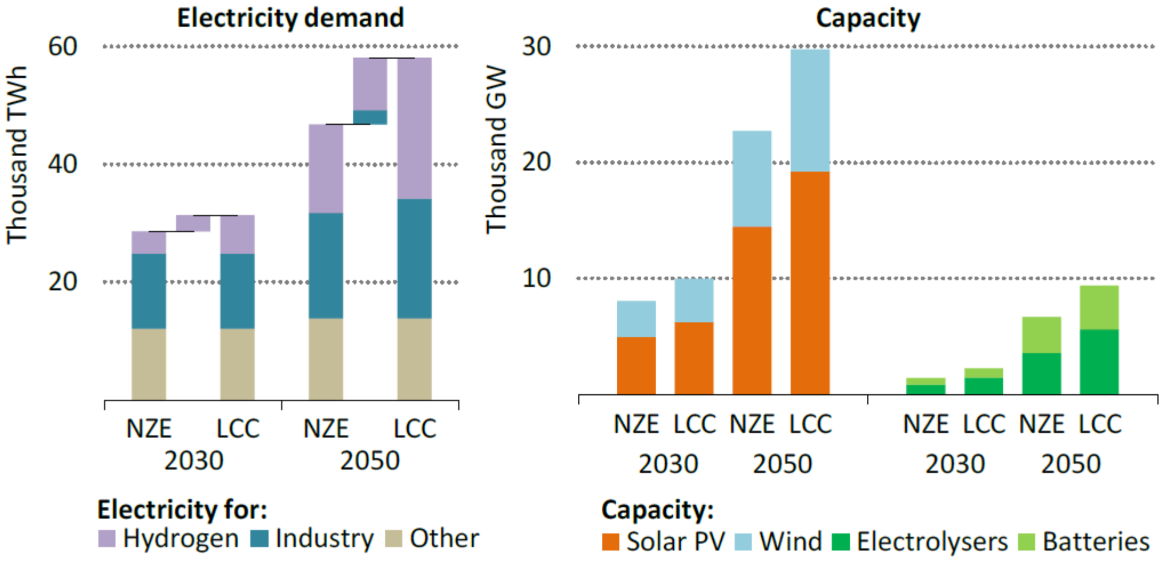
- Swedish Ocean Energy Fund
- France's Investissements d'avenir
- US Department of Energy funding for ocean energy
- Spanish Technological Development Aid Programme for investment in offshore renewable pilot projects and test platforms

Global

- European Union's R&I Programme - Horizon Europe
- US Department of Energy grant scheme for hydrokinetic energy

CCUS in NZE: a keystone



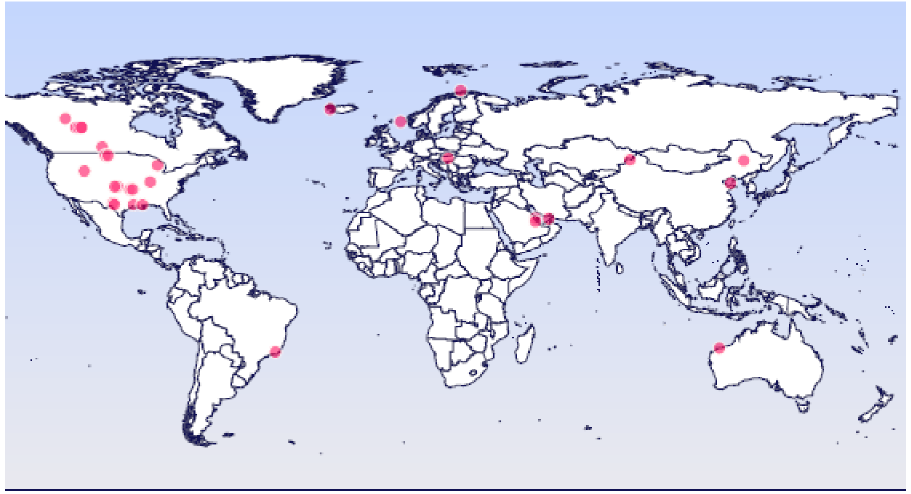


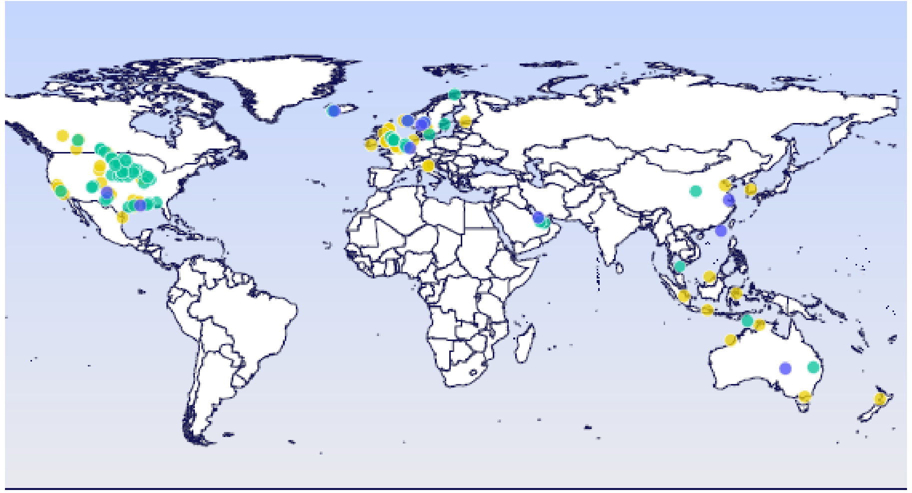
CC(U)S – Carbon Capture (Utilization) and Storage
Goal of CCUS: 7,6 Gt per year CO2 captured in 2050 (20% of 2019 CO2 emissions)

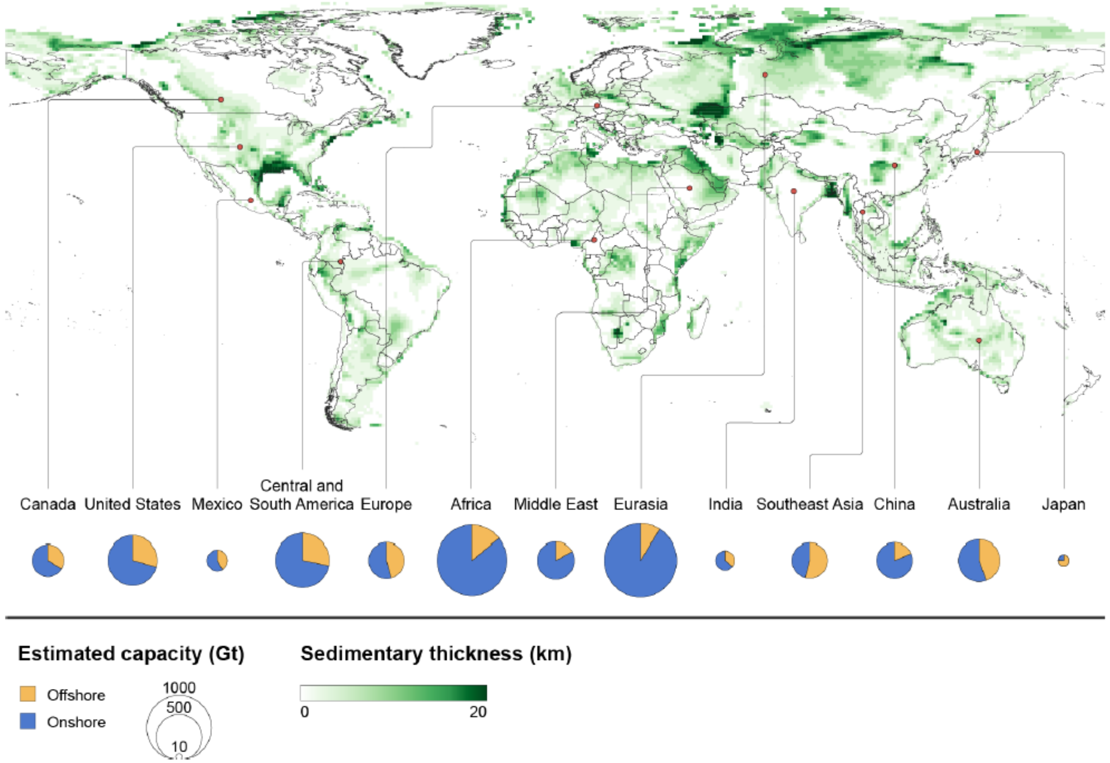
When examining Low CCUS case (LCC): 150 Mt/year CO2 captured from fossil fuel sources in 2050, compared to scenario goal 3,6 Gt/year captured from fossil fuels
Failure to meet this goal, results in relying on prototype industries

- Increased electricity demand by 9 000 TWh from NZE in 2050
- Increased capacity of electrolysers, 2 000 GW or 60 % increase from NZE in 2050

CCUS: Present Situation

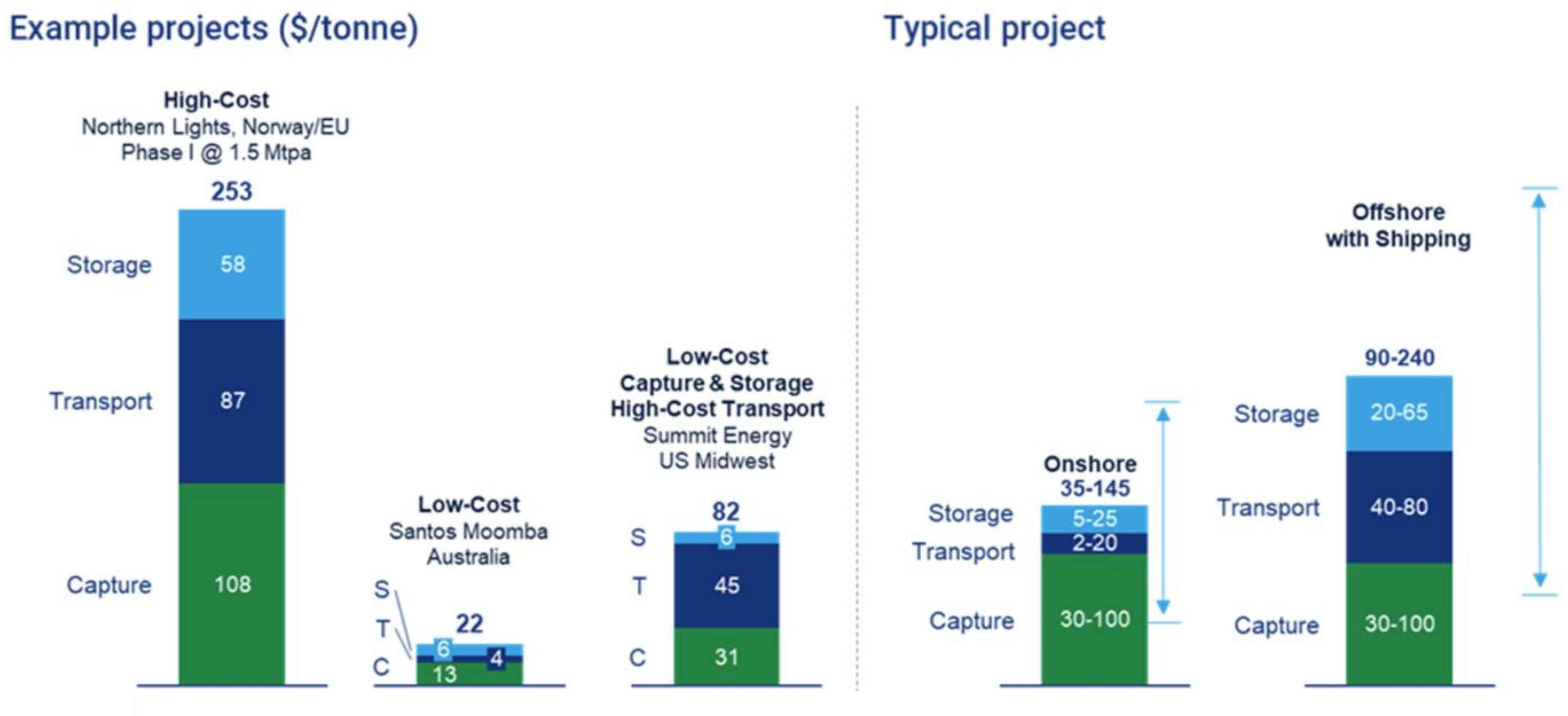






- Current capture rate and capacity: 30 projects, 43 Mt per year
- In development: 164 projects, 244 Mt per year (incl. current)
- Overall technical storage capacity: 8 000 Gt to 55 000 Gt
- Onshore: 6 000 Gt to 42 000 Gt
- Offshore: 2 000 Gt to 13 000 Gt

CCUS: cost distribution



Source: Wood Mackenzie Lens CCUS Valuations

Strong cost discrepancy between projects and technologies – capture typically most costly

CCUS – capture vs transport

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Figure 3.4 Levelised cost of CO_2 capture by sector and initial CO_2 concentration, 2019

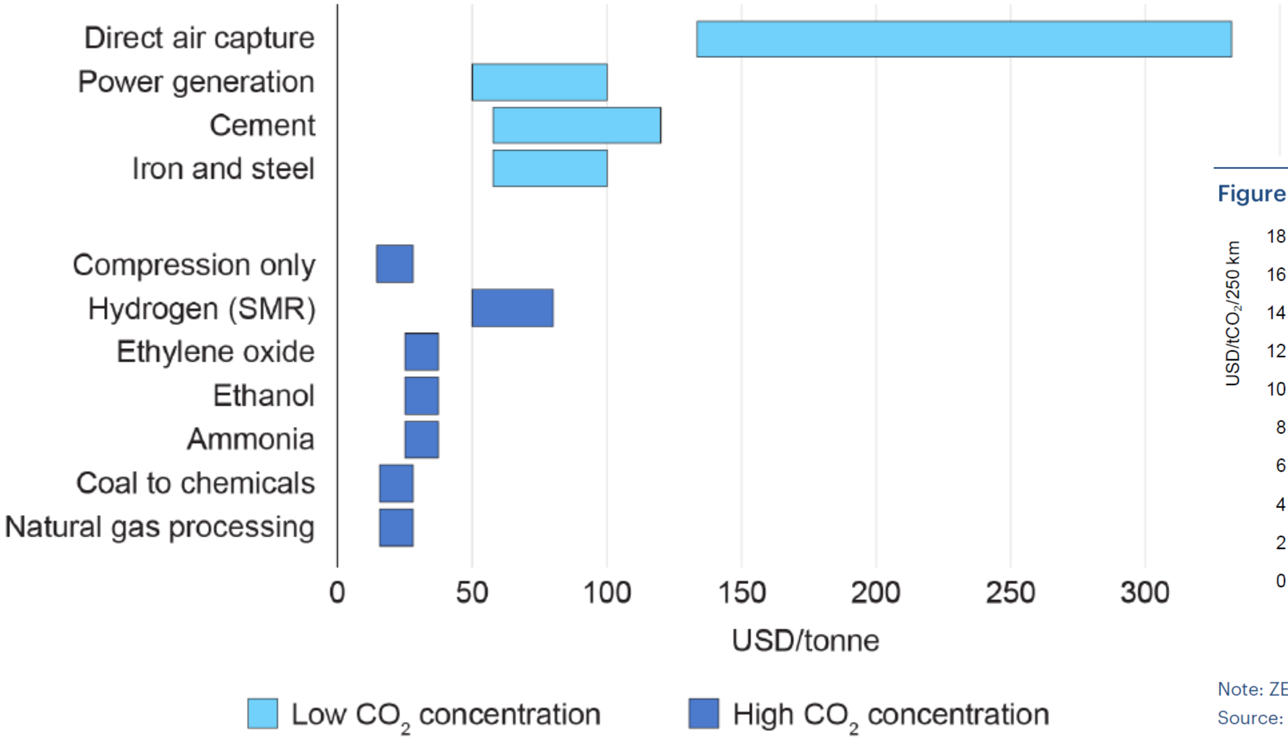
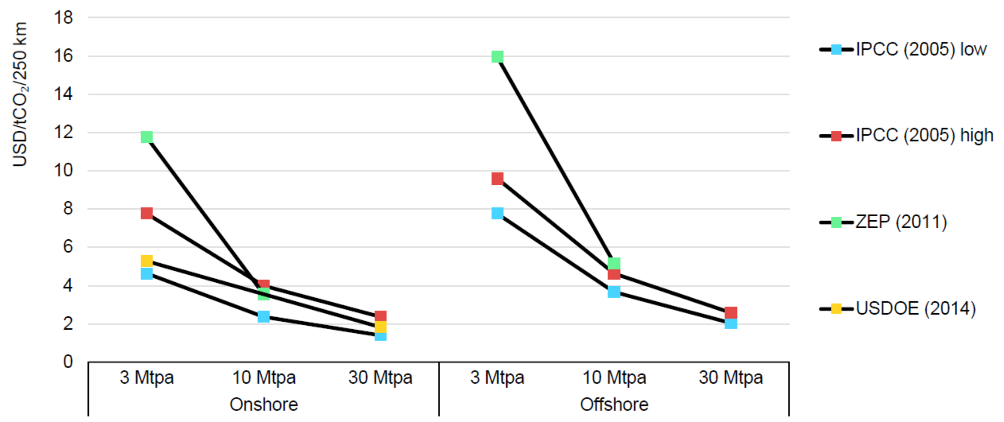


Figure 3.6 Indicative unit CO_2 pipeline transport costs

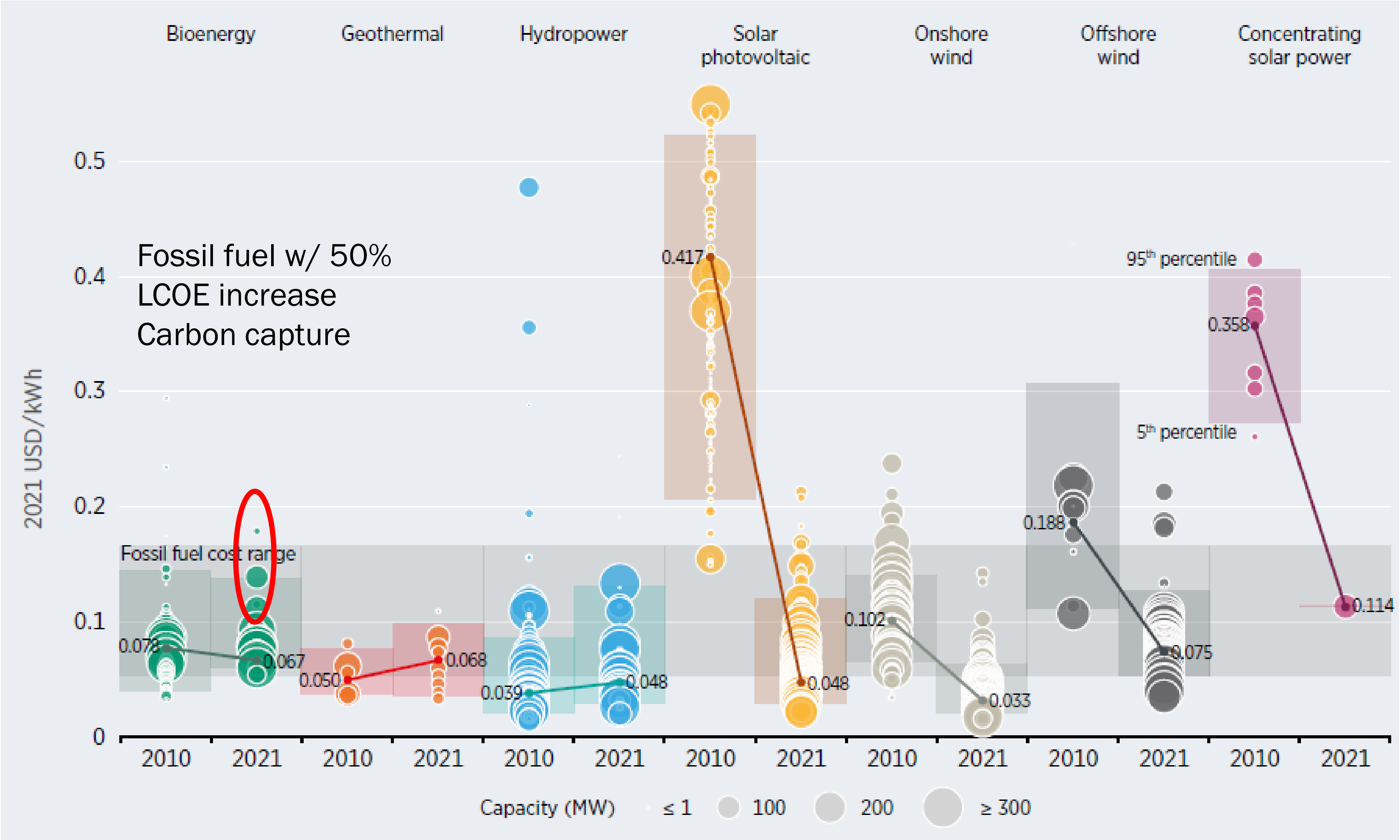


Note: ZEP = Zero Emissions Platform; USDOE = United States Department of Energy.
Source: Based on Rubin, E. S., Davison, J. E. and Herzog, H. J (2015), The cost of CO_2 capture and storage.

IEA, 2020

Renewables Competitiveness

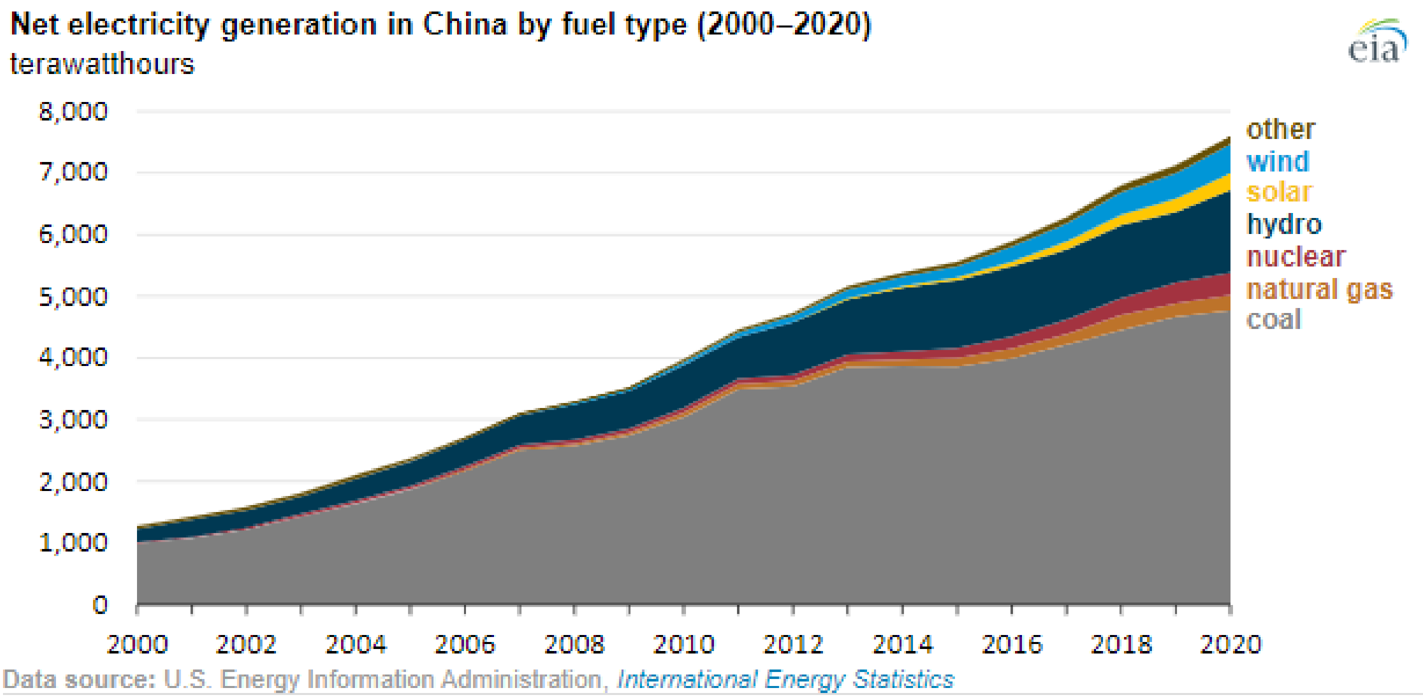
Figure 1.2 Global weighted average LCOEs from newly commissioned, utility-scale renewable power generation technologies, 2010-2021

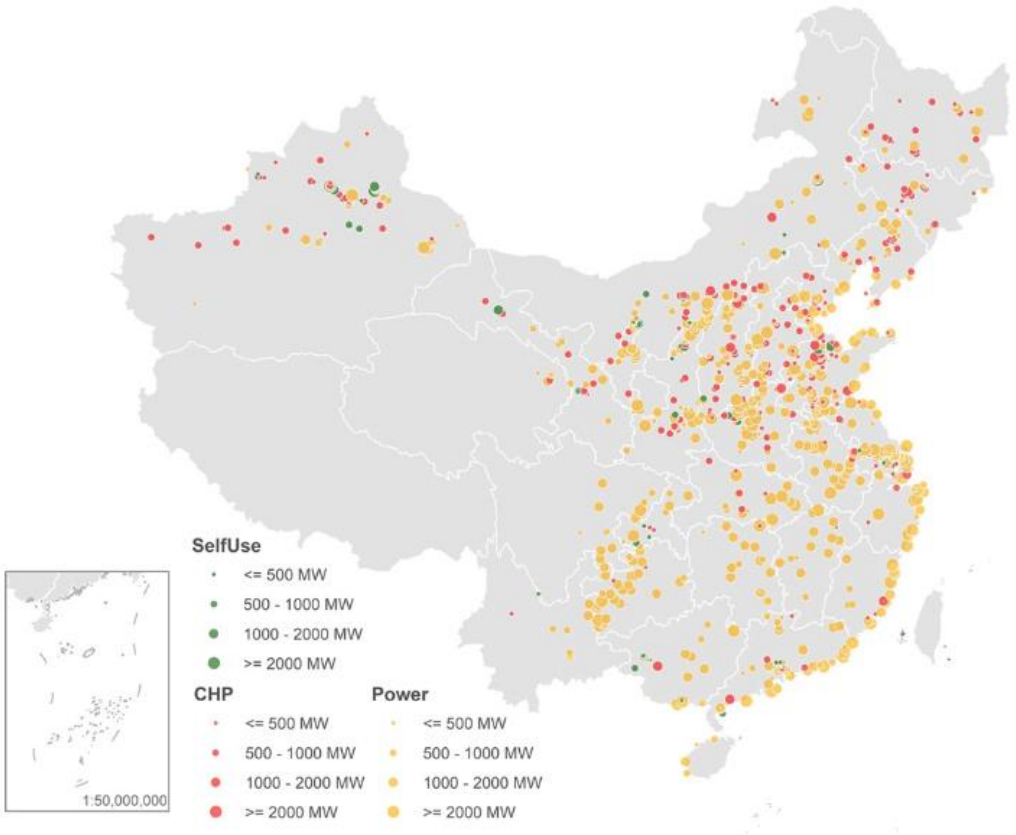


	Levelised cost of electricity (2021 USD/kWh)			ratio with Fossil	
	2010	2021	Percent change	2021	
Bioenergy	0,078	0,067	-14%	0%	-33%
Geothermal	0,05	0,068	34%	1%	-32%
Hydropower	0,039	0,048	24%	-28%	-52%
Solar PV	0,417	0,048	-88%	-28%	-52%
CSP	0,358	0,114	-68%	70%	13%
Onshore wind	0,102	0,033	-68%	-51%	-67%
Offshore wind	0,188	0,075	-60%	12%	-25%
fossil fuel	0,078	0,067	-14%		
fossil w CCS		0,1005			

Integrating CCUS cost in fossil fuel will increase LCOE by 50%, making renewable invesment attractive

Case Study : China





- In 2022, China approved a record breaking 106 GW new coal-fired power capacityhas accepted
- In first half of 2023, authorities granted for 52 GW new coal power
- There are 1,037 existing coal-fired plants in Chin

China 2023 Government Goals :

- Achieve its goal to reach peak carbon emissions by 2030 after which its target is to have carbon emissions decline
- Become carbon neutral by 2060
- Reach a 39% non-fossil fuel share for electricity generation by 2025

Case Study : CO2 EOR in US 2020

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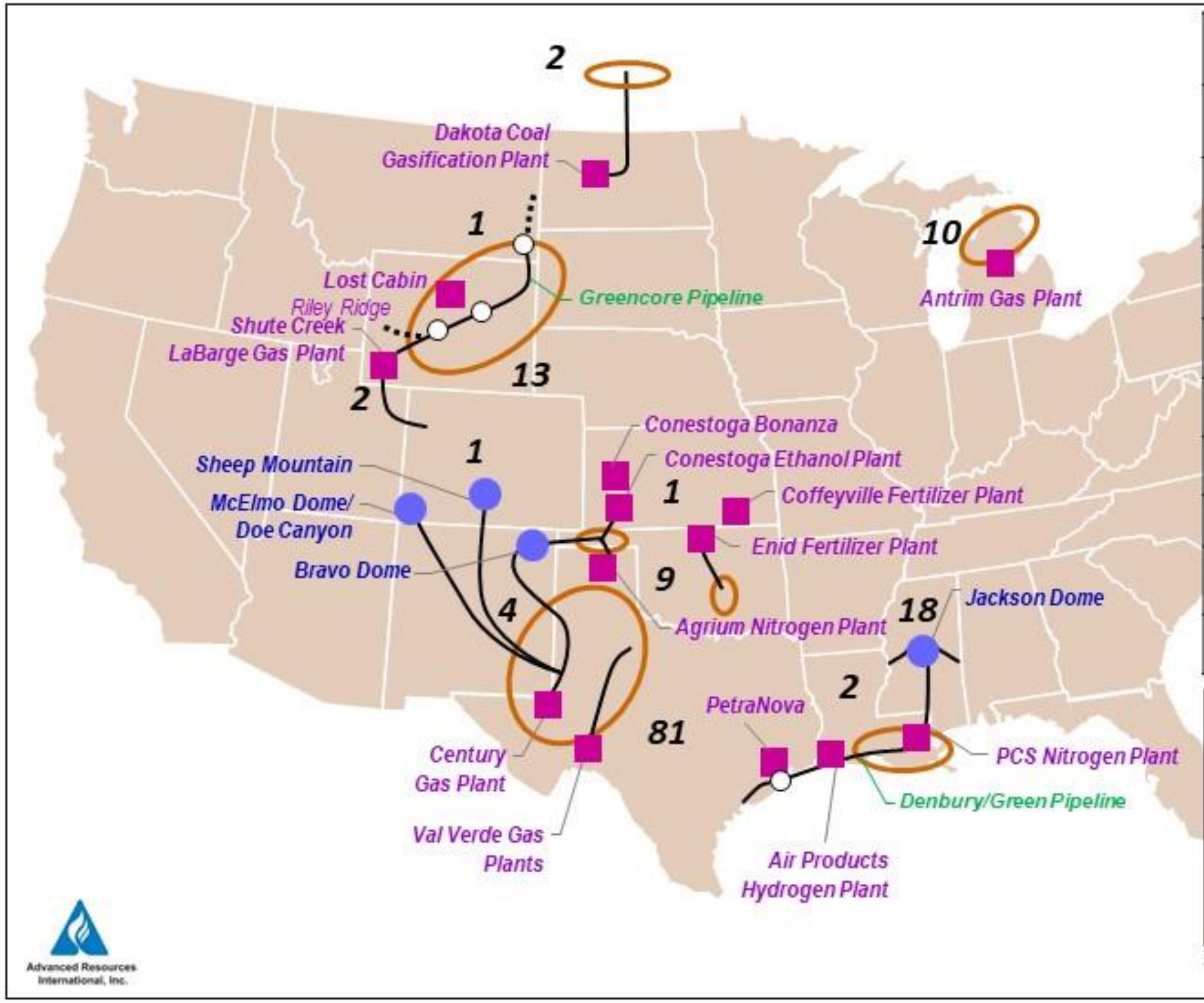

Oil Production (EOY 2020)	
CO_2-EOR Projects	142
Oil Production (MBbl/d)	273
CO_2 Supplies (EOY 2020)	
Number of Sources	18
• *Natural*	5
• *Industrial*	13
CO_2 Supply (Bcf/d)	1.6
• *Natural*	1.3
• *Industrial*	0.3

142 *No. of U.S. CO_2-EOR Projects*
Natural CO_2 Source
Industrial CO_2 Source
CO_2 Pipeline
CO_2 Proposed Pipeline

Source: Advanced Resources International, Inc, 2021

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In face of climate change, CO_2 emissions have to be reduced

Technical solutions are available now

Climate change is a human issue… in the hands of a few decision makers

Renewable are already competitive with Fossil fuel

NZE scenario create investment opportunities for the coming decades worldwide

Thank you for your attention

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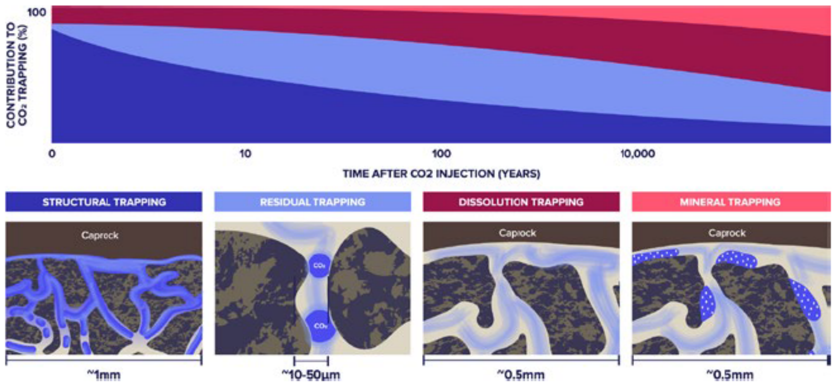
Appendix – geological trapping

APPENDICES

6.1 CO_2 GEOLOGICAL STORAGE

SUMMARY OF STORAGE MECHANISMS AND SECURITY

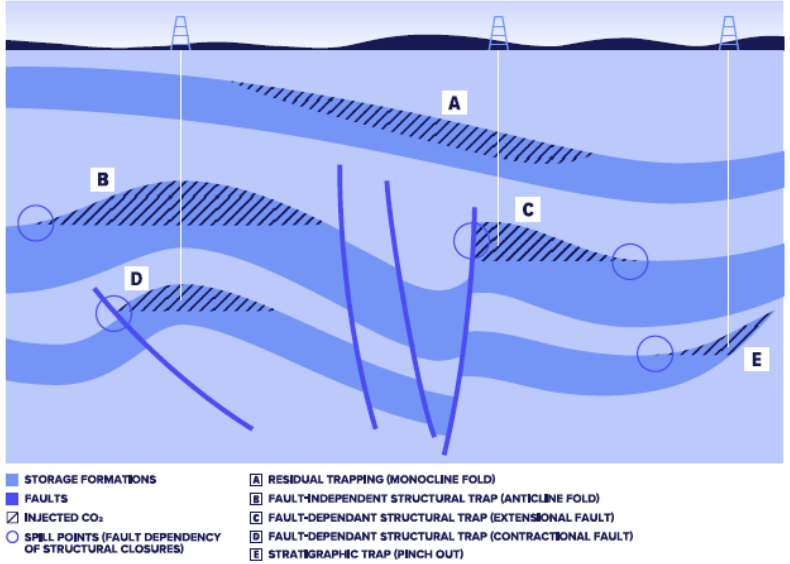
Four mechanisms exist for trapping CO_2 in the subsurface. These mechanisms occur simultaneously upon injection but occur at different rates (Appendix figure 1). The relative contribution of each trapping mechanism – physical, residual, dissolution, mineralisation – changes with time and with a CO_2 plume's evolution. In the initial decades of a standard storage operation, physical trapping of free-phase CO_2 is the primary trapping mechanism. Trapping of CO_2 is strongly dependent on a site's geology and local formation conditions (in-situ fluids, pressure, temperature). A portion of the CO_2 plume may always remain in its free phase, but physical trapping is permanent when the geologic setting is stable and the CO_2 plume is behaving in the reservoir as predicted.



APPENDIX FIGURE 1: (LOWER PANEL) THE FOUR TRAPPING MECHANISMS OPERATING IN THE SUBSURFACE TO PERMANENTLY STORE CO_2. (UPPER PANEL) RELATIVE CONTRIBUTION OF THE FOUR TRAPPING MECHANISMS TO PERMANENT CO_2 STORAGE THROUGH TIME. EACH MECHANISM OPERATES SIMULTANEOUSLY UPON CO_2 INJECTION, BUT THEY OCCUR AT DIFFERENT RATES. SOURCE: IPCC (2005)

PHYSICAL TRAPPING

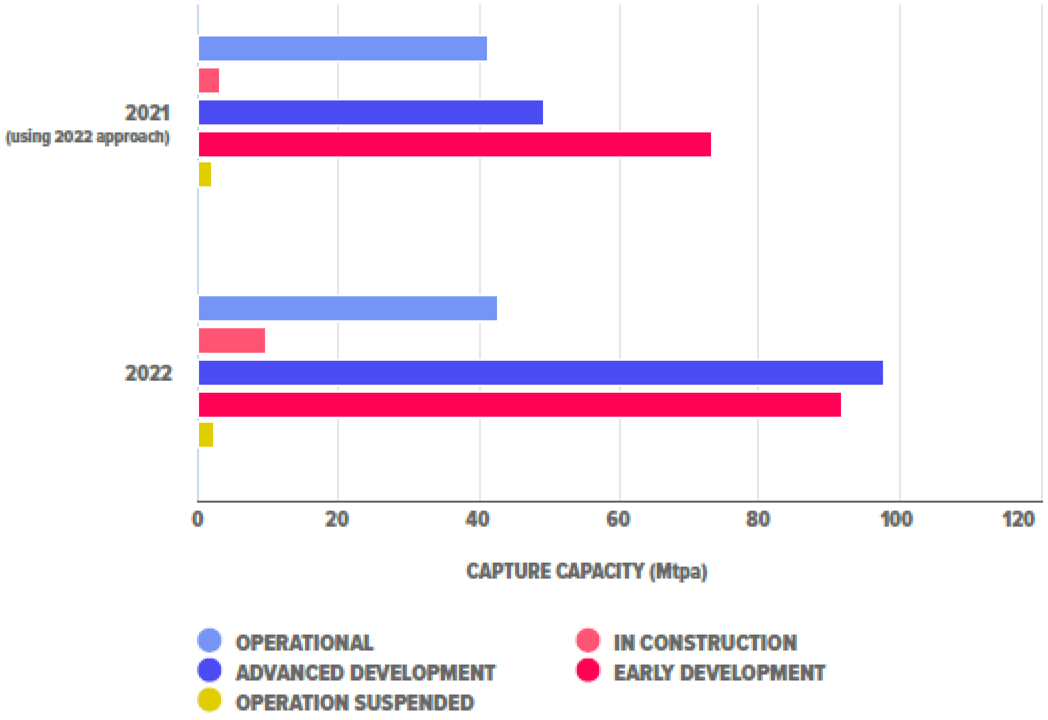
Physical trapping occurs when buoyant, free-phase CO_2 migrates into a body of rock that has been folded or faulted into a subsurface structure (or "trap"), which closes in three or four directions, and is contained below a low-permeability caprock (or "seal") (see Appendix figure 2). Physical trapping is the same mechanism that traps hydrocarbons in the subsurface. Appendix figure 2 illustrates types of physical traps, including independent folded rock bodies and fault-dependent folds (which rely on closure against a fault for CO_2 containment). In certain geological settings, physical trapping of CO_2 occurs when a reservoir thins laterally and ultimately pinches-out. This is called a stratigraphic trap and is shown at "E" in Appendix figure 2.



APPENDIX FIGURE 2: SCHEMATIC ILLUSTRATION OF PHYSICAL TRAPS IN THE SUBSURFACE. CIRCLES SHOW "SPILL POINTS" OR FAULT DEPENDENCY OF STRUCTURAL CLOSURES. (A) Residual trapping can be the dominant trapping mechanism in gently dipping (that is, relatively flat-lying) rock bodies that do not exhibit structural closure. (B) A fault-independent folded rock body (anticline) can trap buoyant CO_2 down to its "spill point", below which CO_2 will migrate out of the folded trap. (C) A fault-dependent (extensional fault) folded closure relies on the juxtaposition of sealing lithologies across the fault plane to prevent CO_2 migration out of the trap. (D) A fault-dependent (contractional fault) folded closure relies on the juxtaposition of sealing lithologies across the fault plane to prevent CO_2 migration out of the trap. (E) A stratigraphic trap relies on lateral changes in lithology (often lateral stratigraphic terminations or "pinch-outs") to prevent CO_2 migration out of the trap.

Global CCS Institute, 2023

Global capacity of CCS



As of September 2022, total capacity of CCS projects *IN DEVEOPMENT* was 244 Mtpa

	OPERATIONAL	IN CONSTRUCTION	ADVANCED DEVELOPMENT	EARLY DEVELOPMENT	OPERATION SUSPENDED	TOTAL
NUMBER OF FACILITIES	30	11	78	75	2	196
CAPTURE CAPACITY (Mtpa)	42.5	9.6	97.6	91.8	2.3	243.9

FIGURE 4: COMMERCIAL CCS FACILITIES BY NUMBER AND TOTAL CO_2 CAPTURE CAPACITY (MID-SEPTEMBER 2022)

Global CCS Institute, 2023

CO2 Retained by EOR