# Can We Go To 1.5°C Pathways Globally

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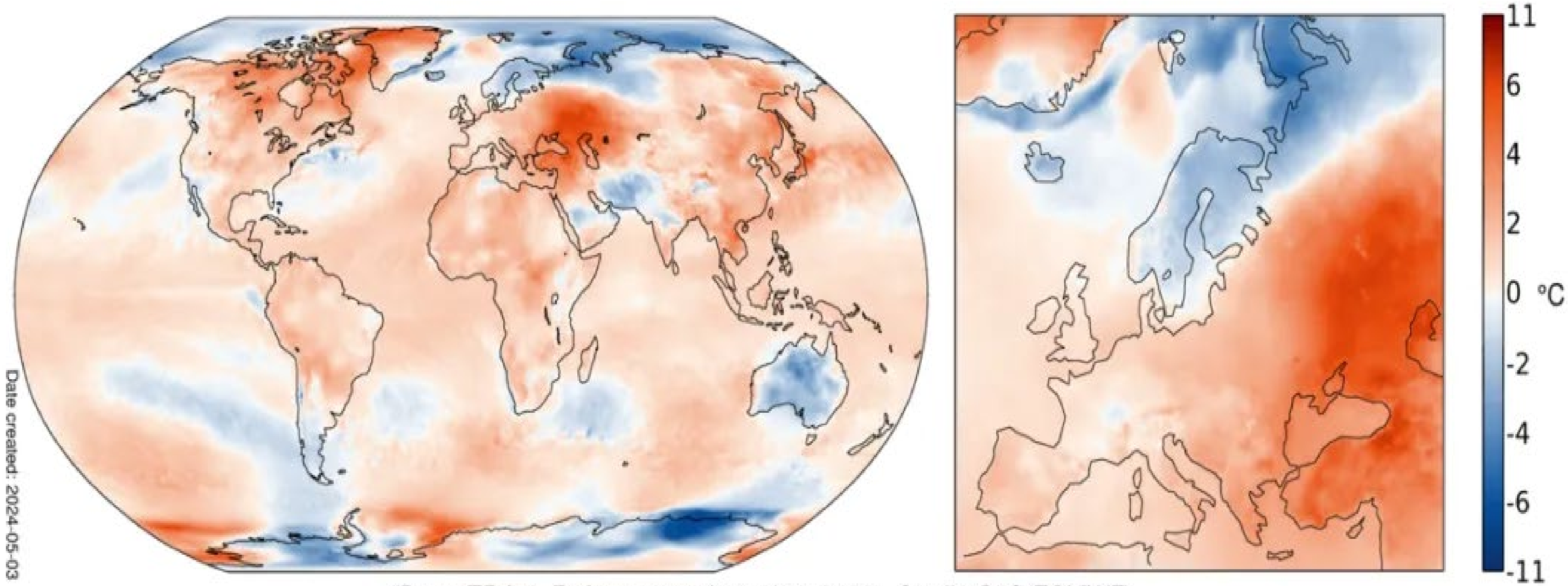
By September 2023, high temperature days(Above 35°C) is 29.7, with 21.1 days more than normal year; From 1981 to 2022 there is 2.4day increased per decade

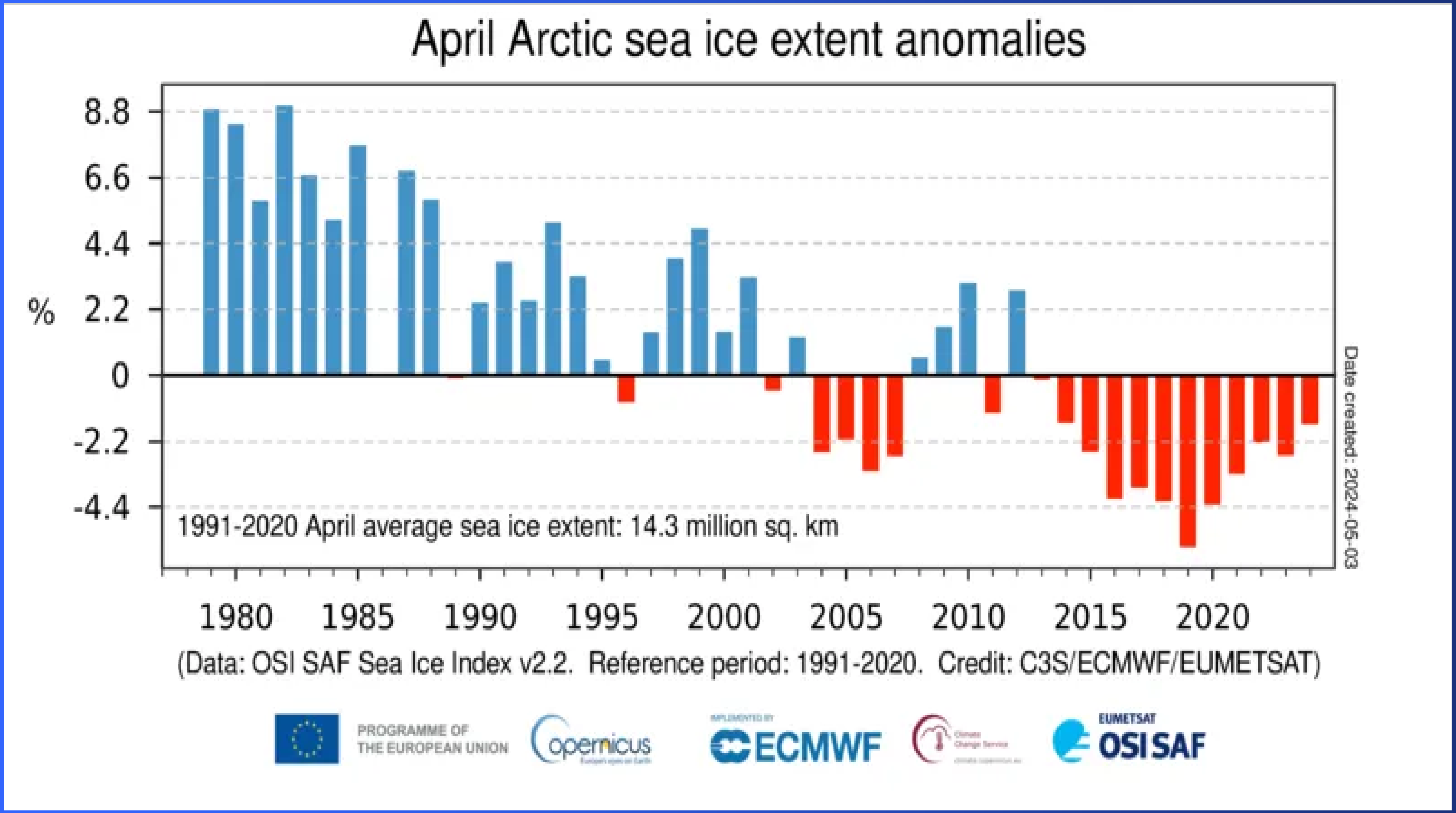
There are more than 40 people dead during high temperature days in May 2024 in Mexico

## Surface air temperature anomaly for April 2024




(Data: ERA5. Reference period: 1991-2020. Credit: C3S/ECMWF)

PROGRAMME OF THE EUROPEAN UNION
Copernicus Europe's eyes on Earth
IMPLEMENTED BY ECMWF
Climate Change Service



April Arctic sea ice extent anomalies
8.8
6.6
4.4
%
2.2
0
-2.2
-4.4
1991-2020 April average sea ice extent: 14.3 million sq. km
Date created: 2024-05-03
1980
1985
1990
1995
2000
2005
2010
2015
2020
(Data: OSI SAF Sea Ice Index v2.2. Reference period: 1991-2020. Credit: C3S/ECMWF/EUMETSAT)
PROGRAMME OF THE EUROPEAN UNION
Copernicus
ECMWF
EUMETSAT
OSI SAF

# WMO: Climate indicators made record in 2023

- State of Global Climate report confirms 2023 as hottest year on record by clear margin, with 1.45 higher than 1850
- Records broken for ocean heat, sea level rise, Antarctic sea ice loss and glacier retreat
- Extreme weather undermines socio-economic development
- Renewable energy transition provides hope
- Cost of climate inaction is higher than cost of climate action

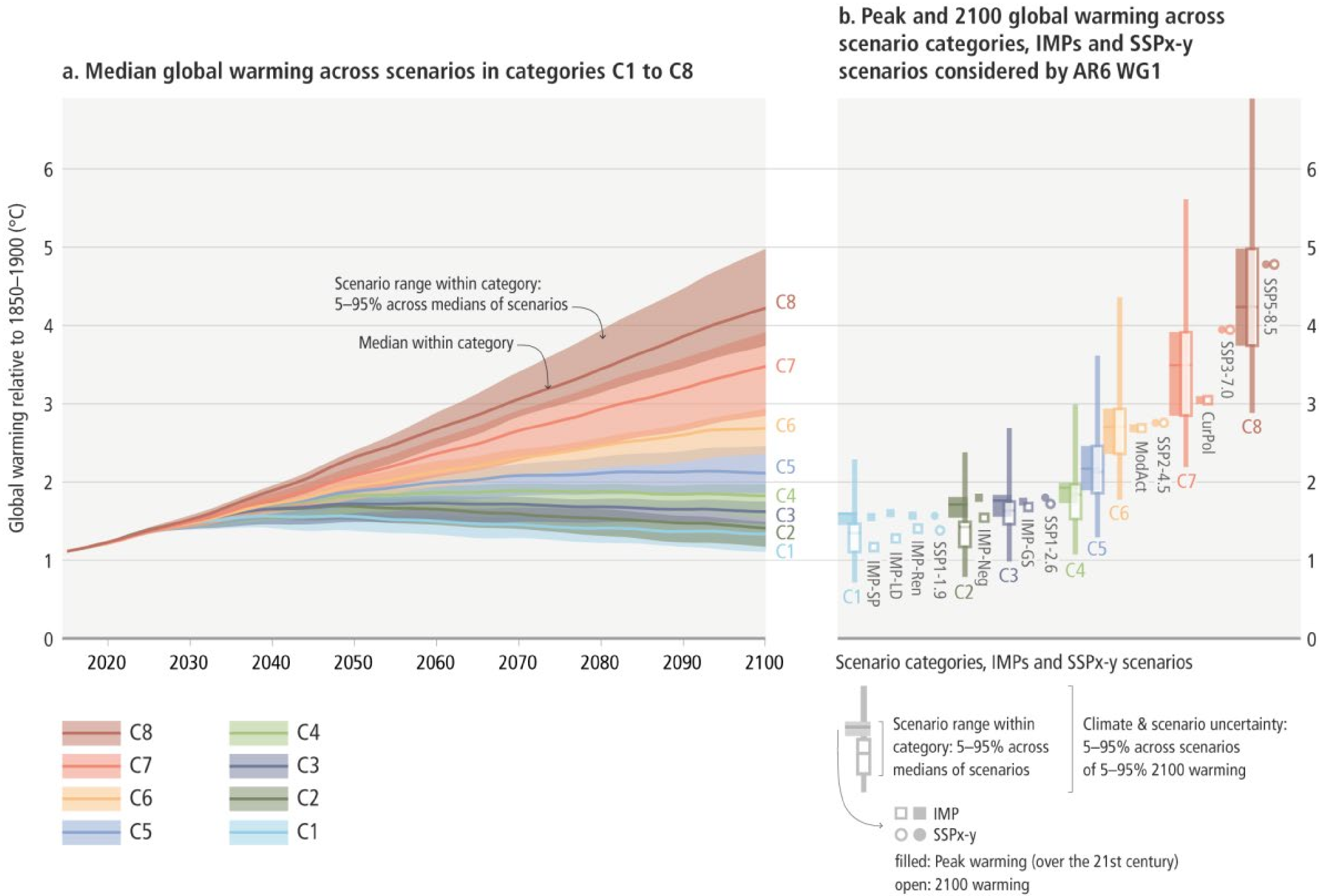
# The Copernicus Climate Change Service (C3S)

In the past 12 months（May 2023 to April 2024）average temperature is highest , is 0.73℃ higher than average of 1991 to 2020, is 1.61℃ higher than 1850。

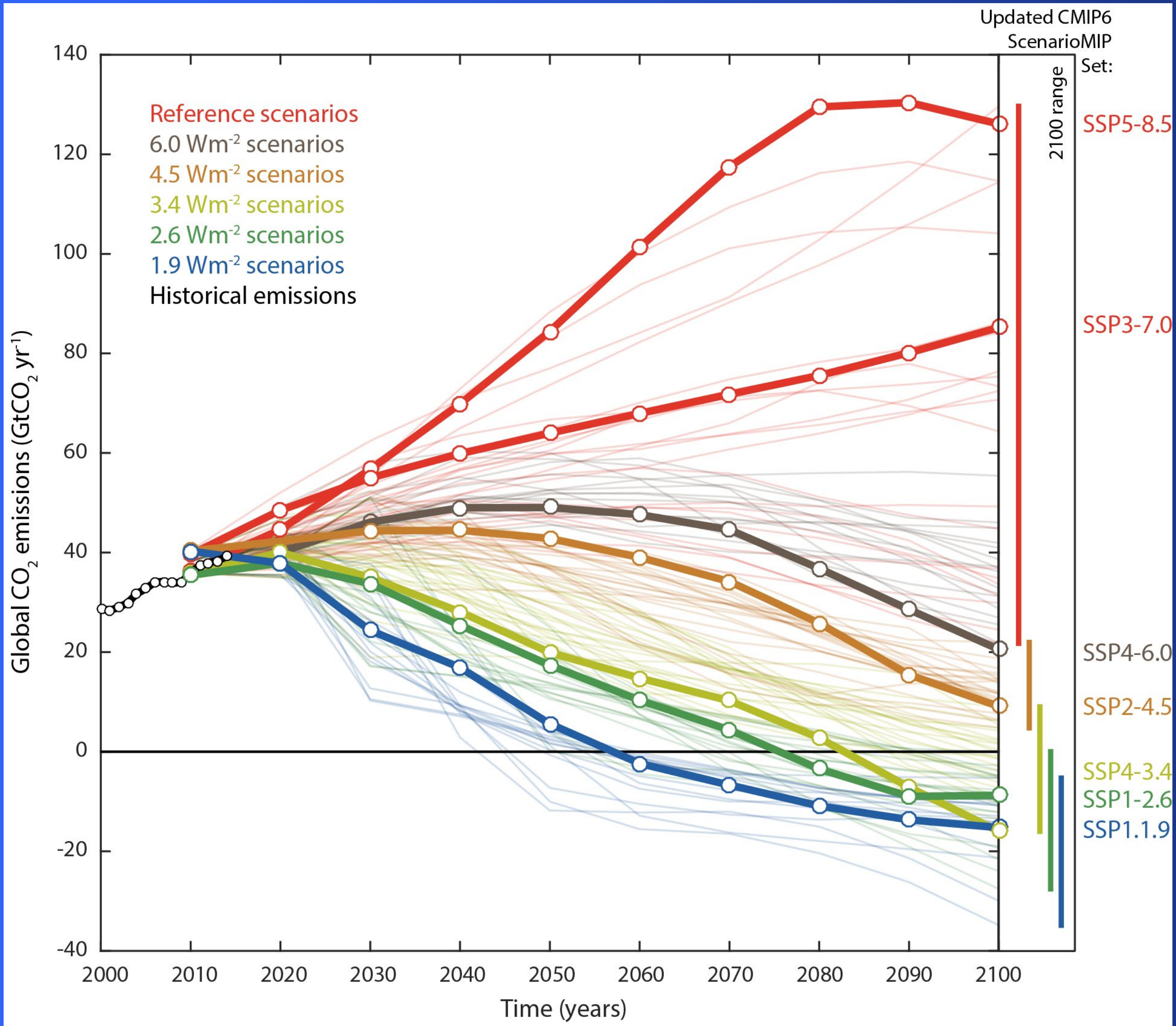
April 2024 is hottest month on record

June 2023 to May 2024, 1.63 ℃ higher

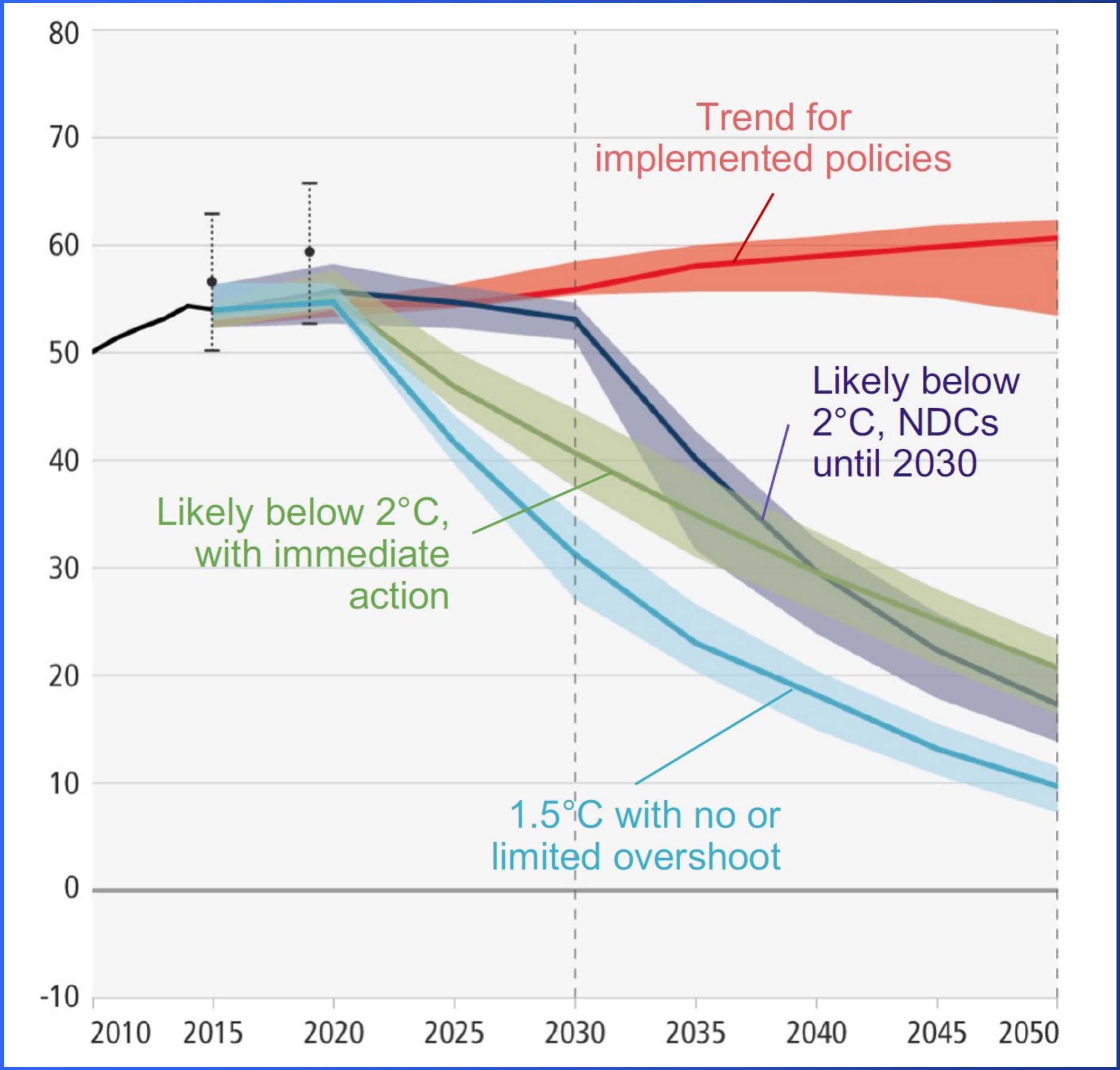
# The range of assessed scenarios results in a range of 21st century projected global warming.



# Global CO2 Emissions, IPCC 1.5C Report

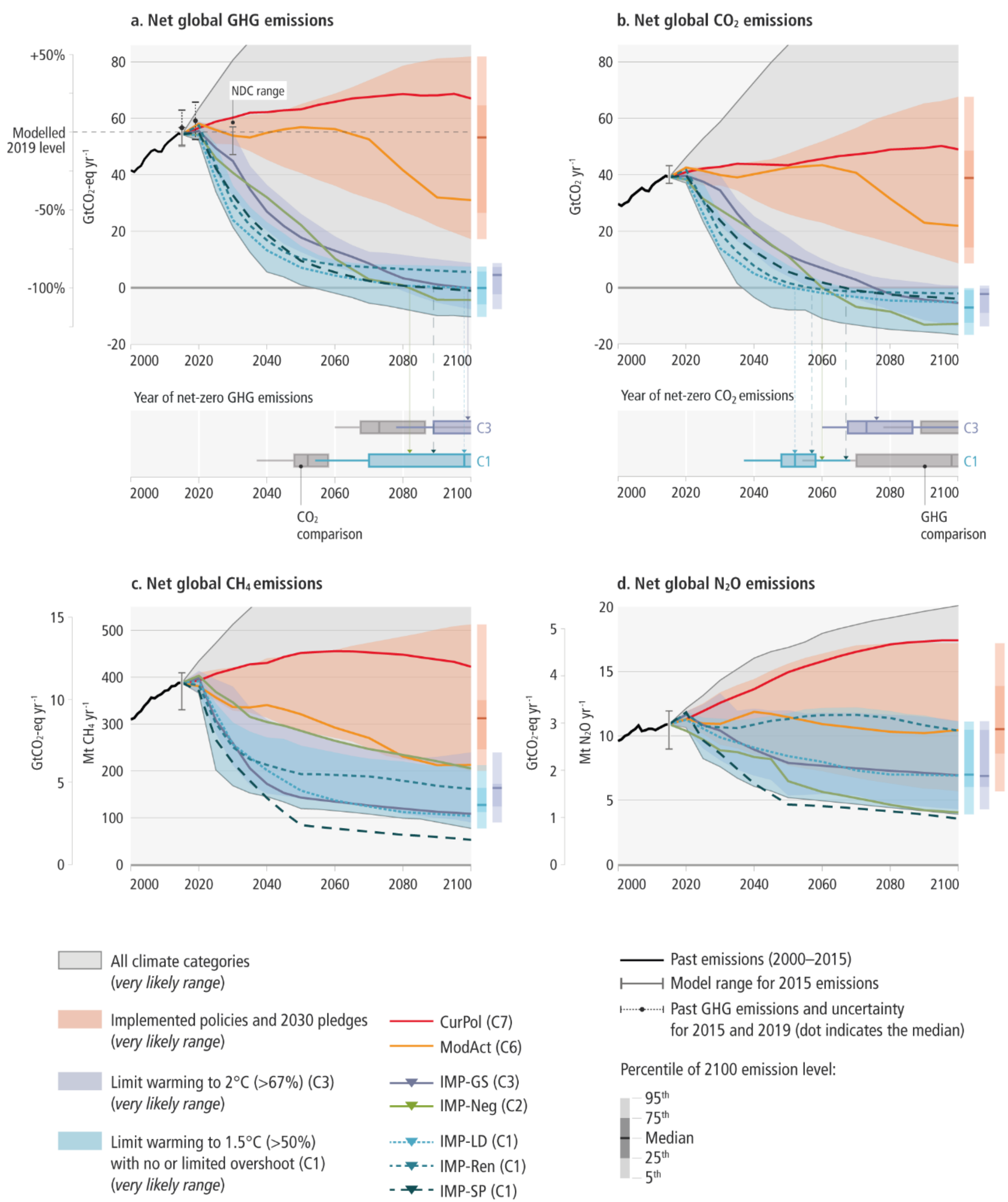


# Long-term Emission Transition Scenarios



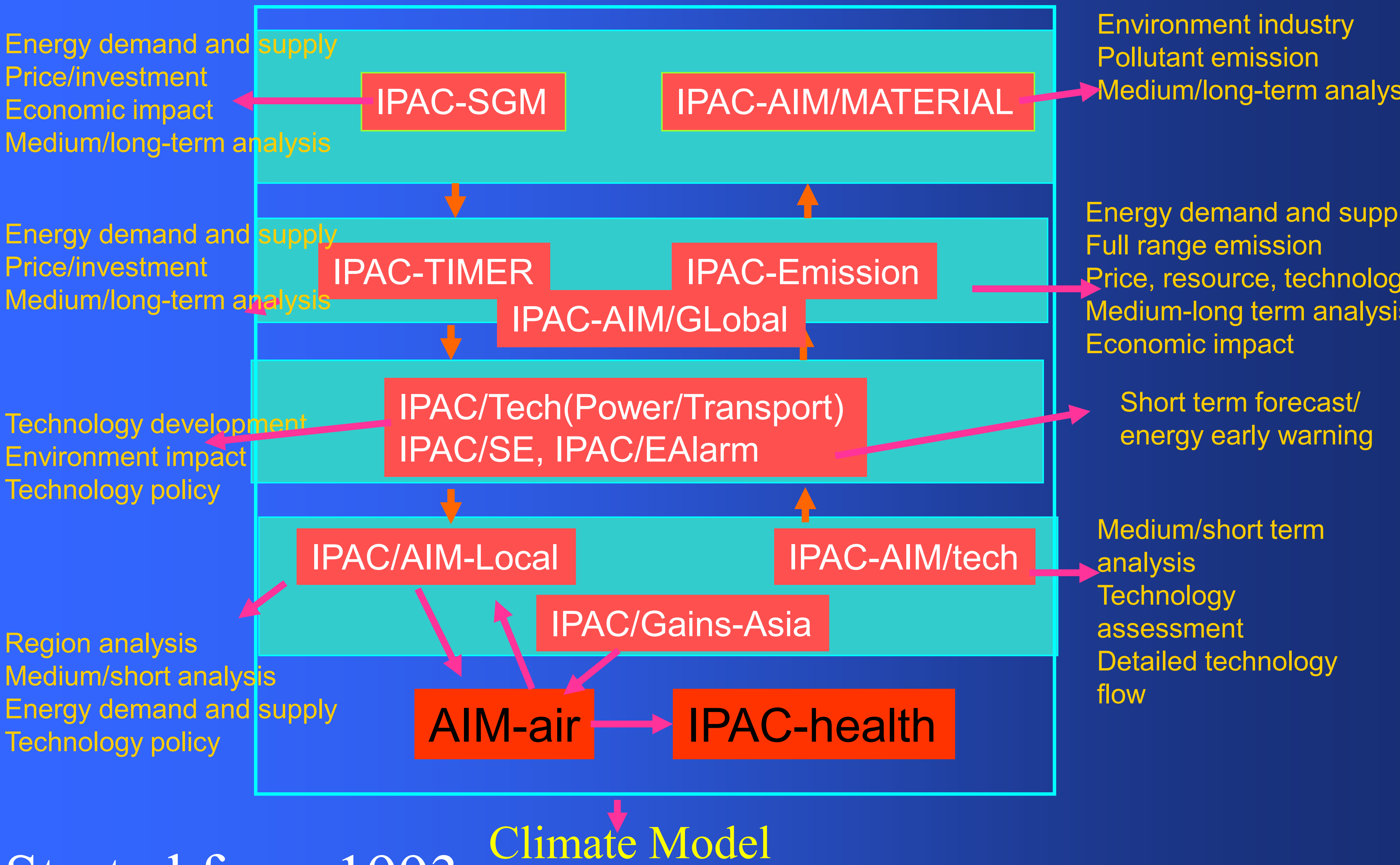
# Scenarios from IPCC AR6

| p50 [p5-p95] [1] | | | GHG emissions Gt $CO_2$-eq/yr [7] | | | GHG emissions reductions from 2019 % [8] | | | Emissions milestones [9,10] | | | | Cumulative $CO_2$ emissions Gt $CO_2$ [13] | | Cumulative net-negative $CO_2$ emissions Gt $CO_2$ | Global mean temperature change 50% probability [14] °C | | Likelihood of peak global warming staying below (%) [15] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category [2,3,4] [# pathways] | Category / subset label | WG I SSP & WG III IPs/IMPs alignment [5,6] | 2030 | 2040 | 2050 | 2030 | 2040 | 2050 | Peak $CO_2$ emissions (% peak before 2100) | Peak GHG emissions (% peak before 2100) | Net-zero $CO_2$ (% net-zero pathways) | Net-zero GHGs [11,12] (% net-zero pathways) | 2020 to net-zero $CO_2$ | 2020-2100 | Year of net-zero $CO_2$ to 2100 | at peak warming | 2100 | <1.5°C | <2.0°C | <3.0°C |
| *Modelled global emissions pathways categorised by projected global warming levels (GWL). Detailed likelihood definitions are provided in SPM Box1. The five illustrative scenarios (SSPx-y) considered by AR6 WGI and the Illustrative (Mitigation) Pathways assessed in WGIII are aligned with the temperature categories and are indicated in a separate column. Global emission pathways contain regionally differentiated information. This assessment focuses on their global characteristics.* | | | *Projected median annual GHG emissions in the year across the scenarios, with the 5th-95th percentile in brackets. Modelled GHG emissions in 2019: 55 [53-58] Gt $CO_2$-eq* | | | *Projected median GHG emissions reductions of pathways in the year across the scenarios compared to modelled 2019, with the 5th-95th percentile in brackets. Negative numbers indicate increase in emissions compared to 2019* | | | *Median 5-year intervals at which projected $CO_2$ & GHG emissions peak, with the 5th-95th percentile interval in square brackets. Percentage of peaking pathways is denoted in round brackets. Three dots (…) denotes emissions peak in 2100 or beyond for that percentile.* | | *Median 5-year intervals at which projected $CO_2$ & GHG emissions of pathways in this category reach net-zero, with the 5th-95th percentile interval in square brackets. Percentage of net zero pathways is denoted in round brackets. Three dots (…) denotes net zero not reached for that percentile.* | | *Median cumulative net $CO_2$ emissions across the projected scenarios in this category until reaching net-zero or until 2100, with the 5th-95th percentile interval in square brackets.* | | *Median cumulative net-negative $CO_2$ emissions between the year of net-zero $CO_2$ and 2100. More net-negative results in greater temperature declines after peak* | *Projected temperature change of pathways in this category (50% probability across the range of climate uncertainties), relative to 1850-1900, at peak warming and in 2100, for the median value across the scenarios and the 5th-95th percentile interval in square brackets.* | | *Median likelihood that the projected pathways in this category stay below a given global warming level, with the 5th-95th percentile interval in square brackets.* | | |
| C1 [97] | limit warming to 1.5°C (>50%) with no or limited overshoot | | 31 [21-36] | 17 [6-23] | 9 [1-15] | 43 [34-60] | 69 [58-90] | 84 [73-98] | 2020-2025 (100%) [2020-2025] | | | 2095-2100 (52%) [2050-…] | 510 [330-710] | 320 [-210-570] | -220 [-660–-20] | 1.6 [1.4-1.6] | 1.3 [1.1-1.5] | 38 [33-58] | 90 [86-97] | 100 [99-100] |
| C1a [50] | … with net-zero GHGs | SSP1-1.9, SP LD | 33 [22-37] | 18 [6-24] | 8 [0-15] | 41 [31-59] | 66 [58-89] | 85 [72-100] | | | 2050-2055 (100%) [2035-2070] | 2070-2075 (100%) [2050-2090] | 550 [340-760] | 160 [-220-620] | -360 [-680–-140] | 1.6 [1.4-1.6] | 1.2 [1.1-1.4] | 38 [34-60] | 90 [85-98] | 100 [99-100] |
| C1b [47] | … without net-zero GHGs | Ren | 29 [21-36] | 16 [7-21] | 9 [4-13] | 48 [35-61] | 70 [62-87] | 84 [76-93] | | | | …-… [0%] […-…] | 460 [320-590] | 360 [10-540] | -60 [-440-0] | 1.6 [1.5-1.6] | 1.4 [1.3-1.5] | 37 [33-56] | 89 [87-96] | 100 [99-100] |
| C2 [133] | return warming to 1.5°C (>50%) after a high overshoot | Neg | 42 [31-55] | 25 [17-34] | 14 [5-21] | 23 [0-44] | 55 [40-71] | 75 [62-91] | 2020-2025 (100%) [2020-2030] | [2020-2025] | 2055-2060 (100%) [2045-2070] | 2070-2075 (87%) [2055-…] | 720 [530-930] | 400 [-90-620] | -360 [-680–-60] | 1.7 [1.5-1.8] | 1.4 [1.2-1.5] | 24 [15-42] | 82 [71-93] | 100 [99-100] |
| C3 [311] | limit warming to 2°C (>67%) | | 44 [32-55] | 29 [20-36] | 20 [13-26] | 21 [1-42] | 46 [34-63] | 64 [53-77] | 2020-2025 (100%) [2020-2030] | [2020-2025] | 2070-2075 (93%) [2055-…] | …-… (30%) [2075-…] | 890 [640-1160] | 800 [510-1140] | -40 [-290-0] | 1.7 [1.6-1.8] | 1.6 [1.5-1.8] | 20 [13-41] | 76 [68-91] | 99 [98-100] |
| C3a [204] | … with action starting in 2020 | SSP1-2.6 | 40 [30-49] | 29 [21-36] | 20 [14-27] | 27 [13-45] | 47 [35-63] | 63 [52-76] | 2020-2025 (100%) [2020-2025] | | 2070-2075 (91%) [2055-…] | …-… (24%) [2080-…] | 860 [640-1180] | 790 [480-1150] | -30 [-280-0] | 1.7 [1.6-1.8] | 1.6 [1.5-1.8] | 21 [14-42] | 78 [69-91] | 100 [98-100] |
| C3b [97] | … NDCs until 2030 | GS | 52 [47-56] | 29 [20-36] | 18 [10-25] | 5 [0-14] | 46 [34-63] | 68 [56-82] | 2020-2025 (100%) [2020-2030] | | 2065-2070 (97%) [2055-2090] | …-… (41%) [2075-…] | 910 [720-1150] | 800 [560-1050] | -60 [-300-0] | 1.8 [1.6-1.8] | 1.6 [1.5-1.7] | 17 [12-35] | 73 [67-87] | 99 [98-99] |
| C4 [159] | limit warming to 2°C (>50%) | | 50 [41-56] | 38 [28-44] | 28 [19-35] | 10 [0-27] | 31 [20-50] | 49 [35-65] | | | 2080-2085 (86%) [2065-…] | …-… (31%) [2075-…] | 1210 [970-1490] | 1160 [700-1490] | -30 [-390-0] | 1.9 [1.7-2.0] | 1.8 [1.5-2.0] | 11 [7-22] | 59 [50-77] | 98 [95-99] |
| C5 [212] | limit warming to 2.5°C (>50%) | | 52 [46-56] | 45 [37-53] | 39 [30-49] | 6 [-1-18] | 18 [4-33] | 29 [11-48] | | | …-… (41%) [2080-…] | …-… (12%) [2090-…] | 1780 [1400-2360] | 1780 [1260-2360] | 0 [-160-0] | 2.2 [1.9-2.5] | 2.1 [1.9-2.5] | 4 [0-10] | 37 [18-59] | 91 [83-98] |
| C6 [97] | limit warming to 3°C (>50%) | SSP2-4.5 Mod-Act | 54 [50-62] | 53 [48-61] | 52 [45-57] | 2 [-10-11] | 3 [-14-14] | 5 [-2-18] | 2030-2035 (96%) [2020-2090] | 2020-2025 (97%) | no net-zero | | no net-zero | 2790 [2440-3520] | no net-zero | temperature does not peak by 2100 | 2.7 [2.4-2.9] | 0 [0-0] | 8 [2-18] | 71 [53-88] |
| C7 [164] | limit warming to 4°C (>50%) | SSP3-7.0 Cur-Pol | 62 [53-69] | 67 [56-76] | 70 [58-83] | -11 [-18-3] | -19 [-31-1] | -24 [-41–-2] | 2085-2090 (57%) [2040-…] | 2090-2095 (56%) | | | | 4220 [3160-5000] | | | 3.5 [2.8-3.9] | 0 [0-0] | 0 [0-2] | 22 [7-60] |
| C8 [29] | exceed warming of 4°C (>=50%) | SSP5-8.5 | 71 [69-81] | 80 [78-96] | 88 [82-112] | -20 [-34–-17] | -35 [-65–-29] | -46 [-92–-36] | 2080-2085 (90%) [2070-…] | | | | | 5600 [4910-7450] | | | 4.2 [3.7-5.0] | 0 [0-0] | 0 [0-0] | 4 [0-11] |



a. Net global GHG emissions
+50%
Modelled 2019 level
-50%
-100%
GtCO2-eq yr-1
NDC range
Year of net-zero GHG emissions
C3
C1
CO2 comparison
b. Net global CO2 emissions
GtCO2 yr-1
Year of net-zero CO2 emissions
GHG comparison
c. Net global CH4 emissions
GtCO2-eq yr-1
Mt CH4 yr-1
d. Net global N2O emissions
GtCO2-eq yr-1
Mt N2O yr-1
All climate categories (very likely range)
Implemented policies and 2030 pledges (very likely range)
Limit warming to 2°C (>67%) (C3) (very likely range)
Limit warming to 1.5°C (>50%) with no or limited overshoot (C1) (very likely range)
CurPol (C7)
ModAct (C6)
IMP-GS (C3)
IMP-Neg (C2)
IMP-LD (C1)
IMP-Ren (C1)
IMP-SP (C1)
Past emissions (2000–2015)
Model range for 2015 emissions
Past GHG emissions and uncertainty for 2015 and 2019 (dot indicates the median)
Percentile of 2100 emission level:
95th
75th
Median
25th
5th

## *Framework of Integrated Policy Model for China (IPAC)*




Started from 1993

ERI, China

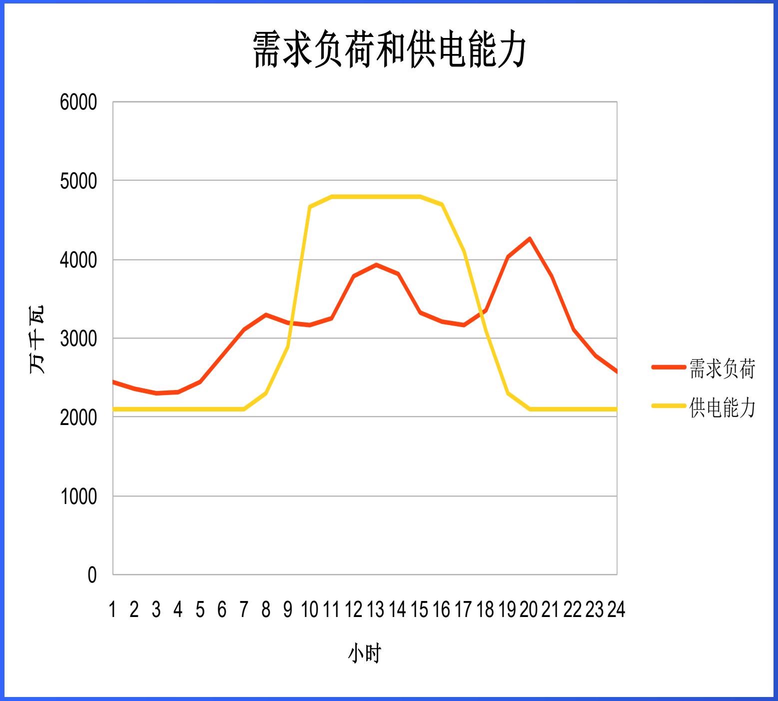
# IEA's analysis

**All the climate pledges announced to date, if met in full and on time, would be enough to hold the rise in global temperatures to 1.8 ° C by 2100**

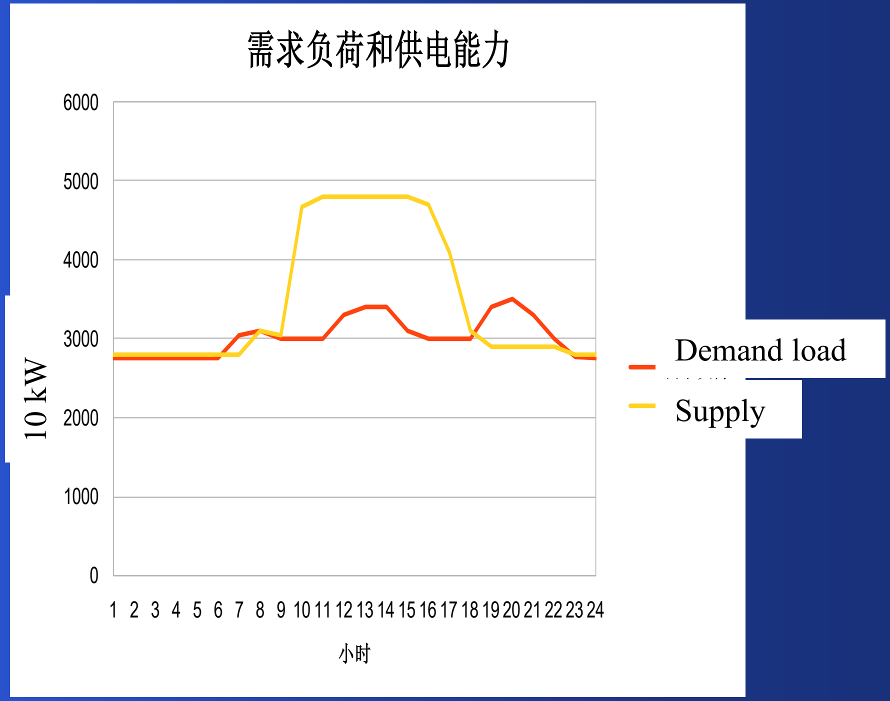
## Progress of technologies

**Solar PV power cost: USDcent 0.7kWh in middle east, USDcent 1.2/kWh in China**
**Wind power cost: USDcent 1.8/kWh on shore, USDcent 3/kWh off-shore**
**Electric Car: USD20000 as standard electric car**

# Power supply and demand load curve in Beijing for selected two days




Summer day




Winter day

# Provinces with peak load and off peak load price

| 中午执行谷段销售电价的省份 | | | |
|---|---|---|---|
| 序号 | 省份 | 低谷时间段 | 时长 (h) |
| 1 | 青海 | 9:00~17:00 | 8 |
| 2 | 宁夏 | 9:00~17:00 | 8 |
| 3 | 甘肃 | 10:00~16:00 | 6 |
| 4 | 山东（3-5月、9-11月） | 10:00~15:00 | 5 |
| 5 | 蒙东 | 11:00~14:00 | 3 |
| 6 | 新疆 | 13:00~17:00 | 4 |
| 7 | 河北（6、7、8月份除外） | 12:00~14:00 | 2 |
| 8 | 河南（3-5月、9-11月） | 11:00~14:00 | 3 |
| 9 | 浙江（2-6月、9-11月） | 11:00~13:00 | 2 |
| | 浙江（重大节日） | 10:00~14:00 | 4 |
| 10 | 山西 | 11:00~13:00 | 2 |
| 11 | 湖北 | 12:00~14:00 | 2 |
| 12 | 辽宁 | 11:30~12:30 | 1 |
| 13 | 陕西（征求意见） | 11:00~15:00 | 4 |
| 14 | 江苏（重大节日） | 11:00~15:00 | 4 |
| 15 | 江西（重大节日） | 12:00~14:00 | 2 |
| 16 | 贵州（重大节日） | 13:00~15:00 | 2 |

# Prices of electricity in different province

2024年7月份各地电价（10千伏两部制电价）
元/kWh

| 区域 | 省市 | 尖峰 | 高峰 | 平时段 | 低谷 | 深谷 |
|---|---|---|---|---|---|---|
| 华北 | 北京 | 1.05778 | 0.92684 | 0.68134 | 0.43583 | |
| | 冀北 | 1.03370 | 0.89145 | 0.59857 | 0.30569 | |
| | 河北南 | 1.08085 | 0.93944 | 0.64831 | 0.35718 | |
| | 山西 | 0.89662 | 0.77930 | 0.55933 | 0.35768 | |
| | 山东 | 1.15877 | 1.01237 | 0.67017 | 0.32827 | 0.23057 |
| | 天津 | 1.18617 | 1.01067 | 0.71817 | 0.40237 | |
| 华中 | 江西 | 0.98091 | 0.98091 | 0.67054 | 0.36017 | |
| | 湖北 | 1.09240 | 0.86050 | 0.63770 | 0.38760 | |
| | 河南 | 1.32824 | 1.12883 | 0.71146 | 0.39263 | |
| | 湖南 | 1.32391 | 1.11097 | 0.71170 | 0.31243 | |
| | 四川 | 0.82328 | 0.69089 | 0.44267 | 0.19445 | |
| | 重庆 | 1.29196 | 1.09321 | 0.72053 | 0.33544 | |
| 华东 | 上海 | 1.60730 | 1.30110 | 0.75660 | 0.34820 | |
| | 浙江 | 1.35080 | 1.12570 | 0.68220 | 0.25930 | |
| | 江苏 | 1.35920 | 1.13270 | 0.65870 | 0.27570 | |
| | 安徽 | | 1.15400 | 0.66520 | 0.30690 | |
| | 福建 | 0.98029 | 0.88318 | 0.62717 | 0.34909 | |
| 东北 | 内蒙古东 | 1.02528 | 0.92823 | 0.73183 | 0.58163 | 0.55390 |
| | 黑龙江 | 1.08256 | 0.91237 | 0.62873 | 0.34508 | |
| | 吉林 | 1.16448 | 0.98467 | 0.68498 | 0.38529 | |
| | 辽宁 | 1.03458 | 0.84217 | 0.58563 | 0.32908 | |
| 西北 | 宁夏 | | 0.59879 | 0.41659 | 0.30449 | |
| | 陕西-陕西电网 | 1.09267 | 0.91813 | 0.58083 | 0.24352 | |
| | 陕西-榆林电网 | 1.04750 | 0.87930 | 0.55420 | 0.22910 | |
| | 新疆 | 0.65735 | 0.59432 | 0.38838 | 0.22494 | 0.19200 |
| | 青海 | | 0.45653 | 0.32290 | 0.18503 | |
| | 甘肃 | | 0.57898 | 0.43562 | 0.29348 | |
| 南网 | 广东-珠三角五市 | 1.41687 | 1.13887 | 0.68137 | 0.27617 | |
| | 广东-惠州 | 1.36067 | 1.09397 | 0.65497 | 0.26607 | |
| | 广东-江门 | 1.40867 | 1.13237 | 0.67757 | 0.27467 | |
| | 广东-东西两翼地区 | 1.23517 | 0.99357 | 0.59587 | 0.24367 | |
| | 广东-粤北山区 | 1.13117 | 0.91037 | 0.54697 | 0.22507 | |
| | 云南 | 0.55820 | 0.50008 | 0.40322 | 0.30636 | |
| | 广西 | | 0.86996 | 0.64492 | 0.41988 | |
| | 贵州 | | 0.95644 | 0.60727 | 0.25811 | |
| | 海南 | 1.41914 | 1.20143 | 0.75320 | 0.36900 | |

# Pumped Hydro Power in Fujian Province

# Gravity energy storage: Rudong county, 100MW
# 25t per block, with total 12600 blocks

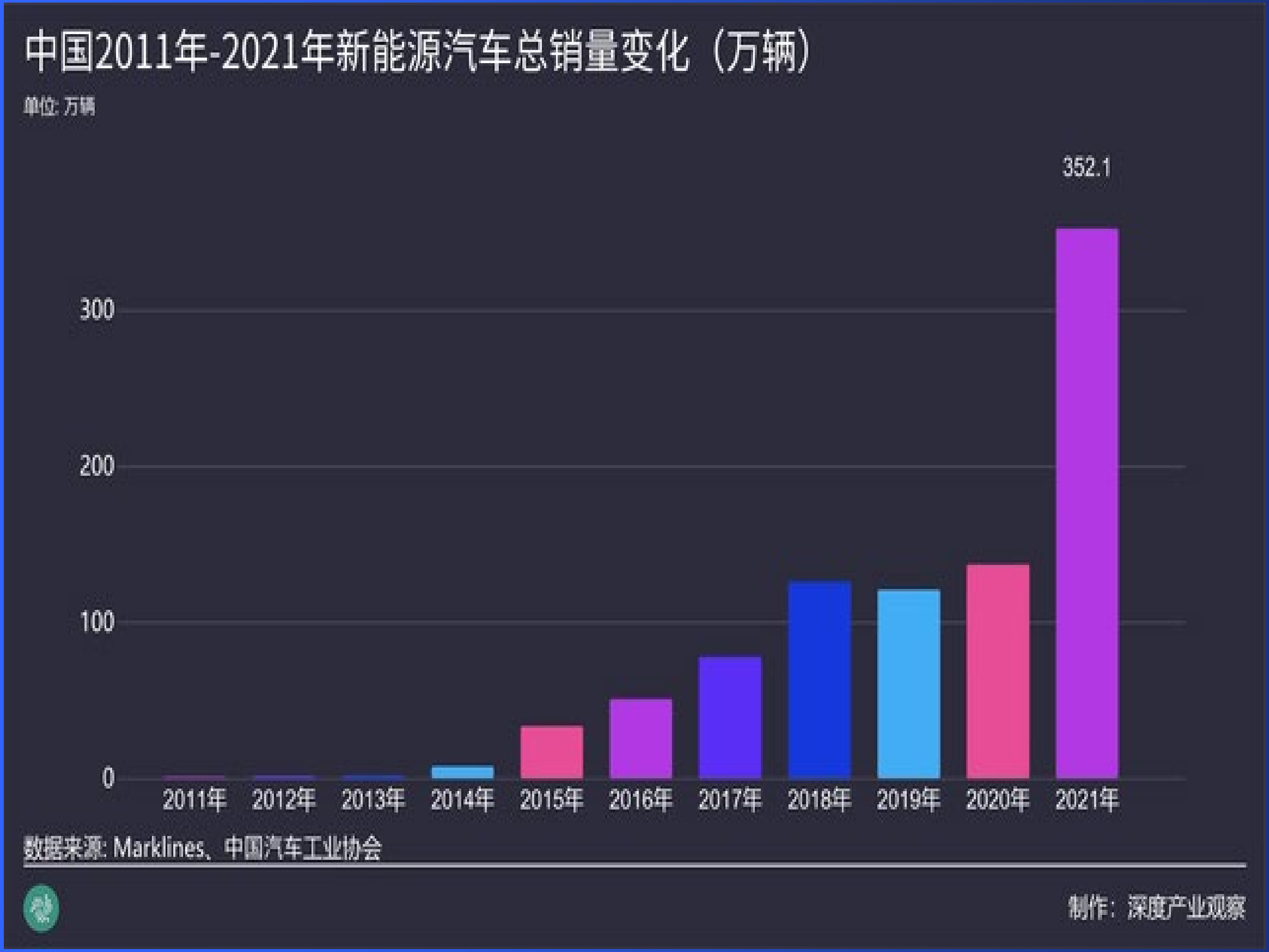
# Chemical battery electricity storage

# Electric car roadmap: Analysis Major Constraints Factors

- Trend Analysis on EVs

| 电动汽车与先进汽油和柴油车成本变化趋势分析 | | | | | |
|---|---|---|---|---|---|
| | 2006-2010 | 2011-2015 | 2016-2020 | 2021-2025 | 2026-2030 |
| 电动汽车Evs | | | | | |
| 电池充满电时总容量kWh | 16 | 24 | 48 | 80 | 112 |
| 电力销售价格（元/kWh） | 0.48 | 0.60 | 0.75 | 0.94 | 1.18 |
| 单位里程耗电量（kWh/km） | 0.18 | 0.13 | 0.08 | 0.08 | 0.07 |
| 单位里程耗电费用（yuan/km） | 0.09 | 0.08 | 0.06 | 0.08 | 0.08 |
| 电动汽车燃料成本（yuan/car） | 43200 | 39067 | 30104 | 37694 | 41299 |
| 单位电池容量成本(USD/kWh) | 750 | 375 | 130 | 75 | 30 |
| Evs车电池组成本(yuan/car) | 80400 | 60300 | 41808 | 40200 | 22512 |
| 电池组寿命（年） | 3.6 | 5 | 11 | 22 | 22 |
| 电池组更换次数（set/year) | 4.1 | 2.8 | 1.4 | 0.7 | 0.7 |
| EVs全寿期电池成本（yuan/car） | 413256 | 226728 | 99503 | 67938 | 38045 |
| EVs全寿期电耗和电池总成本（yuan/car） | 456456 | 265795 | 129607 | 105632 | 79345 |
| 每年费用（yuan/car） | 30430 | 17720 | 8640 | 7042 | 5290 |
| 先进汽油汽车ICE | | | | | |
| 汽油销售价格（yuan/liter) | 6.6 | 8.5 | 10.2 | 11.0 | 11.8 |
| 柴油销售价格（yuan/liter) | 6.4 | 8.3 | 9.9 | 10.6 | 11.4 |
| 单位里程耗汽油（L/km） | 0.050 | 0.039 | 0.031 | 0.024 | 0.020 |
| 单位里程耗柴油（L/km） | 0.047 | 0.038 | 0.030 | 0.024 | 0.020 |
| 全寿期行驶里程（km) | 500000 | 500000 | 500000 | 500000 | 500000 |
| 先进汽油车燃料成本（yuan/car） | 165000 | 167550 | 158356 | 133574 | 117738 |
| 先进柴油车燃料成本（yuan/car） | 150400 | 155333 | 149317 | 128100 | 114170 |
| 每年费用 | 11000 | 11170 | 10557 | 8905 | 7849 |
| 比较（Evs车费用一ICE车费用） | 291456 | 98245 | -28749 | -27941 | -38394 |

# Sale of new energy car: 6.8million in 2022 9.5million in 2023, Expected to be 12.5 million in 2024



# Super Charging station, 10minutes for 400km

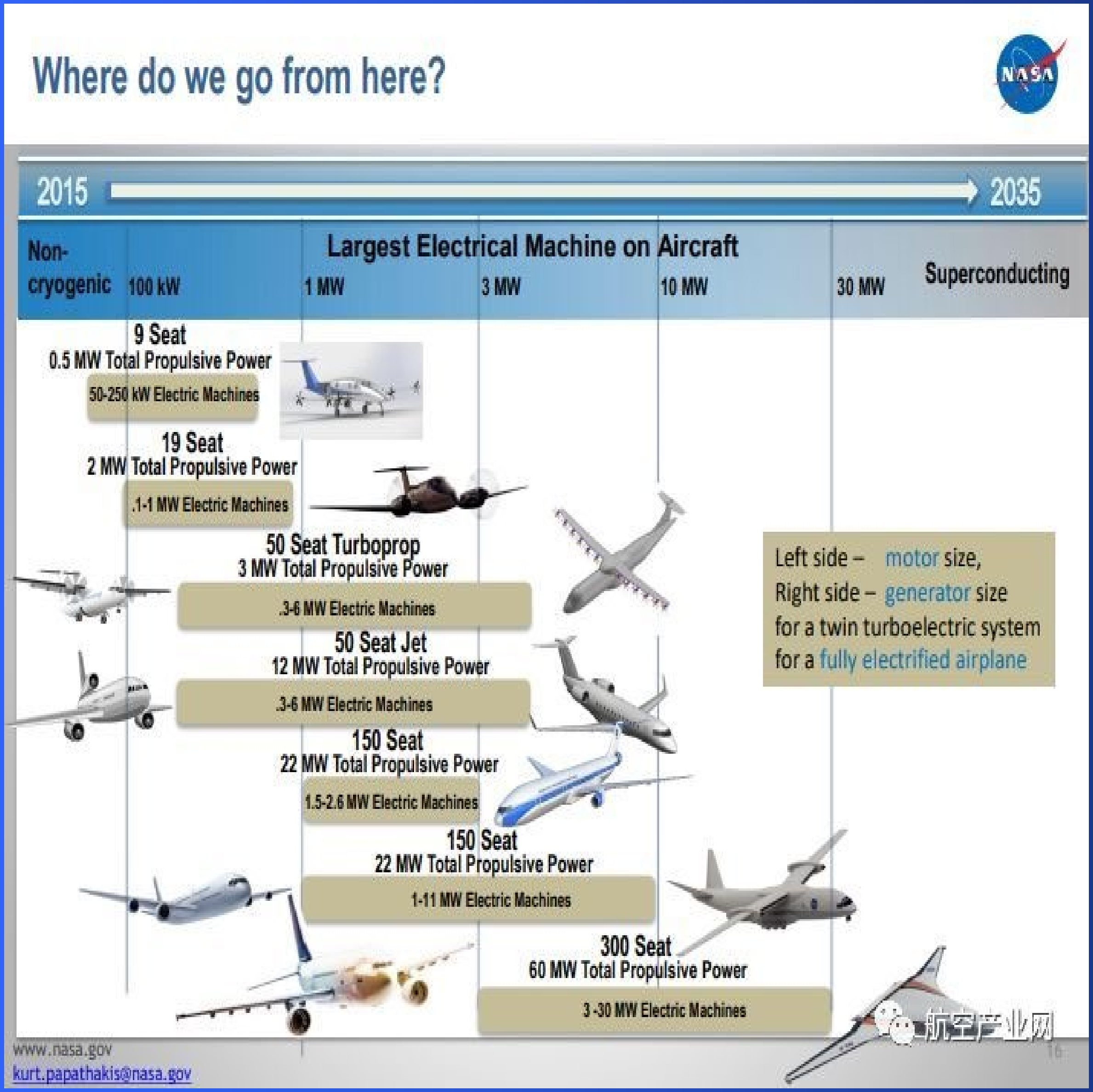
# 2024 China Auto

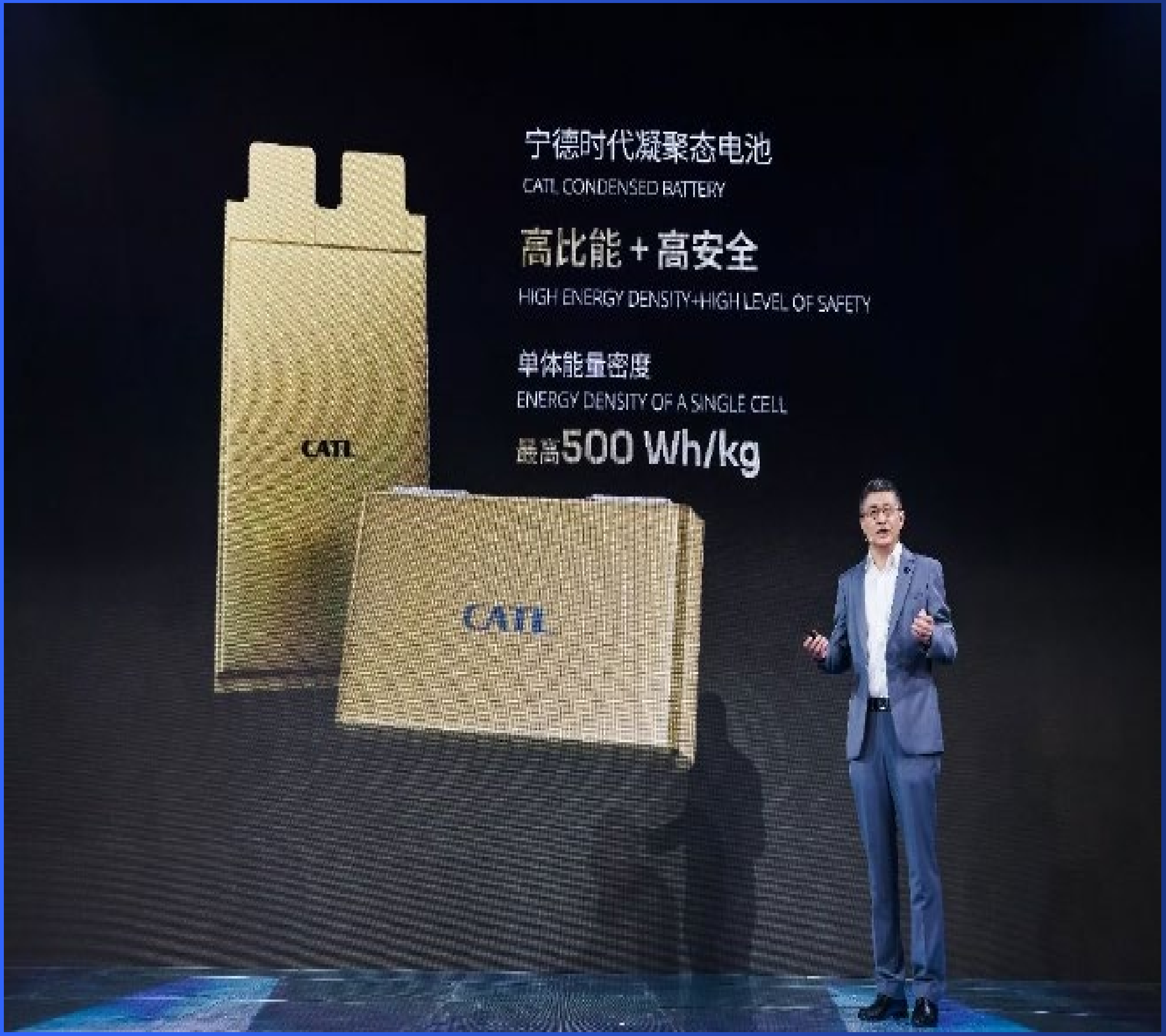
# Charging Station in Shenzhen: solar power, storage, electric vehicle charging and discharging


# Electric Heavy-duty truck


## *Fuel cell truck*




Where do we go from here?
NASA
2015
2035
Non-cryogenic
Largest Electrical Machine on Aircraft
100 kW
1 MW
3 MW
10 MW
30 MW
Superconducting
9 Seat
0.5 MW Total Propulsive Power
50-250 kW Electric Machines
19 Seat
2 MW Total Propulsive Power
.1-1 MW Electric Machines
50 Seat Turboprop
3 MW Total Propulsive Power
.3-6 MW Electric Machines
50 Seat Jet
12 MW Total Propulsive Power
.3-6 MW Electric Machines
150 Seat
22 MW Total Propulsive Power
1.5-2.6 MW Electric Machines
150 Seat
22 MW Total Propulsive Power
1-11 MW Electric Machines
300 Seat
60 MW Total Propulsive Power
3 -30 MW Electric Machines
Left side – motor size,
Right side – generator size
for a twin turboelectric system
for a fully electrified airplane
www.nasa.gov
kurt.papathakis@nasa.gov
航空产业网


宁德时代凝聚态电池
CATL CONDENSED BATTERY
高比能 + 高安全
HIGH ENERGY DENSITY+HIGH LEVEL OF SAFETY
单体能量密度
ENERGY DENSITY OF A SINGLE CELL
最高500 Wh/kg
CATL
CATL

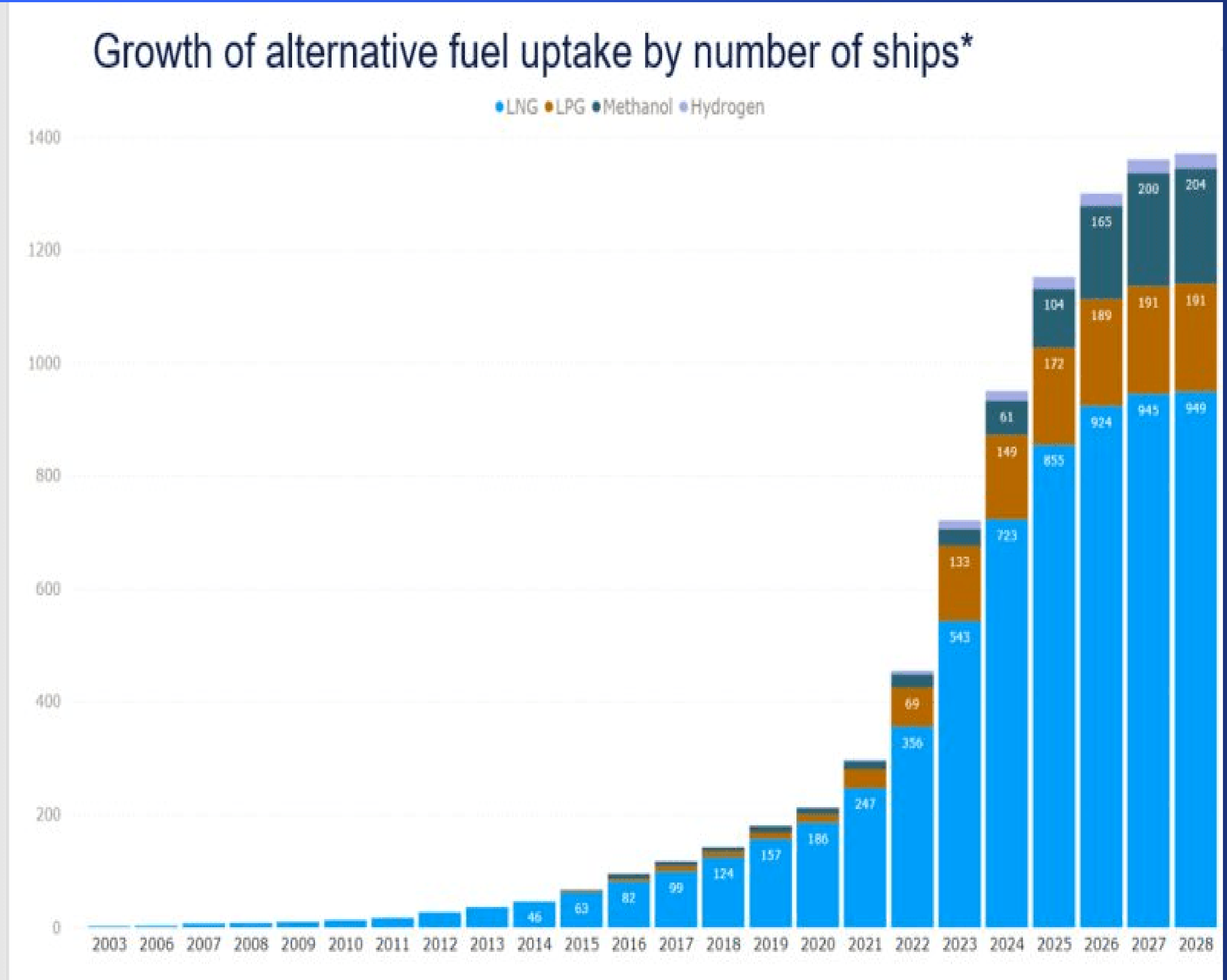

CATL 宁德时代
凝聚态航空电池
CONDENSED BATTERY FOR ELECTRIC AIRCRAFTS


Each wingtip has a
large electric motor.
量子位


电动集装箱船(N997)顺利进水
COSCO SHIPPING
中远海运绿水01

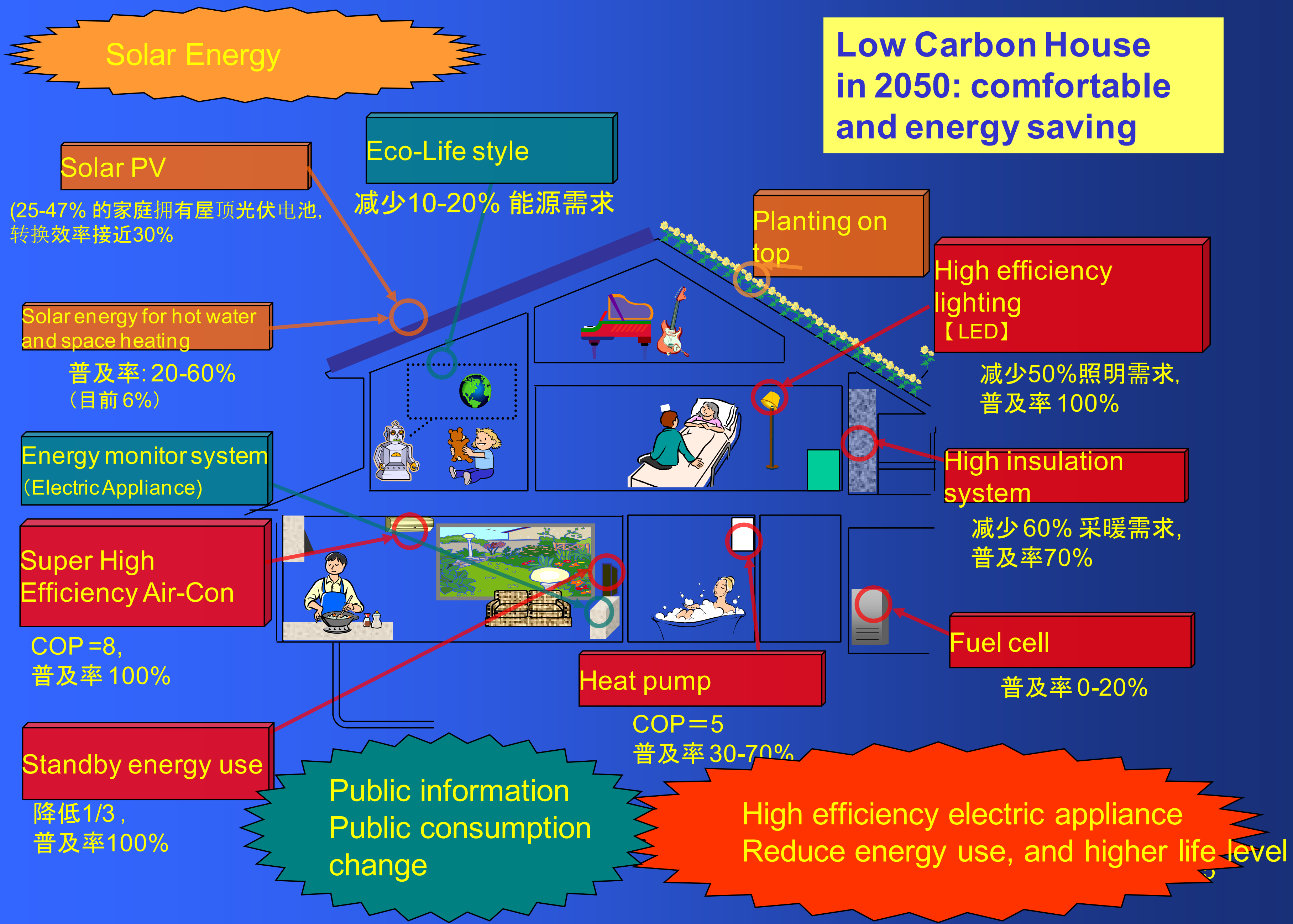


三峡氢舟1

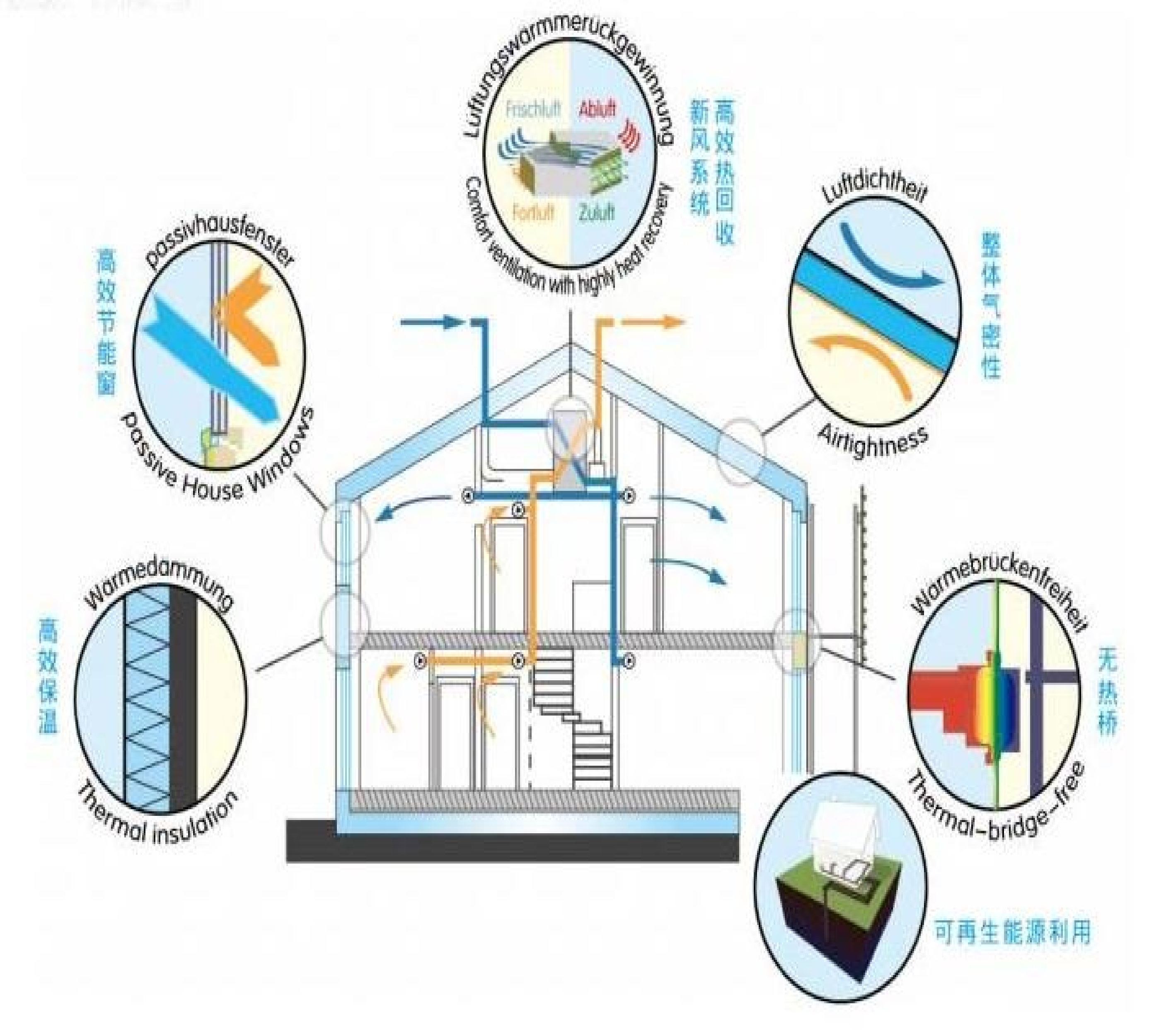


Growth of alternative fuel uptake by number of ships*
LNG LPG Methanol Hydrogen
1400
1200
1000
800
600
400
200
0
2003 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028
46
63
82
99
124
157
186
247
356
69
543
133
723
149
61
855
172
104
924
189
165
945
191
200
949
191
204

## Low Carbon House in 2050: comfortable and energy saving



# Ultra-low energy use building



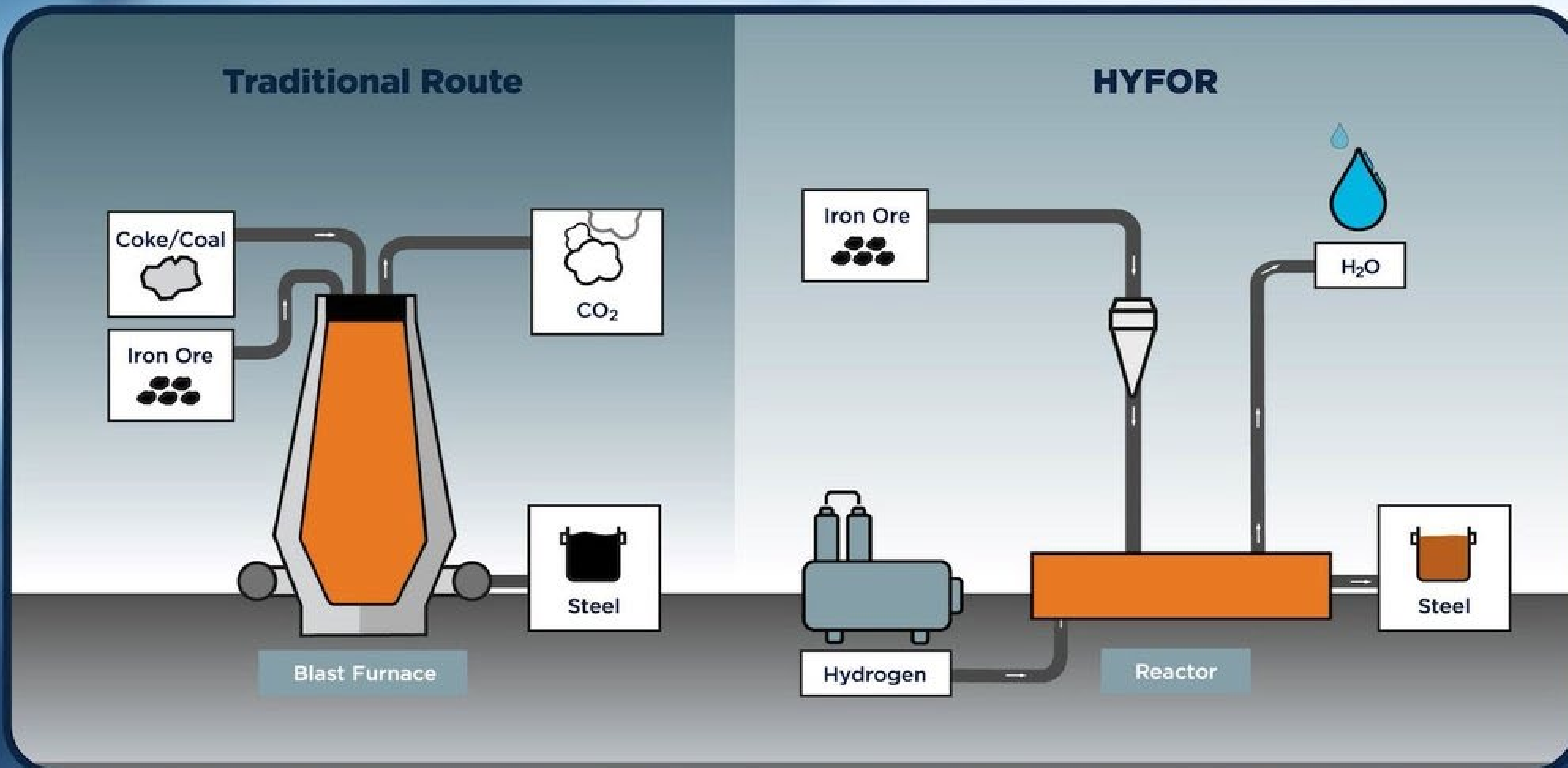
# Rural area: could be a big power plant, self-sufficient energy supply

# It is good for low income families

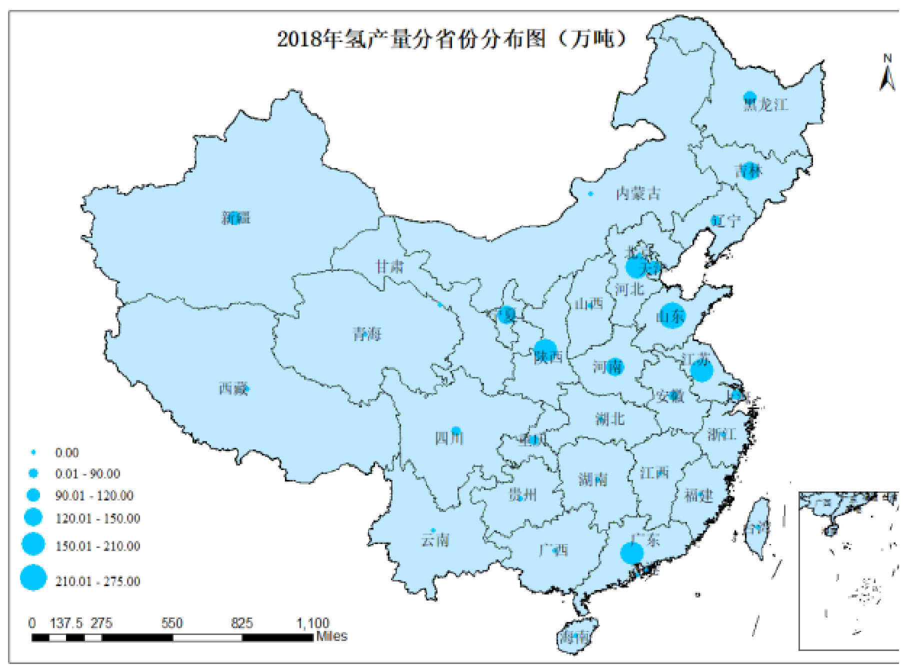
# Significant Transition in Industry Sectors and Transport: Hydrogen Based Process

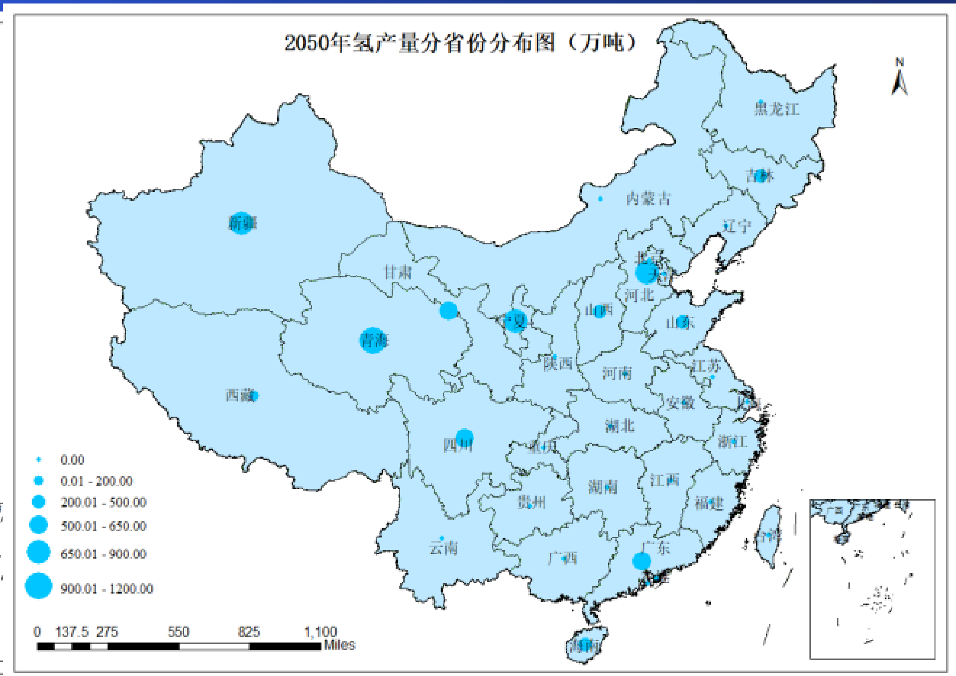
- Steel making
- Ammonia
- Benzene
- Ethylene
- Methanol
- Clinker
- Heavy Duty transport and air plane

# Steel making transition

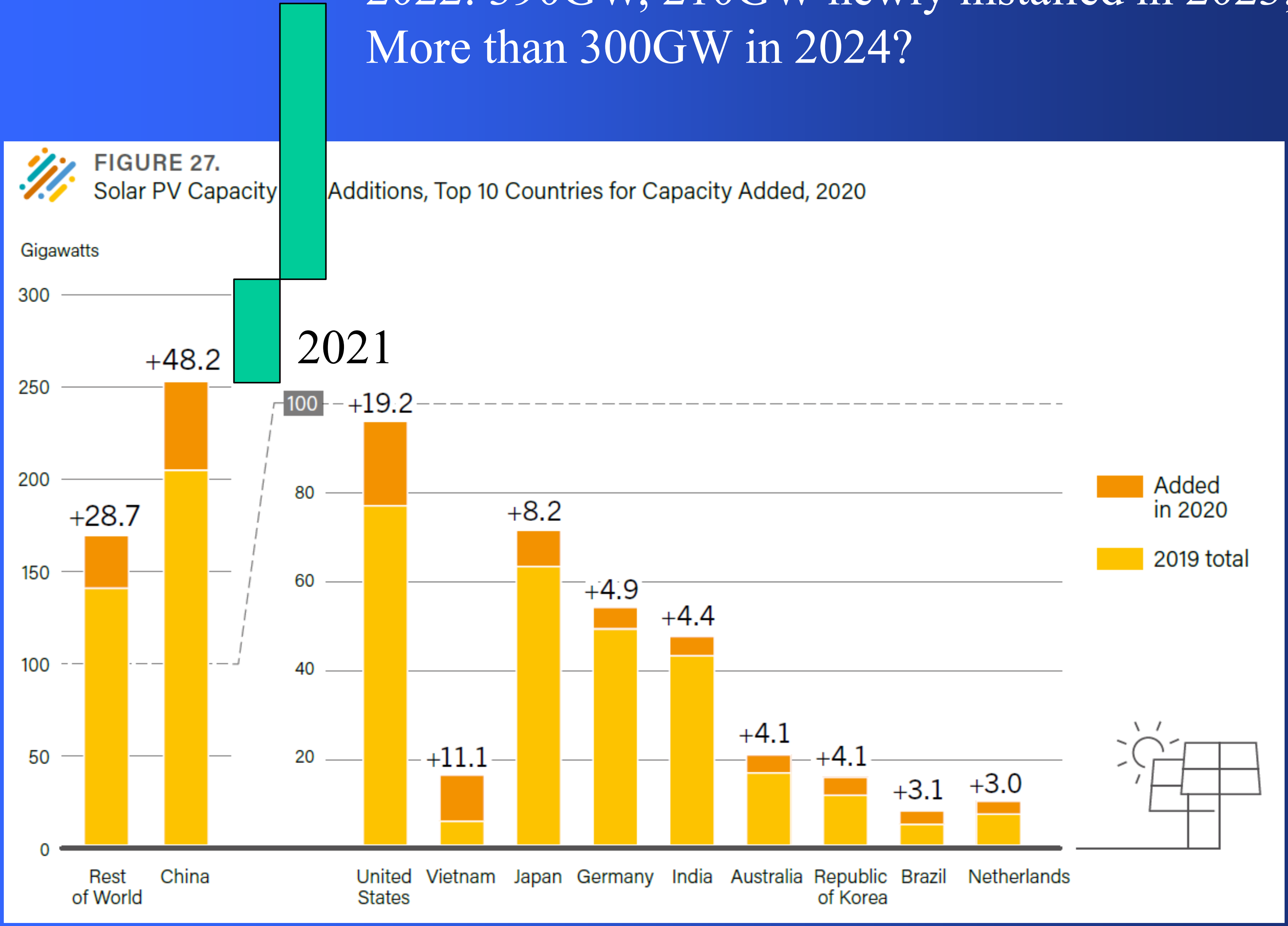


# Hydrogen


2018年氢产量分省份分布图（万吨）
N
黑龙江
吉林
内蒙古
辽宁
新疆
甘肃
北京
天津
河北
山西
宁夏
山东
青海
陕西
河南
江苏
西藏
安徽
湖北
四川
浙江
江西
湖南
贵州
福建
云南
广西
广东
台湾
海南
0.00
0.01 - 90.00
90.01 - 120.00
120.01 - 150.00
150.01 - 210.00
210.01 - 275.00
0 137.5 275 550 825 1,100
Miles

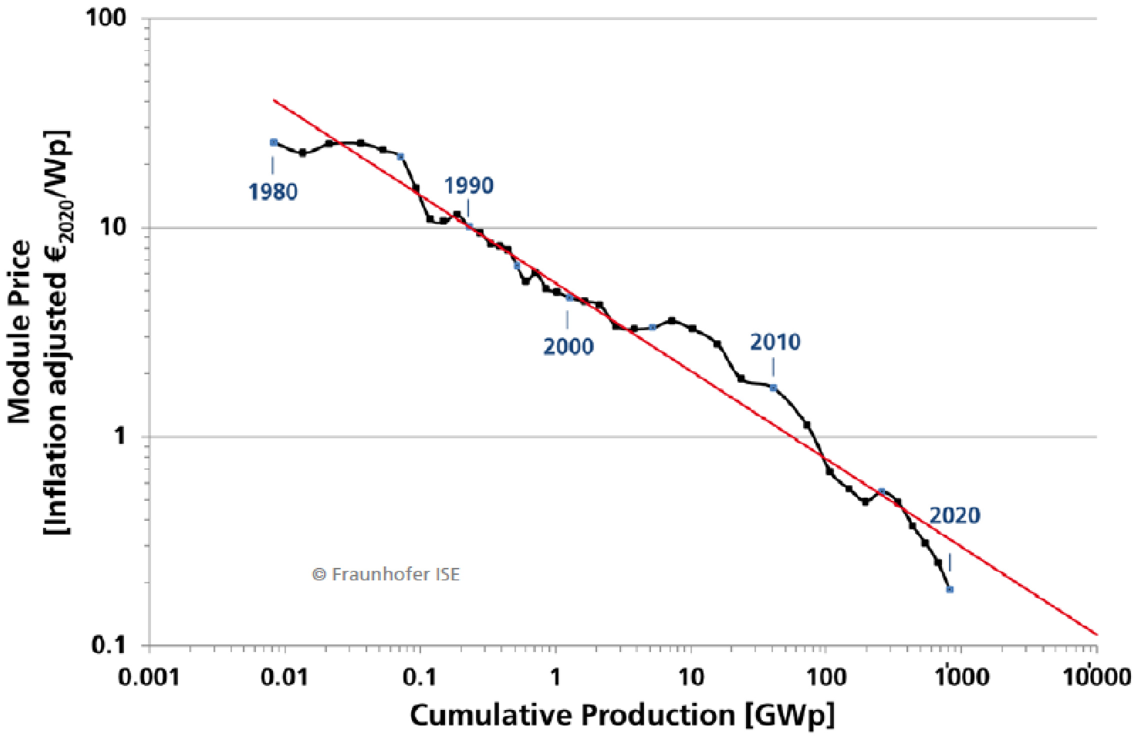

2050年氢产量分省份分布图（万吨）
N
黑龙江
吉林
内蒙古
辽宁
新疆
甘肃
北京
天津
河北
山西
宁夏
山东
青海
陕西
河南
江苏
西藏
安徽
湖北
四川
浙江
江西
湖南
贵州
福建
云南
广西
广东
台湾
海南
0.00
0.01 - 200.00
200.01 - 500.00
500.01 - 650.00
650.01 - 900.00
900.01 - 1200.00
0 137.5 275 550 825 1,100
Miles

# 2022: 390GW, 210GW newly installed in 2023; More than 300GW in 2024?



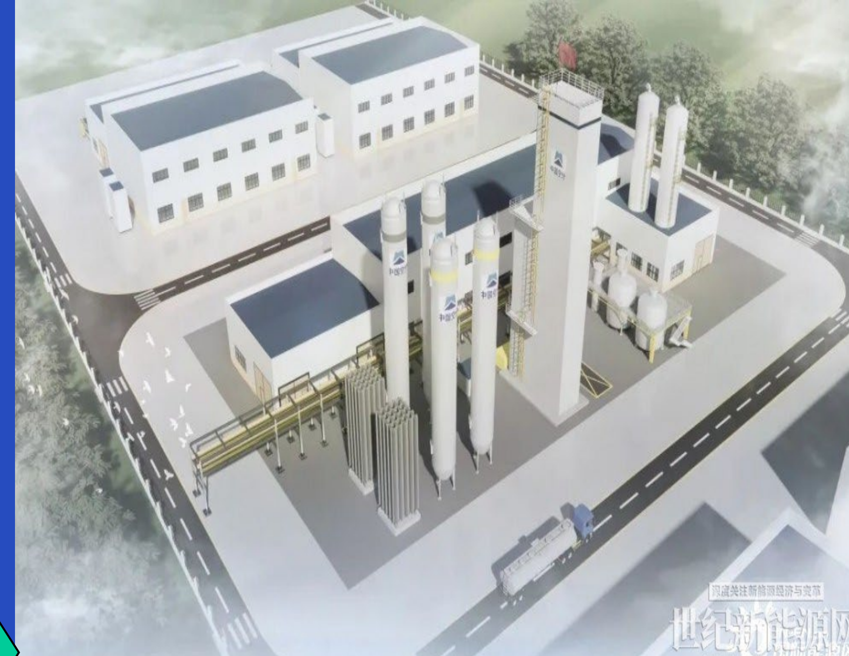

中新网
Ecns.cn

# Price Learning Curve
## Includes all Commercially Available PV Technologies

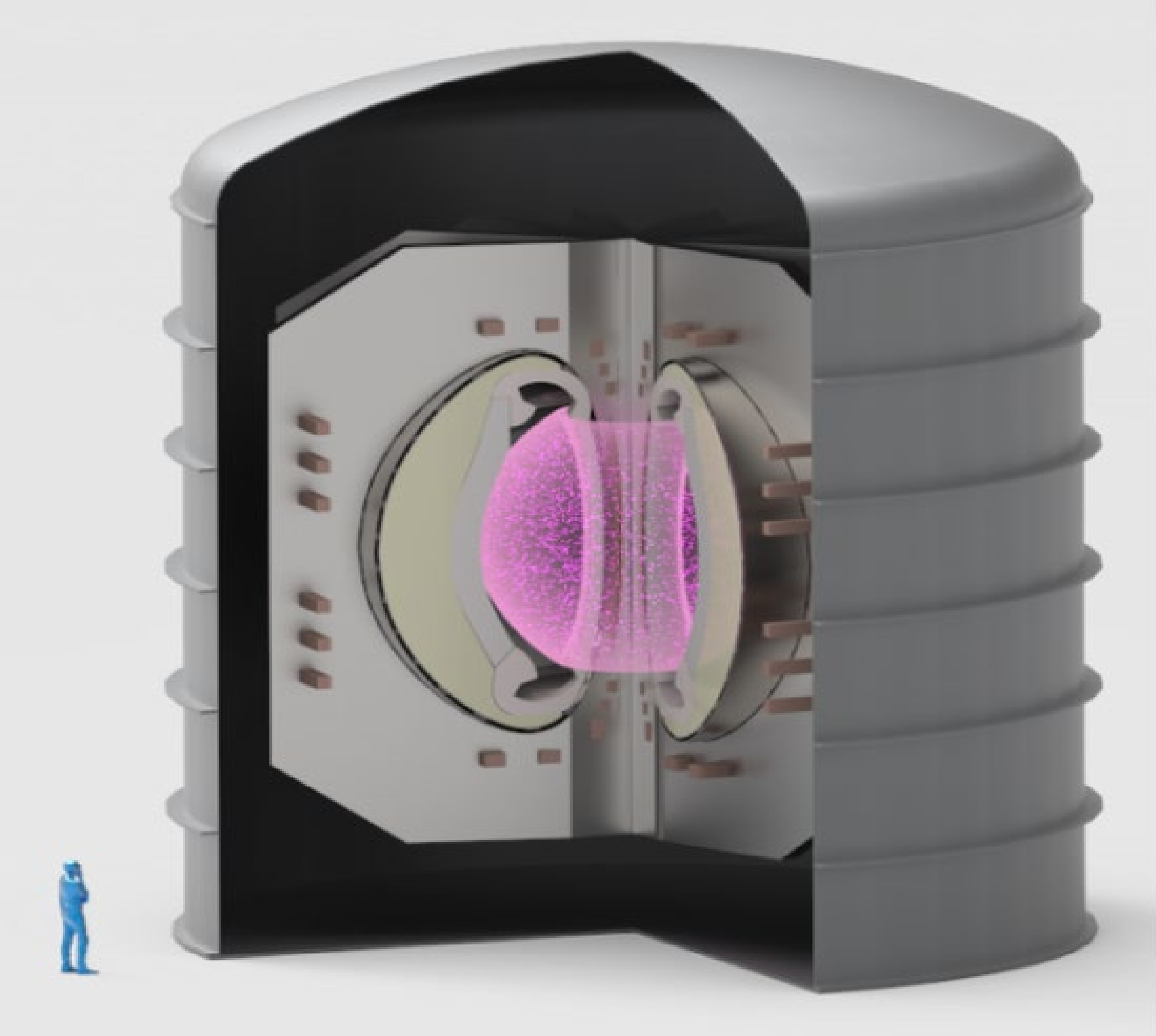



**Learning Rate:**
Each time the cumulative PV module production doubled; the price went down by 25% for the last 40 years.

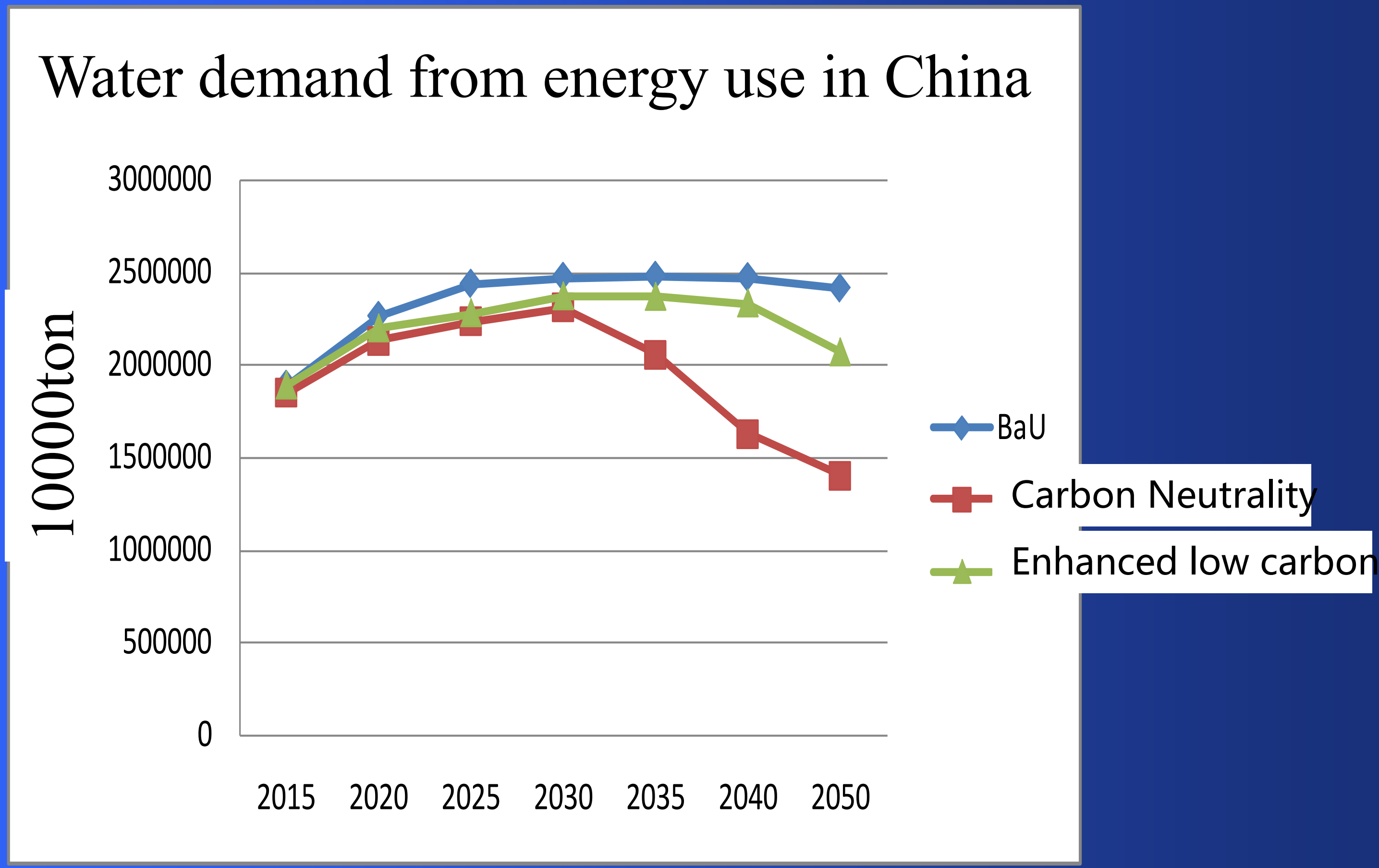
# From traditional ammonia to hudrogen based ammonia




# Nuclear fussion companies got more than US$5billion private investment



# SUSTAINABLE DEVELOPMENT GOALS

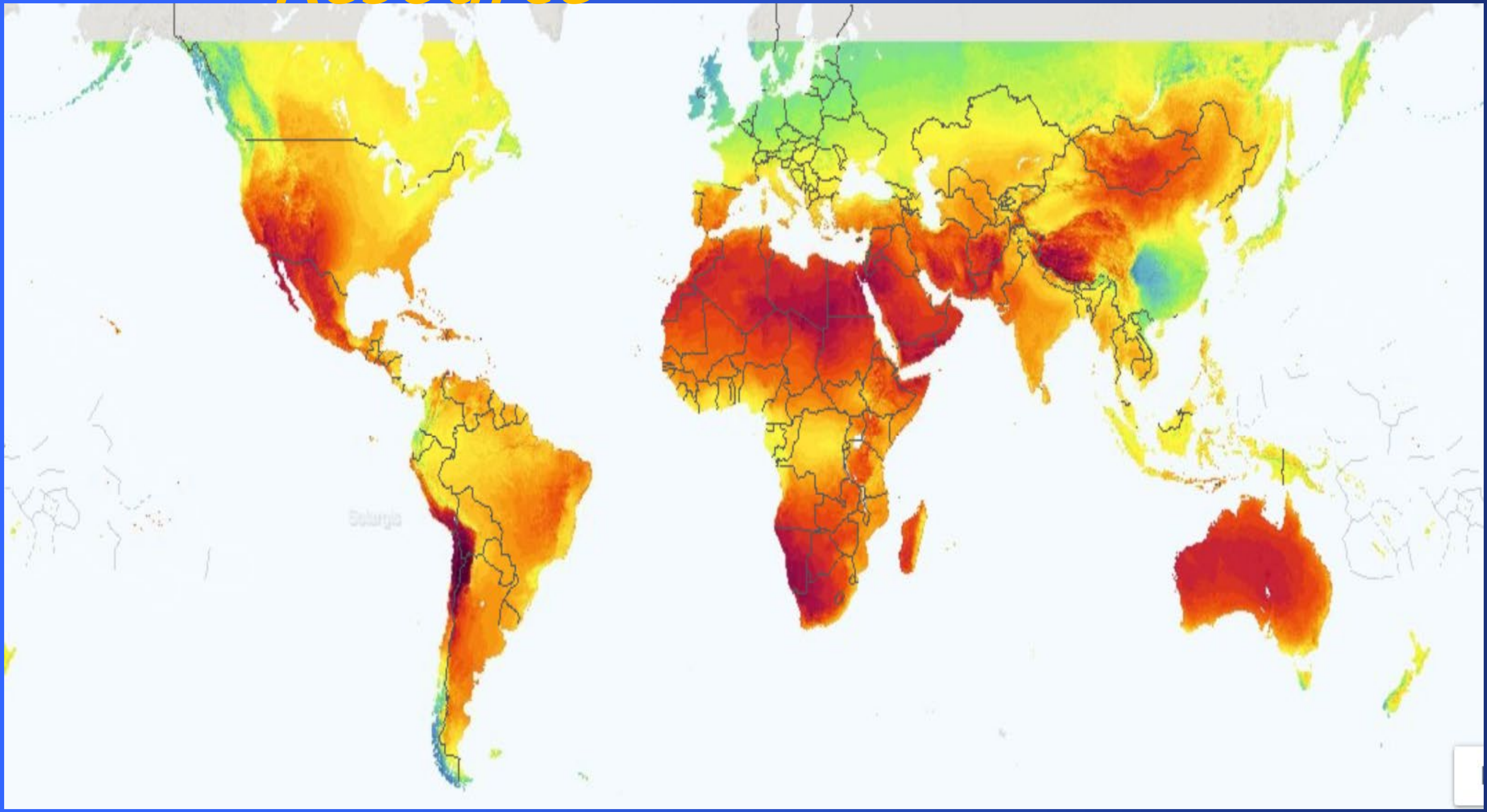


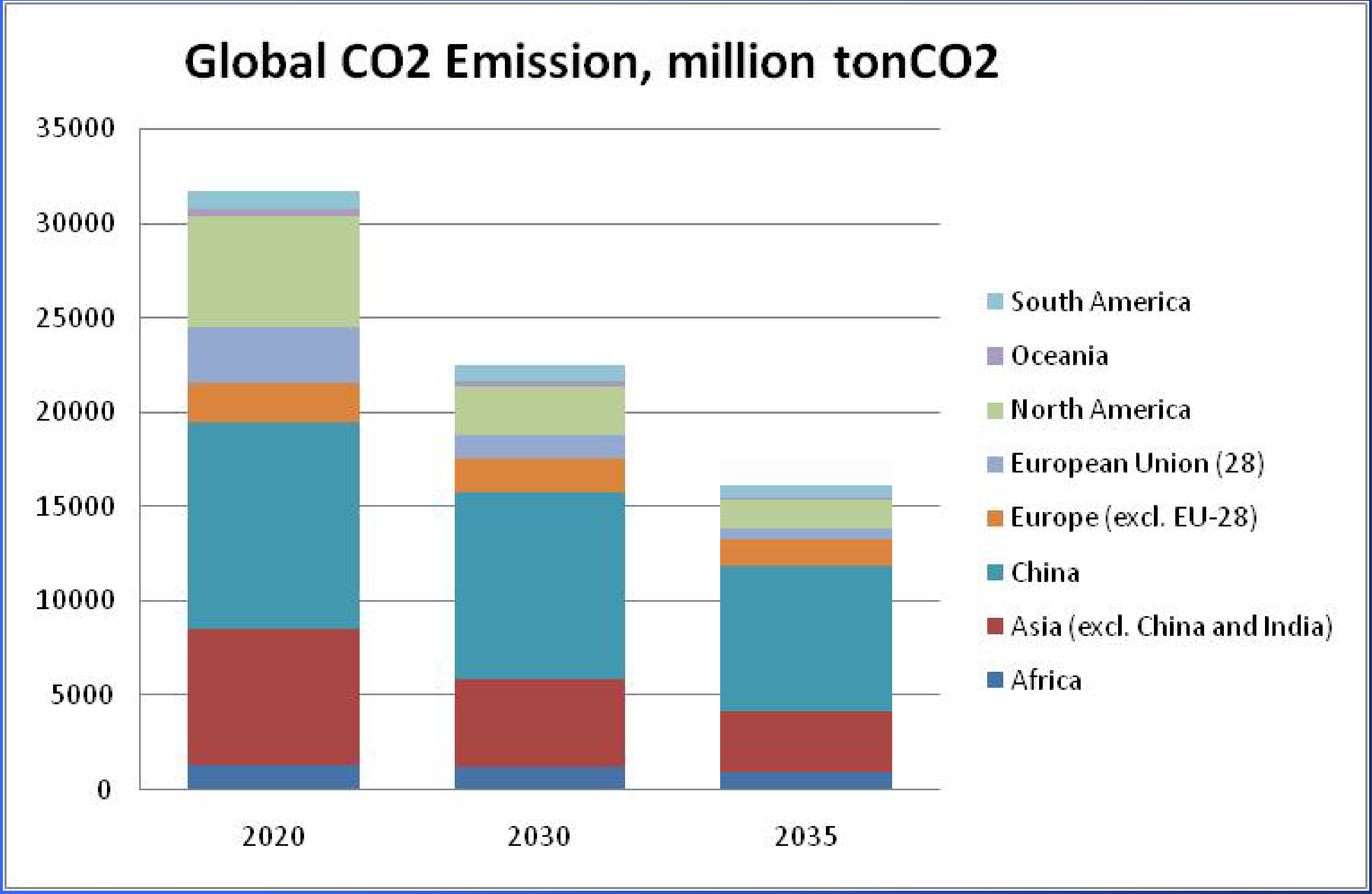
Water demand from energy use in China
10000ton
3000000
2500000
2000000
1500000
1000000
500000
0
2015
2020
2025
2030
2035
2040
2050
BaU
Carbon Neutrality
Enhanced low carbon

# No soil agriculture

# No soil agriculture

# *Global Solar Resource*





Global CO2 Emission, million tonCO2
35000
30000
25000
20000
15000
10000
5000
0
2020
2030
2035
South America
Oceania
North America
European Union (28)
Europe (excl. EU-28)
China
Asia (excl. China and India)
Africa

Thanks !