Global Energy Policy Research | GEPR

GEPR?? ????http://agorajp.com/?? ???

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?? ??? ?? · Tuesday, September 12th, 2023

Gwengoat/iStock

?????1980???????70?? ???

??????????????????????????????????????80????????????????????SED?????????83???SED??????F DJ???????????????????????????“????”???

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?????????????????8?????????????????

36???16??

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???Wikipedia

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36??

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???2010?????13??

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??AfD??
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Posted in ???, ?? | No Comments »

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?? ?? · Thursday, September 7th, 2023

2022?????????????????????F?????????????????????????????????????

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????Quantum Korea 2023??

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Posted in ???, ????? | No Comments »

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?? ?? · Saturday, September 2nd, 2023

axz66/iStock

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ALPS???

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2027???????????—???????????????????????????

Posted in ???, ?????????, ?? | No Comments »

?????G7?G20??????????1.5????????

?? ? · Thursday, August 31st, 2023

photoschmidt/iStock

?????????G20?????????????????????????????????7?28?????????????G20????????????????????????
???????????????????????

???????????68?????????63?66????????????????G20???
??G7?????????????????????????????

???????????????63?

5??G7??????????IPCC?6???????AR6??????1.5???????????????GHG????2025???????????2019??
?2030?????43??2035?????60?????????????????2030?NDC???????GHG???????LTS??1.5????????
??2050??????????????????????????????????????COP28?????????2030?NDC????????????LTS???
??????????2050??

??????????????????????????????????G20????????????100??????????????????G20??????????????
??????????NDC????????????????????????????????2023?????????????2030?????????????????????
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????????????????????????1.5???2?????????????1.5??
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> G20???????????IPCC??G20????????????
> ?2025?????????????????????2019???2035????????60%??????????????????????????
> ???2030??????????CO2?????????????
> ?????????????????
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> ???????????G20???G20??????
> ???????2040???????????????????????

????G20??????3?????????G7???

G7???IPCC?6??????????????2025????????2035??60????????????12??COP28??????????????????
???????????????G20?????????IPCC????????????????

??????????Third World Network ?IPCC???
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??????IPCC???

???????2040??????????????????????????????COP27??????????LMDC???????2050?????????????
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G7???????1.5????????????????????2050???
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??3???
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EU????????????????65?

???CBAM???????????????????????????????????????
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EU?CBAM??6???????????????????????????????????????
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?????G7?G20???G7??????G20?????????????
?????????1.5?????????????????

???6??IPCC???????????????????1.5???????????????
?1.5??

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Posted in ???????????, ???, ????? | No Comments »

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?? ? · Monday, August 28th, 2023

dima_zel/iStock

??GCR????????????????PDF????12????????16???????????????????????????5?????????????????????????

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?????????1997??????????????????GCR???????????????????????????????????GCR???

???????????CO2?????????????????IPCC???

????????????????????????????C^{14}?GCR???GCR??????C^{14}????????????????????????????????????

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??????????????2019??????????????????GCR?????78??
??????????GCR??2km??????????????????????
???????????7?12km??????????????

???????????high-altitude
clouds?????????????????????????2?7km????????????????????????????????

??GCR??
??????????????????7?12km??

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activities??
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??GCR??
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?????????decadal?10????????????????????????????11??
GCR?????????????????????1.4??????????

??0?3?4?????
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??????????????????????NOAA??????????????????1979??1979
????43??

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cycles??????????GCR??????????????GCR??
????????11???????????????????

???????Fig.
1??GCR???????????????0?3????????????????????????????8?????????????1???????????Fig.
2????????????????????????????GCR????????????????????????????5?6?7??8????????????????????????????
???????????????????

??????????GCR cycles?????????????????Fig. 3????????Fig.
S5??????????GCR????????????????????????GCR????????????????????????????GCR????????????????????
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Fig.
4????????GCR????????????????????????????????????3??
????????????????????????????GCR????????????????????GCR??
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???????????????GCR cycles?????????????????Fig.
5??

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????????????????8?????????????????????GCR???
?????????GCR cycles??????????????????????

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Posted in ???, ?????, ????? | No Comments »

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?? ?? · Sunday, August 27th, 2023

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??????????????????IPCC??????????????????????1.5???????????????1.5?????????????????????????
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Don’t overstate 1.5 degrees C threat, new IPCC head says

??Woke, Inc.: Inside Corporate America’s Social Justice Scam???

Vivek Ramaswamy says the ‘climate change agenda’ is a hoax

???Climate Change isn't Everything???

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???1???????????????????

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???2022?????????????????????????????1600?????????????????????WORLD CLIMATE DECLARATION???????????????

Nobel Prize winner Dr. John F. Clauser signs the Clintel World Climate Declaration

?????????????????????5?????????????????

IPCC?????63???????????????????

???????2019?9?23???????????????????????????????????500???1600????????

?????6??????????????

- Natural as well as anthropogenic factors cause warming
- Warming is far slower than predicted
- Climate policy relies on inadequate models
- Global warming has not increased natural disasters
- Policy must respect scientific and economic realities
- CO2 is not a pollutant. It is essential to all life on Earth. Photosynthesis is a blessing. More CO2 is beneficial for nature, greening the Earth: additional CO2 in the air has promoted growth in global plant biomass. It is also good for agriculture, increasing the yields of crop worldwide.

Posted in ???, ????? | No Comments »

??????10?????????

?? ?? · Saturday, August 26th, 2023

???1????????????10???????????????????????????????

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???????????????????3000?????????????3???????1??????????????????????8???????????????????????
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1970??
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Posted in ???????????, ???, ????????? | No Comments »

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?? ?? · Thursday, August 24th, 2023

NithidPhoto/iStock

2023?8?22????????????????9????????????????????????????

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??2050?????????????2030??CO2???46%?????????????
GX??

2022?3?15????????????????????????????

> ??CO2????2030?46%??????????????????????
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GX??CO2????????????????????????????????
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?SDGs????????

Posted in ???????????, ??? | No Comments »

????2???????CO2??????????????????

?? ?? · Tuesday, August 22nd, 2023

Artur/iStock

???MIT????????????????????????????CO2?
” h e a v i l y
saturated”?????????????EPA??
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CO2?????????

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????CO2 ??????????????????????????

????CO2???
?????????80??????????????????

?????????40?????Gt????????????????????????????????????CO2?1??????????????????????????
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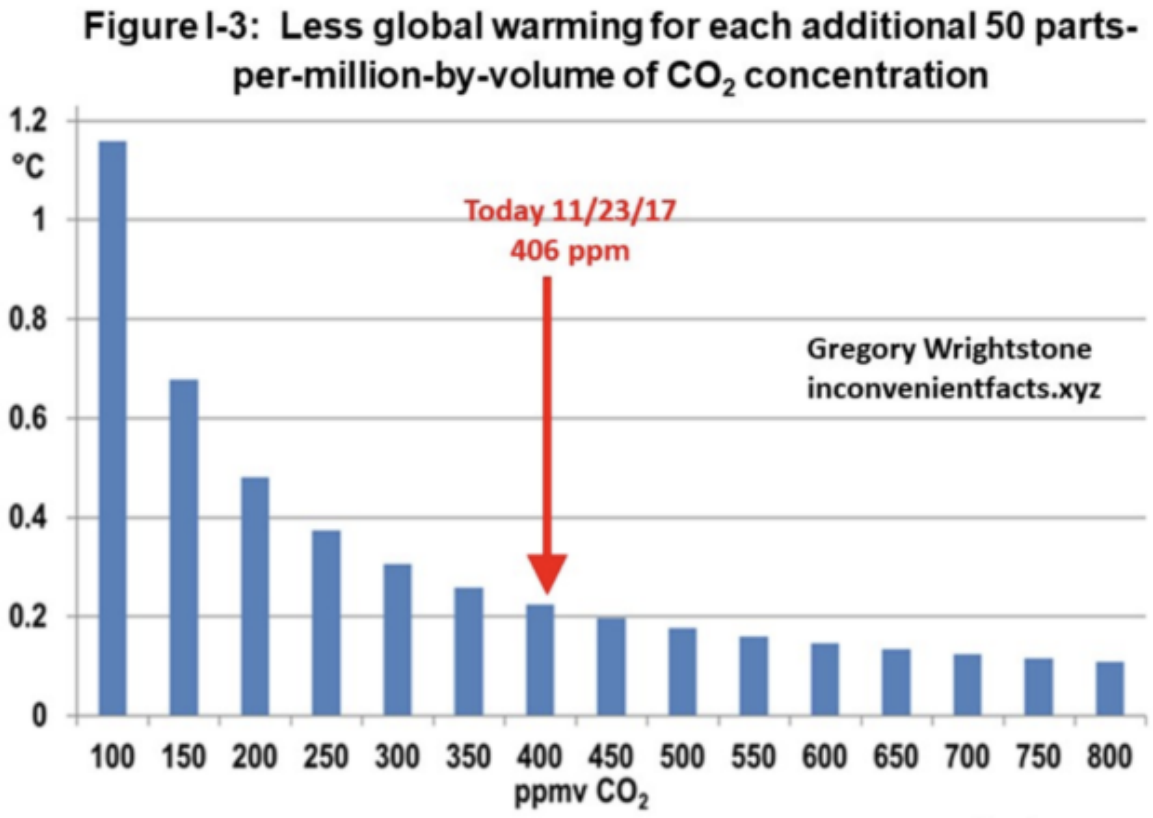
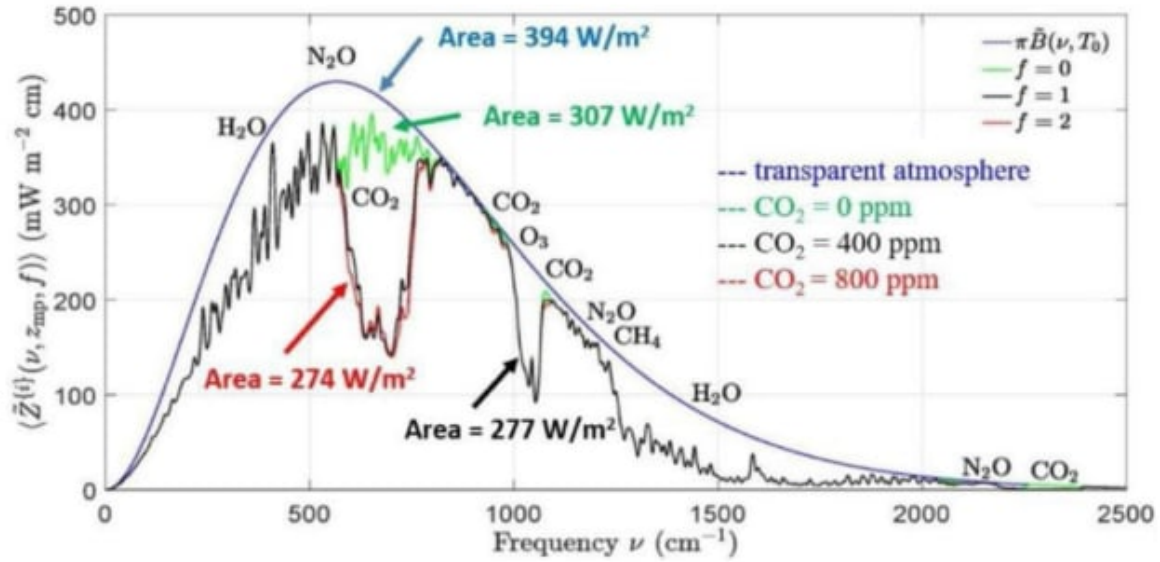
????CO2?”heavily saturated”

????????CO2???50ppm??????????????????????????CO2???????????????????????????????????
?????????????????????? = saturation?????????????CO2?“heavily saturated”???????



????????CO2????2??800ppm????????????????????????CO2????????????????????????????????????
?

????????????????????????????CO2????????????????????????CO2?N2O?O3?CH4????????????
??394 W/m2?????????????????@transparent atmosphere????????????27??



??????????????????????????CO2 =
400ppm???????394W/m2????277W/m2????????????????????????????277/394 =
70??????????CO2?400ppm??800ppm????????????????????????274 W/m2?69.5%????????????????????????3W/m2???????????? 1??????????

???????CO2???

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??????????????EPA??????????????”State Farm[?]”????????????????????????????

? State Farm Test: ??

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1. EPA???????????????????????????
2. EPA??????????????????IPCC??
3. ??????????????????

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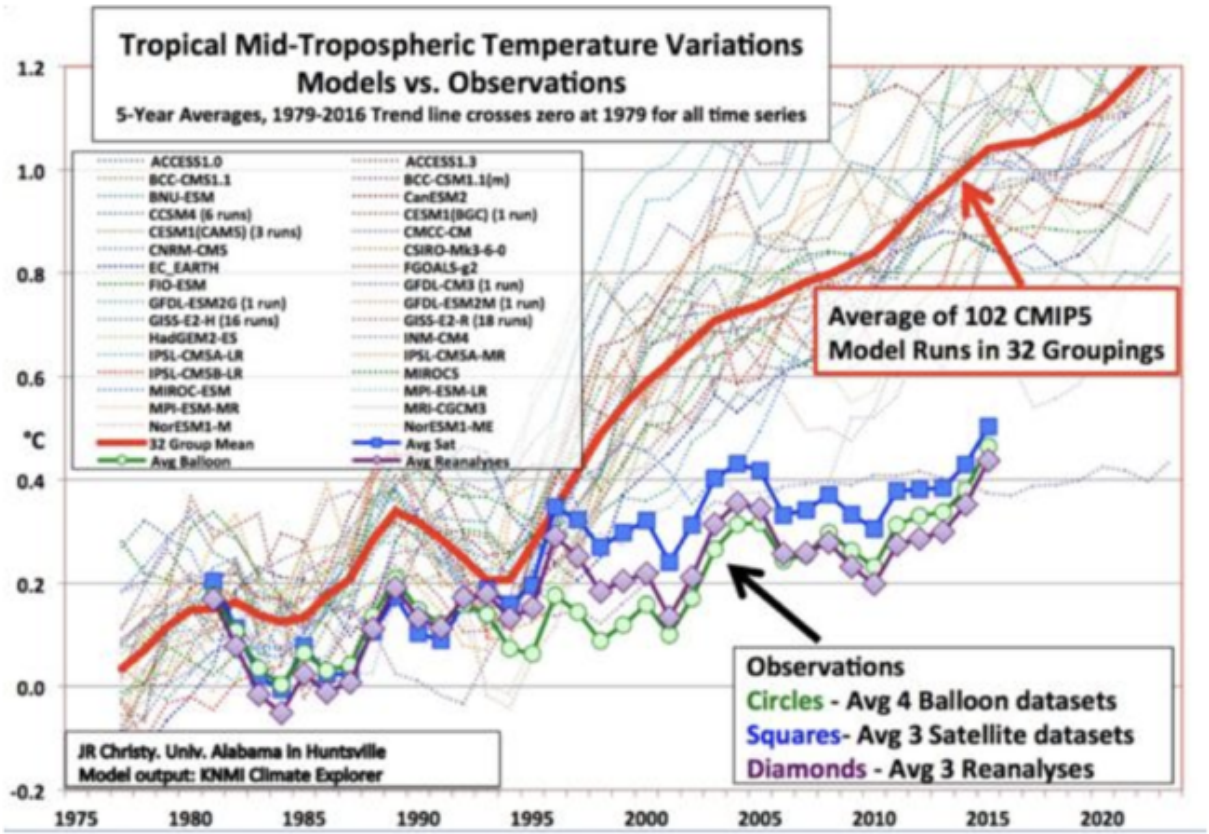

??????EPA????????????CO2???????????CO2????????????????????????

???????????EPA??

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> The main conclusion of this part of the study is that even an order of magnitude increase of CO2 in the atmosphere by human activities, which at the present rate of input is not expected within the next several thousand years, may not be sufficient to produce a runaway greenhouse effect on Earth. On the short time scale, if CO? is augmented by another 10 percent in the next 30 years, the increase in the global temperature may be as small as 0.1°K.

Posted in ???, ????? | No Comments »

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?? ?? · Friday, August 18th, 2023

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Luisa Trescher Photos/iStock

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> 60????????????????????????

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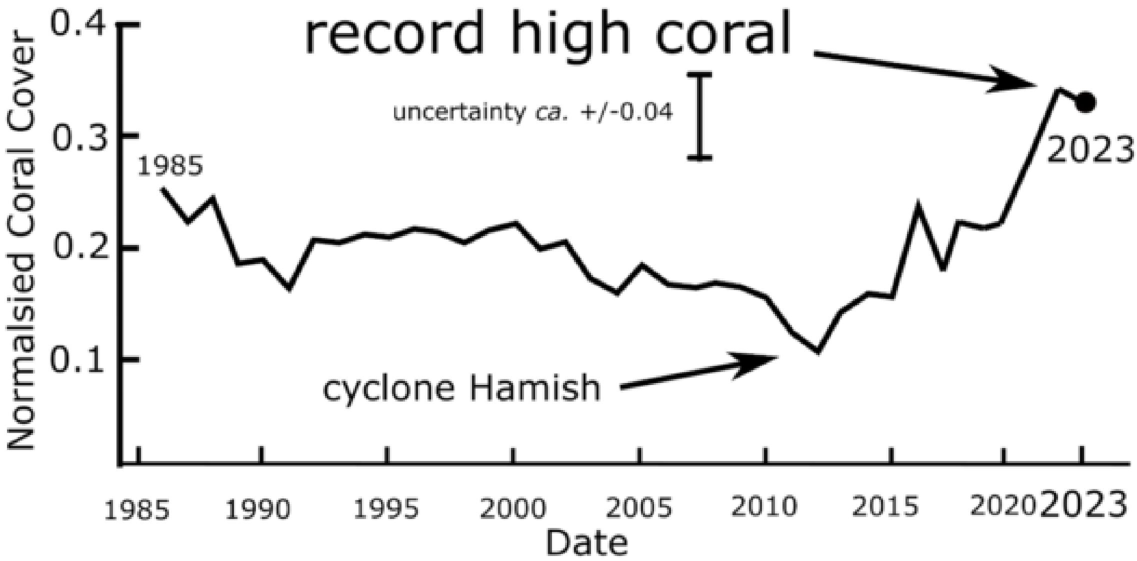

2023??

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2022??2016??2017??2020??2022??4??
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> ??????????????????AIMS??????2023???
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> ??60????????????????????
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> ???Australian Environment Foundation???51?????????
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Posted in ???, ????? | No Comments »

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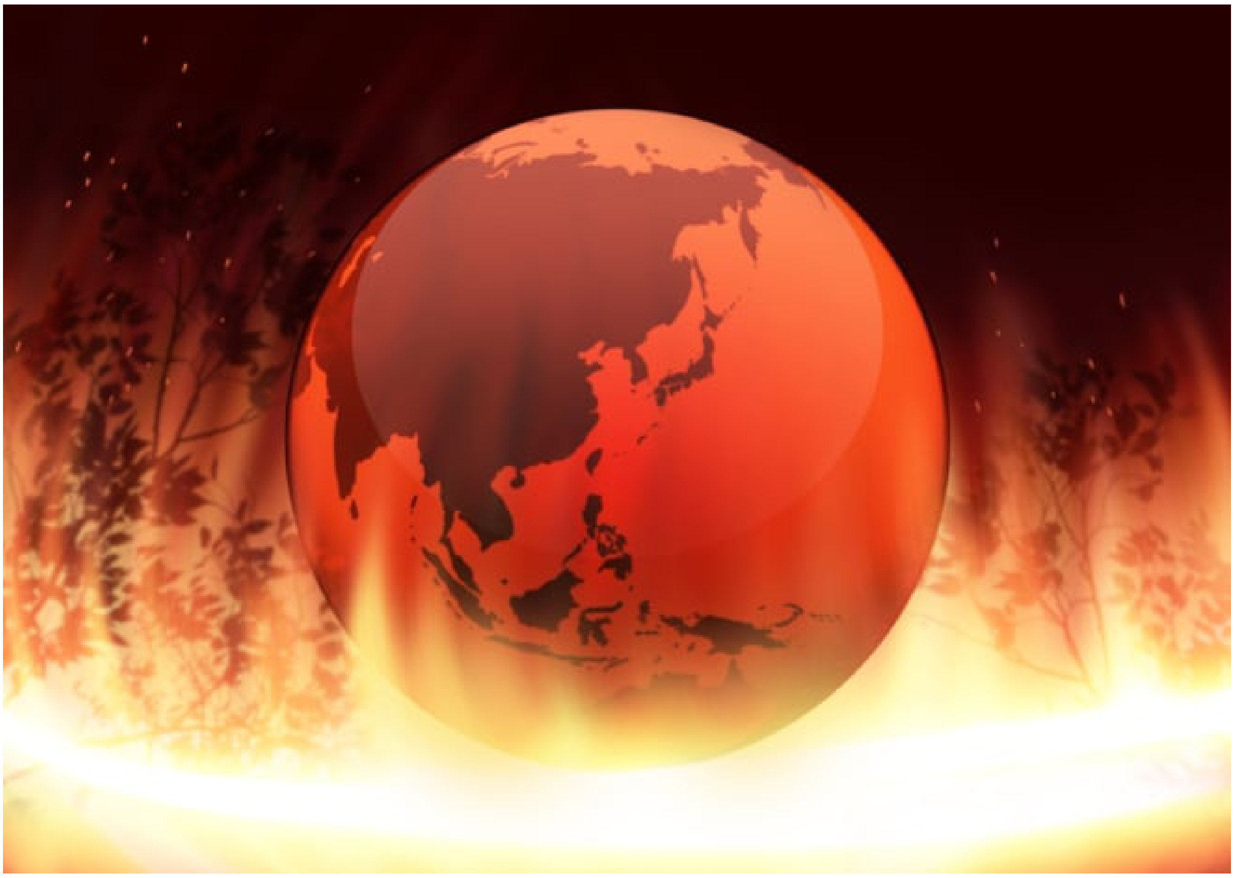
?? ?? · Thursday, August 17th, 2023



Tr6/iStock

???????????????????????????global warming??????????global boiling???????????

“????”????????????????7??

> 2023?7??“????”?????????????
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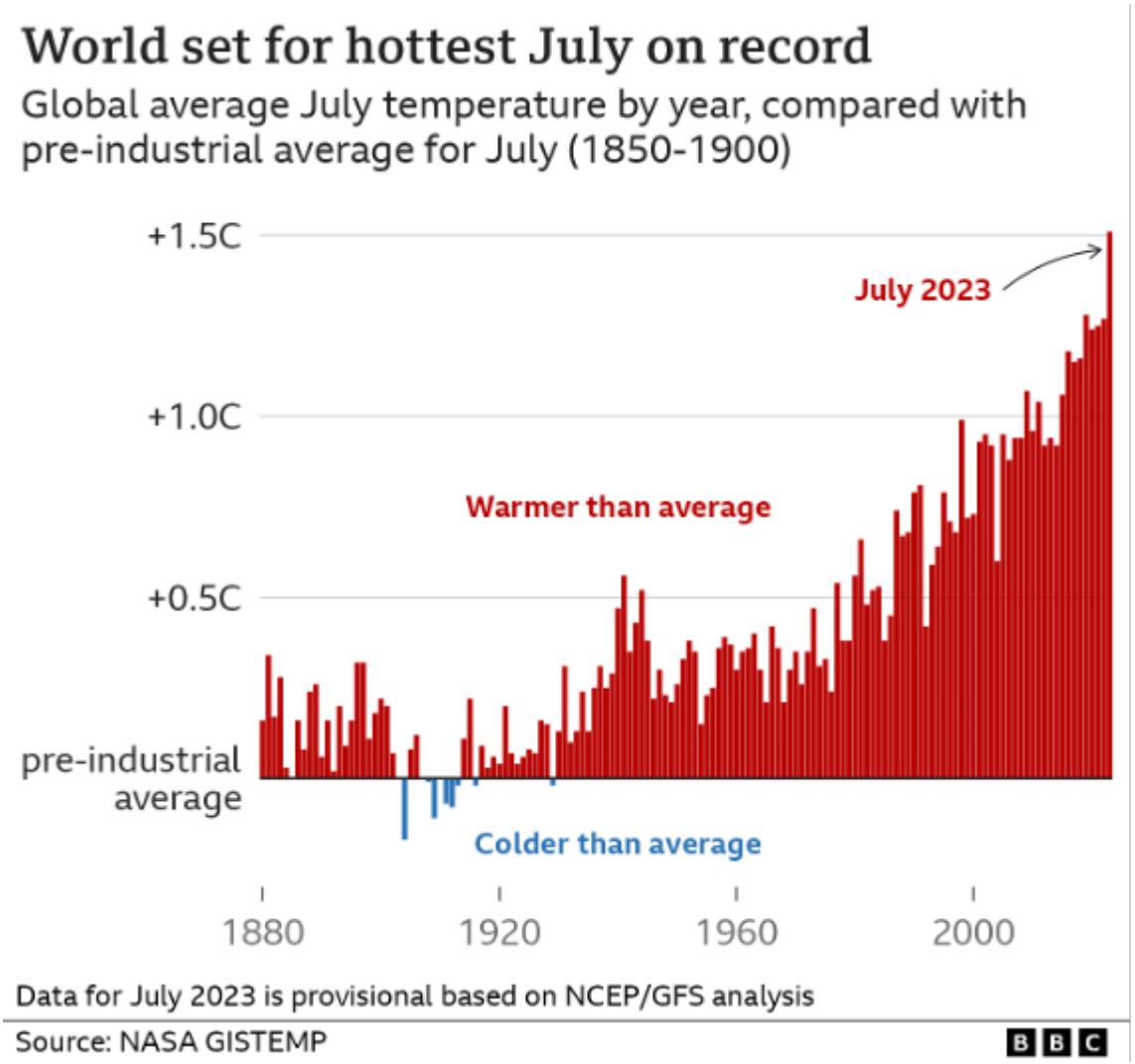
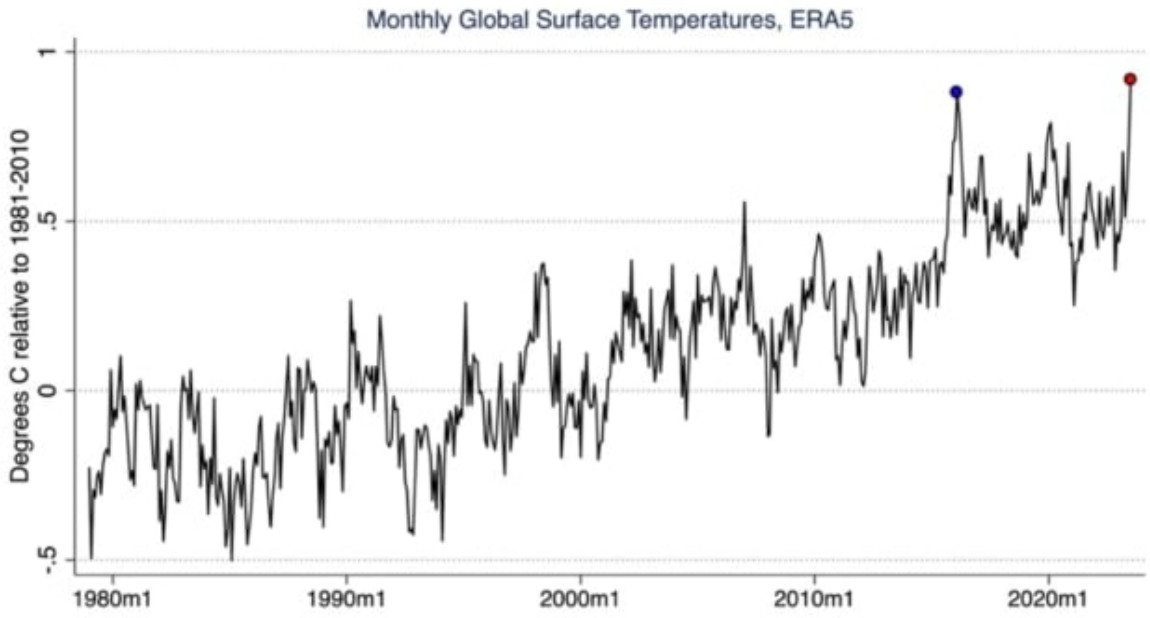


?1?BBC??

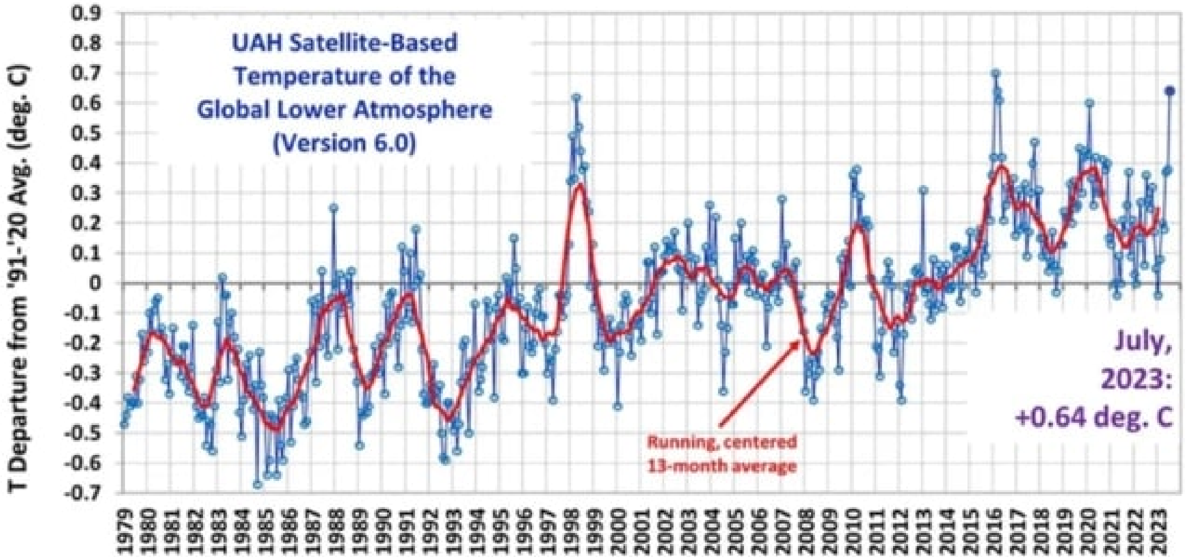
??????????????????????????????2??????????????????ERA5???2??????????



?2???2??????

???Climate Etc.

????????9000???????????????????UAH??????3?????????



?3?????????
???Climate Etc.

???????2????????????2023?7???????????????????????????3??????????????????????????????

?1???2?3?????????????1?7??????????????????7???
?????????????????????????????

???2??3??????2???????????????????????????2????1???????3??????3????????????????????????????
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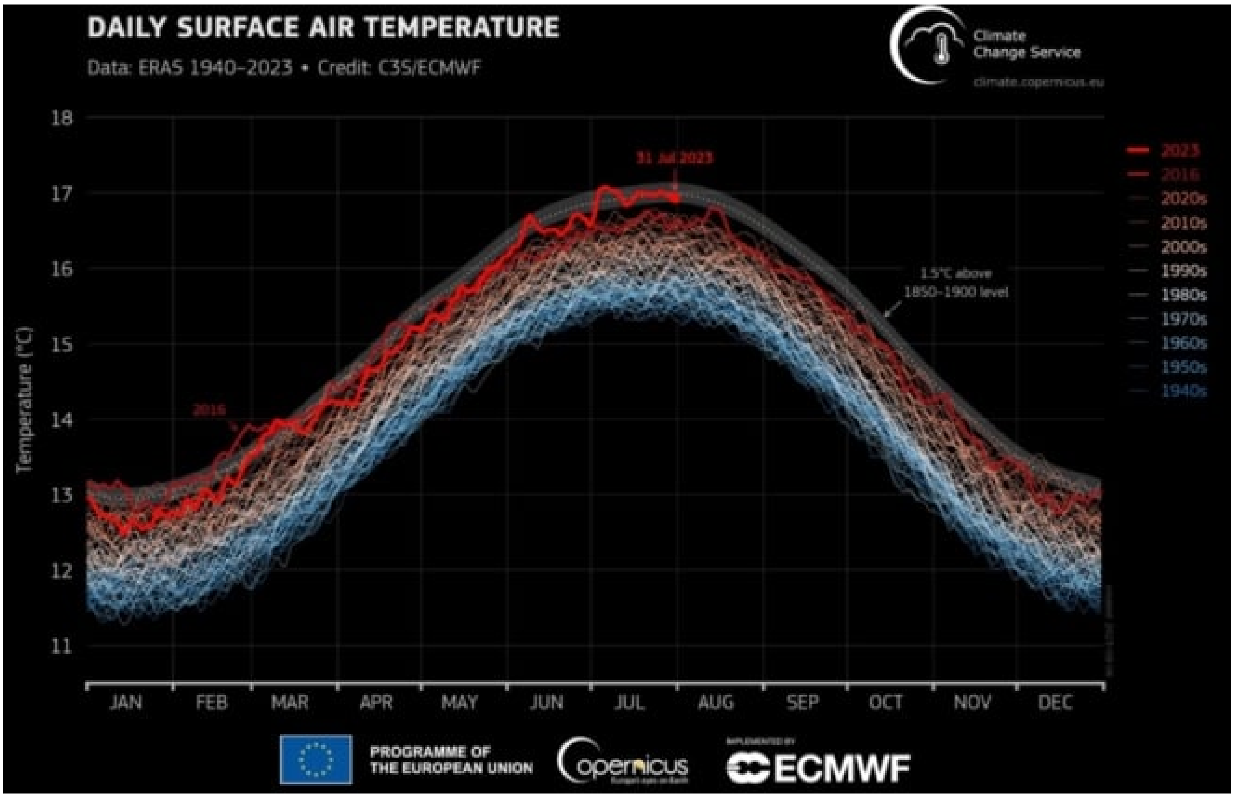
?????2023?7????????????????????????4??????????????????1???12??????????????????????1?????7
??????????????????????????????????????2023?7???????????????????????????



?4

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??1???????????1??7??4???7??

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2023??2022??2015????????2020??CO2???

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Posted in ???, ????? | No Comments »

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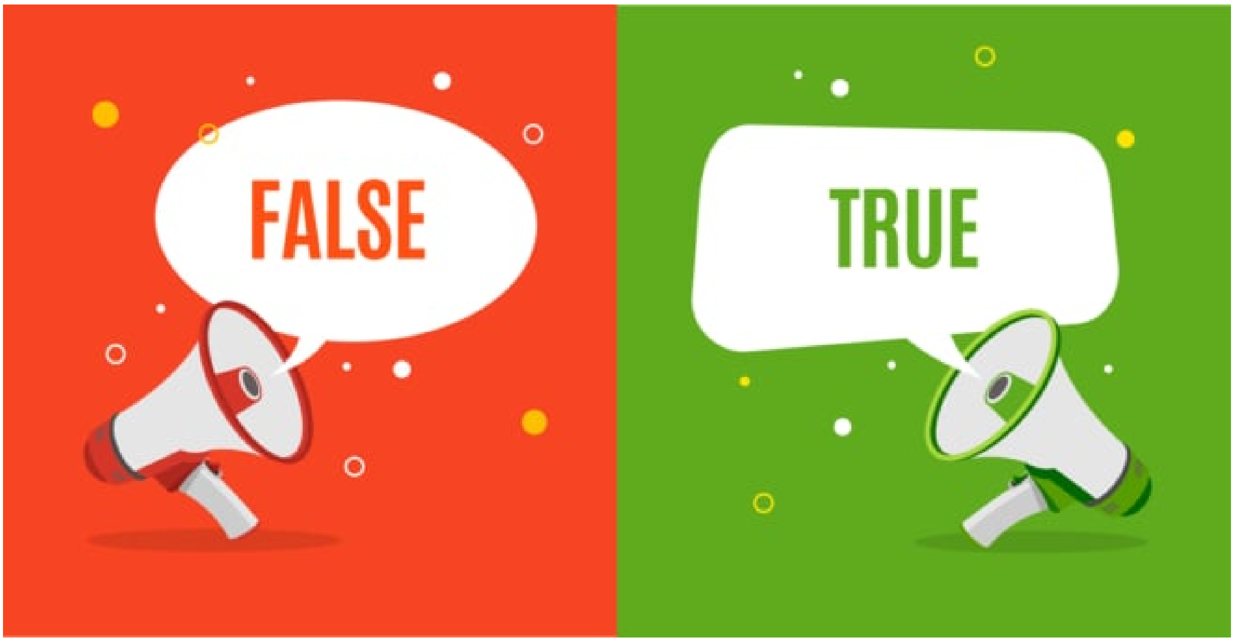
?? ? · Saturday, August 5th, 2023



nidwlw/iStock

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> ??CO2????????

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??CO2????????????????????????????????CN???????????
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??CO2?????CN?????????????

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???2009?4?????14????????
??S. Matsuda?" Validity of Bio-Ethanol as a Countermeasure against Global Warming", J. Environ. Inf. Sci. , Vol.37, No.5, pp.1-6 (2009.3)??

????????????????????CO2???

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???CO2??
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?? ??CN????CO2?????????????

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Posted in ???, ??????????? | No Comments »

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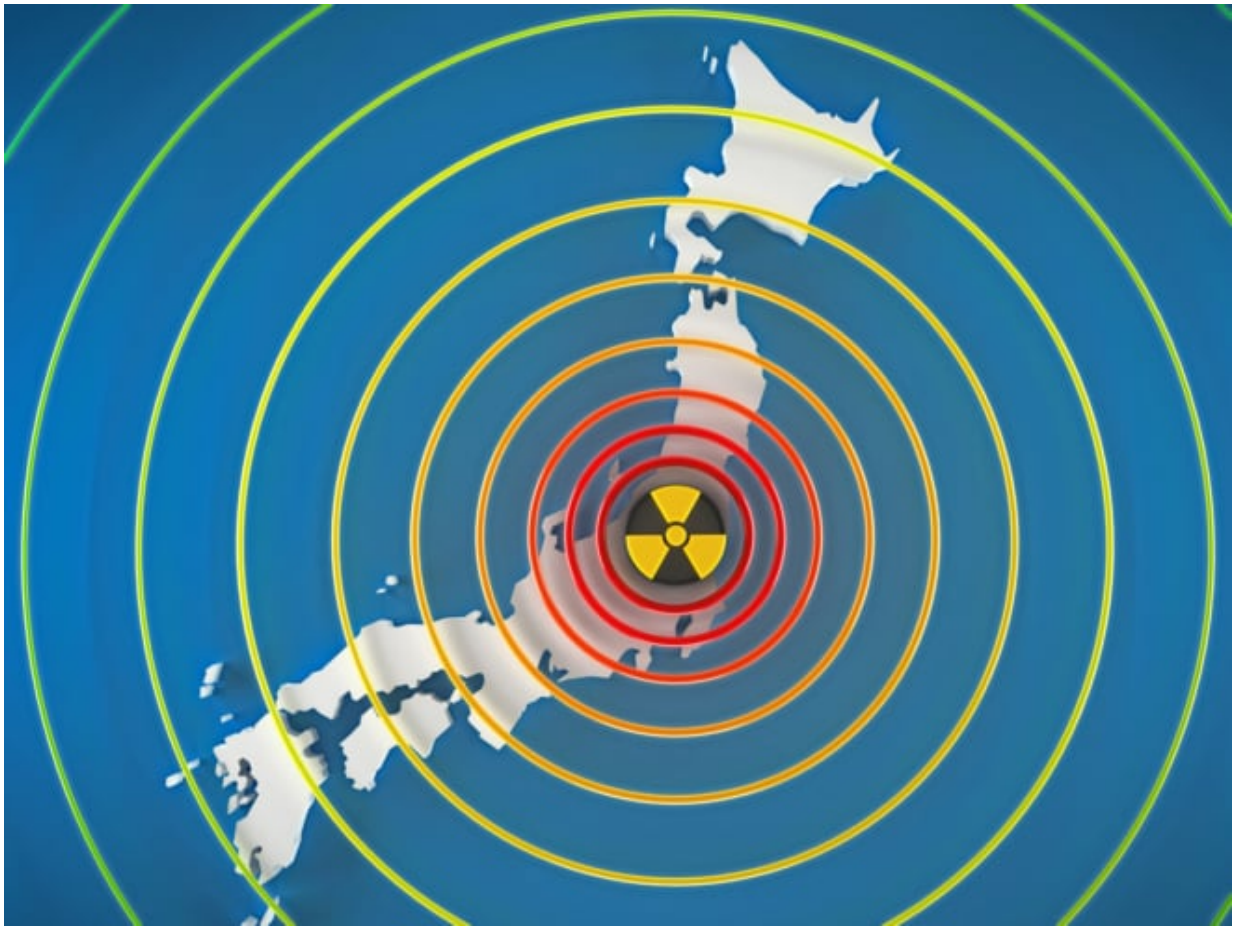
?? ?? · Thursday, August 3rd, 2023



adventtr/iStock

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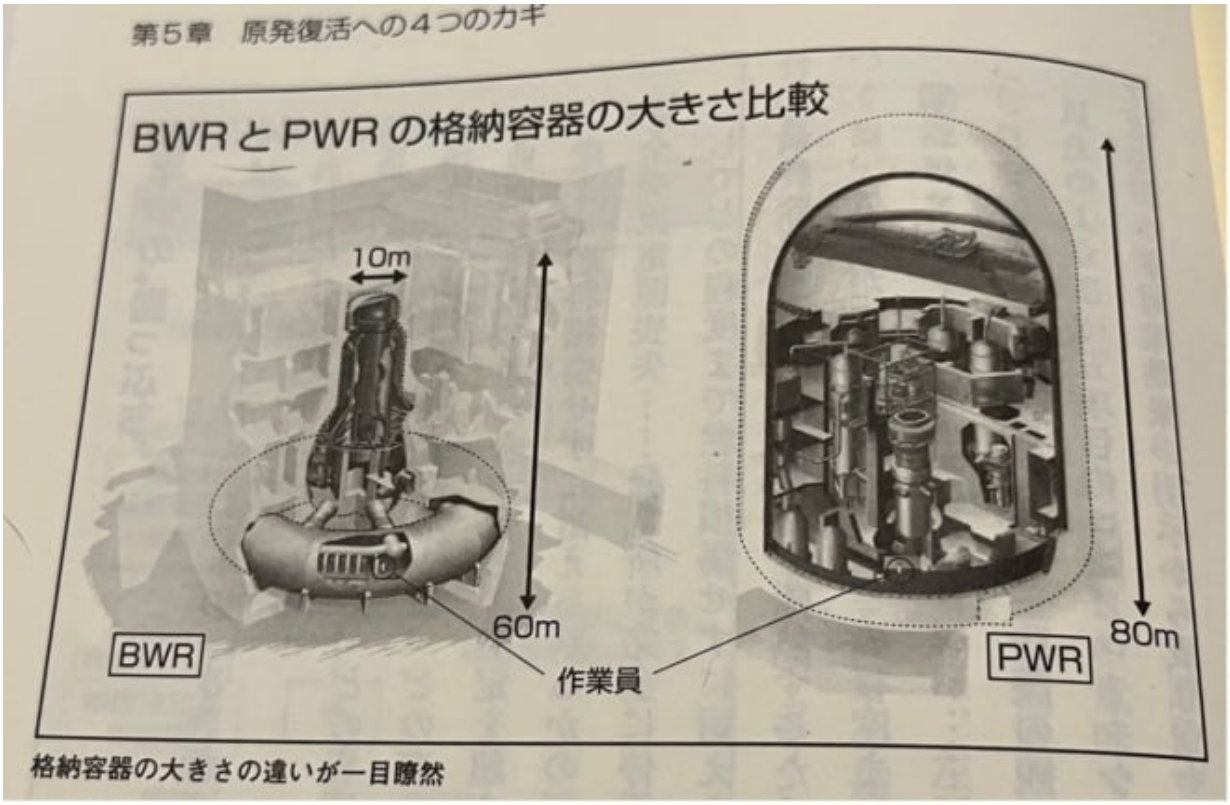
? B W R /Mark?I??????????????????PWR???



?????????????BWR/Mark-I?????????????PWR?????????????
??????????????????2012, WAC, 219????

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3.11????????????PWR??H?????????????
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3.11?????????????? ?????????

2011?3?25??

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50km????????????????—???????????????

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©? japan.cnet.com

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> 250??????????5000????????????????250???????????????????????????????????5000
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??2014??7?26???Vol.56, No.10, p. 62 (2014)??

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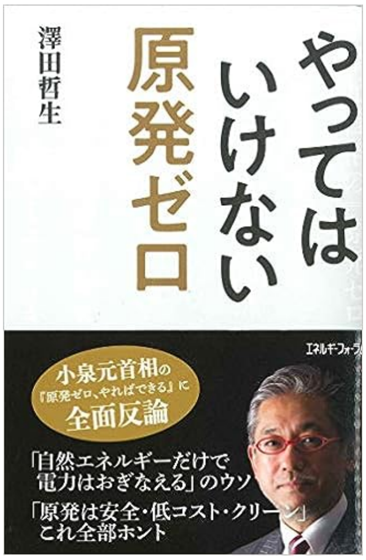
???100??1??????????????????????????3?????????????????



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Posted in ???, ????????? | No Comments »

“???????”????? ??????????????

?? ??? ?? · Wednesday, August 2nd, 2023

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bluejayphoto/iStock

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7?27?????????WMO???EU??????????????????????????2023?7?????????????????????????????????
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???100?????????CO2??????????????????????
???7???
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???CO2???????????????????

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??????????7?????????????130???

??CO2?????????????????????????

?????????7?????????????????????????????WMO???COP?????????????

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Posted in ???, ??, ????? | No Comments »

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?? ? · Monday, July 31st, 2023

7?22??????????G20???2022???????????
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NHK??

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> **?others??**?????????????????????????????**???????????**

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???????????by or around mid century????????????????????G20????????????

??????????1.5??

Posted in ???????????, ???, ????? | No Comments »

IPCC AR6??????“???”????

?? ?? · Sunday, July 30th, 2023

??6?23??????IPCC???

???????????????3???????IPCC??6???????AR6???????????????

??????????????????1.5??????????????????????????GHG???????7?????7???????????????????????????????????????

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????AR6???GHG??

?????????????6?????????????????AR6-SPM???????????????Longer Report???

NicoElNino/iStock

AR6??COP26????????????????????2?????1.5???????????????????IPCC????????????2014???5????
?AR5????2021?????????1.5??

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?????????**2????67?????????**????????????1.5???????????????????????**????????????????????5 0?????1.5???????**?????????????????????

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???1.5?????????**?????????????????**?????
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???????1.5??????????2019??????????????????500?????CO2e?????????2??????????1150?????????
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???2020????????????50?????GHG????????????1.5?????????????????10??????23???????7????????
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?????????????????????????????IPCC?????????1.5????2????????????????????0.5???????????????
?????????????????650????????????????

???AR6-SPM?TableSPM.1?????2???????????????????????????GHG?????2050??2019??64?????????2030??21???????????????????????2070??????????????Table SPM.1?1.5?????????????????2030?43??2050?84????????????????????????????????[?22?]?

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??0.2?0.3??????????????
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???AR6????1.5???????????????????????1.7?1.8?????????????????????????????????????1.5?????
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??1.5?????????????????AR6-SPM?P26????????

> ????1.5??????????????????????????????**?????????????????????????**?1.5???????????2
> ???[?4?]

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????**????????1.5???**?????????????????????IPCC?AR6????**???????**?????????????AR6??????????
????1.5??2???????????????????????????1.5???
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2????????????2030?21??????GHG????AR6-SPM?C.2.4???

???1.5???????30?43??50?84?? ???????AR6-SPM?C.2.5?????????????????????

> **???imply???**[?]
> [5?]?

????????????1.5???
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???????AR6???
?????????????[?6?]??
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?????IPCC AR6??????????????????????????1.5??
?????????????????????2?????????????????????????????????????1.5????????????????????????????????
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>
> ??1.5???2??????????????????????????1.5?????????????????????????????????????
>
> ???1.5???5?????????1.5??????????????

? ? ? ? ? ? I P C C
AR6???1.5???

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?1?AR6-SPM?B5.2?????????1.5??

?2???????GHG??????CO2????????????1.5????2050?99????2030?48????????????30????50???????????????

?3?AR6.SPM?C.2.4?"Even without accounting for all the benefits of avoiding potential damages the global economic and social benefit of limiting global warming to 2°C exceeds the cost of mitigation in most of the assessed literature" (medium confidence)

?4?AR6-SMP P26 ??50?"The evidence is too limited to make a similar robust conclusion for limiting warming to 1.5°C. Limiting global warming to 1.5°C instead of 2°C would increase the costs of mitigation, but also increase the benefits in terms of reduced impacts and related risks, and reduced adaptation needs."

?5?AR6.SPM C.2.5: "Ambitious mitigation pathways imply large and sometimes disruptive changes in existing economic structures, with significant distributional consequences within and between countries."

?6?AR6-SPM E.1.3: "Strengthened and coordinated near-term actions in cost-effective modelled global pathways that limit warming to 2°C (>67%) or lower, reduce the overall risks to the feasibility of the system transitions, compared to modelled pathways with relatively delayed or uncoordinated action."

Posted in ???, ????? | No Comments »

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?? ? · Saturday, July 29th, 2023

BrianAJackson/iStock

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??IAEA??????????????????????????????????
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Posted in ???, ????? | No Comments »

??????CO2??????????????????????

?? ?? · Thursday, July 27th, 2023

JaCZhou/iStock

??????CO2??????????????????2023?7?4????????????????????????????????Enrico Mariutti??????????????????????????????The Dirty Secret of the Solar Industry???

??????????????CO2??????????????????????????????CO2????????????IEA?IPCC???????????? ??????????????????

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- ??CO2?????????
- ????????????????????????????????CO2??????????????????????????
- ??????????????????????????CO2??????????
- ??????????????????????????CO2??????????
- ????????????????????????????????CO2??????????????????????????

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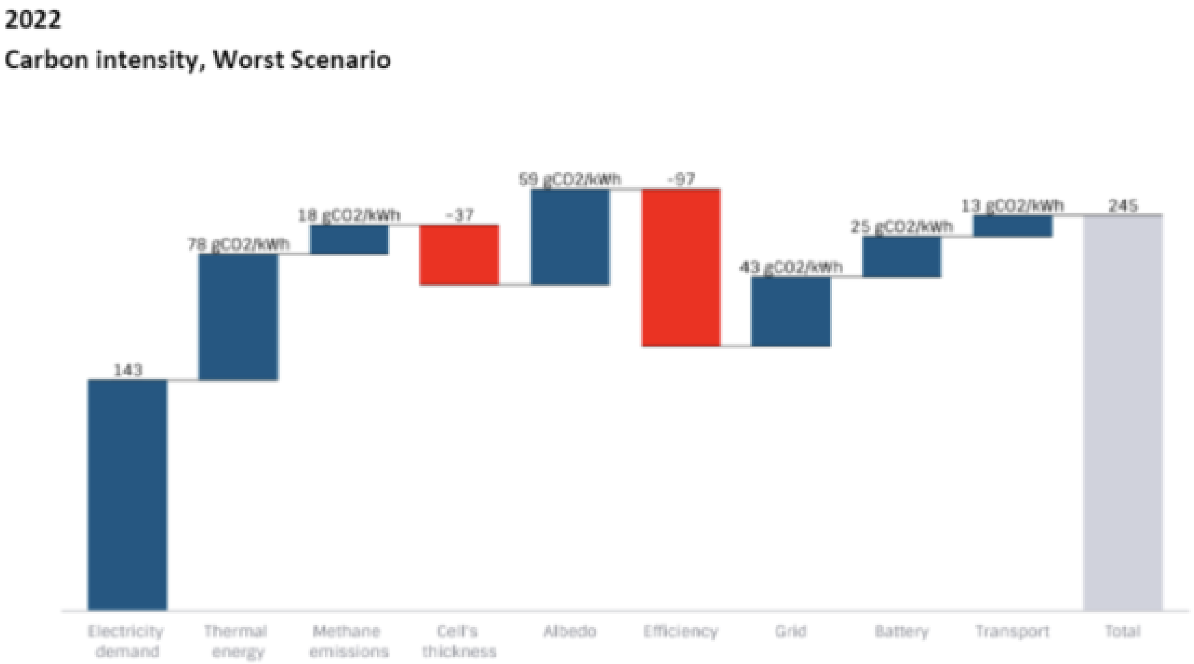

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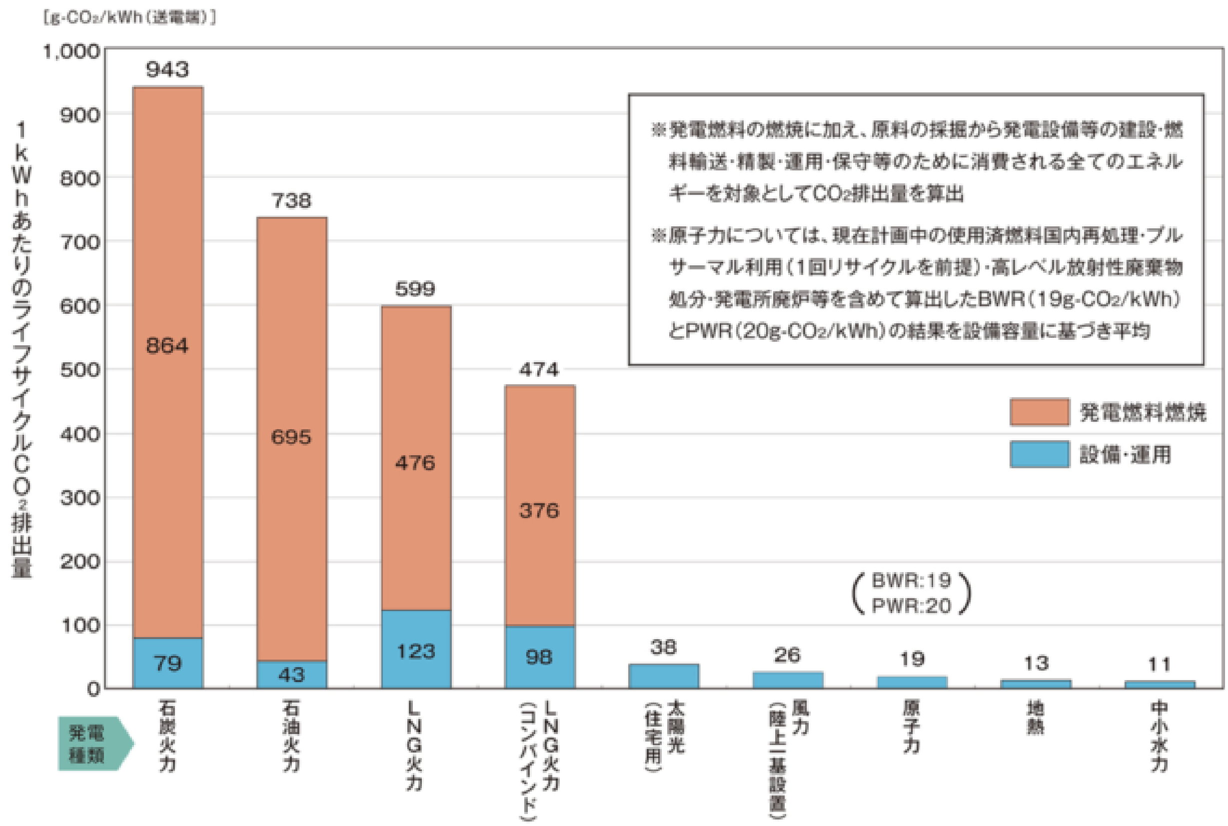
??????????????????????????????????????CO2????????????????????????????????CO2??????????
?245???????

??1kWh???245???2016????????????????????
?????kWh???38?????????2????????


[g-CO2/kWh(送電端)]
1kWhあたりのライフサイクルCO2排出量
1,000
900
800
700
600
500
400
300
200
100
0
943
864
79
738
695
43
599
476
123
474
376
98
38
26
19
13
11
※発電燃料の燃焼に加え、原料の採掘から発電設備等の建設・燃料輸送・精製・運用・保守等のために消費される全てのエネルギーを対象としてCO2排出量を算出
※原子力については、現在計画中の使用済燃料国内再処理・プルサーマル利用(1回リサイクルを前提)・高レベル放射性廃棄物処分・発電所廃炉等を含めて算出したBWR(19g-CO2/kWh)とPWR(20g-CO2/kWh)の結果を設備容量に基づき平均
発電燃料燃焼
設備・運用
BWR:19
PWR:20
発電種類
石炭火力
石油火力
LNG火力
LNG火力(コンバインド)
太陽光(住宅用)
風力(陸上一基設置)
原子力
地熱
中小水力

?2??????????

??????????????CO2??????????????????????????????????????9????????????????????????????
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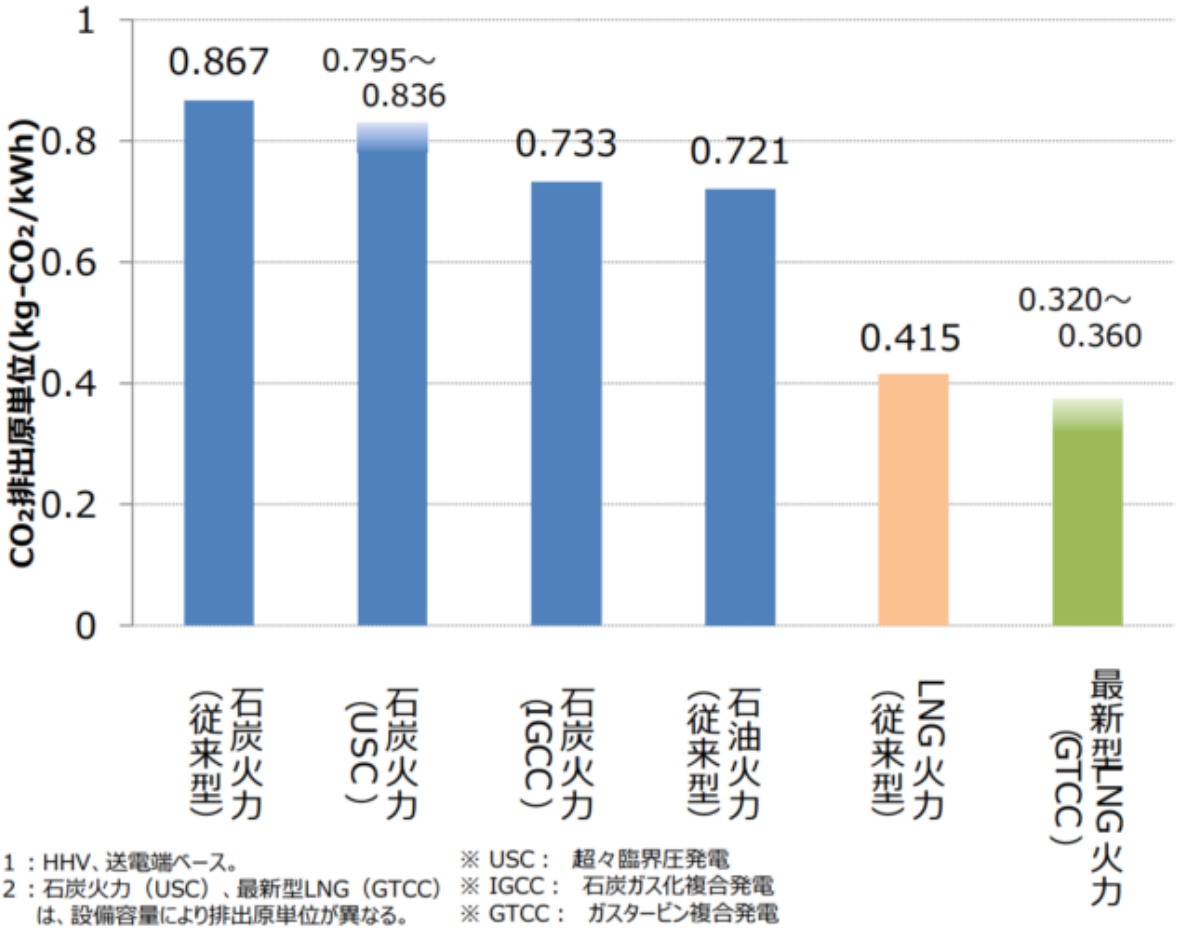
1kWh???245????CO2????????????????????????????????2022????????????????????????????????
??LNG??????????CO2??????1kWh???320??360?????????????3??



?3??????

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> ????????????????????????????????CO2??
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??????????????????????????CO2??
?????????????????????????????

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Posted in ???, ????? | No Comments »

??????EV????????????

?? ?? · Friday, July 21st, 2023

??????????????EV??EPA?EV?
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EV?????????????????????????????????

jetcityimage/iStock

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??EV???
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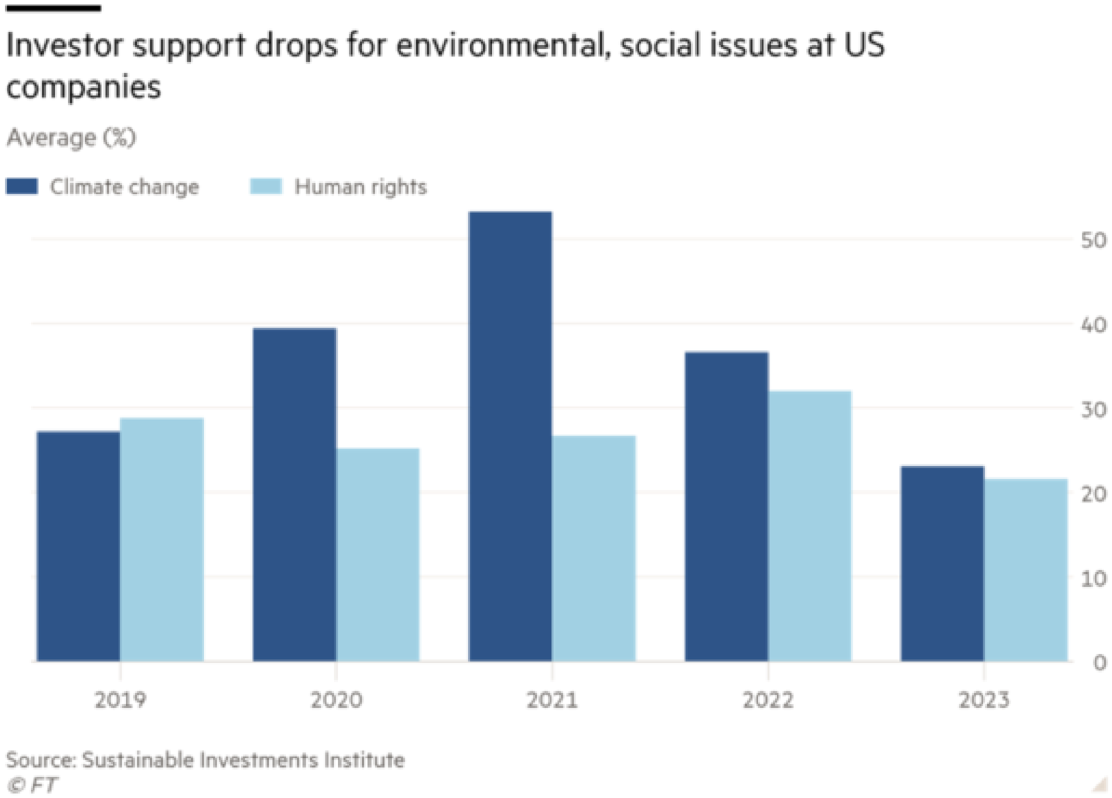
?????????????5??????????????????????????????????3?????????ESG????????????????????????????????????
????????????????????

????????????4,000?????????????????????????????3???
???

????????EV?????

??????????????????????ESG?????????????????????????????



FINANCIAL TIMES??

??????????????????????????????????????EPA??
??????????????????????

4?12??EPA???2032????????????????????
????67??EV??????????????????50?????????????35??????????????25??EV???????

?????EPA???67???????????EV??
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??EV?????????????????????????????????????
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?????EPA?????????????????????????????EPA???????????????????

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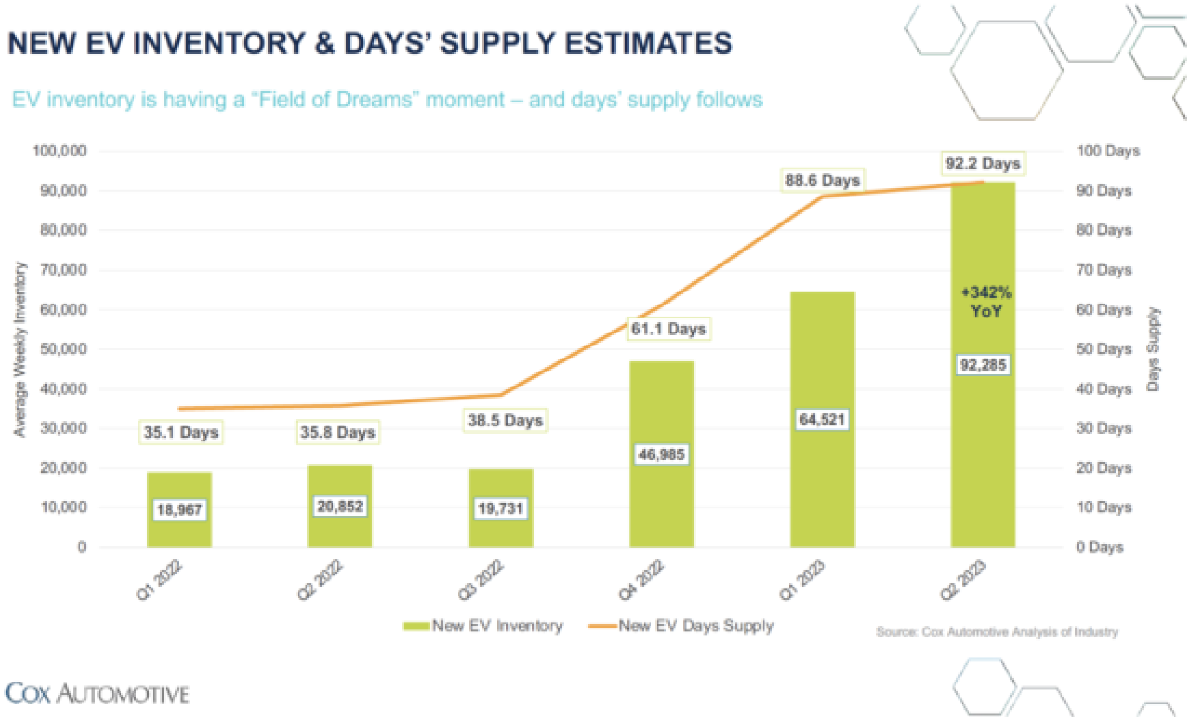
????????????????????EV?????????????????????????????JD?????????????EV??????????????????????
???3??????????????21??EV?????????????????????????????1??17.8????????

???10????EV???
????????????????????EV??????????????

2023 Cox Automotive Mid-year Review???????2023???2?????????????????????????????
92,000??????????2022????2?????????342% ????????



EV???????????????????

??????????2050????????????????????????????????????EV??

??12??????????????????????????????EV??????????????????????????????????

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Posted in ???, ?????, ?? | No Comments »

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?? ? · Thursday, July 20th, 2023

??G7???????????????????????????????????COP???

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NickS/iStock

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Nobel Physics Laureate 2022 Slams 'Climate Emergency' Narrative as "Dangerous Corruption of Science"

????????narrative??

??300???
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???300???????????????????????????????????

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?????????????????????????????21?5????????????????????????

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????CO2????????????????????CO2????
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1???100???0.72??1979????????????????1.4
?????IPCC??????????3?5??????????????????????????

2????CO2?????????2ppm??????????4?????40????????????????????CO2???????????IPCC????????
?????????CO2?????????????????CO2???????????????????????????????????

???????????????????????CO2????200????????????????IPCC??????????????????????????????200
???????CO2?????????5?????????????????CO2?5???????2ppm????5????0.1ppm????????????????
????????????????????????????????????2ppm?????????????

??????????????????CO2?????????????????????????2009???????????2021??????????????????????
????2022????????????????????????????????CO2??

???????????0.1ppm??????????????20?????????????0.02ppm??????????????????????????????????
????????????????????????????????

3???????CO2???CO2????????????
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??CO2???
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???????????????????????????????IPCC??

???
????CO2??

1??????CO2??????CO2???????2????CO2????????????????3?????????????????????????????

3???1???????????????????CO2?????????????????????????

???????????1??2?????????????3?????????????????????????????????????? ?????????????????????

???CO2???????????????CO2??
???????????????????????????????CO2???

??1000???????????1000???????????
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???TV??????????????????????????????????
????????????? 10???????????????????????????

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Posted in ???, ????? | No Comments »

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?? ?? · Wednesday, July 19th, 2023

Max Lirnyk/iStock

????????????????????????????????? ??????????????????Electric Vehicles for Everyone? The Impossible Dream??????????????????????????????????

??????????????????BEV??????????????????????????????????ICE??????????????????????????????????BEV??????
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> EV??I
> CE????EV????????????????????????

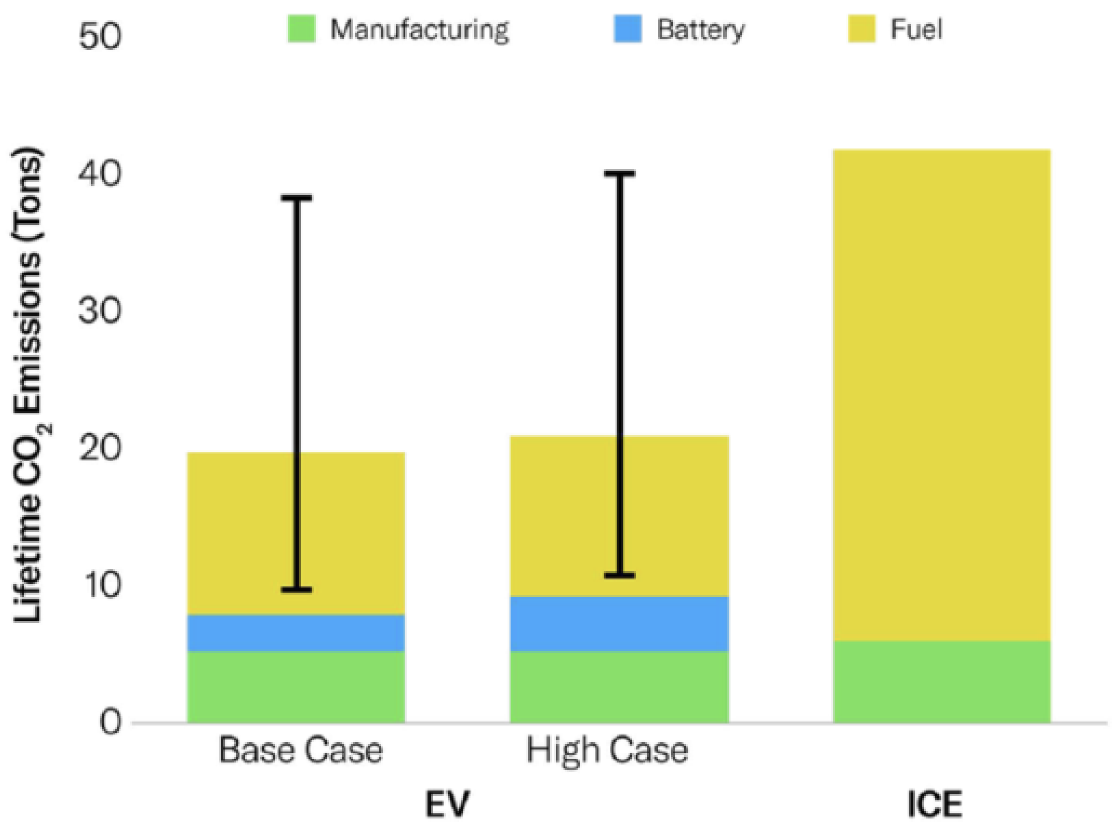
??????2????????CO2?????????????EV????CO2????????????????????????????

??1?CO2

???BEV???ICE????????????CO2????????????????

Figure 3

Estimated Life-Cycle Emissions for EVs vs. ICE Cars, per IEA



Source: IEA, "The Role of Critical Minerals in Clean Energy Transitions"

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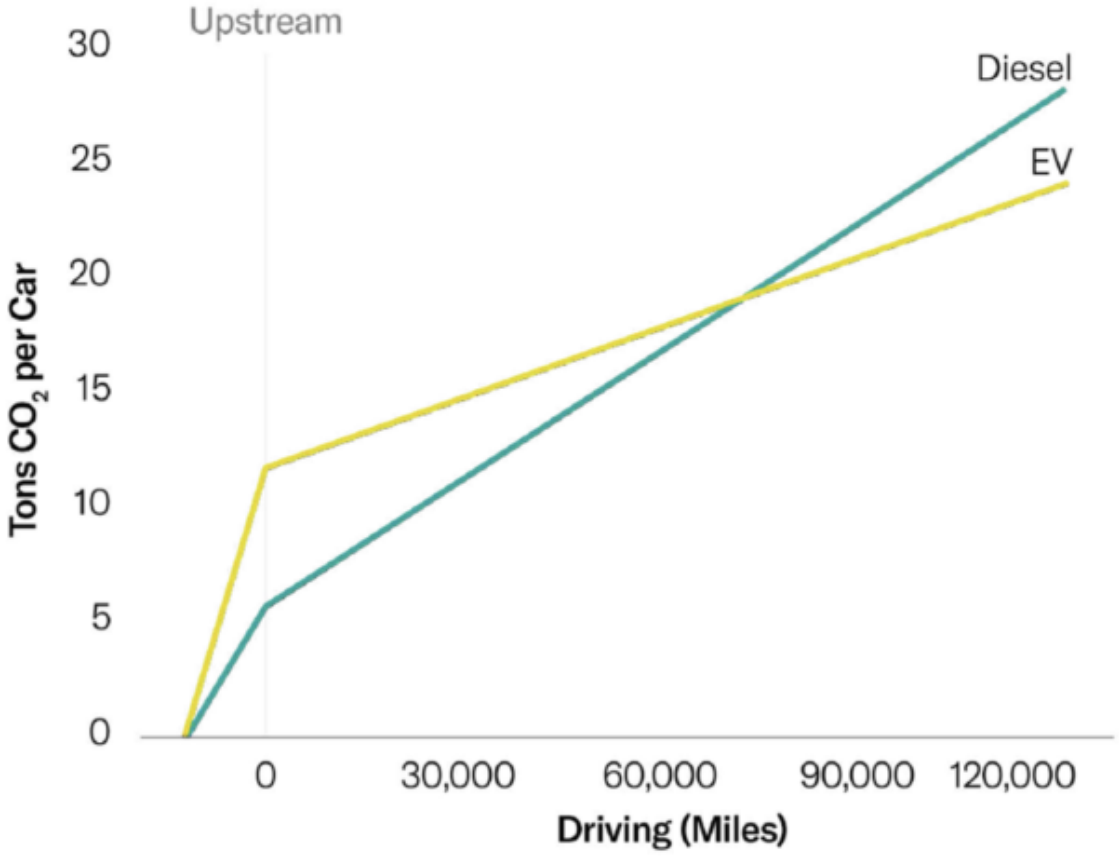
????IEA???????????????????????????????????NZE?? ?????????????????????????????????

?????????ICE?EV????????CO2???????????6??????????????????EV?????CO2?????????????????? ???EV?????????????

Figure 4

Life-Cycle Emissions: Volkswagen EV vs. Diesel



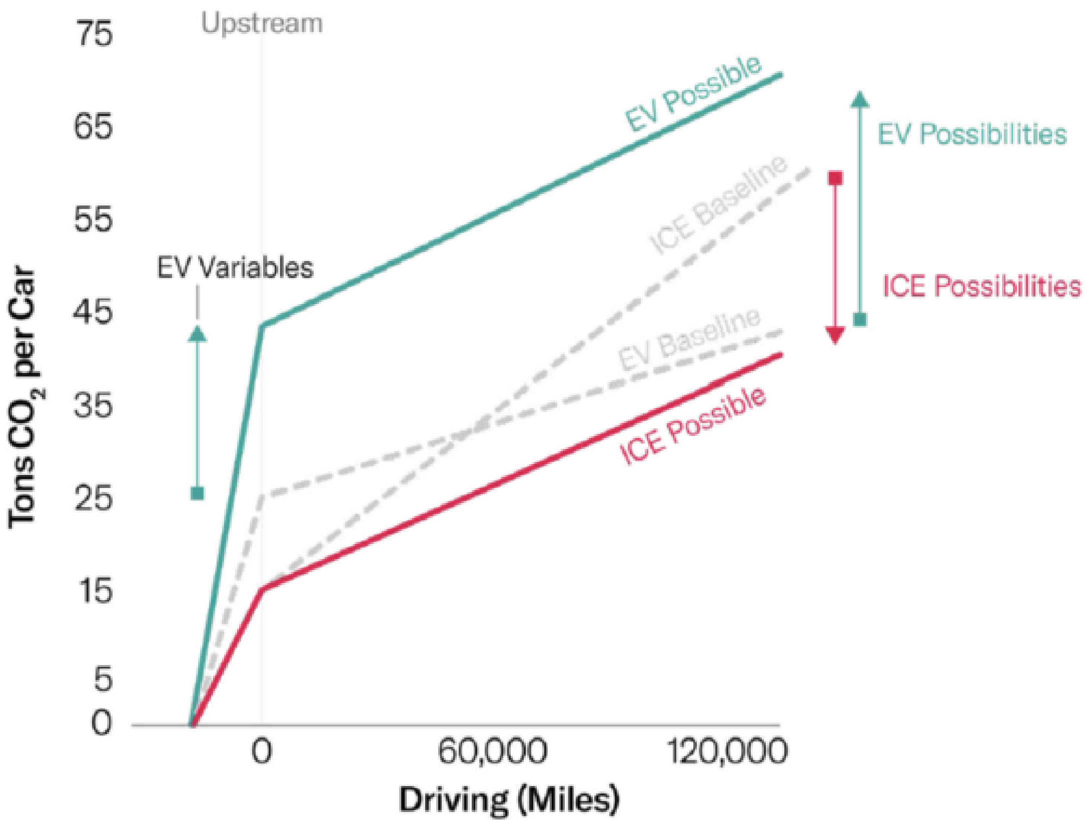
Source: Maciej Neugebauer, Adam Żebrowski, and Ogulcan Esmer, "Cumulative Emissions of CO_2 for Electric and Combustion Cars: A Case Study on Specific Models," *Energies*, Apr. 6, 2022

??????????????????EV??????????????????EV????CO2??????????????????????????????ICE??????????
????????2???

??????????????????EV????????CO2??????????ICE??????????????????????????????????12????????
?EV???ICE???CO2????????????????????????

Figure 6

EV vs. ICE CO_2 Emissions: Scenarios with Known Unknowns



Source: Author's calculations from multiple data sources in this report; see Appendix

???2????

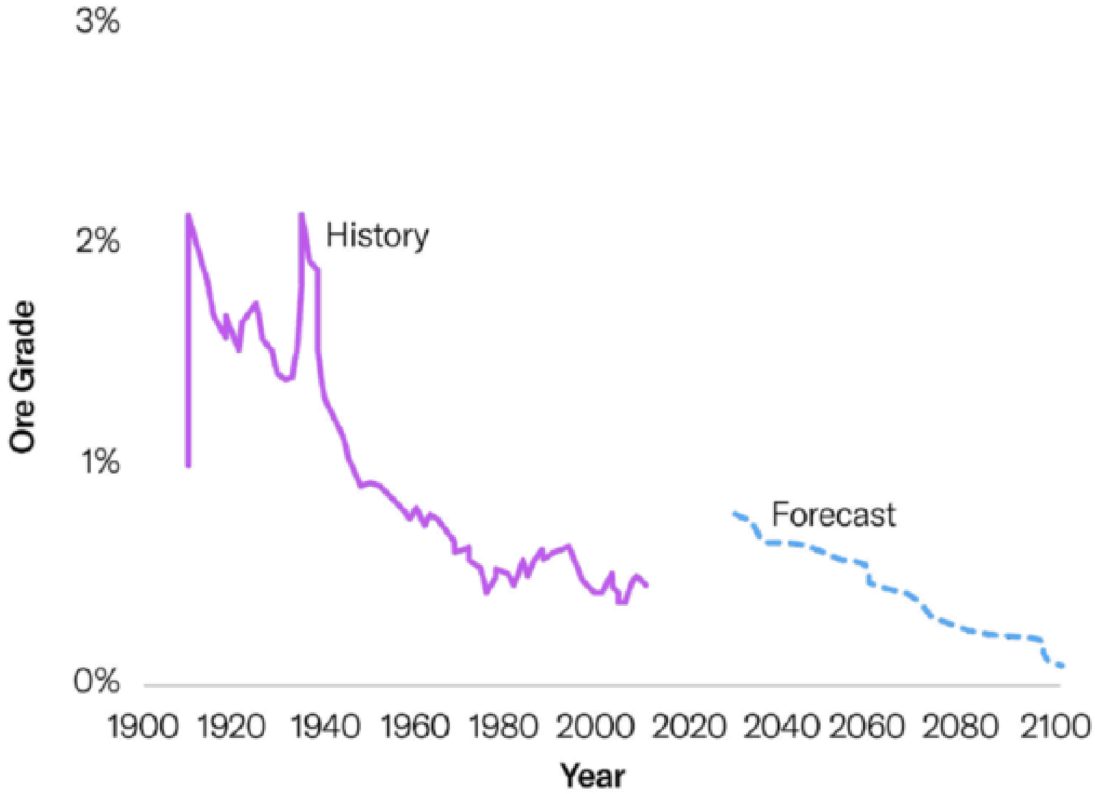
CO2????????????1????????????????? EV???ICE????????????????????????????

???1????????????????????EV???

????????????????????????1???2?????????????????0.5??
????????????????????

Figure 8

Two Centuries of Global Copper Ore Grades



Source: S. Northey et al., "Modelling Future Copper Ore Grade Decline Based on a Detailed Assessment of Copper Resources and Mining," *Resources, Conservation and Recycling* 83 (February 2014): 190–201

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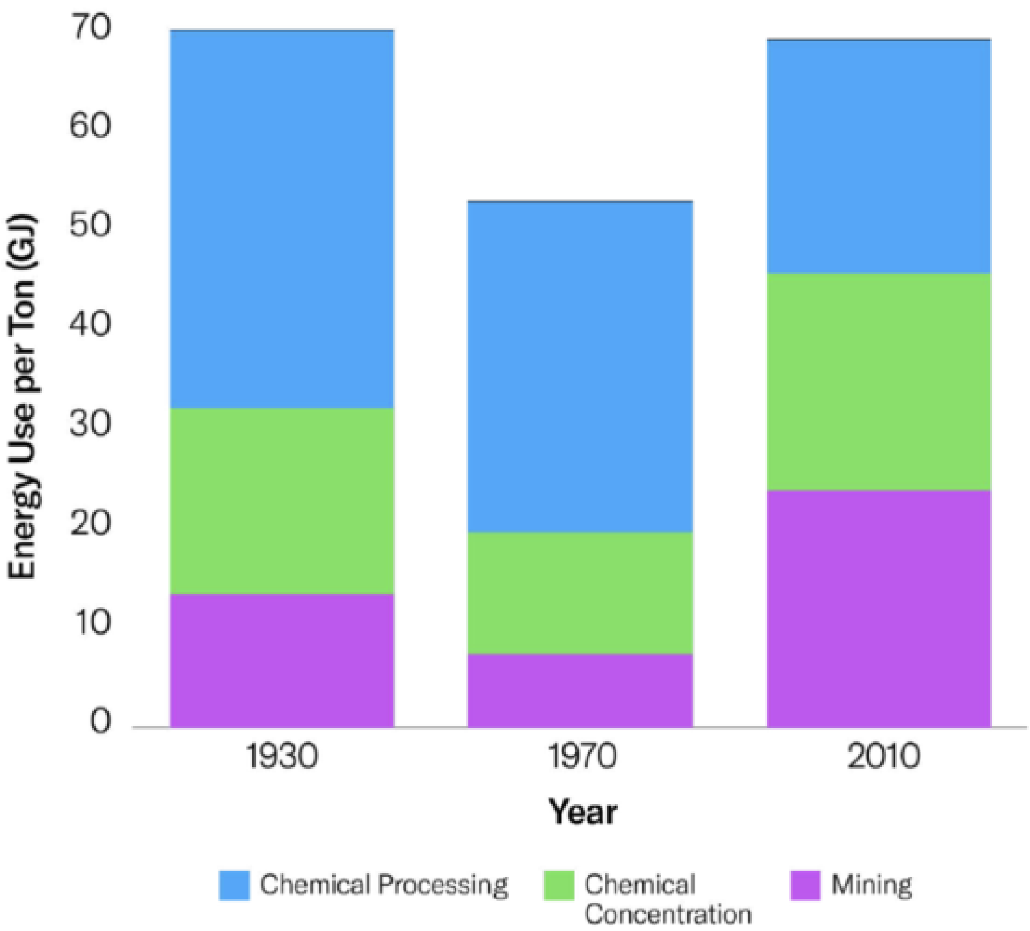
?????????????mining?????????chemical concentration???BEV????????????????????

Figure 10

Copper Production: Technology Trends in Energy Use per Ton



Source: Nadine Rötzer and Mario Schmidt, "Historical, Current, and Future Energy Demand from Global Copper Production and Its Impact on Climate Change," *Resources* 9, no. 4 (April 2020)

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> ??ICE?HEV??????????????????? ??
>
> ??????EV???????????????????????????????????EV???????????????????ICE??EV??? ???????????????????????CO2?????2????????????????????????????????????
>
> ICE??? ??????????CO2???????????????????????????EV???????????????????????

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Posted in ???????????, ???, ????? | No Comments »

?????????20?????????

?? ?? · Sunday, July 16th, 2023

Douglas Rissing/iStock

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7?11???Blackout-News???

> ????????????????10???????1?????????????????????????????

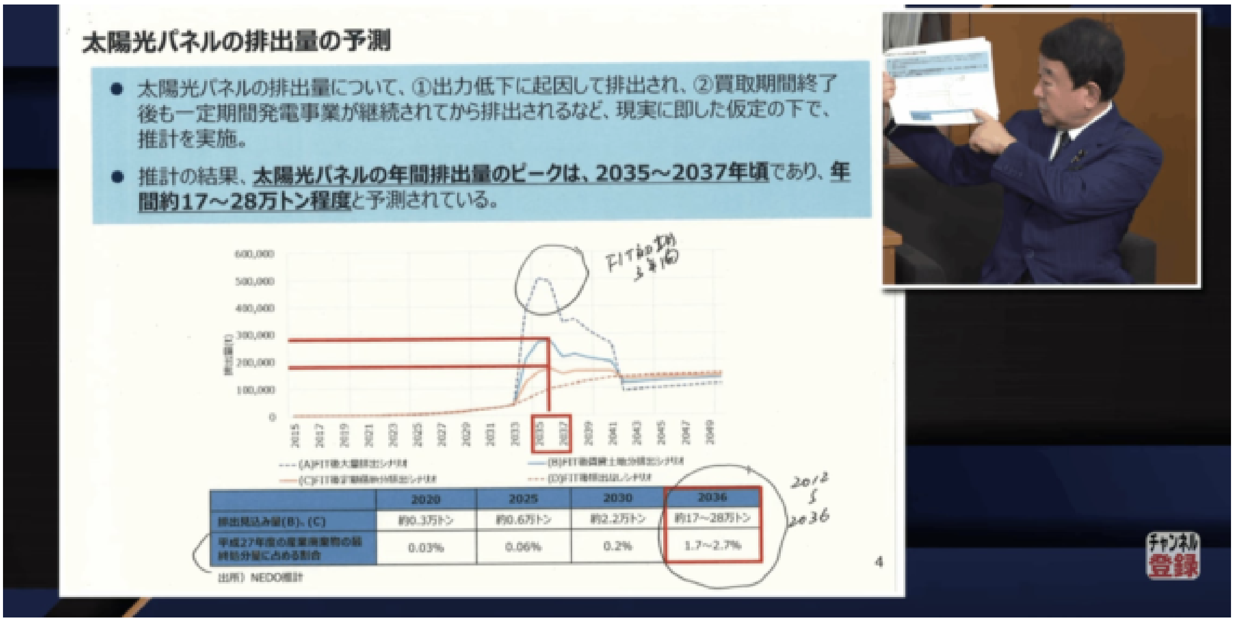
> ??????????????????????????????1?????????????????3?????5?????????????

> ???????????????????????????1???3?????????????????????????????????12????25???
> ?????????????????????????1?????????????

> ??
> ??????????????????

????????????????????????????????2030???
??

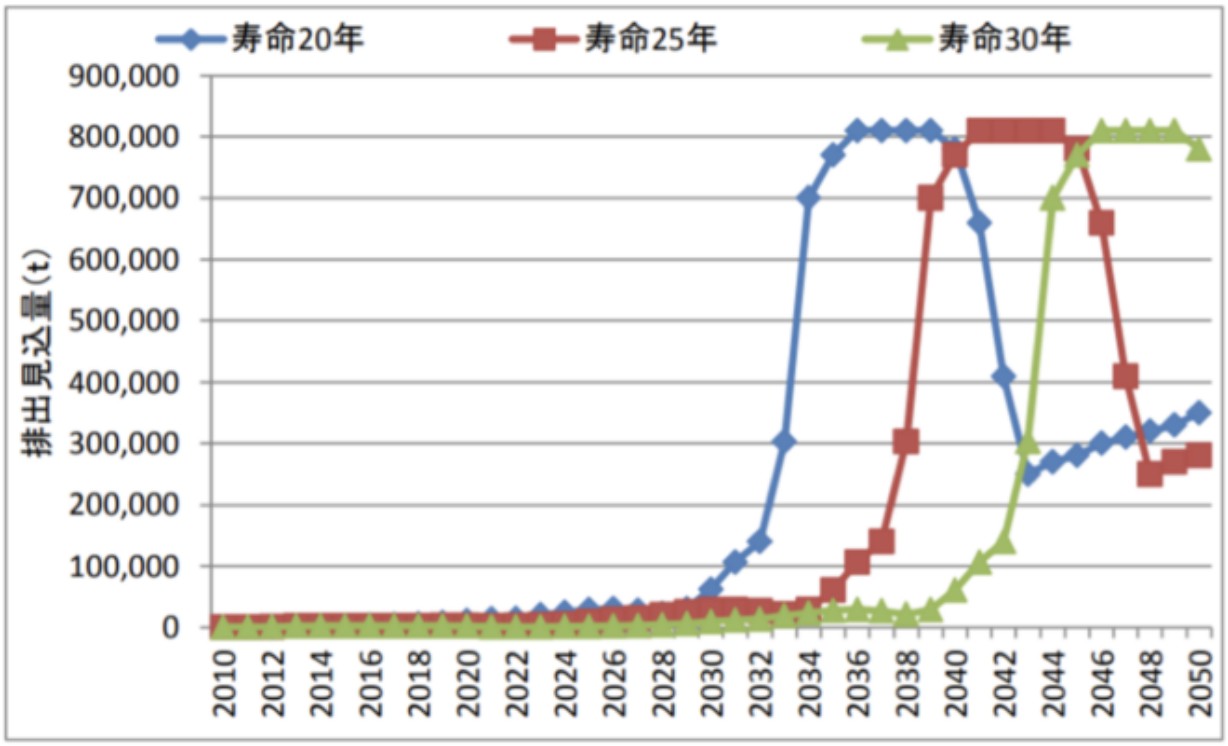
??2035?????????????????2015???????????????3%?????
????????????1??



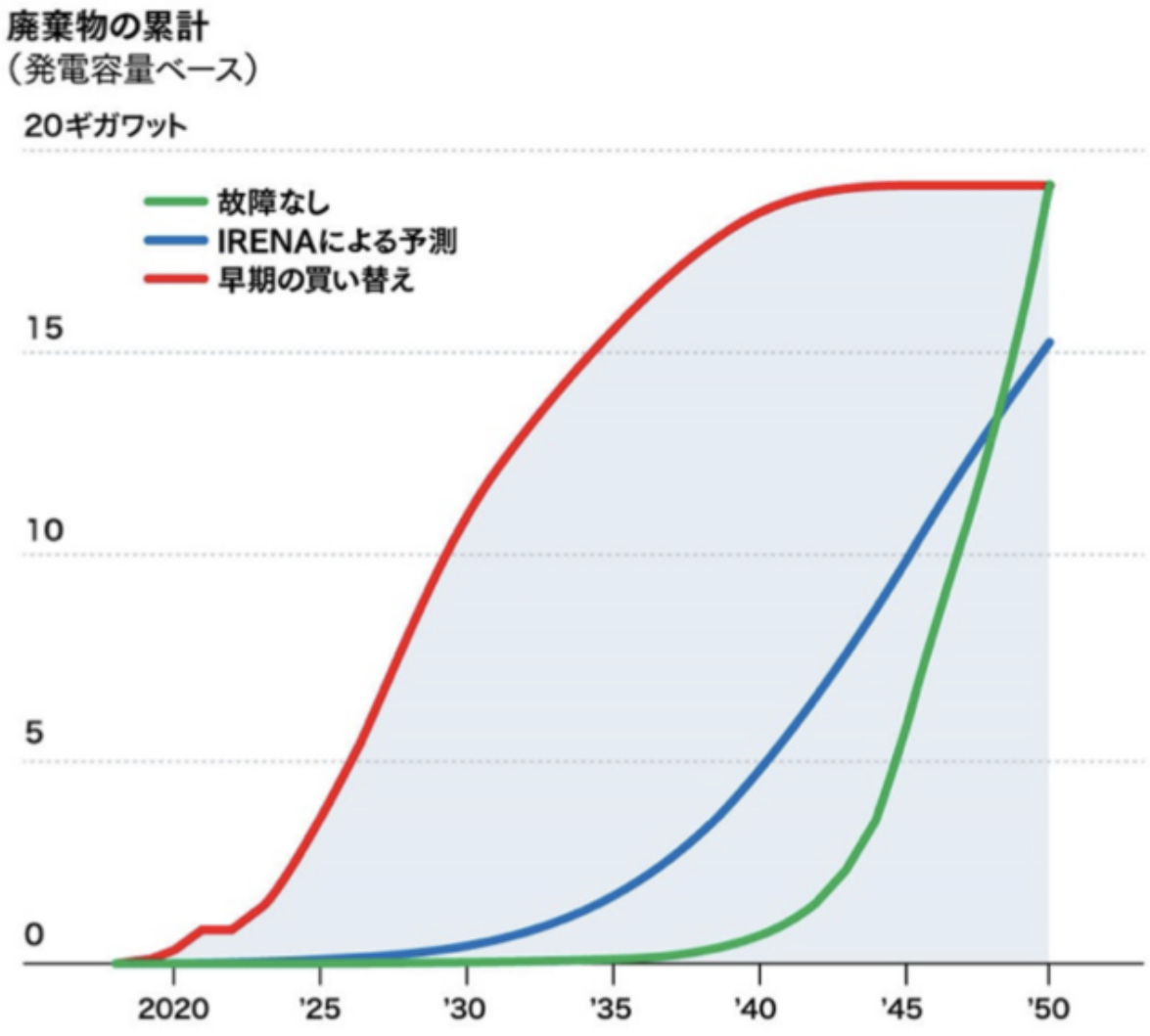
?1??????????????
???????????????????????446????????????????????????????

?????????????????????????9???????????1??10%??
??

????????????????????????2035?????????????2???3??


寿命20年
寿命25年
寿命30年
排出見込量(t)
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
2048
2050

?2?????????????????20?25?30??
??????


廃棄物の累計
(発電容量ベース)
20ギガワット
故障なし
IRENAによる予測
早期の買い替え
15
10
5
0
2020
'25
'30
'35
'40
'45
'50

?3?????????????????
???DIAMOND ???????????????

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??????????????????????????PCB?????????????????

> **?PCB???**
>
> PCB??Poly Chlorinated Biphenyl??????????????????????????
> ????????????PCB??
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> **?PCB????**
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> ???PCB???????????????
> ?????????1968????43???????????????????????????PCB????????????????????????????
> ??????????43?10??
> ??????????????????????????????????

> **?PCB?????????**
>
> PCB????????????????????????????????1972????47?????????????????????30?????????
> ???
>
> ??13?6?22???????????
> ??????????????????????????PCB ?????????????7?15????????????

1972???PCB???????????????????????????????PCB????????????????????????????2001??PCB???????
2004????????????????????JESCO??30??????????????
????PCB???????????

PCB??????????2016???????????????????JESCO???????????????????????????????????PCB???????
????????????????????????????????????PCB??
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?? ??? ?? · Sunday, July 9th, 2023

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A Critical Assessment of the IEA’s Net Zero Scenario, ESG, and the Cessation of Investment in New Oil and Gas Fields.

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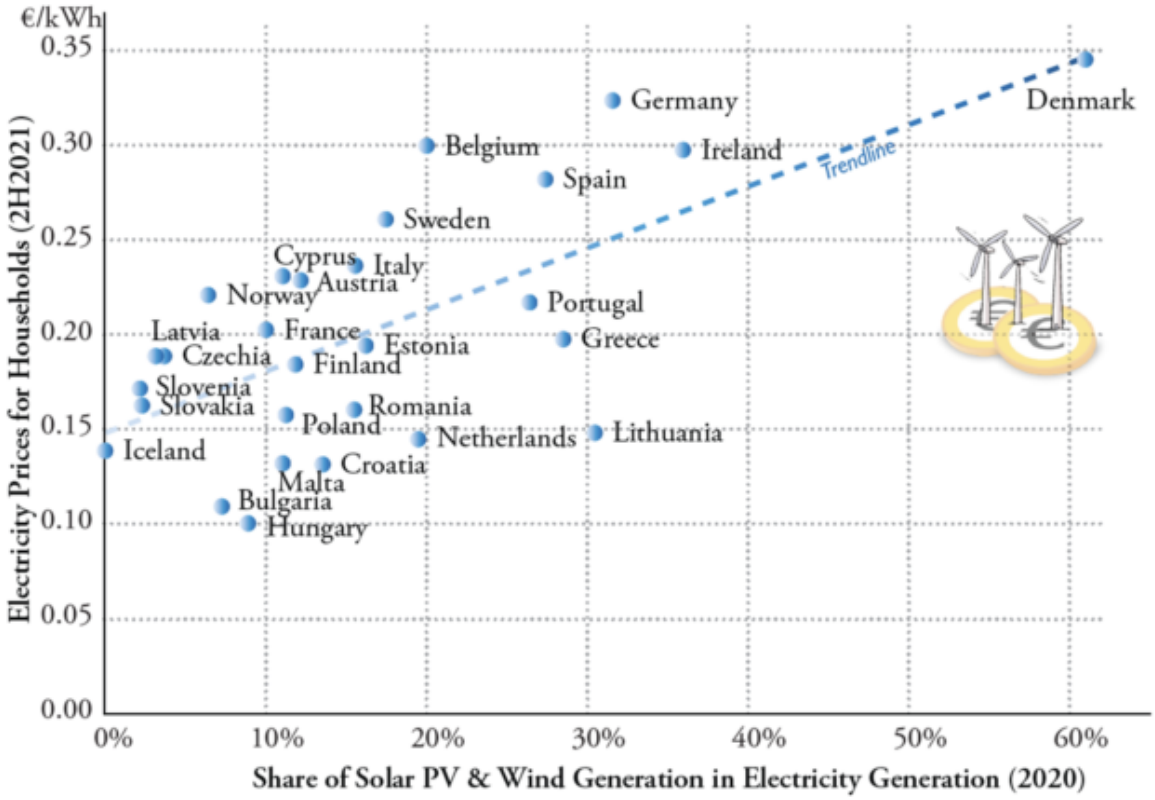
Figure 46: Solar and Wind Penetration and Electricity Prices in Europe



Source: Energy Policy Research, Eurostat, IEA

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IEA?NZE?????????????????????????????????????2050??
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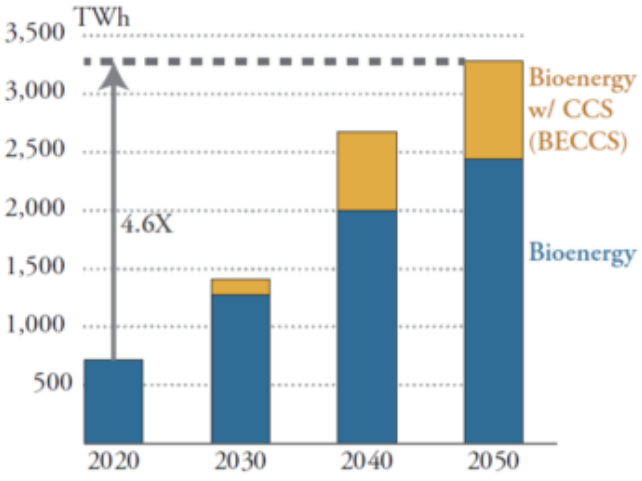
Figure 23. Bioenergy for Electricity Generation in NZE

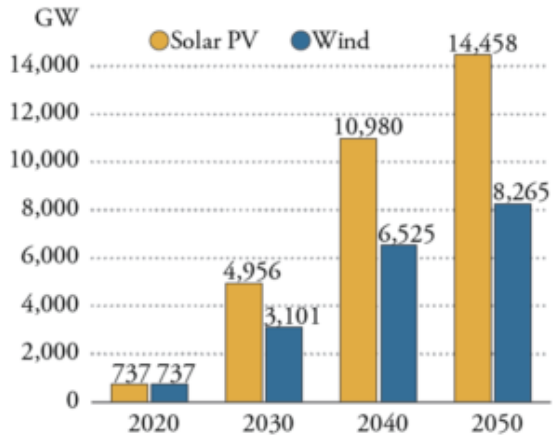


Source: IEA, *Net Zero by 2050* (2021)

Figure 24. Global Land Requirements for Bioenergy for Electricity Generation in NZE

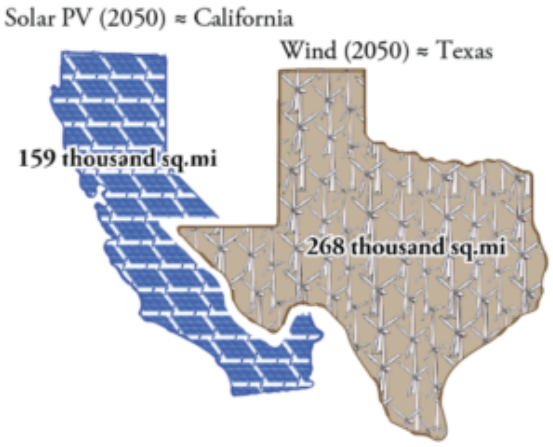
Source: Energy Policy Research. Land requirement calculations made using FreeingEnergy.

Figure 25. Global Solar and Wind Capacity in NZE



Source: IEA, *Net Zero by 2050* (2021)

Figure 26. Global Land Requirements for Solar/ Wind Farms in NZE



Source: Energy Policy Research based on NZE
Assumes sufficient/optimal grid infrastructure (transmission, storage) and current rate of efficiency

	万 km2	日本＝1
メキシコ	197	5.2
フランス	55	1.5
カリフォルニア	42	1.1
テキサス	70	1.8
日本	38	1.0

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CHUYN/iStock

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EV???????????????

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A Critical Assessment of the IEA's Net Zero Scenario, ESG, and the Cessation of Investment in New Oil and Gas Fields.

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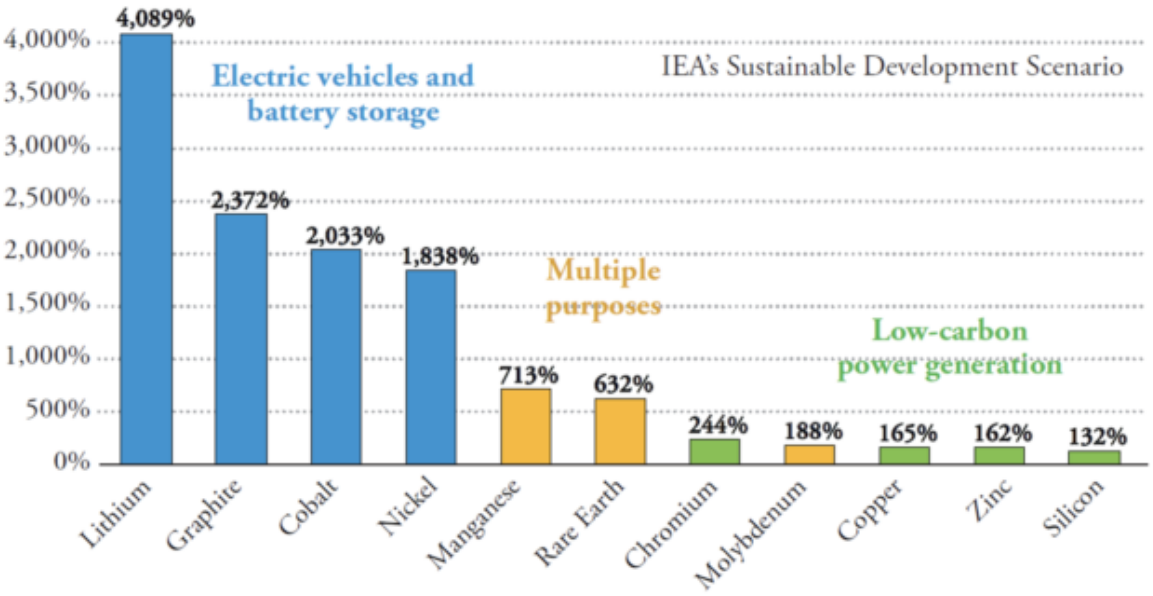
Figure 33. Required Growth of Critical Mineral Supply (IEA's SDS scenario, 2020–40)



Source: Energy Policy Research, IEA, *The Role of Critical Minerals in Clean Energy Transitions* (2021)

???EV??60kWh??????????????????????
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Table 13. Battery Chemistry by Content, Kg (60 kWh Lithium-Ion)

Mineral/Metal	NMC811	NMC523	NMC622	NCA+	LFP
Lithium	5	7	6	6	6
Cobalt	5	11	11	2	0
Nickel	39	28	32	43	0
Manganese	5	16	10	0	0
Graphite	45	53	50	44	66
Aluminum	30	35	33	30	44
Copper	20	20	19	17	26
Steel	20	20	19	17	26
Iron	0	0	0	0	41

NMC811 Nickel (80%) Manganese (10%) Cobalt (10%)
NMC523 Nickel (50%) Manganese (20%) Cobalt (30%)
NMC622 Nickel (60%) Manganese (20%) Cobalt (20%)
NCA+ Nickel Cobalt Aluminum Oxide
LFP Lithium iron phosphate

Source: Bhutada, G. VC Elements

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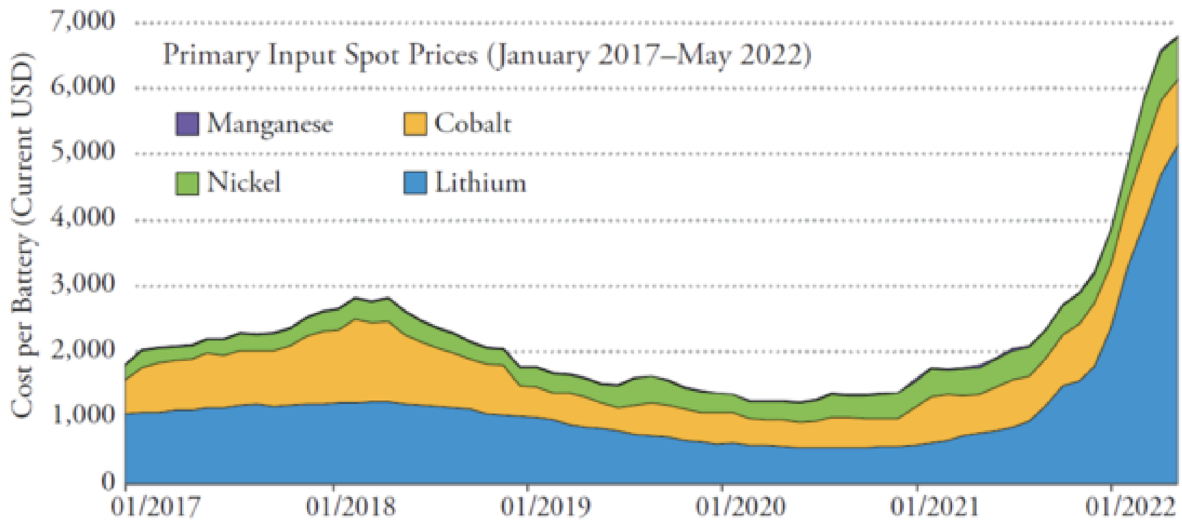
Figure 34. Tesla Battery Cost Based on Monthly Average



Source: Energy Policy Research, LME Monthly Data

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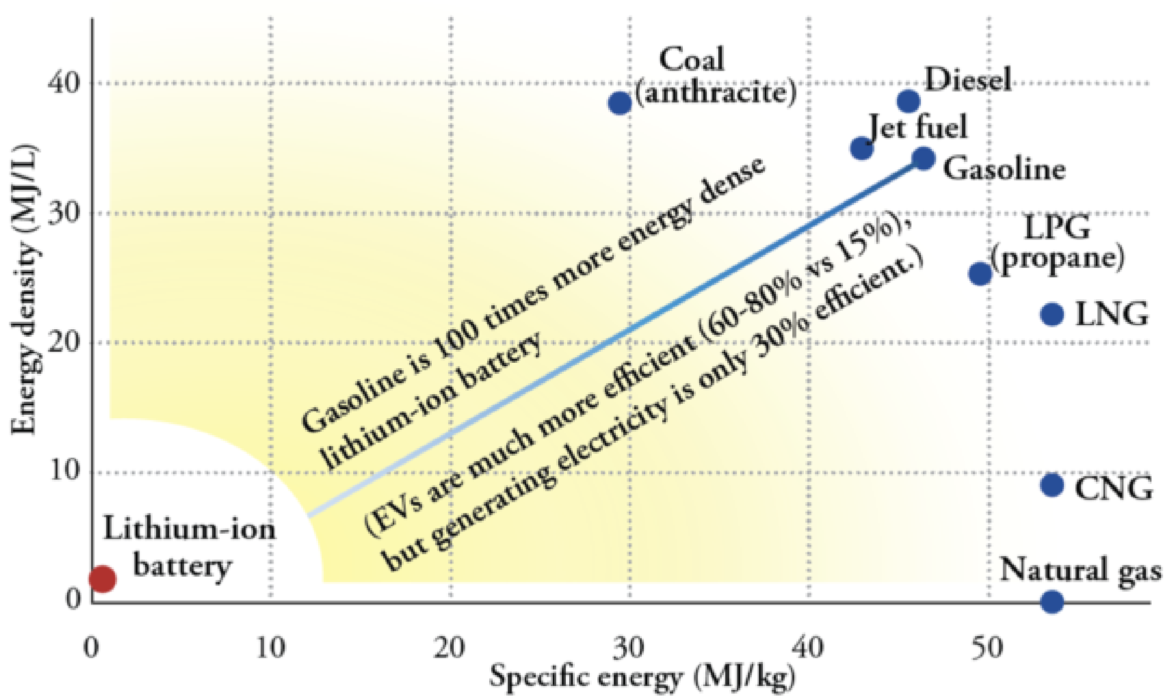
Figure 35. Energy Densities of Common Fuels, Li-ion battery



Source: Energy Policy Research, various sources

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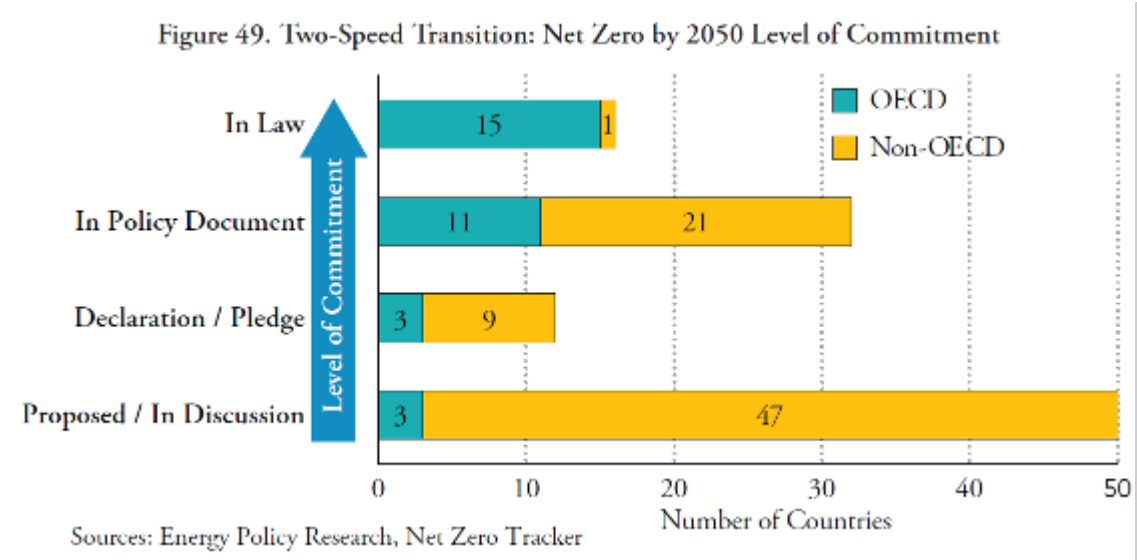

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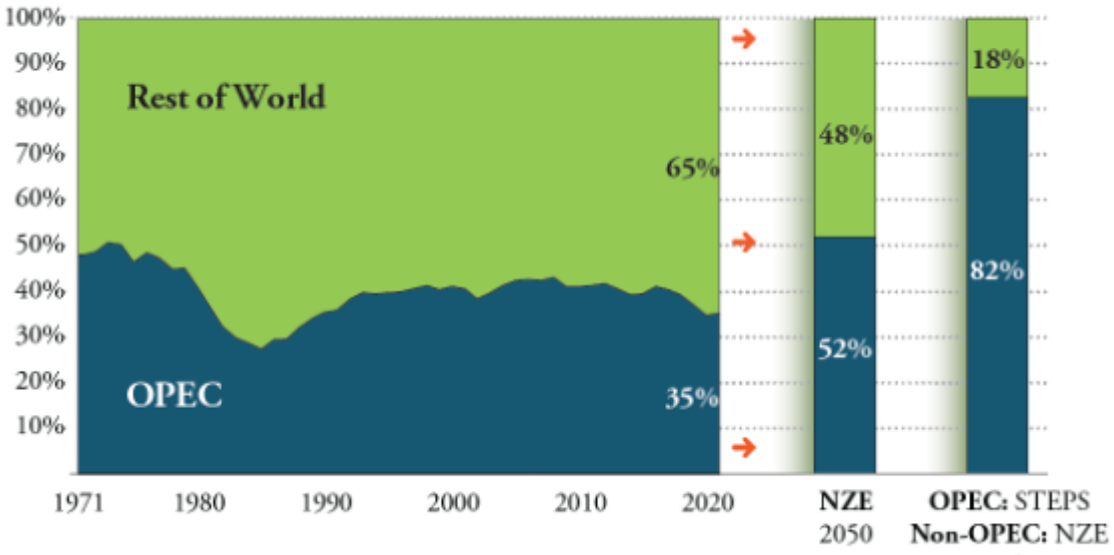
Figure 17. OPEC Share of Global Oil Production



Source: Energy Policy Research, IEA World Energy Outlook 2022, IEA World Energy Balances

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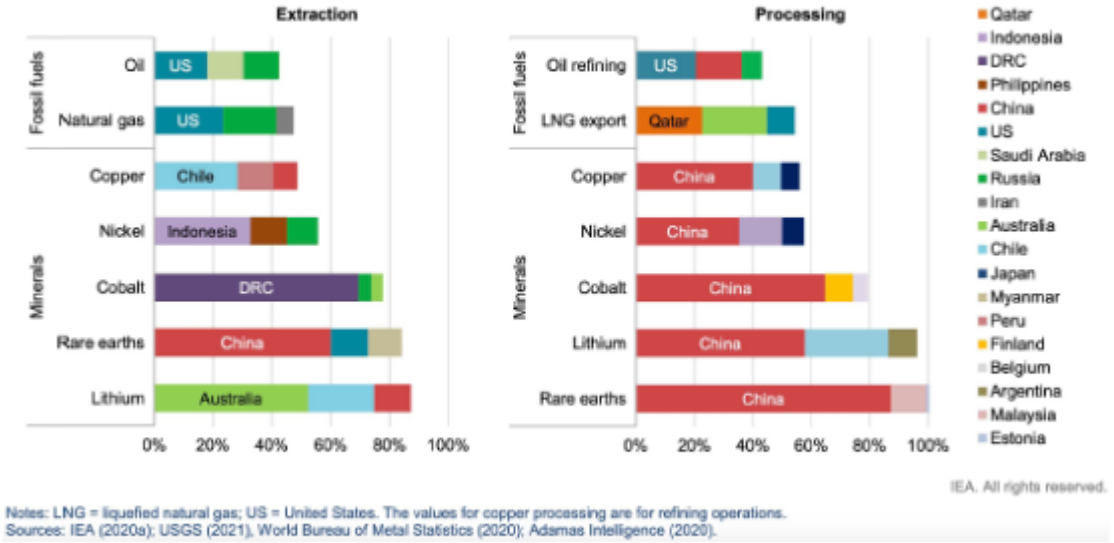
Figure 18. Share of Top Three Producing Countries in Production of Selected Minerals and Fossil Fuels, 2019



Source: IEA, *The Role of Critical Minerals in Clean Energy Transitions (2021)*

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A Critical Assessment of the IEA's Net Zero Scenario, ESG, and the Cessation of Investment in New Oil and Gas Fields.

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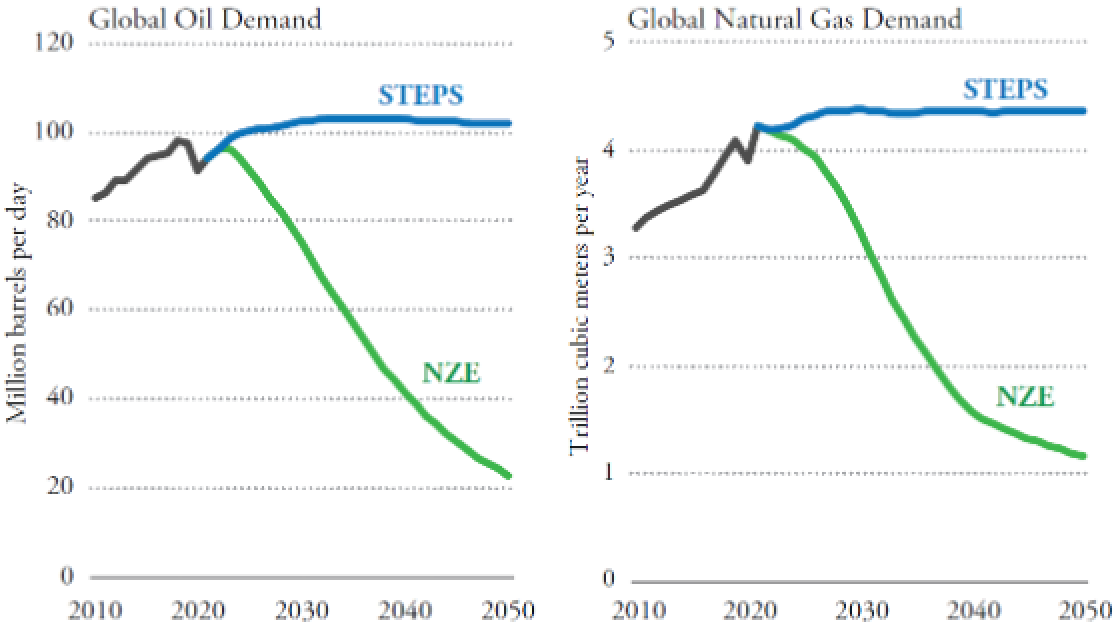
Figure 13. Oil and Gas Demand in IEA *WEO-2022*



Source: Data from IEA, *World Energy Outlook* (2022) & Outlooks for gas markets and investment (2023). The data derived and estimated from graphs in the *WEO-2022* and the IEA's gas report for the G7, as the IEA's data tables only show scenario data for 2030 and 2050.

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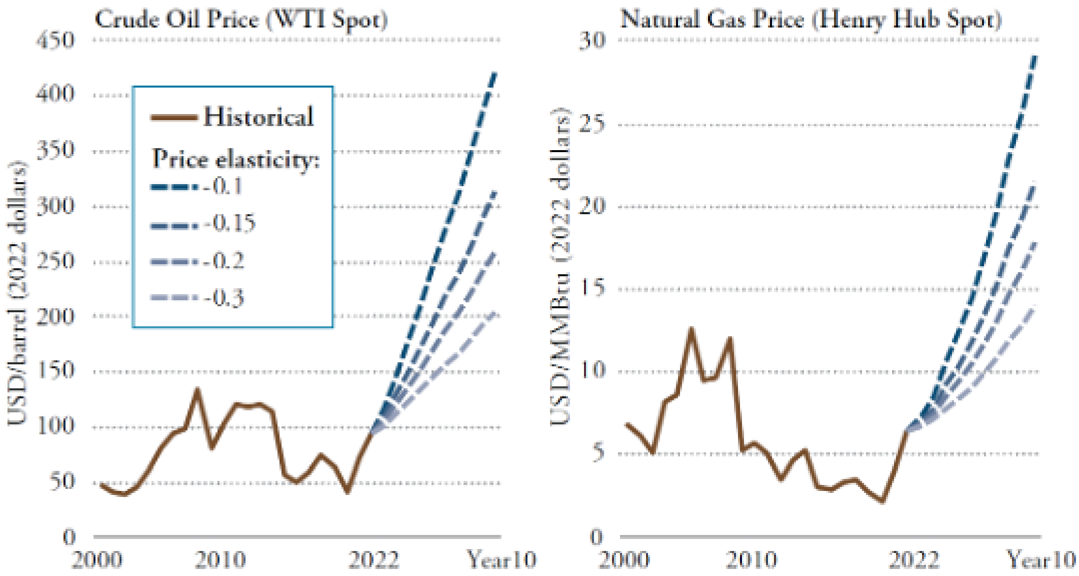
Figure 14. Potential Price Spikes by Price Elasticity Level Under Net Zero Scenario



Source: Energy Policy Research based on IEA NZE

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