Is it possible to fully decarbonize the global supply of energy by 2050?

Some Good News and Some Bad News

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Energy Trilemma in the Post-Corona world : Can Innovation and Soft Power be the solutions?

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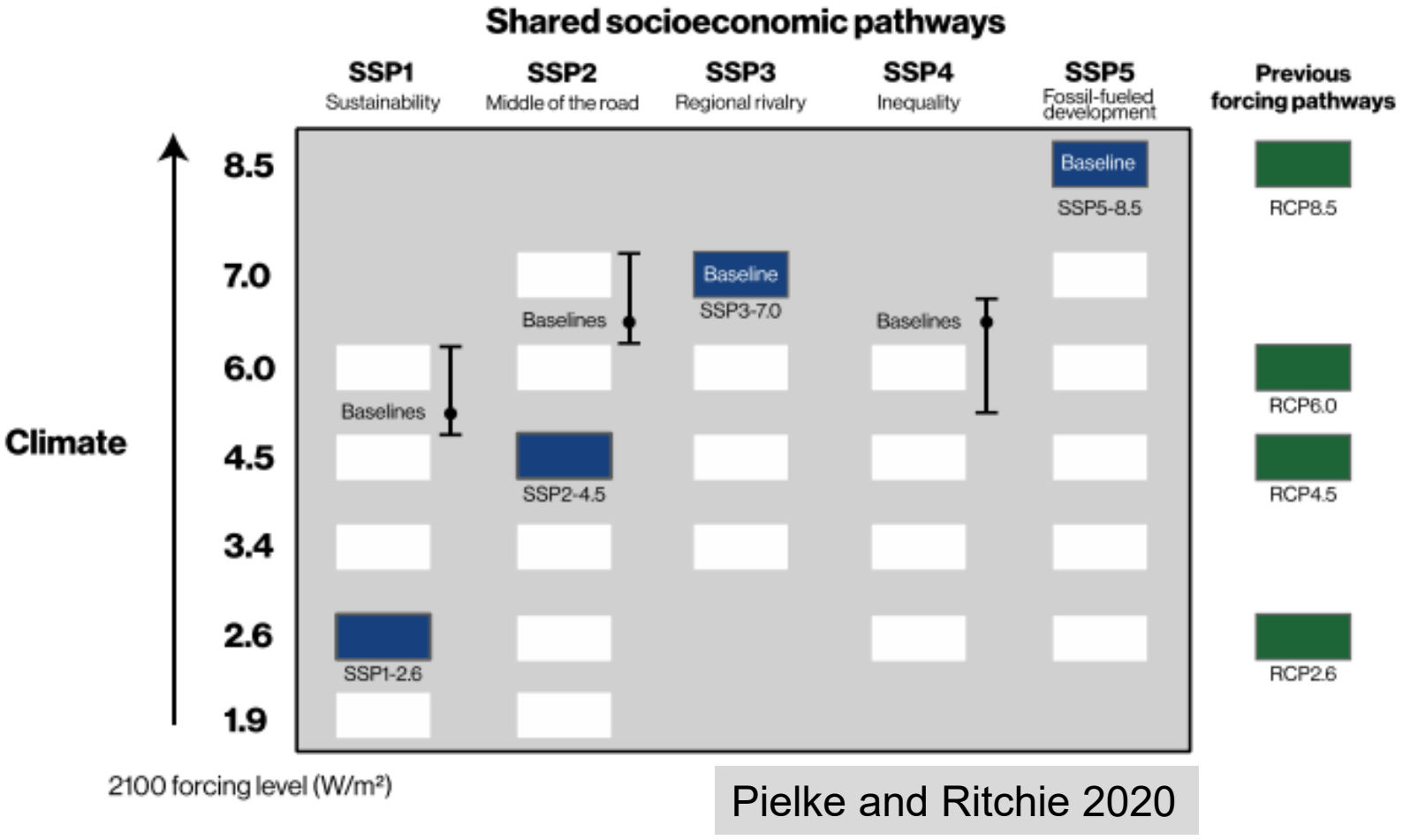
Outline of this talk

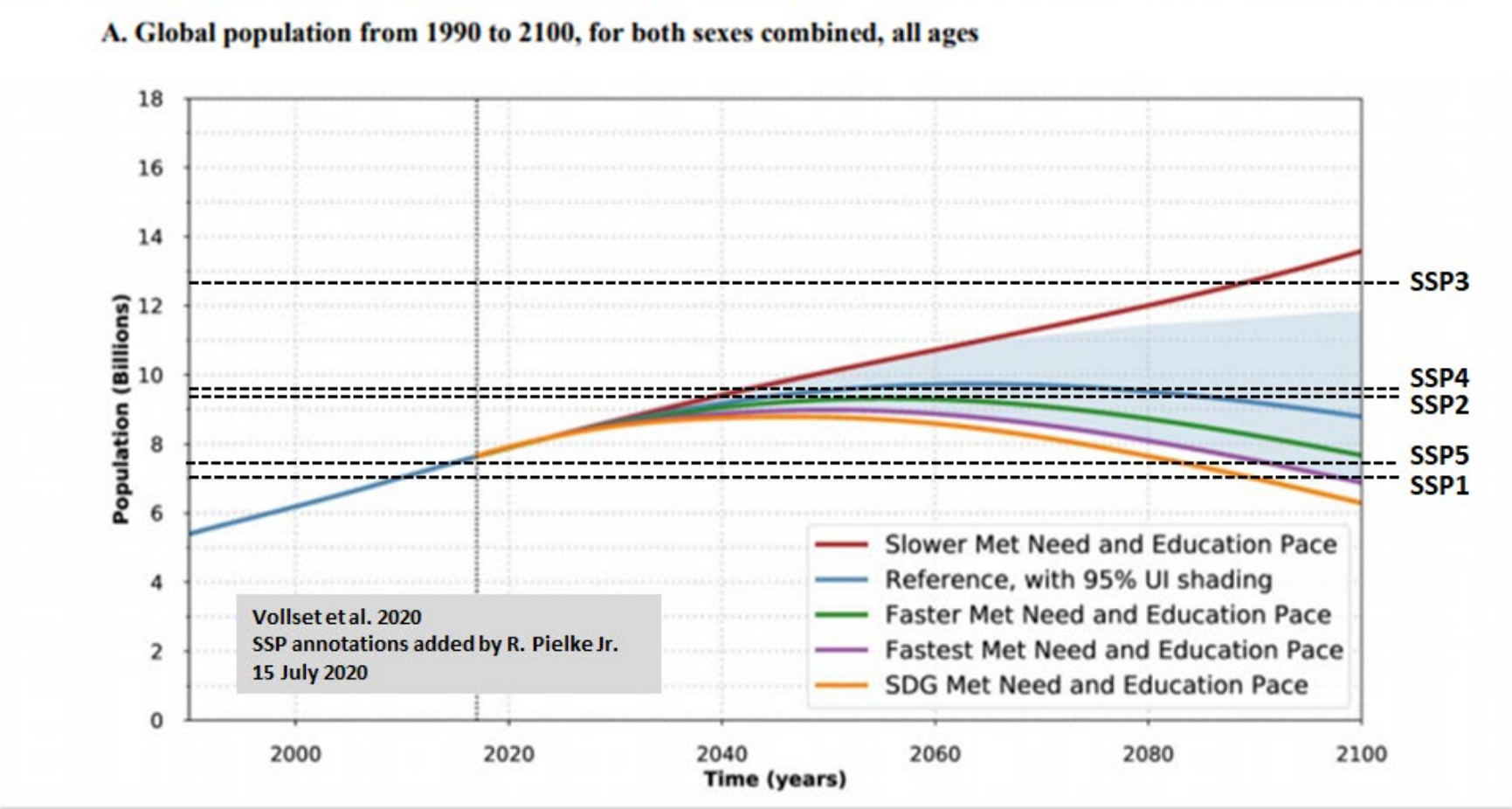
1. **Good news**: The scenarios we use to project the future over-project per capita GDP and carbon dioxide emissions
2. **Good news**: Global carbon dioxide emissions may have stopped growing
3. **Bad news**: Fossil fuel consumption continues to expand faster than carbon-free consumption
4. **Bad news**: No nation has yet put forward any plausible or realistic plans for the decommissioning of fossil fuel energy production on time scales of aggressive emissions reductions targets

1. Good news: The scenarios we use to project the future over-project per capita GDP and emissions



Pielke and Ritchie 2020

Figure 1. Global and super-region population 1990–2100 in the reference, slower, faster, fastest, and SDG pace scenarios. Past estimates are from GBD 2017, and values are in billions. SDG=Sustainable Development Goals. GBD=Global Burden of Disease.



2100 Global population	Millions (in ref or marker)	Difference from IHME
IHME	8786	0%
UN	10875	24%
SSP1	6958	-21%
SSP2	9032	3%
SSP3	12620	44%
SSP4	9292	6%
SSP5	7375	-16%

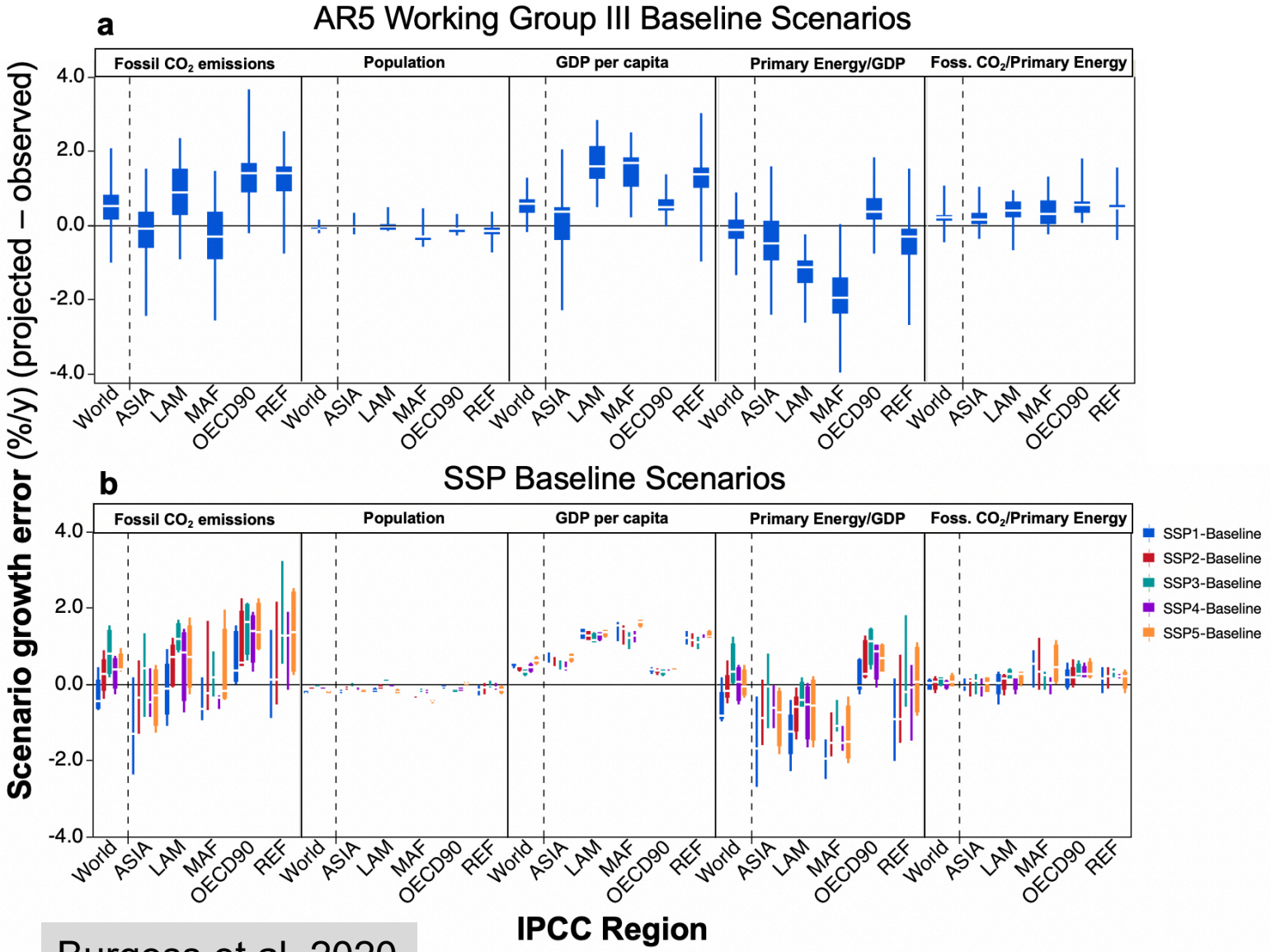
Global population projections to 2100 vs. SSPs

Vollset, S.E., Goren, E., Yuan, C.W., Cao, J., Smith, A.E., Hsiao, T., Bisignano, C., Azhar, G.S., Castro, E., Chalek, J. and Dolgert, A.J., 2020. Fertility, mortality, migration, and population scenarios for 195 countries and territories from 2017 to 2100: a forecasting analysis for the Global Burden of Disease Study. *The Lancet*. https://www.sciencedirect.com/science/article/pii/S0140673620306772

Scenarios vs Reality 2005-2020

Above zero means scenarios over-projected

Below zero means scenarios under-projected

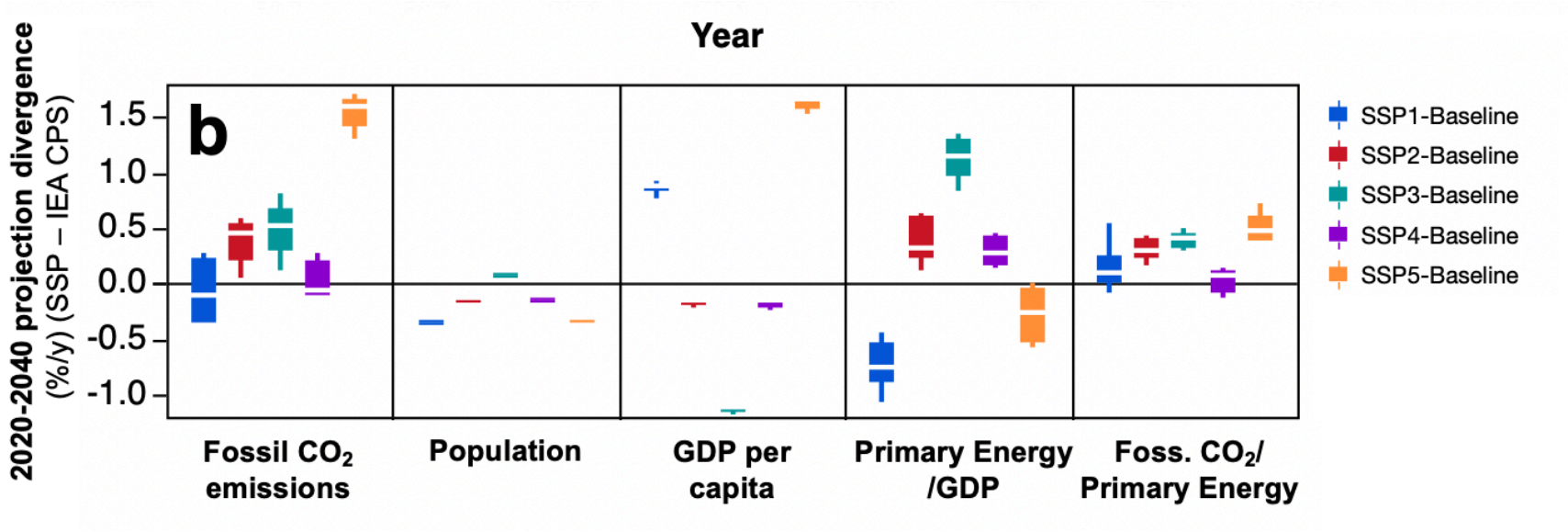


Burgess et al. 2020

Scenarios vs IEA CPS Projections 2020-2040

Above zero means SSP scenarios over-project vs. IEA CPS

Below zero means SSP scenarios under-project vs. IEA CPS



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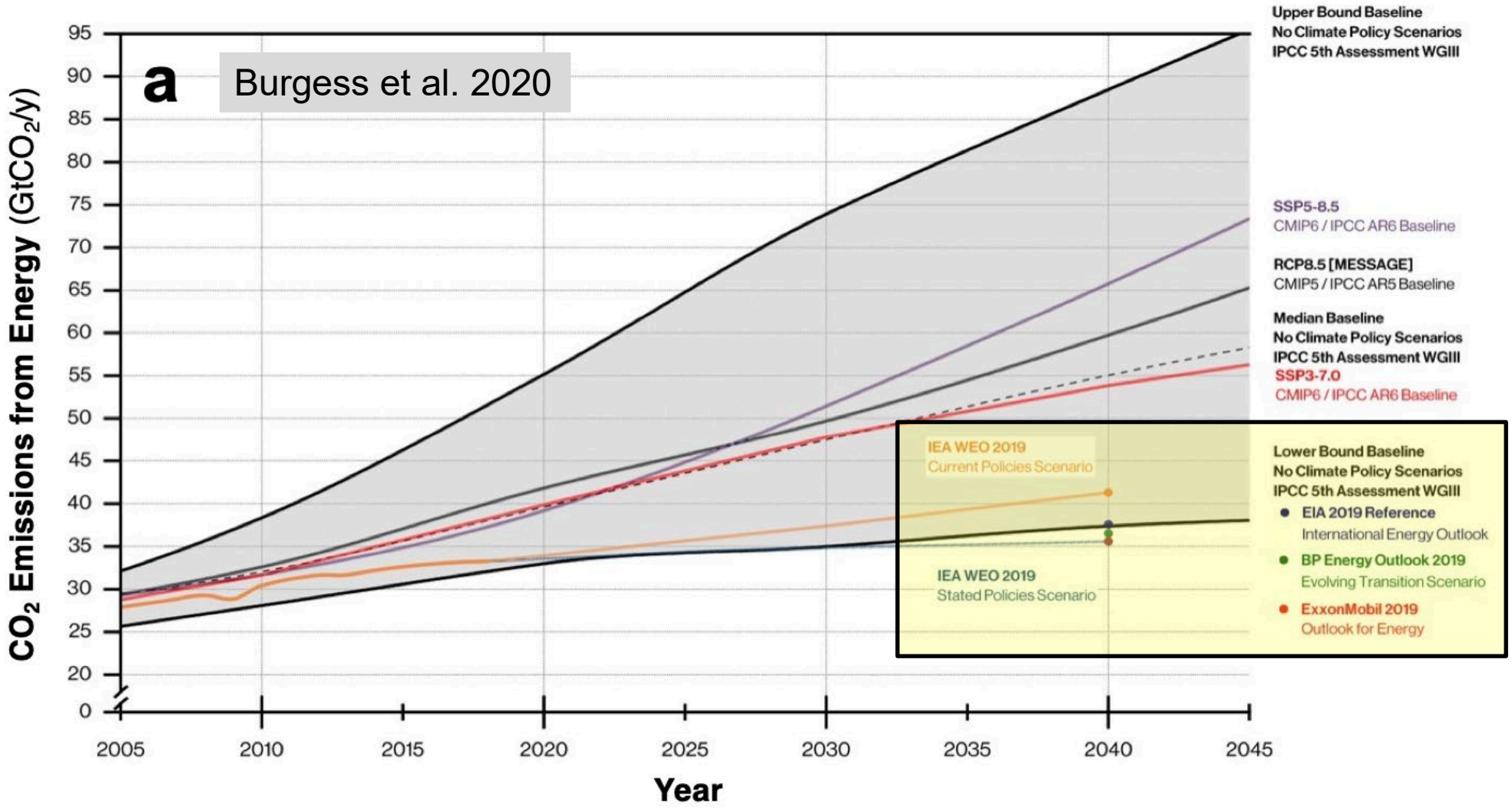
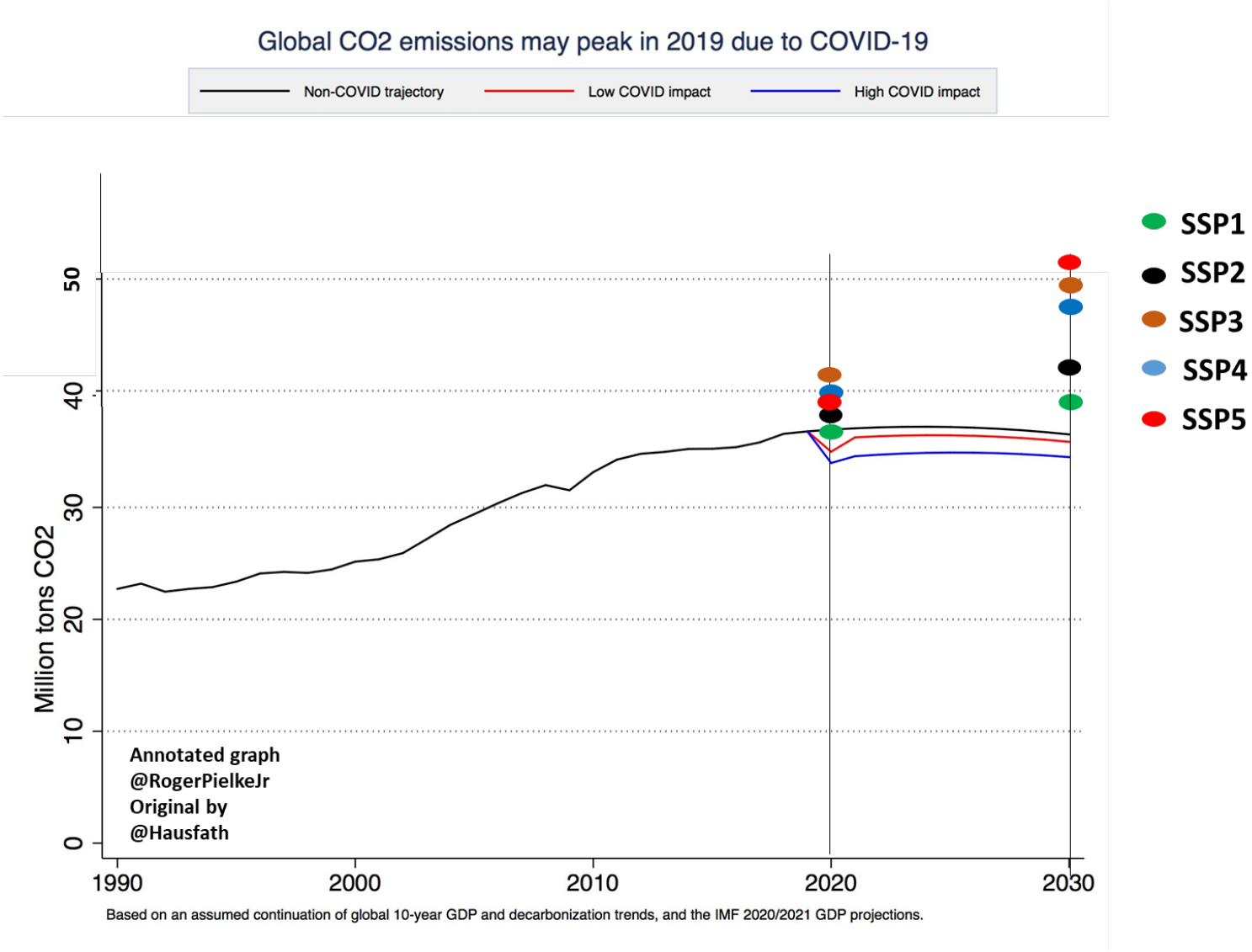
2. Good news: Global carbon dioxide emissions may have stopped growing



Carbon dioxide emissions from fossil fuels to 2030

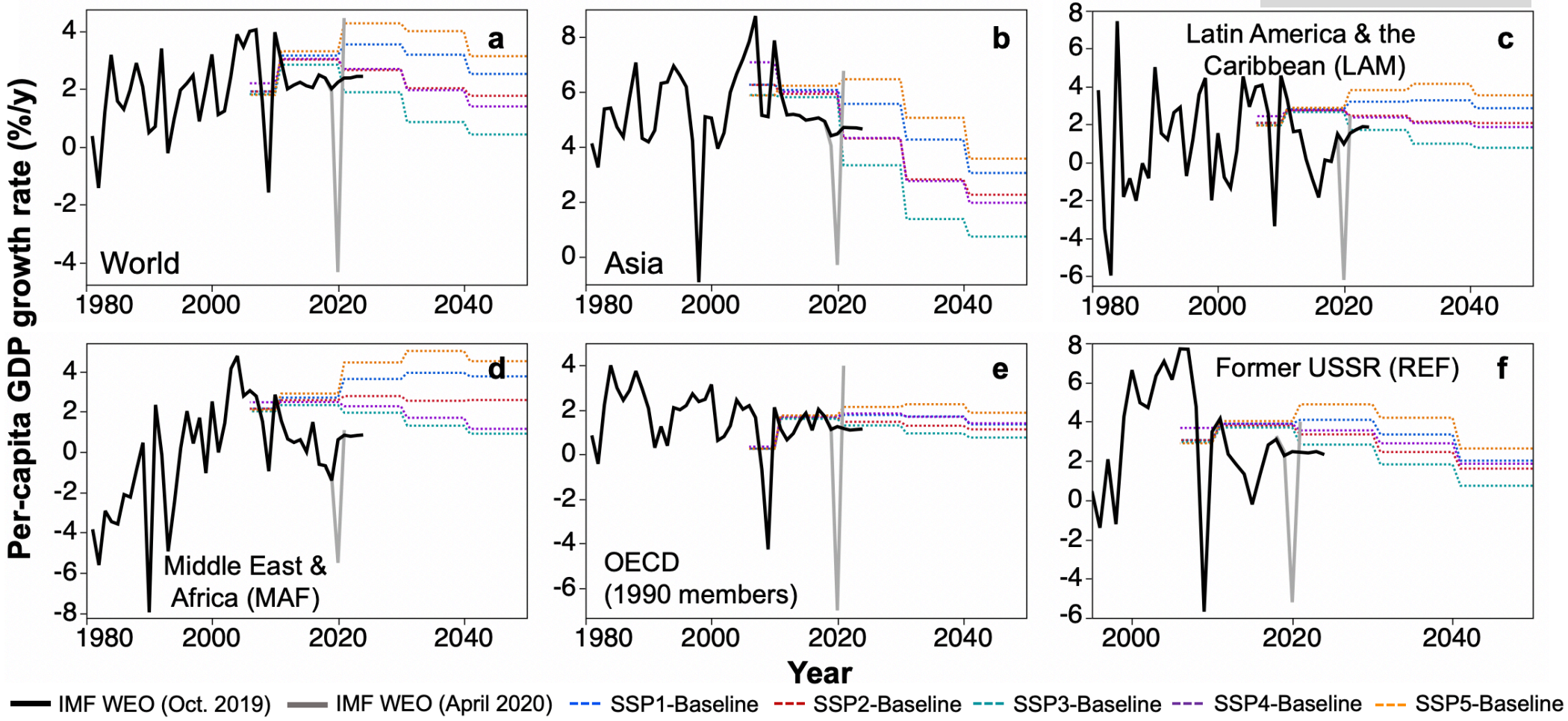


IMF per-capita GDP observations and projections to 2024 vs SSP projections

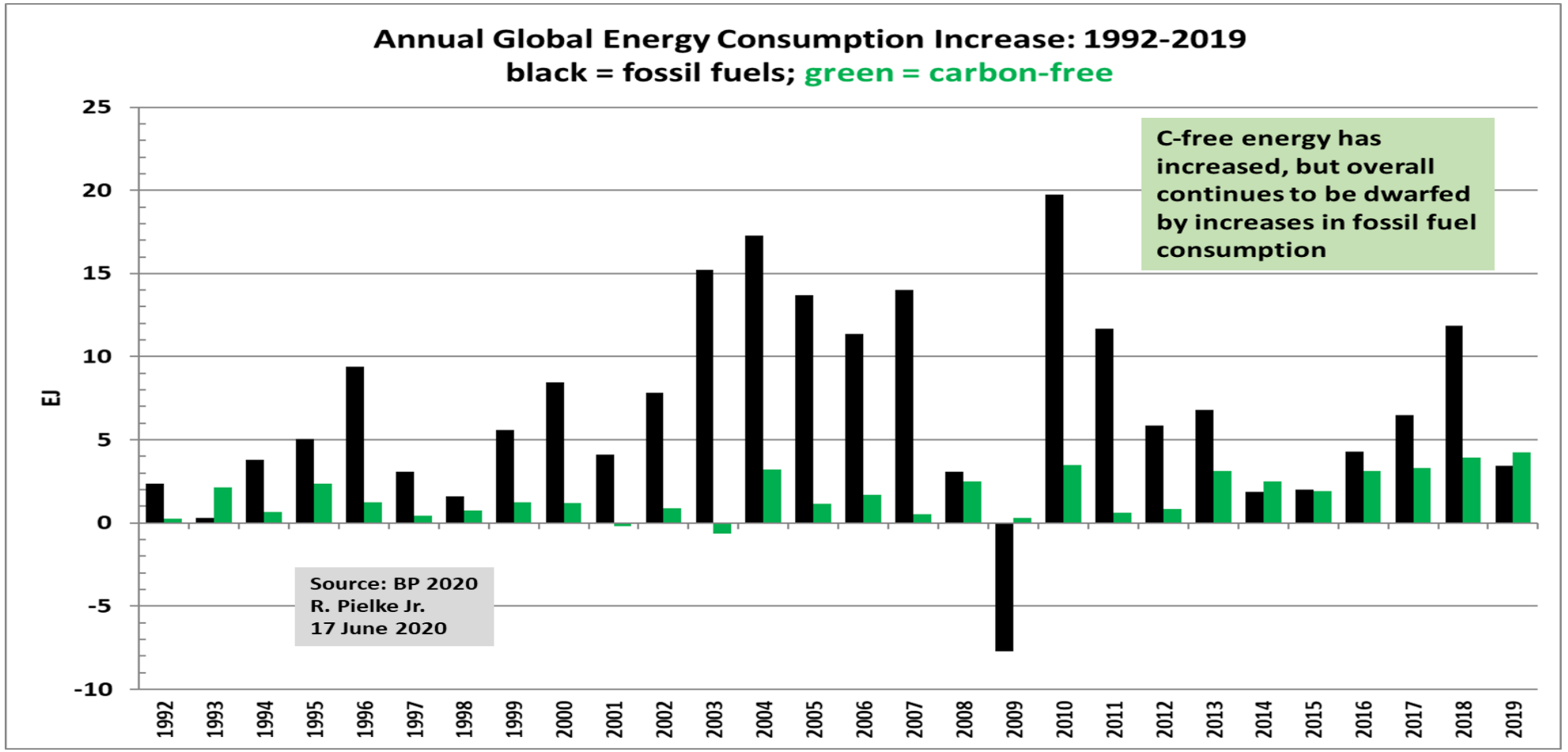
Black = observed and projected to 2024 prior to COVID-19

Grey = projected to 2021 including effects of COVID-19

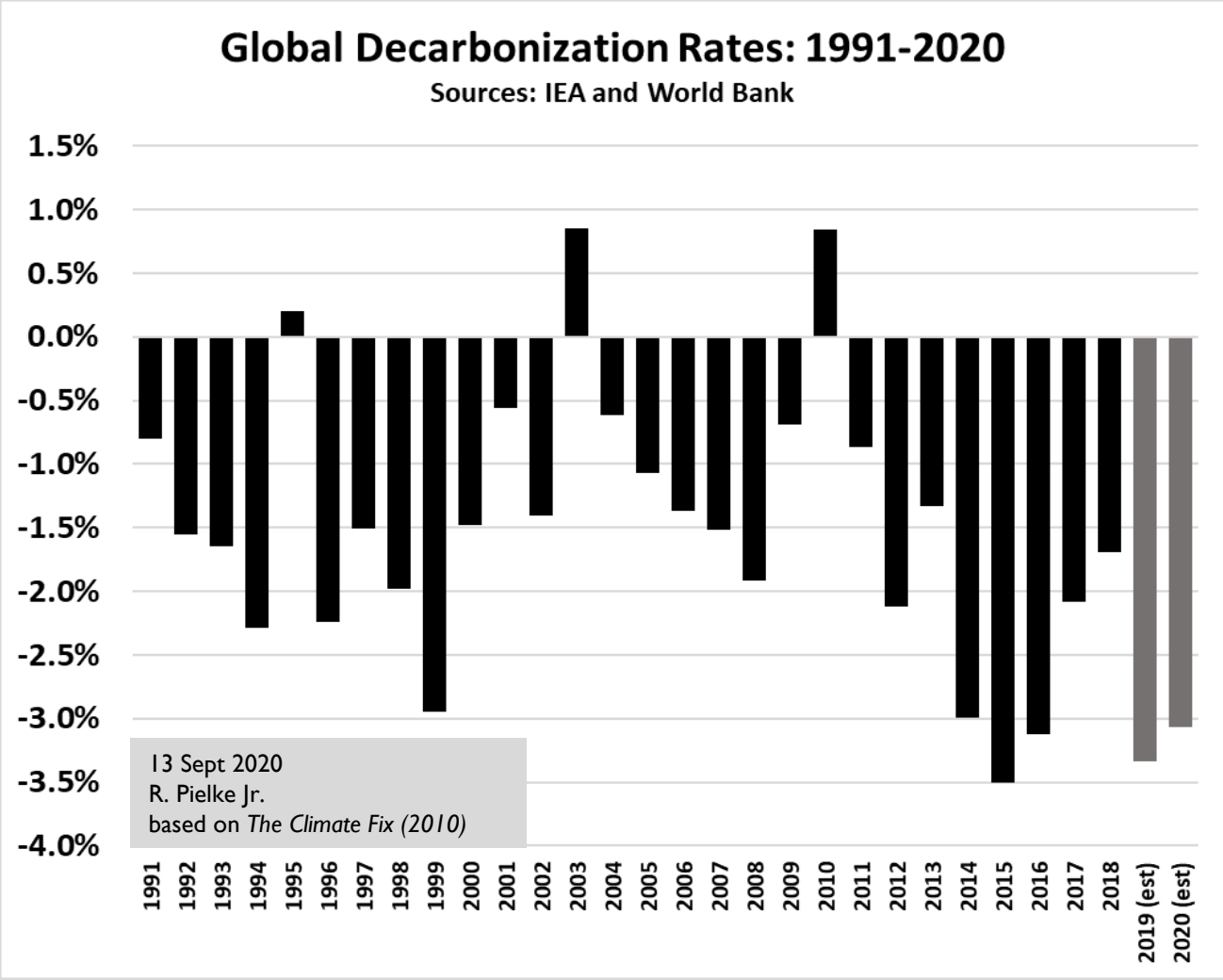
Burgess et al. 2020



3. Bad news: Fossil fuel consumption continues to expand faster than carbon-free consumption



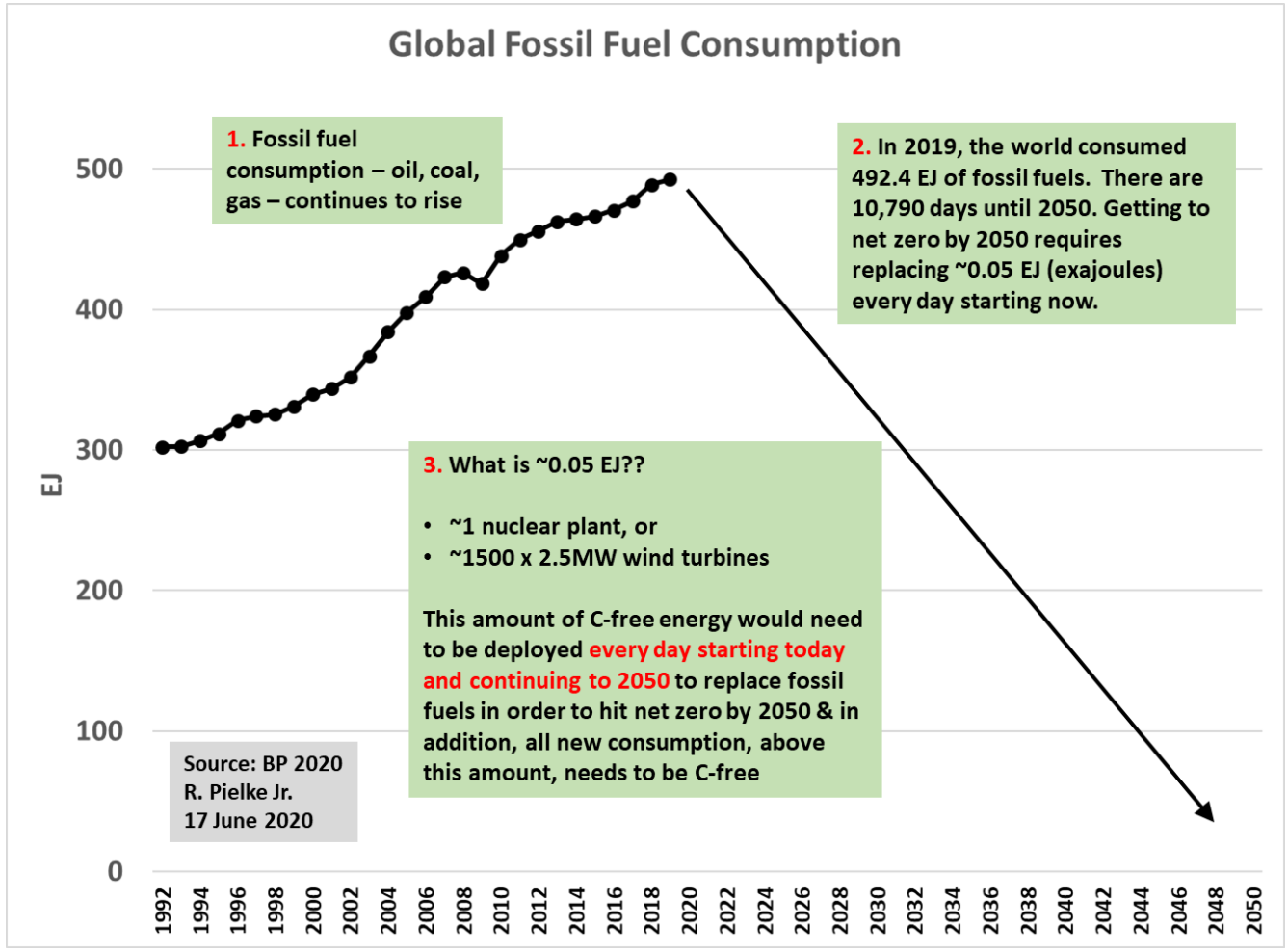
COVID-19 is projected to have little impact on 2020 decarbonization rate



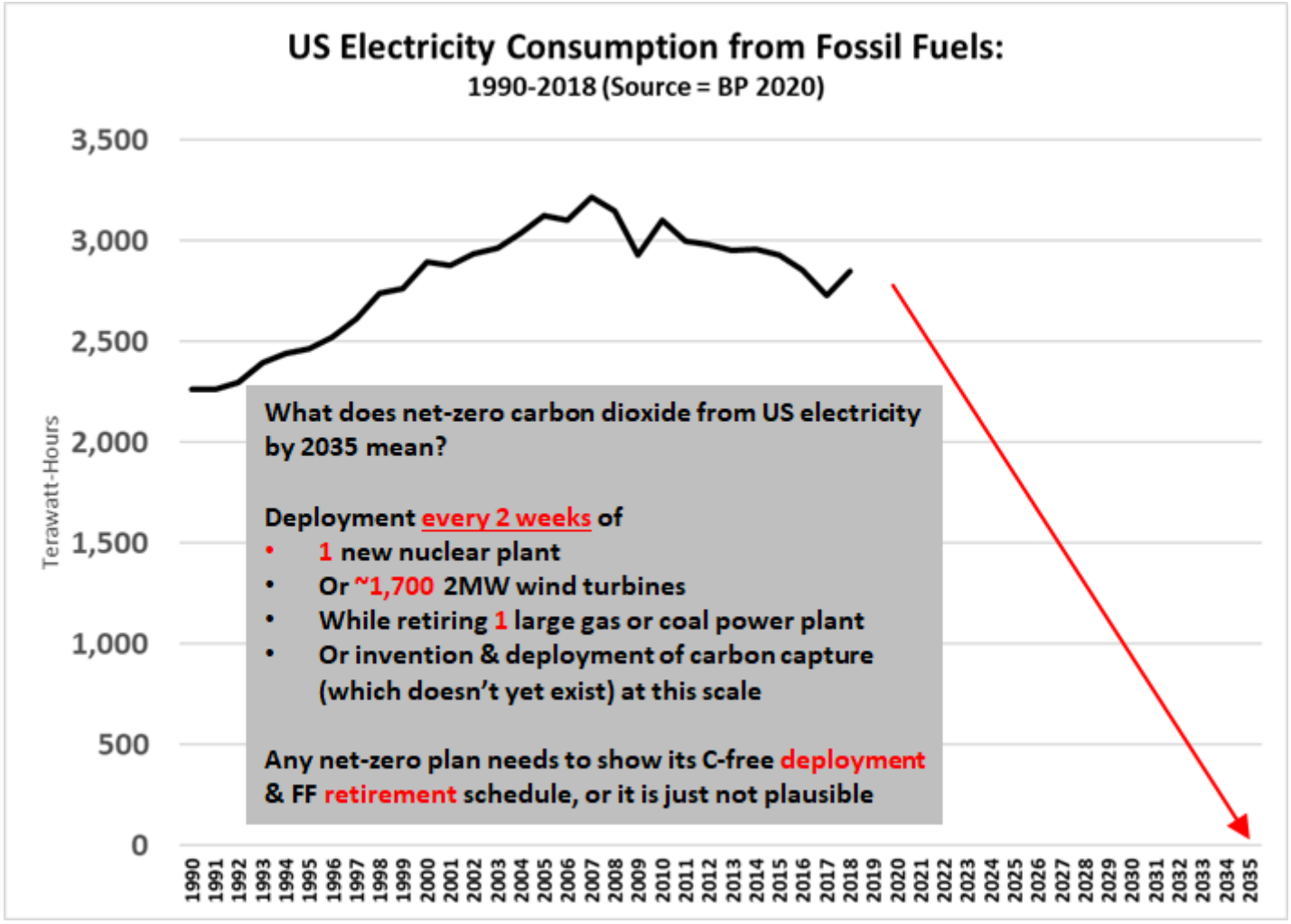
Decarbonization refers to a reduction in the ratio of carbon dioxide emissions (from fossil fuels) to GDP

To hit targets for deep decarbonization requires rates of 7% or greater.

4. Bad news: No nation has yet put forward any plausible or realistic plans for the decommissioning of fossil fuel energy production on time scales of aggressive emissions reductions targets



Implications of proposed United States 2035 target for net-zero carbon dioxide from electricity



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Thank you

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For further reading

- Burgess, M. G., Ritchie, J., Shapland, J., & Pielke Jr, R. (2020, under review). IPCC baseline scenarios over-project CO2 emissions and economic growth. https://osf.io/preprints/socarxiv/ahsxw/
- Burgess, M. G., Langendorf, R. E., Ippolito, T., & Pielke Jr, R. (2020, under review). Optimistically biased economic growth forecasts and negatively skewed annual variation. https://econpapers.repec.org/paper/osfsocarx/vndqr.htm
- Pielke, R., & Ritchie, J. (2020, under review). Systemic Misuse of Scenarios in Climate Research and Assessment. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3581777

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