



Climate Change, Climate Policy, and Economic Growth

Jim Stock

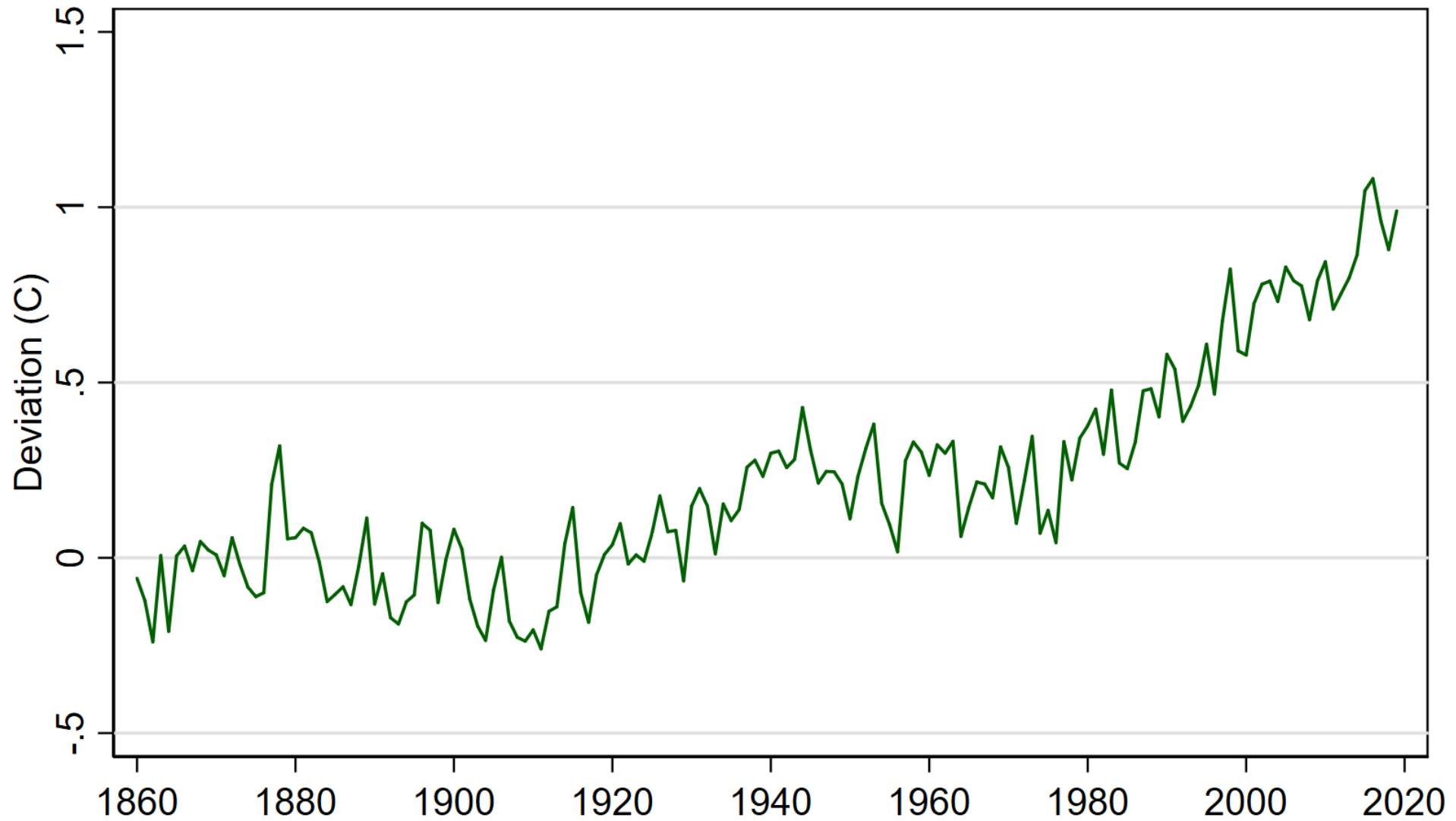
Harvard University and the NBER

NBER Macroeconomics Annual

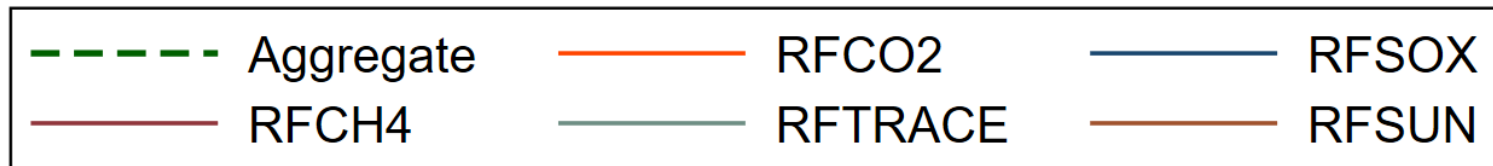
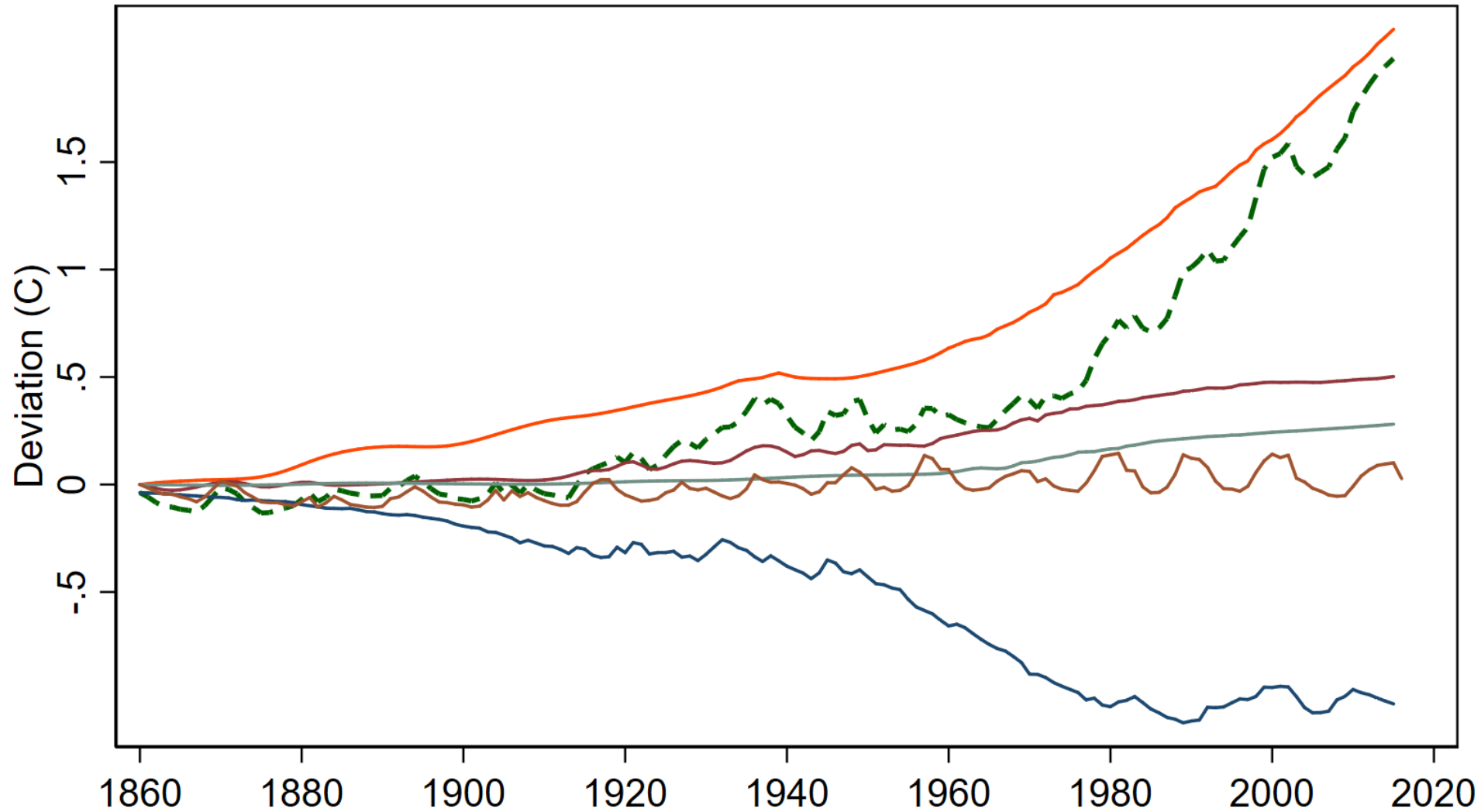
April 11, 2019

Global Mean Temperature

Deviation from 1870-1890 mean



Radiative Forcings



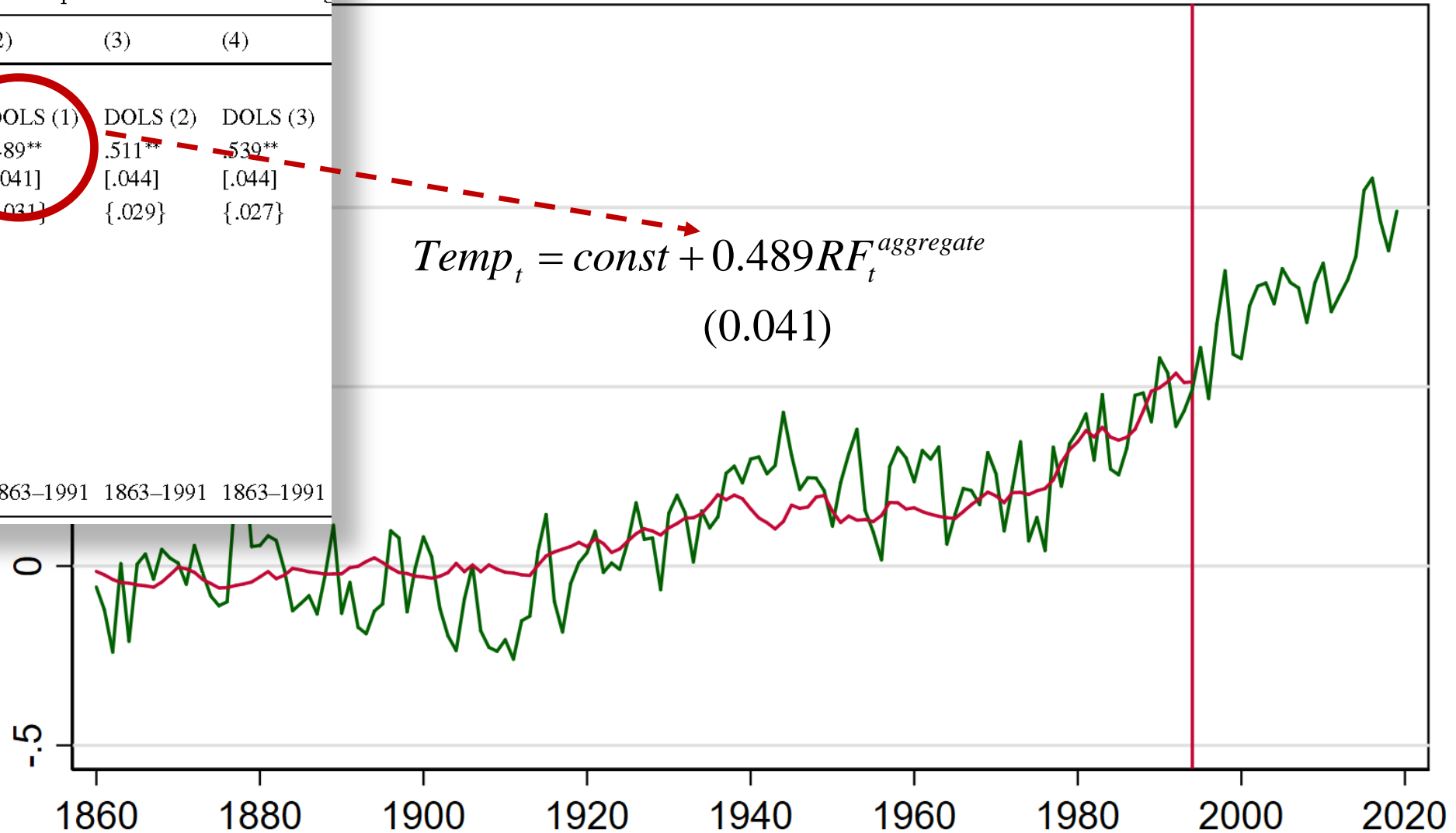
Temperature and Fitted Values based on Radiative Forcings

Table II

Long-run relation between temperature and radiative forcings

	(1)	(2)	(3)	(4)
Estimation method	OLS	DOLS (1)	DOLS (2)	DOLS (3)
RFAGG	.460	.489** [.041] {.031}	.511** [.044] {.029}	.530** [.044] {.027}
RFCO2				
RFCH4				
RFSOX				
RFSUN				
Sample	1860-1994	1863-1991	1863-1991	1863-1991

Deviation from 1870-1890 mean

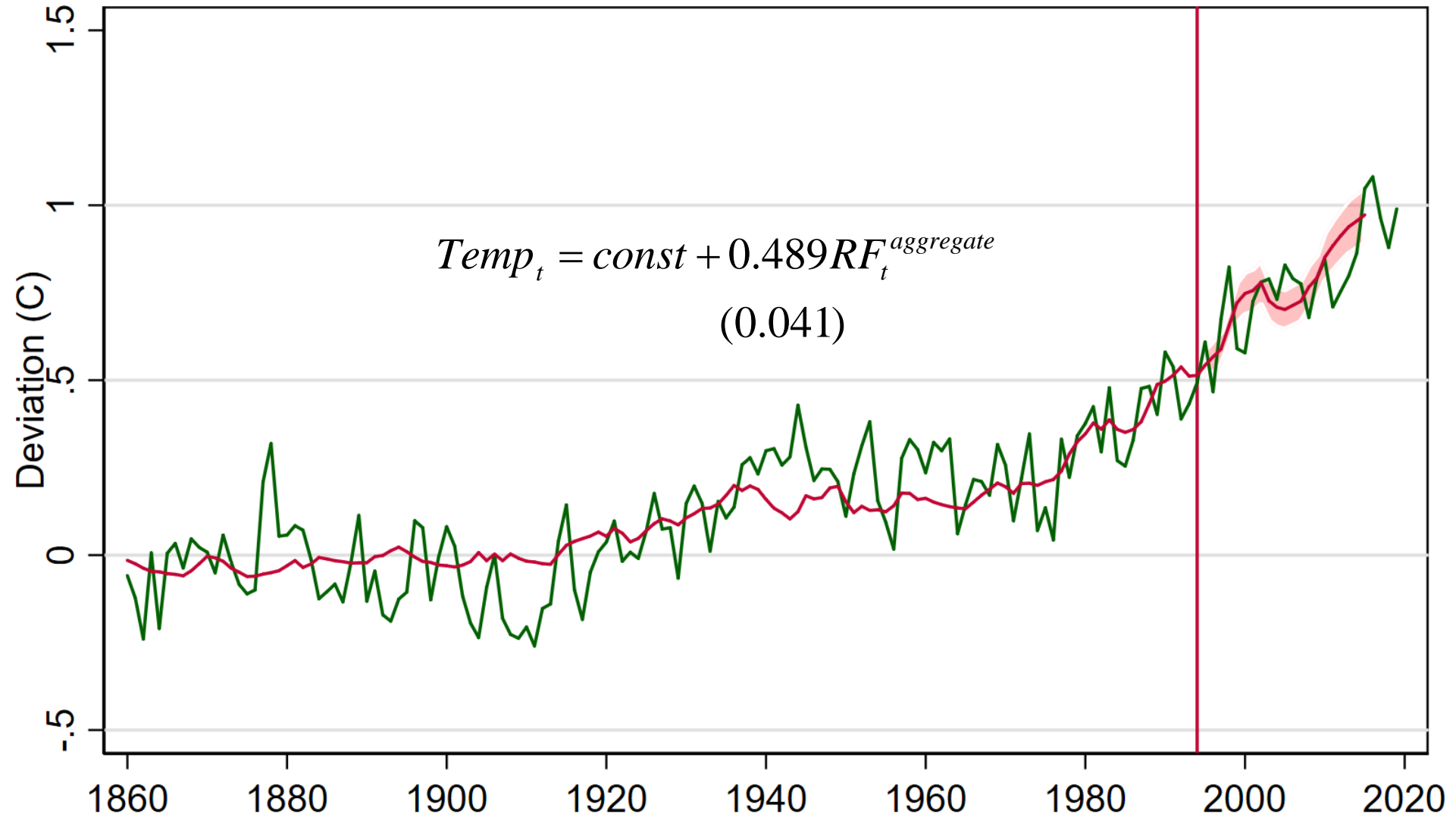


Estimation 1860-1994.

Predicted value uses DOLS cointegrating vector from Kaufmann, Kaupi, Stock (2006, Table II(2)).

Temperature and Fitted Values based on Radiative Forcings

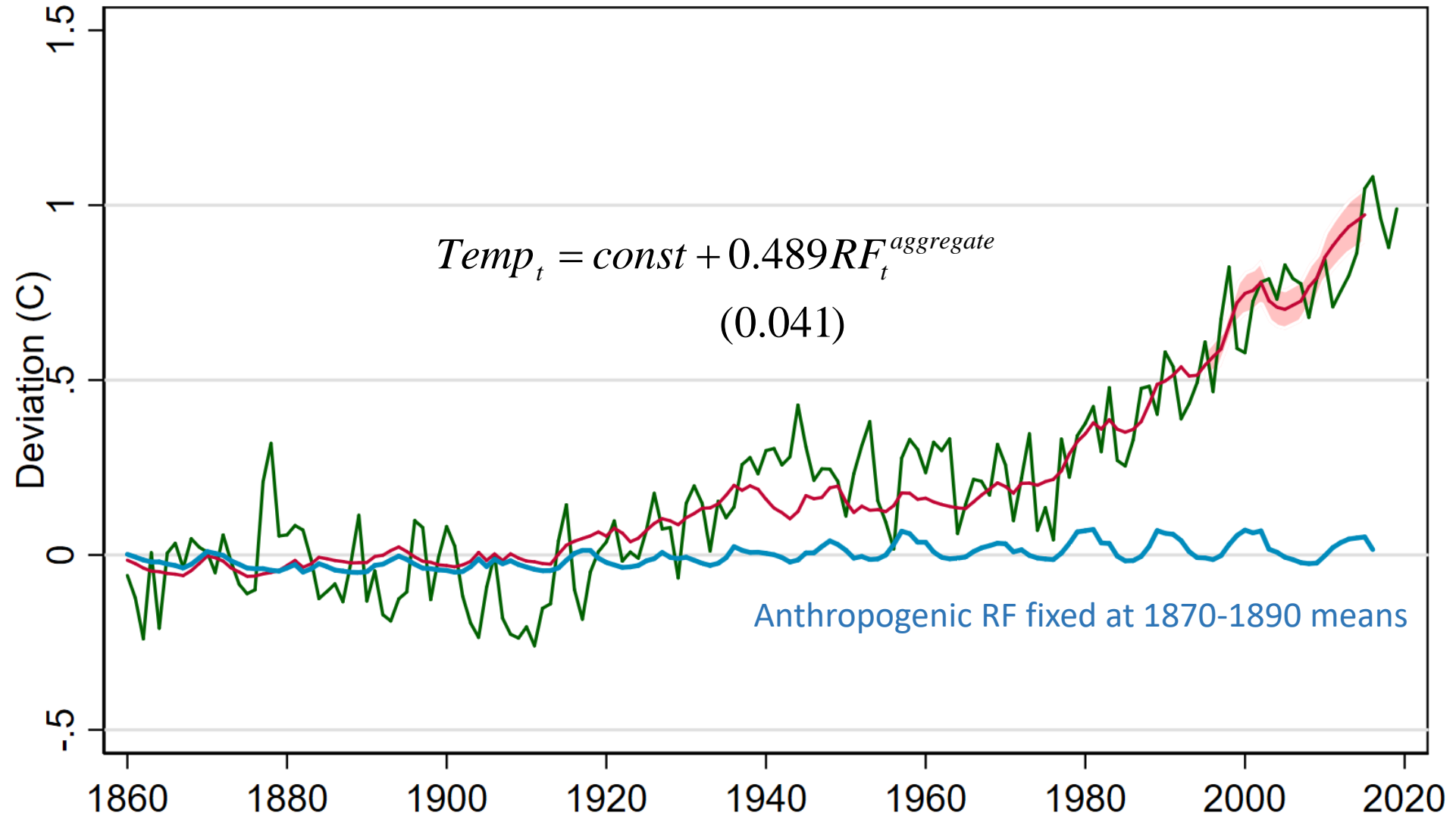
Deviation from 1870-1890 mean



Estimation 1860-1994. Shading is 67% confidence interval conditional on RF.
Predicted value uses DOLS cointegrating vector from Kaufmann, Kaupi, Stock (2006, Table II(2)).

Temperature and Fitted Values based on Radiative Forcings

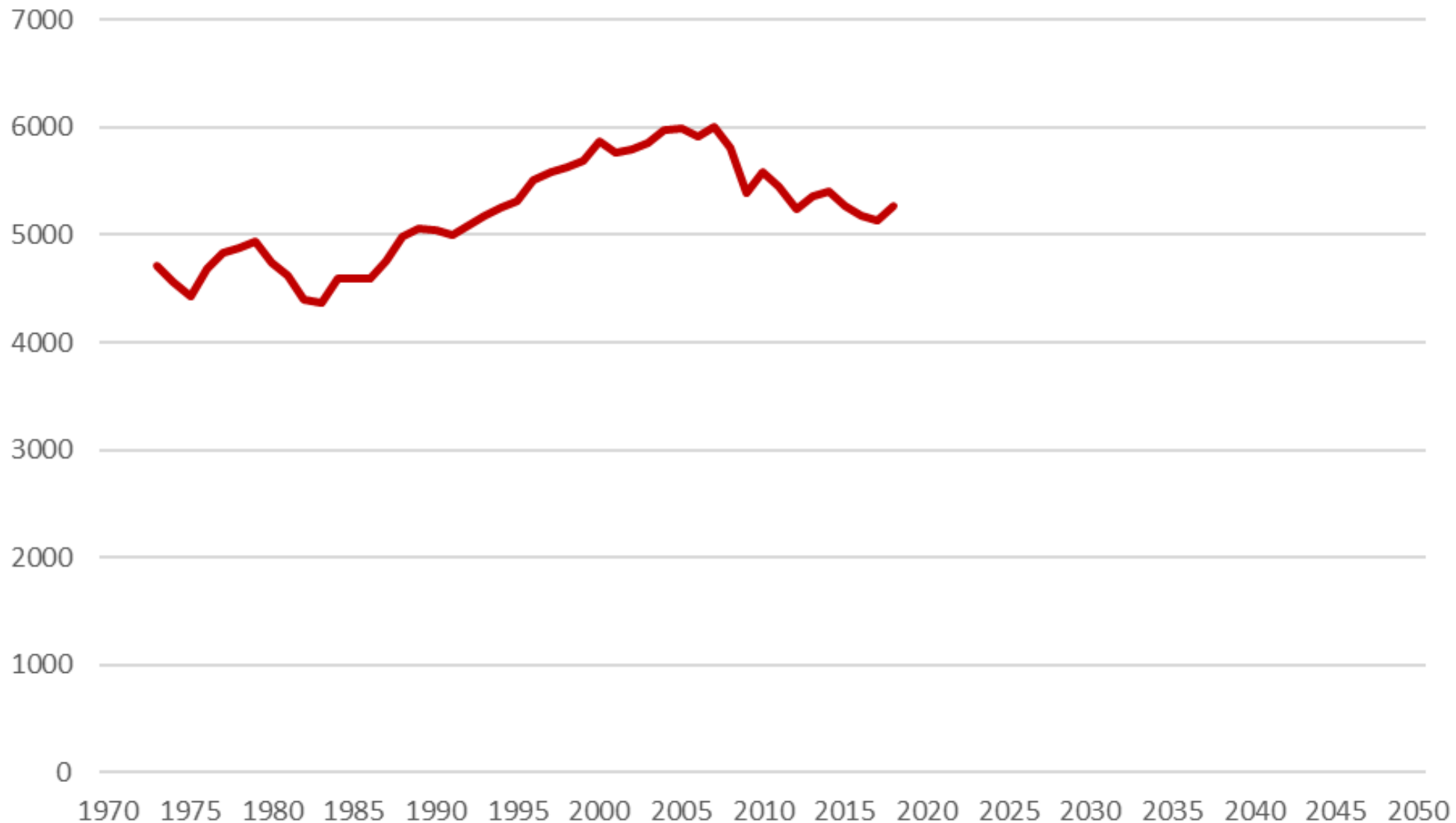
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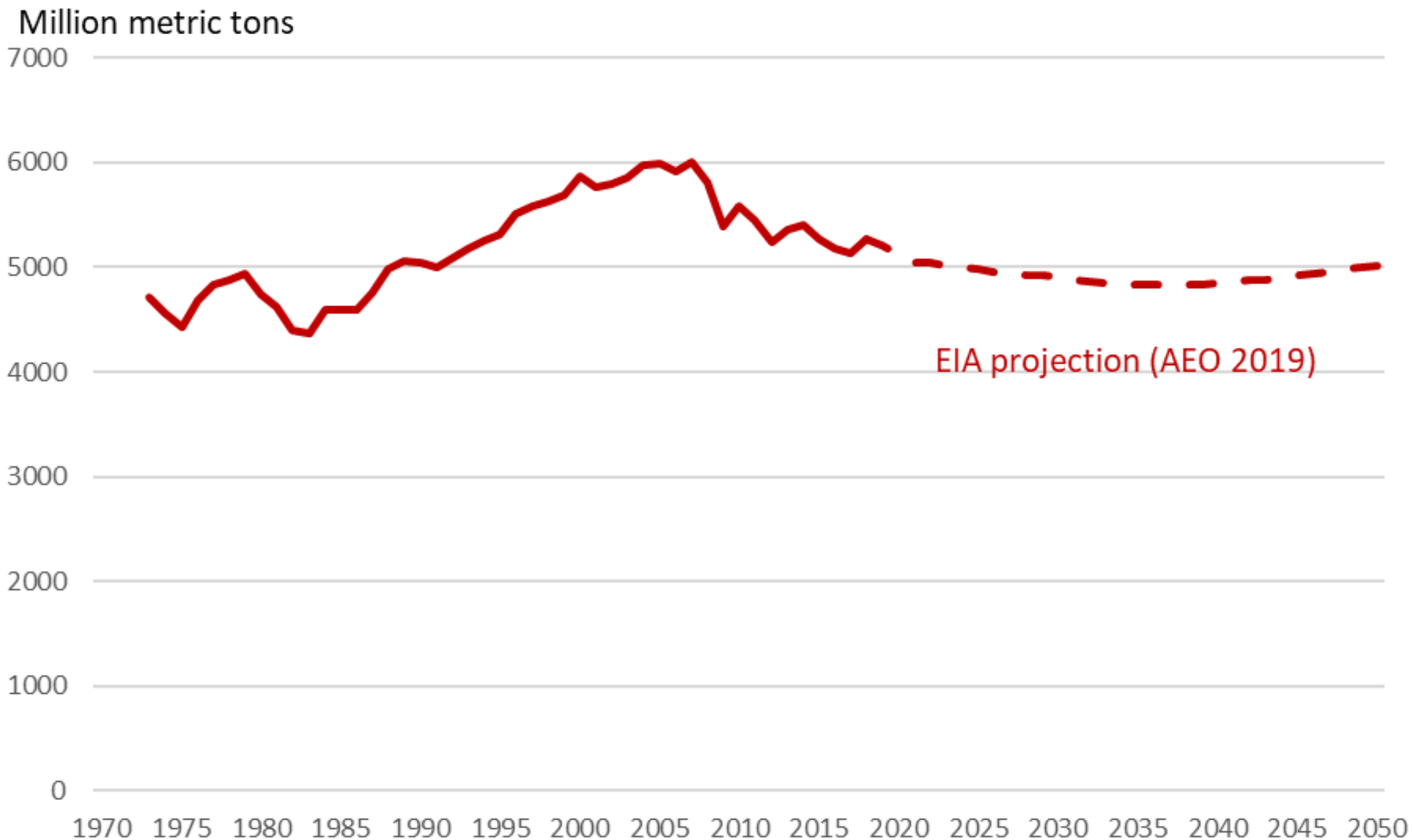
U.S. CO2 Emissions from Energy Consumption 1973-2018

Million metric tons



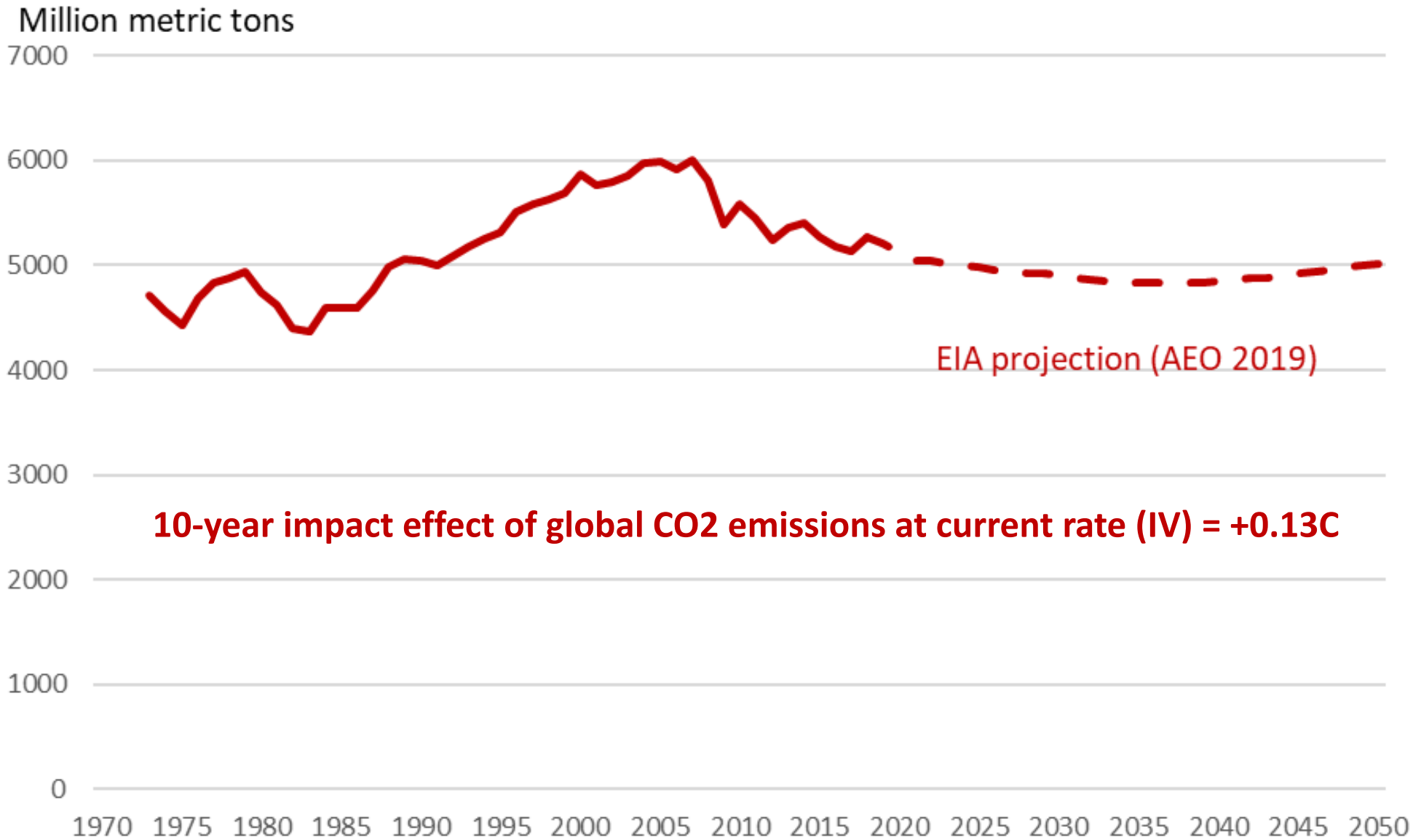
Source: Energy Information Administration

U.S. CO2 Emissions from Energy Consumption 1973-2018



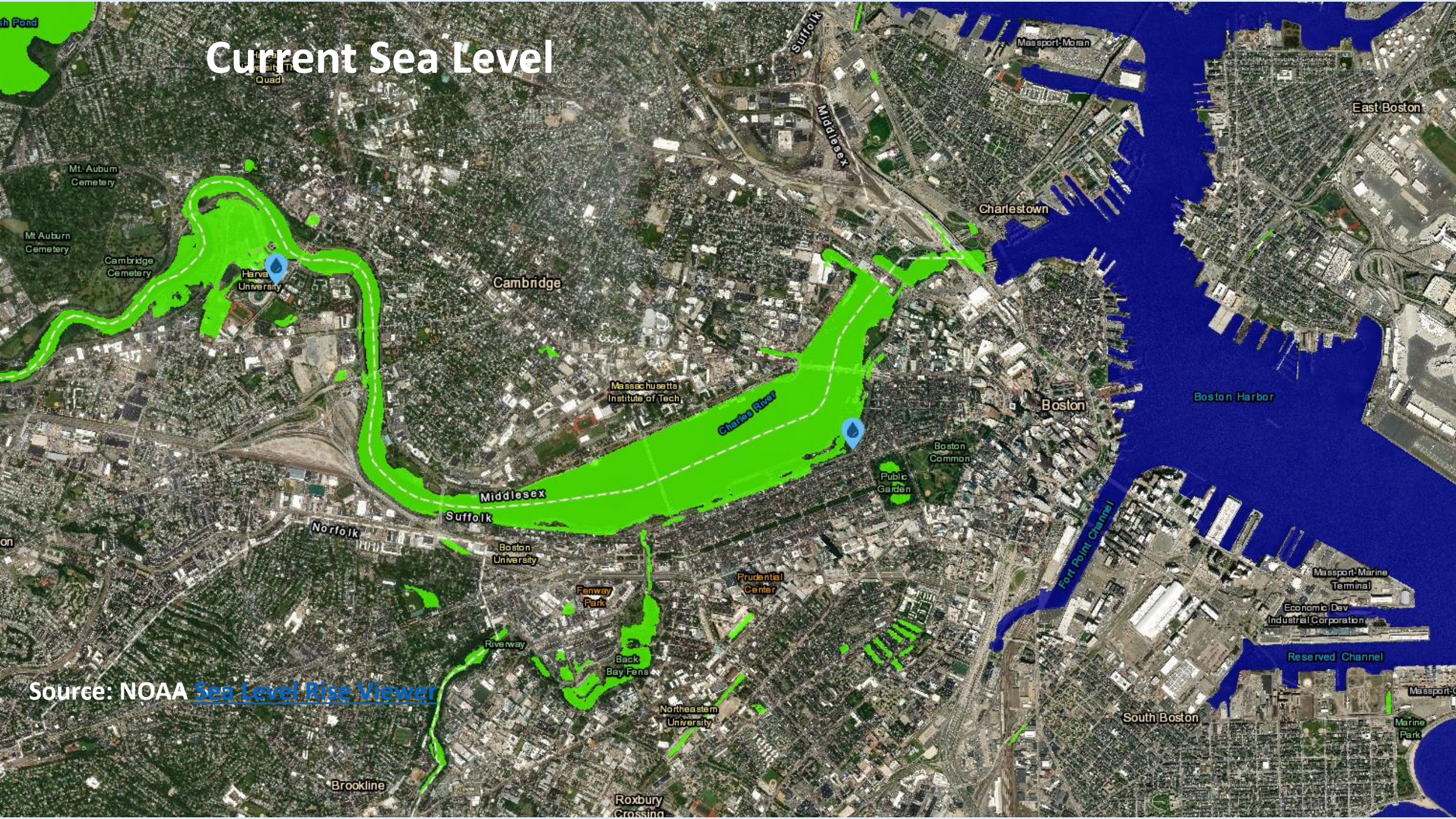
Source: Energy Information Administration

U.S. CO2 Emissions from Energy Consumption 1973-2018



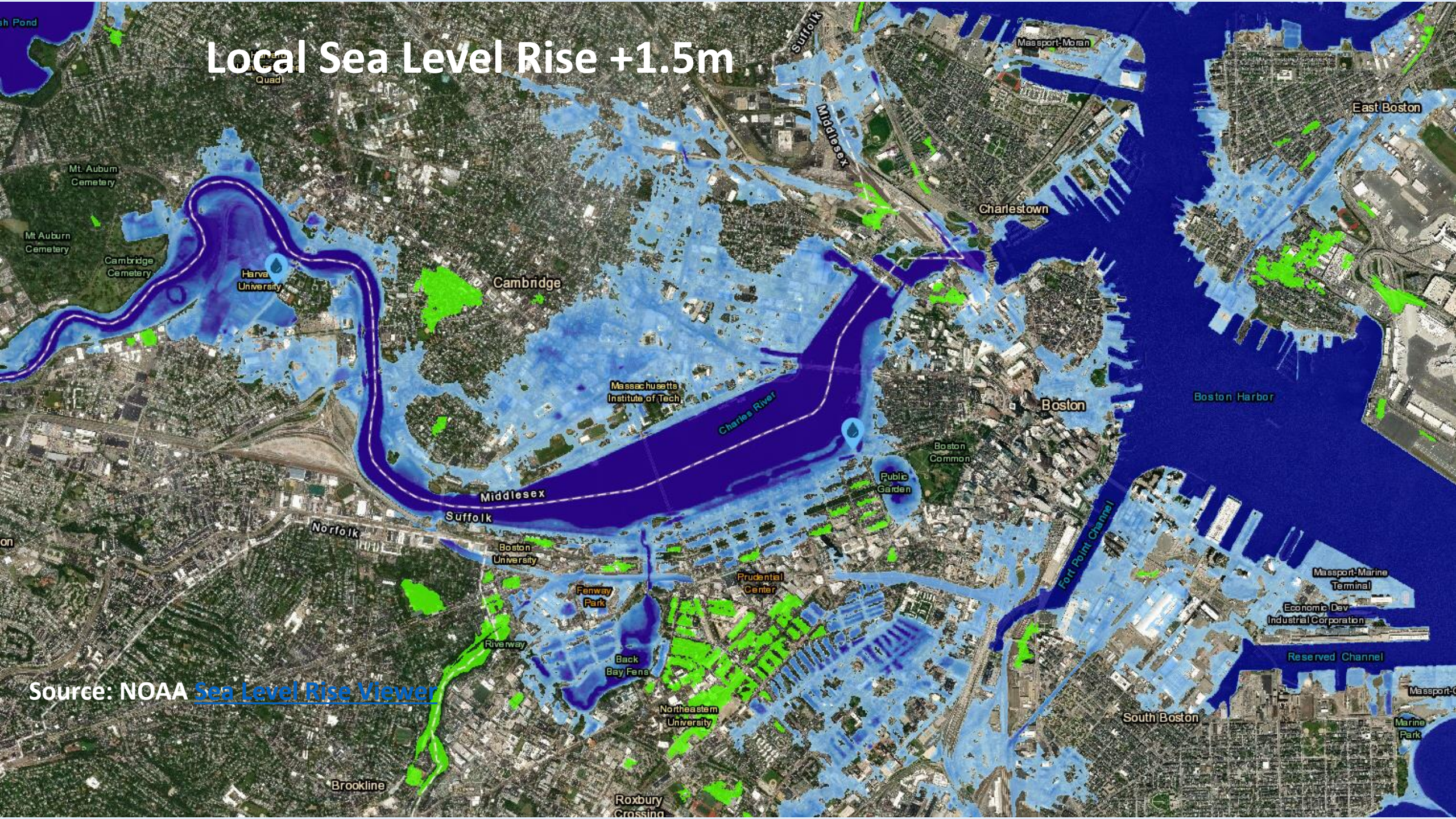
Source: Energy Information Administration

Current Sea Level



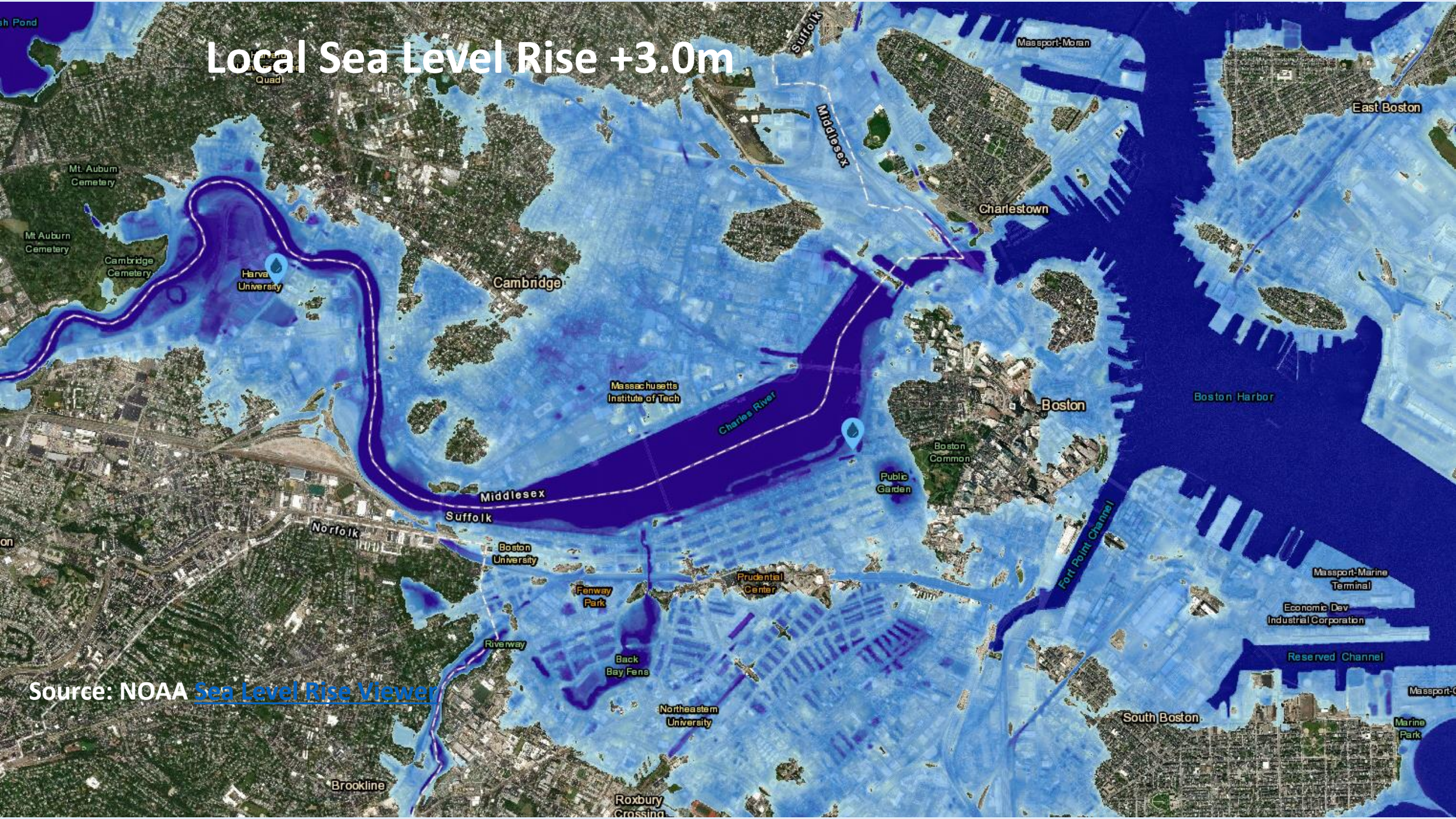
Source: NOAA [Sea Level Rise Viewer](#)

Local Sea Level Rise +1.5m



Source: NOAA [Sea Level Rise Viewer](#)

Local Sea Level Rise +3.0m



Source: NOAA [Sea Level Rise Viewer](#)



Existing Climate Policies: Costs and Macro Impacts



Existing Climate Policies: Costs and Macro Impacts

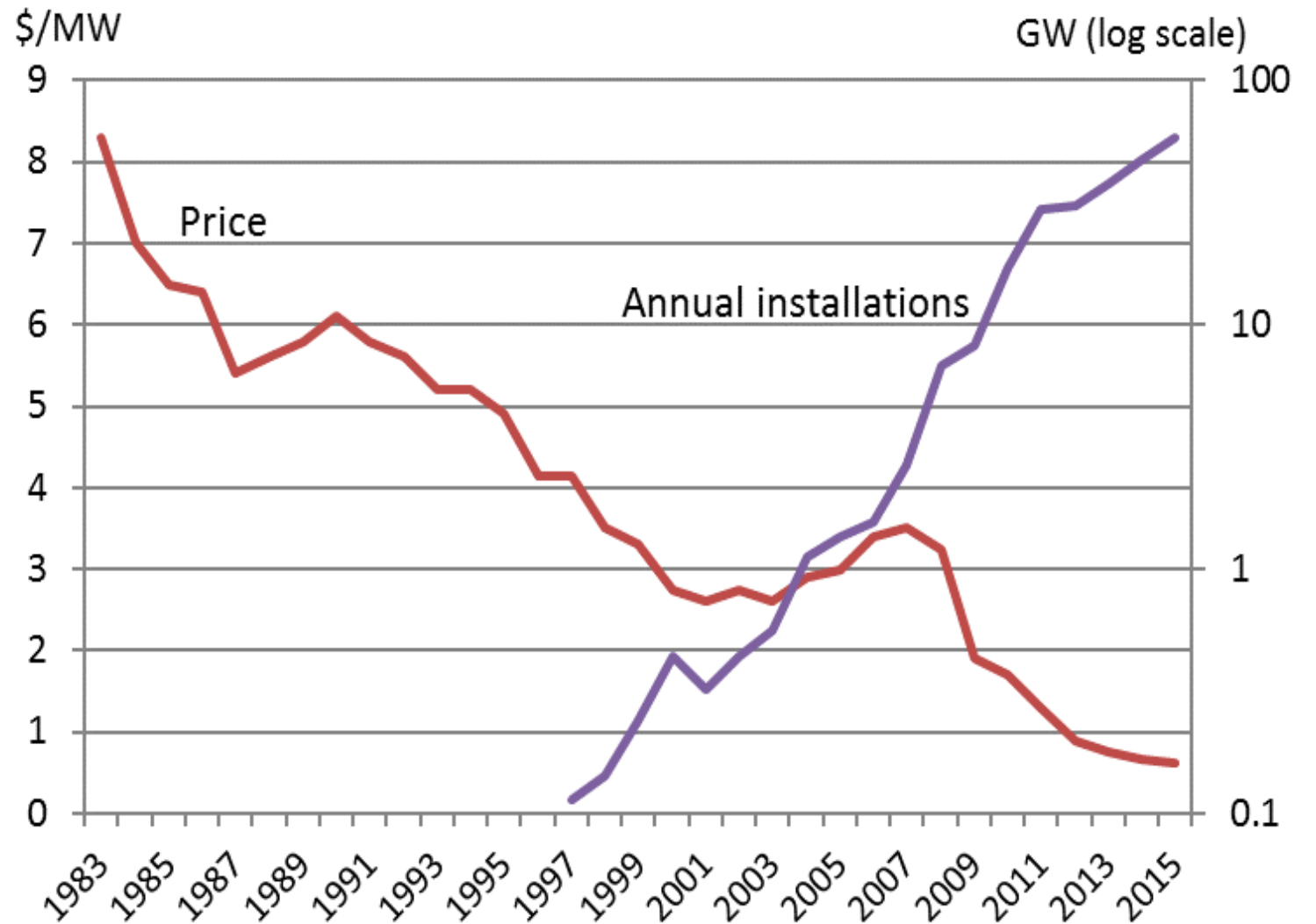
Benchmark:

Social Cost of Carbon (SCC)

= NPV of economic damage from emitting a marginal ton of CO₂.

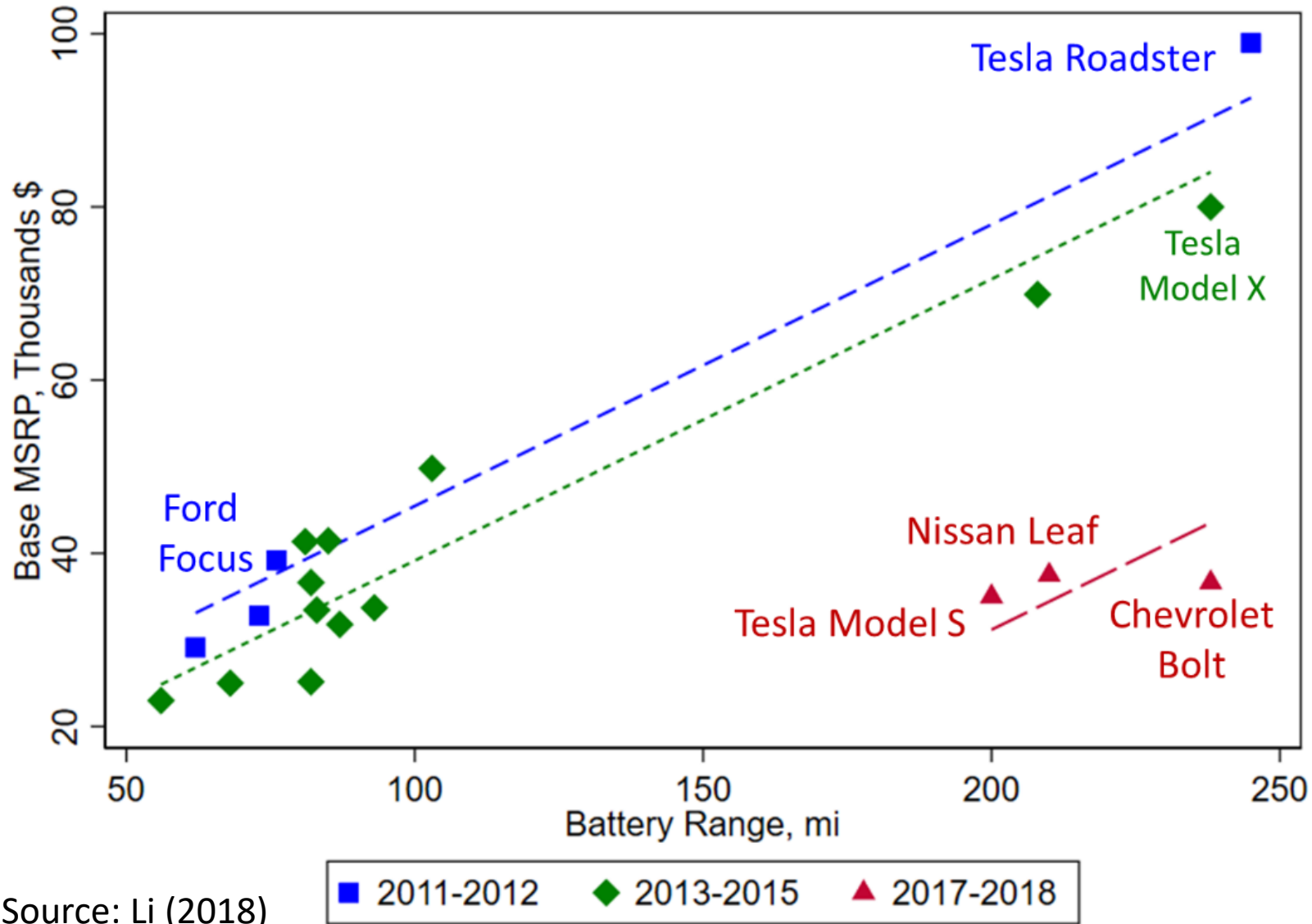
Working estimate: ~\$50/metric ton for CO₂ emitted in 2020 (USG 2016)

Solar panel price indexes (left, excluding subsidies) and cumulative worldwide installed capacity (right), 1983-2015



Sources: International Energy Agency (2017), Navigant Consulting (2009), Gerarden (2017)

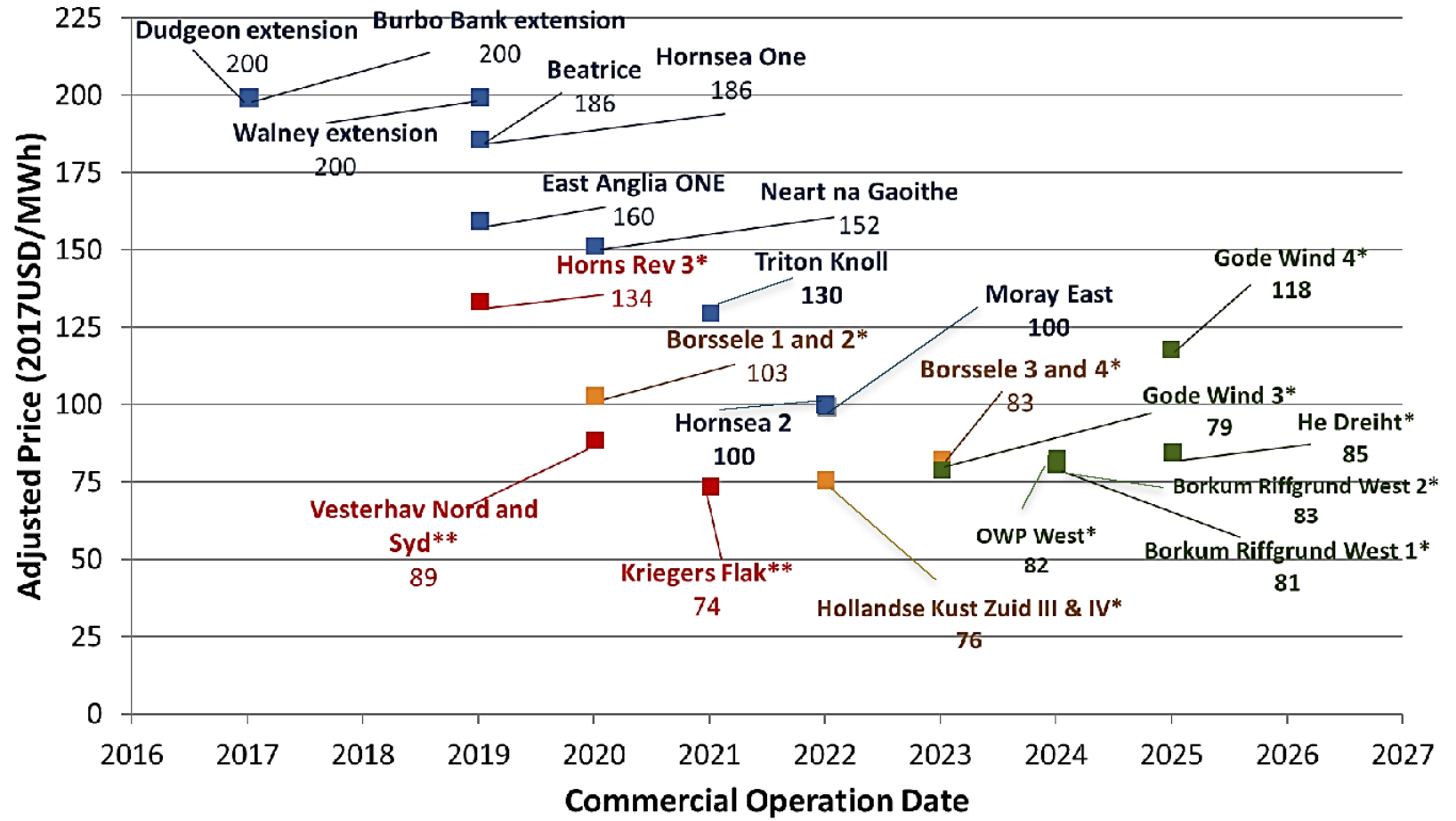
MSRP's of Battery Electric Vehicles v. Battery Range by Year of Model Introduction



Source: Li (2018)



Vineyard Wind bid (Aug 2018):
\$65/MWh



■ United Kingdom ■ Denmark ■ Netherlands ■ Germany

Adjusted Strike Prices from European Offshore Wind Auctions

Source: DOE (2018), *Offshore Wind Update*



