

Responding to Economic and Ecological Deficits

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45th Eastern Economic Association Annual Meeting
New York City, March 3 2019



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Rethinking Macroeconomic Theory

- Rethinking of macroeconomic theory was initiated by the financial crisis, but has been left incomplete.**
- This is true both concerning traditional economic issues such as employment and inflation, and with regard to environmental policy/climate crisis.**
- Urgency of responding to environmental crises, especially climate change, will have major macroeconomic implications.**

Greening Macroeconomics

- Promoting transition to zero carbon emissions.
- Differentiating ecologically damaging and ecologically sound forms of consumption, investment, government spending.
- **“Green Keynesianism”** can use government-led investment to promote efficiency, renewables, repair and expand infrastructure.
- Goal is to achieve improvement in employment and well-being while reducing throughput—the flow of inputs into the economy and outputs of wastes and pollution into the environment.

Ecological Macroeconomics

$$(1) Y = C + I + G + (X - M)$$

$$(2) Y = [C_g + C_s] + [I_{me} + I_{mc} + I_n + I_h] + [G_g + G_{me} + G_{mc} + G_s + G_n + G_h] + (X - M)$$

C_g = consumption of material goods

C_s = consumption of services

I_{me} = investment in **energy-intensive** manufactured capital

I_{mc} = investment in **energy-conserving** manufactured capital

I_n = investment in **natural capital**

I_h = investment in **human capital**

G_g = government spending on goods

G_s = government spending on services

G_{me} = investment in **energy-intensive** manufactured capital

G_{mc} = investment in **energy-conserving** manufactured capital

G_n = government investment in **natural capital**

G_h = government investment in **human capital**

$(X-M)$ = exports minus imports

Reformulation of Macro Balance Equation

Y [output] = GDP [expenditure]

$$(3) \quad Y = [C_g + I_{me} + G_g + G_{me}] + [C_s + I_{mc} + I_n + I_h + G_s + G_{mc} + G_n + G_h] + (X - M)$$

To satisfy sustainability criteria, the terms in the first set of bracketed terms should for the most part be stabilized or reduced over time, but the terms in the second set of bracketed terms can be expanded.

GDP can grow over time, but throughput (input of materials and energy and output of wastes) will stay constant or decline.

(X-M) factor is trade – to avoid “leakage” international coordination of policies is needed

Green Keynesianism in Practice

- **Obama administration 2009 stimulus included a significant “green” component of about \$80 billion: investment in energy efficiency, renewable energy, and other green spending.**
- **Green stimulus government spending in China was even higher, at over \$200 billion.**
- **Thus the response to the economic crisis also involved at least a partial response to environmental crises as well.**

Economic and Ecological Deficits

- Keynesian policy often involves fiscal deficits.
- Conservative critiques of deficit spending is overblown, but long-term economic deficits and debt remain an issue.
- Ecological deficits: when an economy withdraws resources in excess of the ecosystem's capacity to renew them, or overloads the ecosystem with waste outputs in excess of its ability to absorb them.
- A prime goal of **Green Keynesianism** must be to reduce or eliminate ecological deficits.

Measuring Ecological Deficits

- **The global ecological deficit is estimated at 70% of global biocapacity, by ecological footprint analysis.**
- **A more disaggregated view of the ecological footprint reveals some serious shortcomings.**
 - **Biocapacity and footprint for cropland and built-up land are identically equal by definition, indicating neither surplus nor deficit.**
 - **Forest, fishing, and grazing land categories each show a surplus of biocapacity over footprint**
 - **Global deficit is entirely due to carbon emissions. Omitting carbon accounting gives a planetary surplus.**

Global Footprint Surplus and Deficit

2014 TRILLION GLOBAL HECTARES	CARBON	BUILT-UP LAND	CROPLAND	FISHING GROUNDS	FORESTS	GRAZING LANDS	TOTAL without carbon	TOTAL with carbon
BIOCAPACITY	0	0.5	4.0	1.1	5.2	1.5	12.2	12.2
FOOTPRINT	12.4	0.5	4.0	0.7	2.0	1.1	8.2	20.6
SURPLUS/ DEFICIT	-12.4	0	0	0.4	3.2	0.4	4.0	-8.4

Source: Global Footprint Network

<http://data.footprintnetwork.org/#/countryTrends?cn=5001&type=BCtot,EFctot>

Goals for Eliminating Ecological Deficits

- Carbon. Human generated carbon emissions in excess of natural absorption capacity need to be reduced to zero (or to a surplus, meaning net carbon absorption). **Requires a complete transition away from carbon-based energy** to energy efficiency and renewable energy, as well as significant additional carbon absorption by forests, soils, and wetlands.
- Forests and Wetlands. No net loss of forests and wetlands is a minimal goal. To make progress towards the carbon goal, need to **expand forested area**. Different types of forest need to be accounted for separately, since replacing tropical forest with second-growth forest or plantation forest in temperate zones represents a net ecological loss.
- Soils. Degradation of soils can be measured by loss of nutrients and carbon. Eliminating deficits is not sufficient; need to move to surplus by **building up soil** carbon and other nutrients.

Goals for Eliminating Ecological Deficits (cont'd)

- Fisheries. Numerous global fisheries are in decline; to meet ecological criteria fisheries need to have **stable fish biomass** and ecological balance.
- Grazing Lands. As with soils, the quality of **grazing lands** **needs to be maintained or improved** over time.
- Water. Depletion or degradation of groundwater is an ecological deficit, as is sustained water pollution. **Water withdrawals** need to be **at sustainable levels**.
- Biodiversity. Species loss is a clear ecological deficit. It is not possible to **reduce species loss** to zero, but that goal needs to be approached as much as possible.

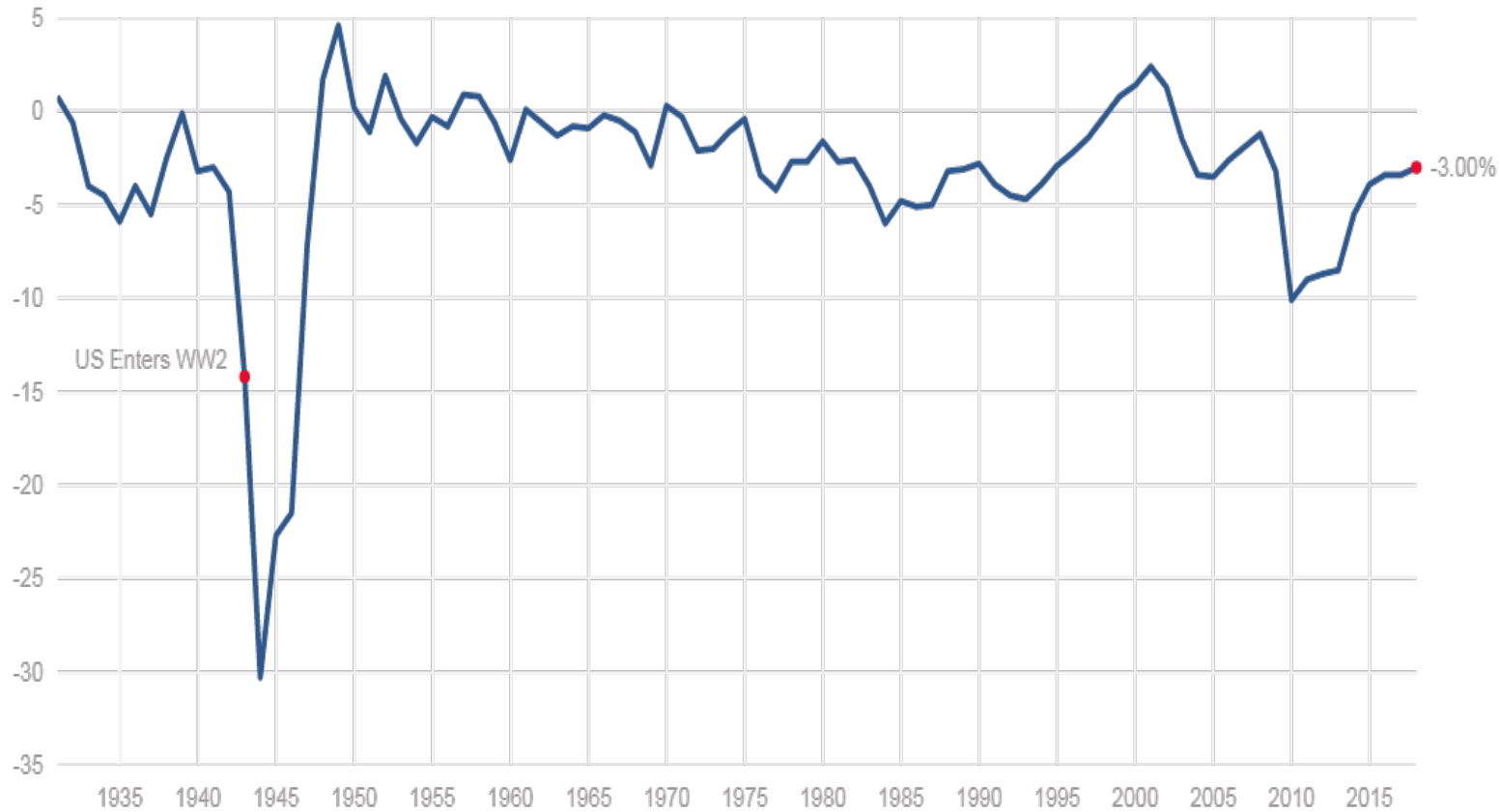
Will Reducing Ecological Deficits Raise Economic Deficits?

- The task of **reducing ecological deficits** is huge, but it does not necessarily involve high economic costs in all cases.
- Most ecological deficits arise from the **exploitation of “free” or low-priced natural resources**. Putting a **proper price** on these resources implies a shift in economic techniques and activities rather than an absolute cost.
- **Carbon taxes** can provide both incentive to reduce fossil fuel use and revenue stream to invest in alternatives (after set-aside for per-capita).
- **Reallocating current resource and agricultural subsidies**, plus proper pricing of natural resources, can also provide funding for investment in regenerative resource management.
- **Infrastructure investment in modernizing electrical grid**, transportation systems, and developing wind and hydropower facilities may need to be funded out of general government revenues.

Is there an Economic Deficit Problem?

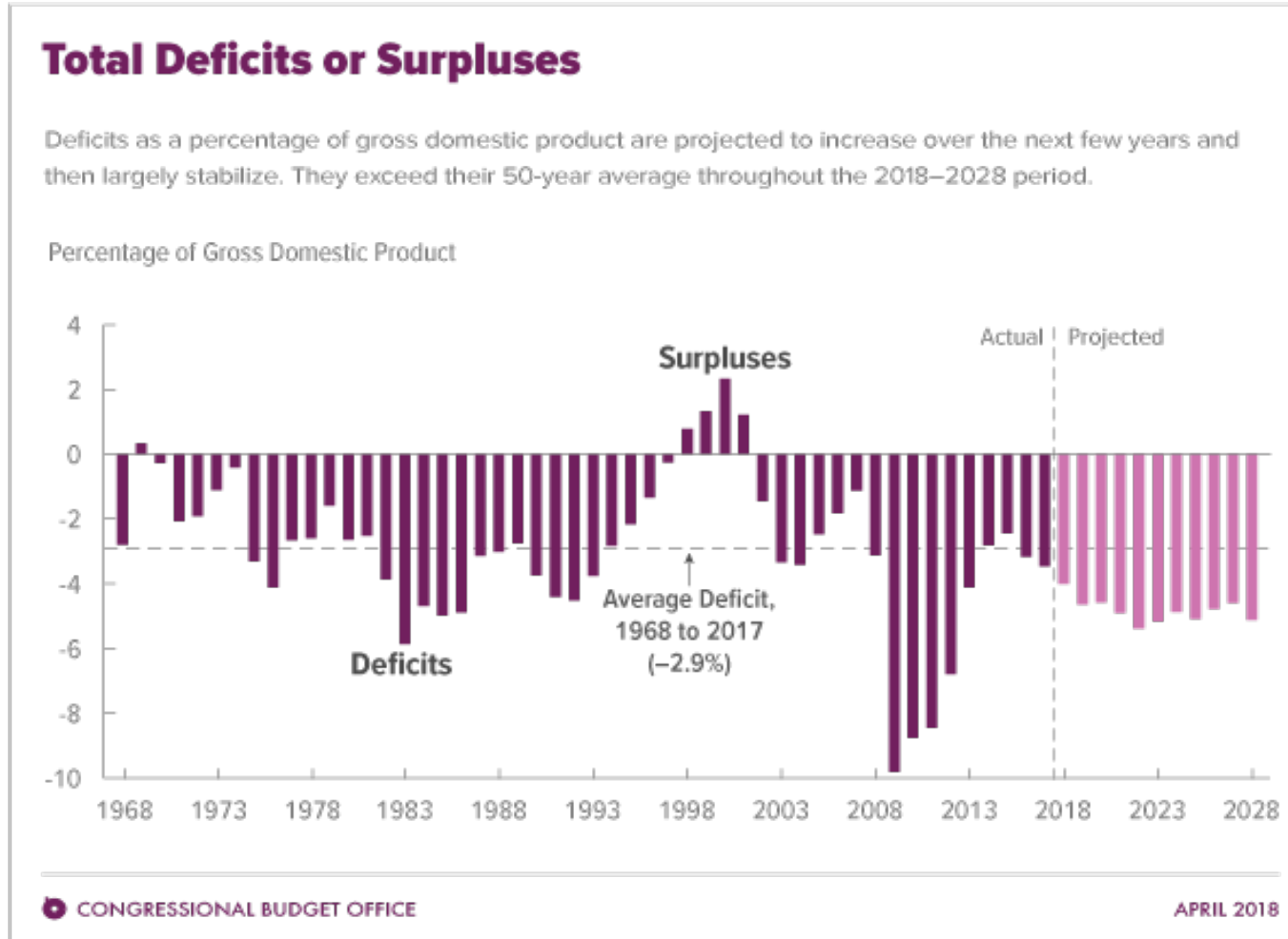
- Rule of thumb often been used by Keynesian analysts to evaluate deficits and debt: deficits, as a percent of GDP should on average be no higher than the rate of economic growth.
- Obama administration more or less in accordance with this rule by 2015: deficits of \$500-600 billion, or about 3% of GDP, in fiscal years 2015 and 2016.
- Trump administration moves rapidly back to larger deficits, with the deficit currently on track for over \$1 trillion or about 5% of GDP, by 2019.
- Primarily a result of 2017 tax cuts, not rising “entitlement” spending .

U.S. Federal Deficit as a Percent of GDP



Source: [White House Office of Management and Budget](#), *Summary of Receipts, Outlays, and Surpluses or Deficits (-) as Percentages of GDP*.

Projected Federal Budget Deficits through 2028



Source: Congressional Budget Office, *CBO's Projections of Deficits and Debt for the 2018–2028 Period*, April 2018.

Problems with Deficits

- **High deficits and debt constrain infrastructure investment. Deficits due to Trump tax cuts benefit primarily upper-income taxpayers and large corporations.**
- **Goals of stabilizing the debt/GDP ratio, expanding infrastructure investment including green investment, and promoting greater income and wealth equity, require repealing most or all of the 2017 tax cuts.**
- **Goal of stabilizing debt/GDP ratio would be easier with more rapid economic growth (unconvincingly promised by the Trump administration).**
- **On the other hand a move towards a slower-growing economy would make the deficit reduction goals tougher, and a no-growth economy would require a balanced budget.**

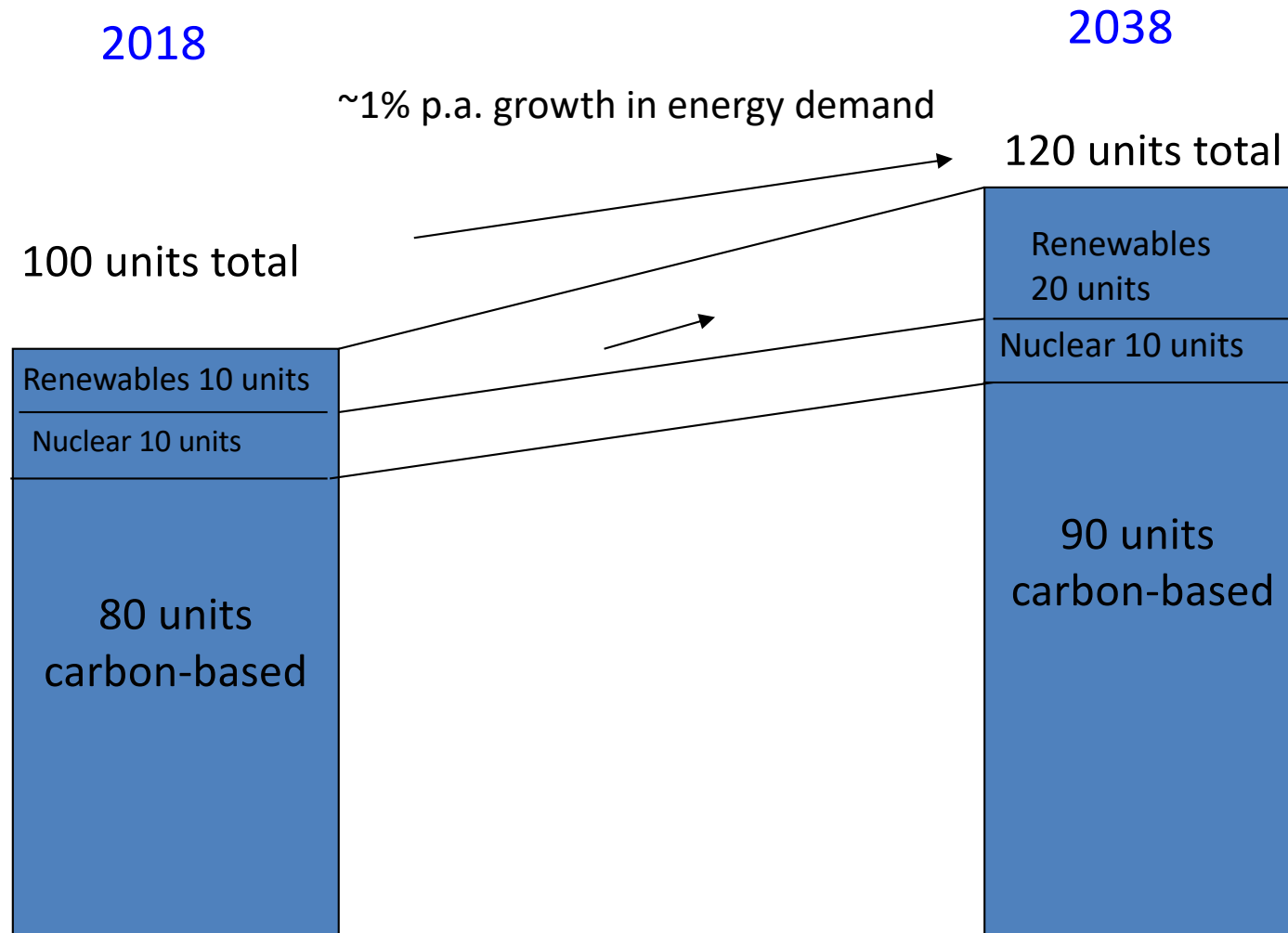
Do We Need Degrowth?

- Ecological economists point out that we can't grow forever, and therefore can't rely on growth to manage debt.
- But this is only true of "throughput" growth (energy and resources).
- We have lots of scope for growth in services, human capital, environmental infrastructure, renewable energy, etc.)
- For debt reduction, health care reform and cost control, limit military spending, carbon tax with partial per-capita rebate, repeal 2017 individual tax cuts and close corporate loopholes.
- Long term, need to adapt to **steady-state economy**. Population stabilization implies a larger cohort of elderly people, requiring greater investment in social services and health care.

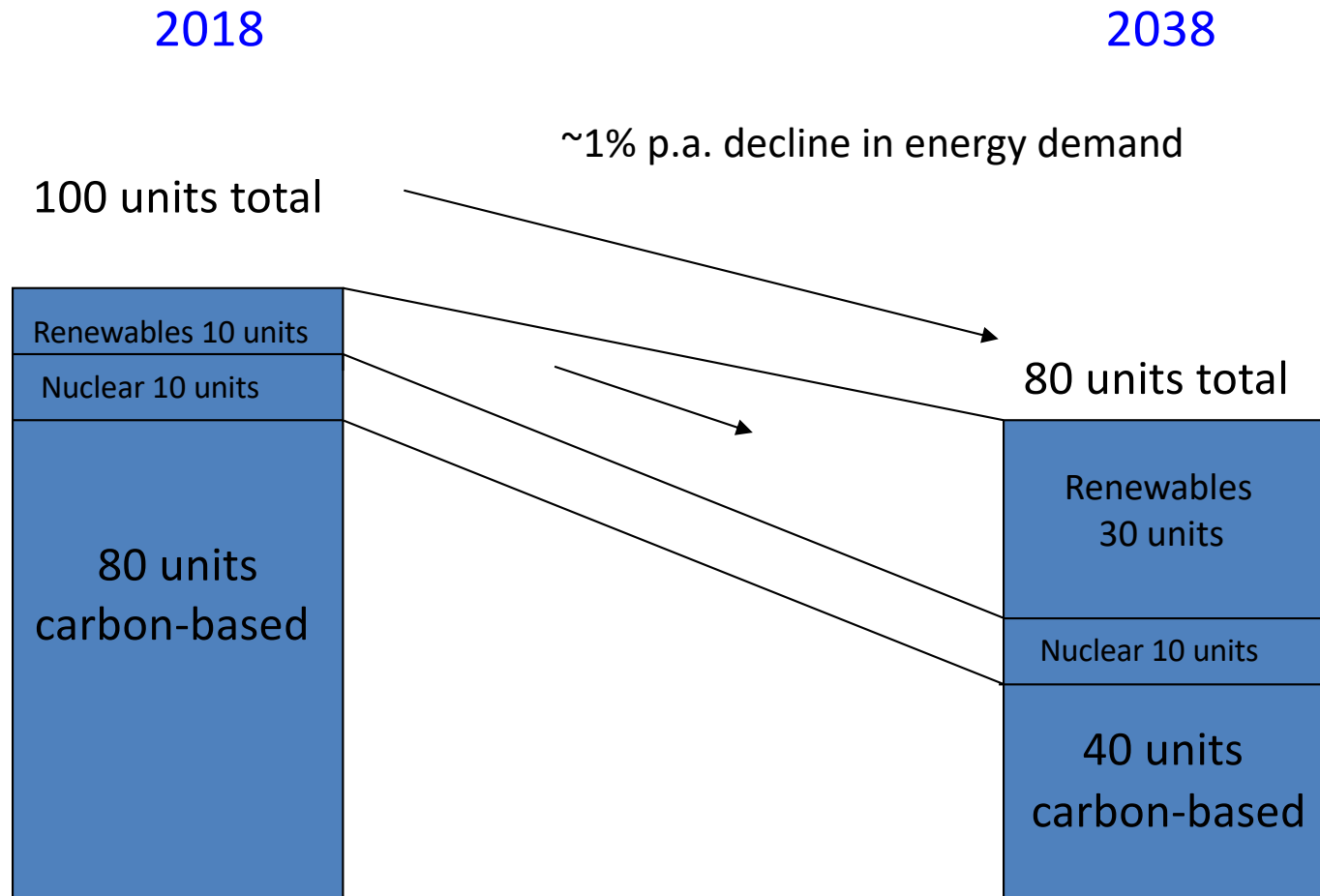
A 2% Solution for Carbon Reduction

- **Reduce overall energy use by 1% of current energy consumption per year.**
- **Increase the share of renewables by 1% of current energy consumption per year.**
- **As a result, reduce carbon emissions by about 2% of current emissions per year.**
 - **Reduction of 50% in about 20 years**
 - **Reduction to zero in about 40 years.**
- **(Actual U.S. primary energy use has been approximately stable for the last 20 years, and has declined over the last 10 years, despite increasing population; renewable energy production has increased its share by about 5% of total energy use over the last ten years.)**

Business as Usual Scenario



Services, Efficiency, & Renewables Scenario



Based on modest investment in services, efficiency, renewables, with no loss in employment (probably a gain). Nuclear could also be replaced with renewables.

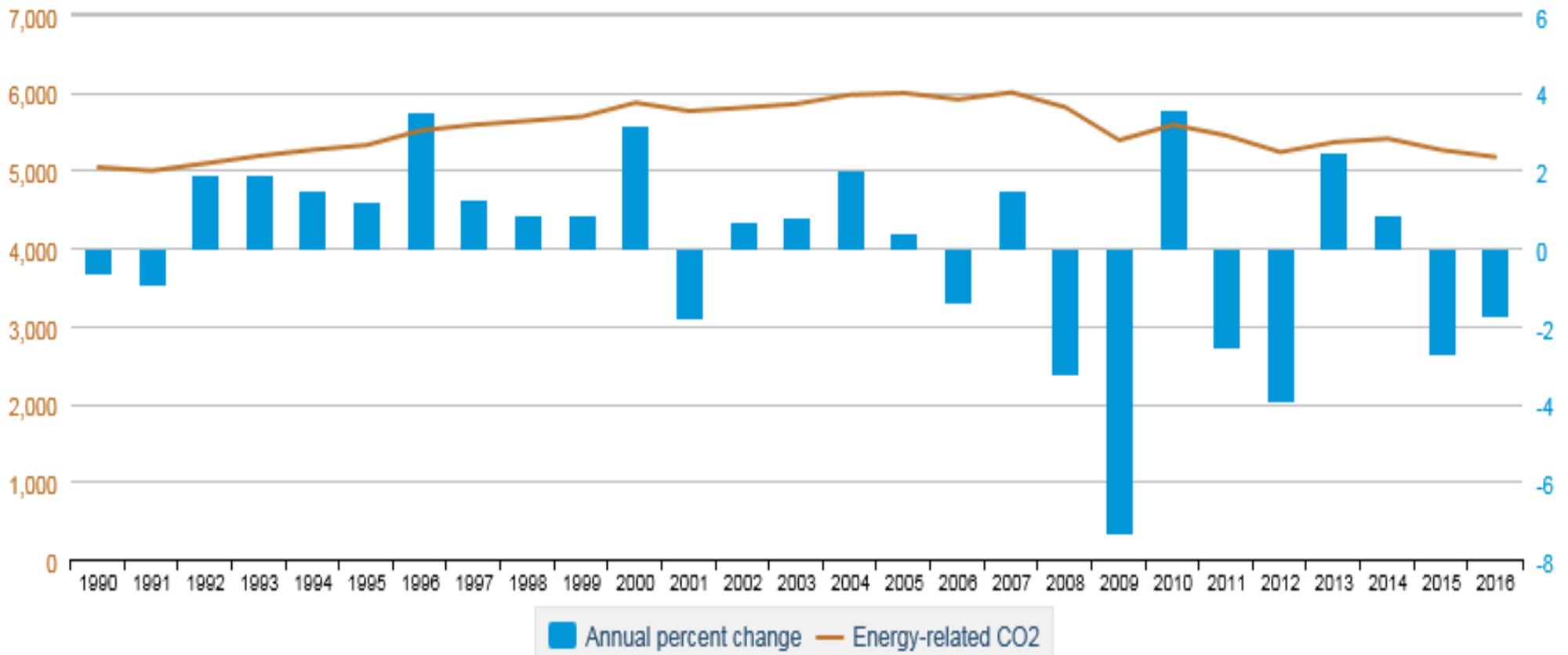
Actual U.S. Energy-Related CO₂ Emissions

Decline of 14% between 2007 and 2016,
from 6,000 MMT to 5,170 MMT.

Figure 1. Energy-related carbon dioxide emissions, 1990-2016

million metric tons carbon dioxide

 DOWNLOAD
annual percent change



Macroeconomics for the 21st Century

- **Drastically reduce carbon emissions through investment in energy efficiency and renewables, increased carbon storage in forest and soils.**
- **Adapt to ecological limits to growth, including carbon limits but also water, land, forests, etc.**
- **Limit both economic and ecological deficits, with ultimate goal of reduction to zero.**
- **Increased taxes on upper incomes and corporations, carbon tax with rebate**
- **Use **Green Keynesian** policies and invest in green technology.**