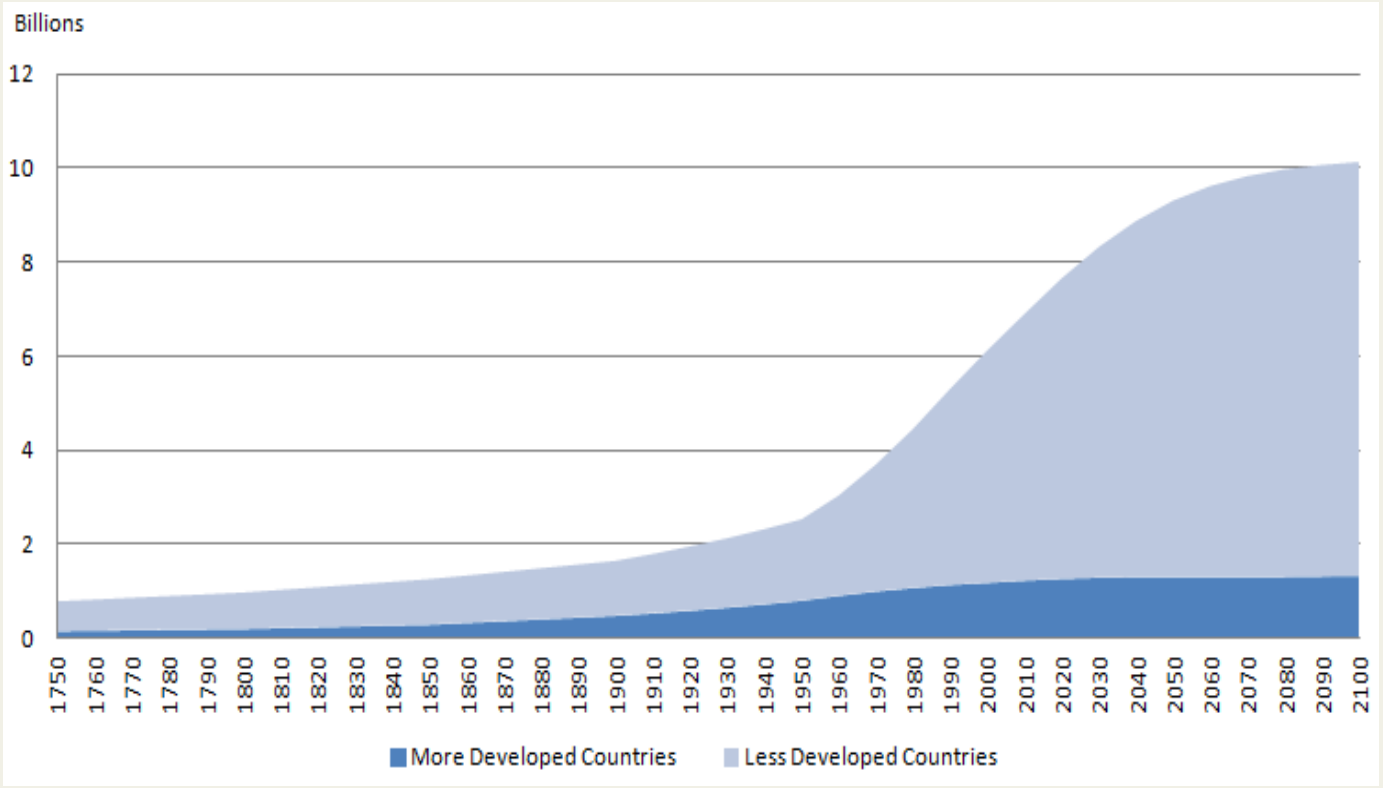
Consumption, Resources, and the Green Economy

Jonathan M. Harris

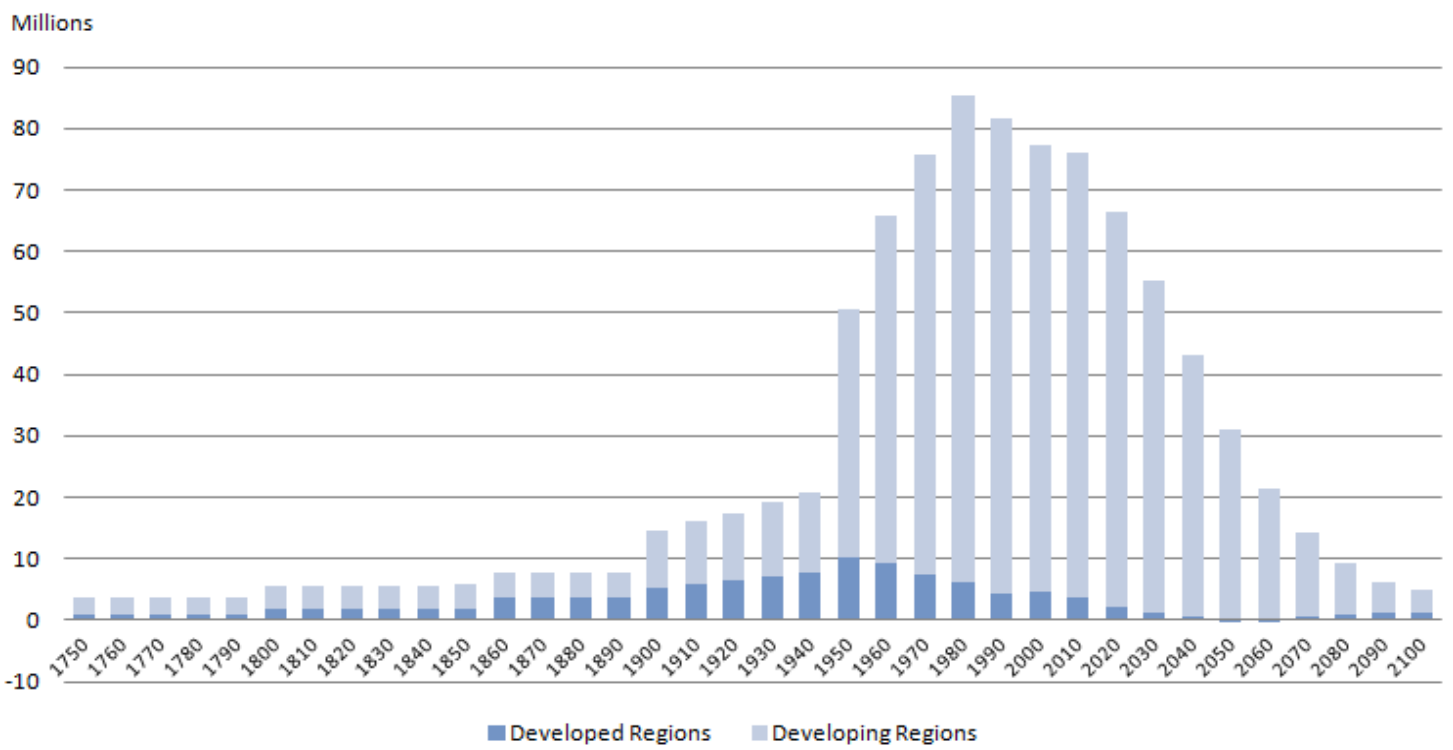
http://ase.tufts.edu/gdae

Global Population Growth and Projections, 1750-2100



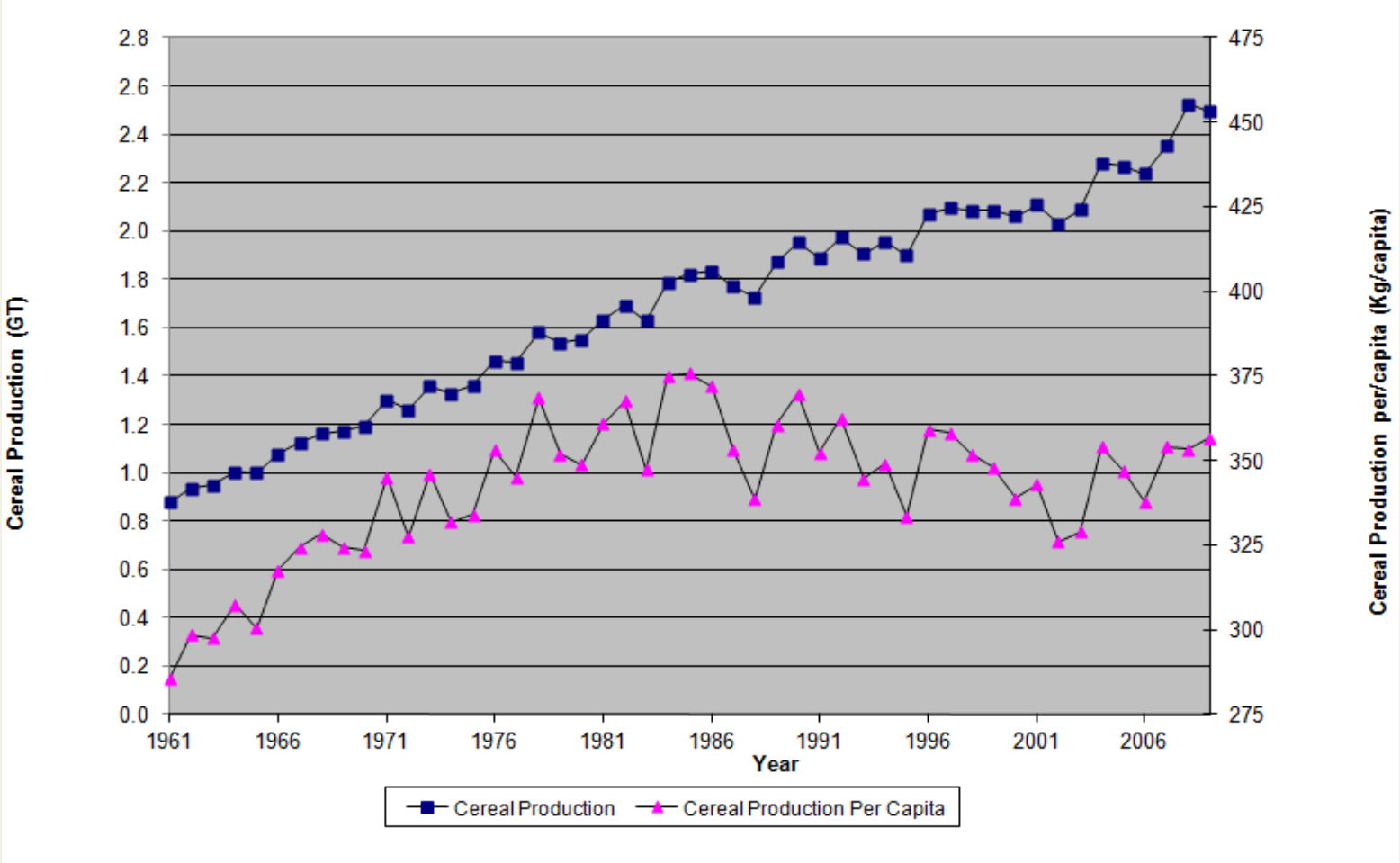
Sources: United Nations Department of Economic and Social Affairs of the United Nations Secretariat, Population Division, *World Population Prospects: The 2010 Revision*, Medium Variant http://esa.un.org/unpd/wpp/index.htm; Caldwell, John C and Thomas Schindlmayr, 2002. "Historical Population Estimates: Unraveling the Consensus," *Population and Development Review* **28**(2): 183-204.

Net Annual Increase in Population by Decade 1750-2100



Sources: United Nations Department of Economic and Social Affairs of the United Nations Secretariat, Population Division, *World Population Prospects: The 2010 Revision*, Medium Variant http://esa.un.org/unpd/wpp/index.htm; Repetto, Robert, 1991. *Population, Resources, Environment: An Uncertain Future,* Washington, D.C: Population Reference Bureau.

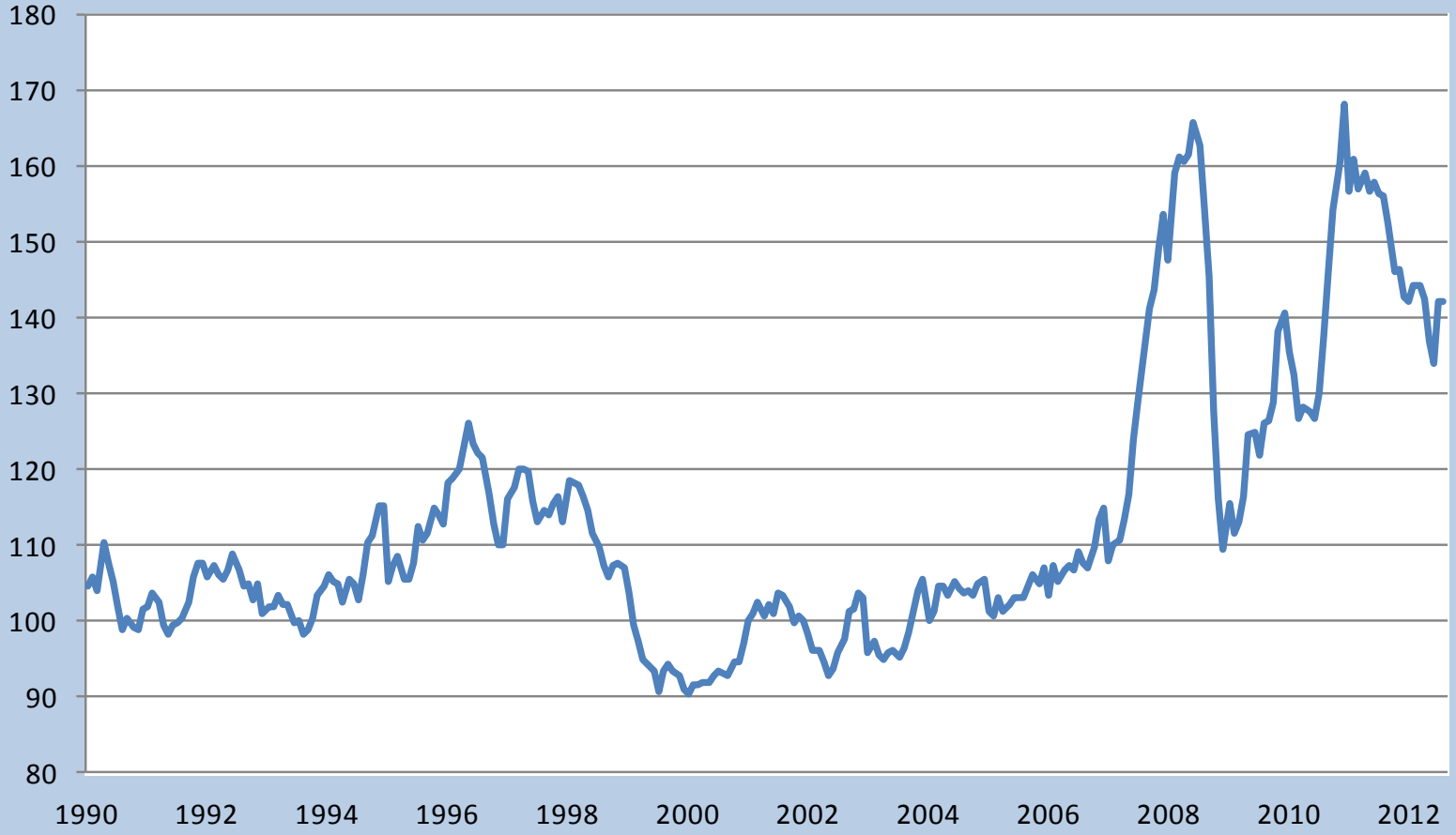
Absolute and Per Capita Grain Production, 1950 to 2010



Source: For world total cereal production FAO, 2011 http://faostat.fao.org/
Population Source: World Bank 2011 -- http://data.worldbank.org/indicator/SP.POP.TOTL

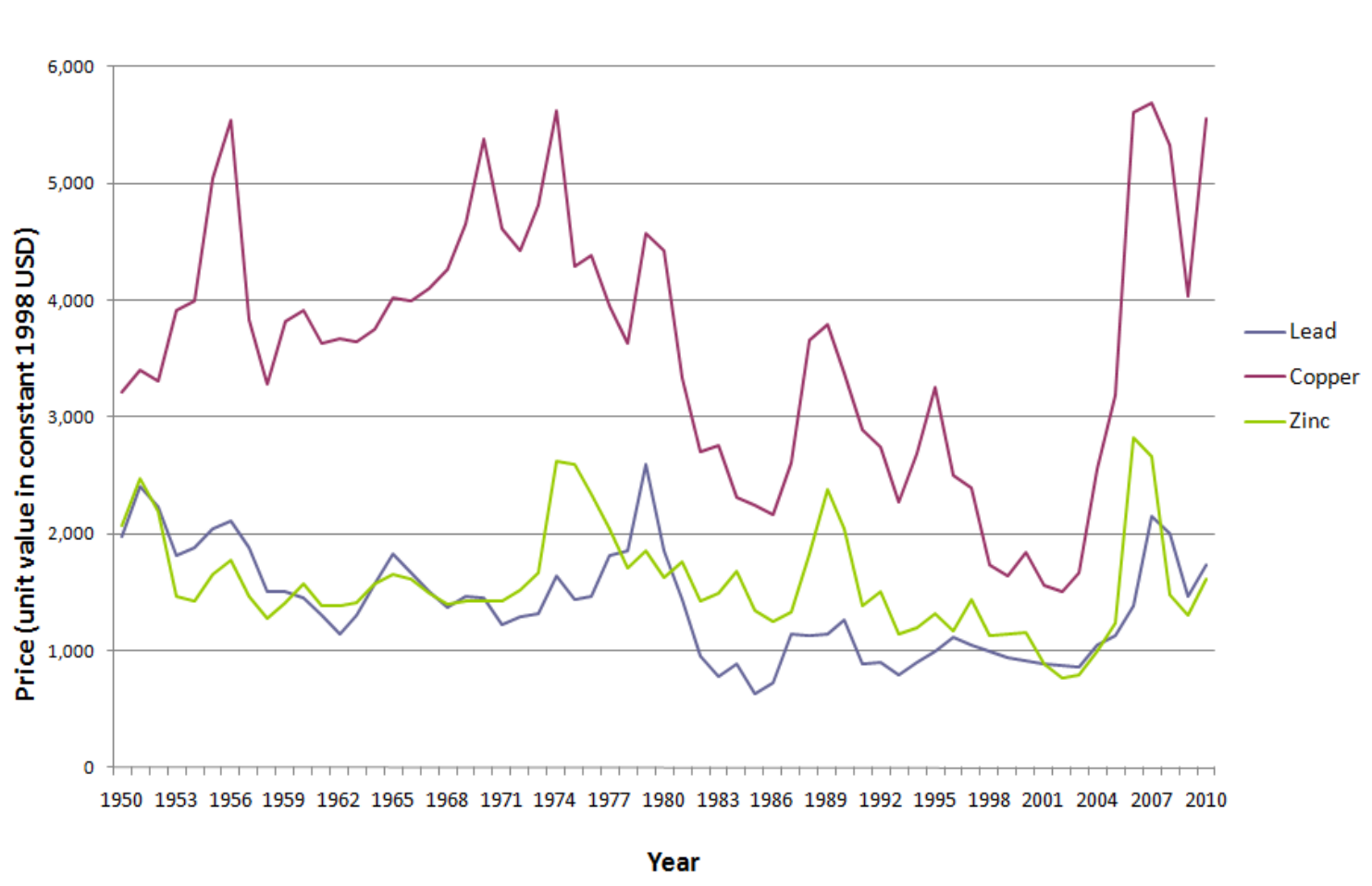
FAO Monthly Food Price Index, 1990-2012

(2002-2004=100)



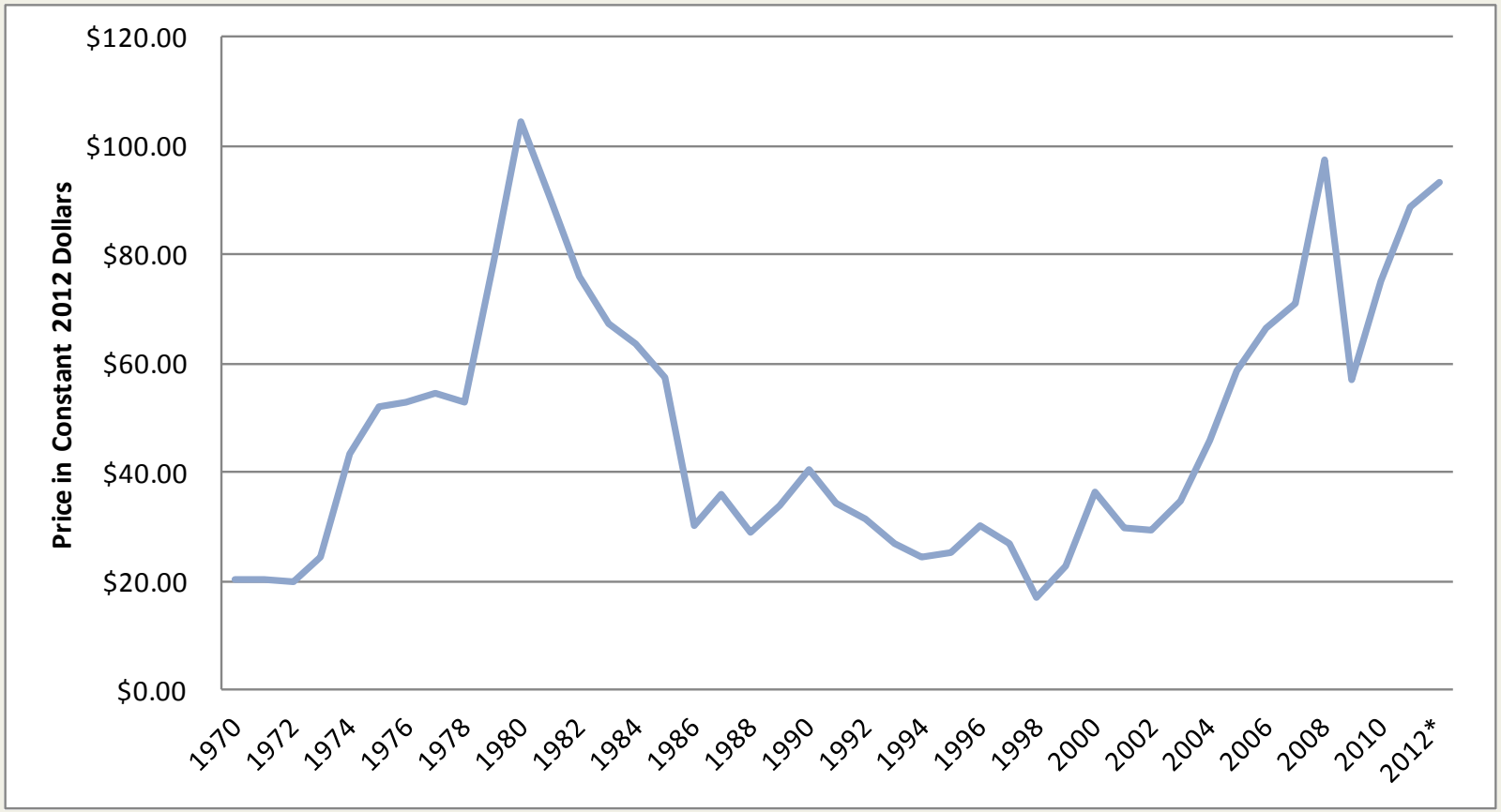
Source: FAO, Food Price Index, Accessed Sept 20, 2012

Price Trends for Selected Minerals (Price per ton)



Source: USGS, available at: http://minerals.usgs.gov/ds/2005/140/

Oil Prices in Constant Dollars, 1990-2012



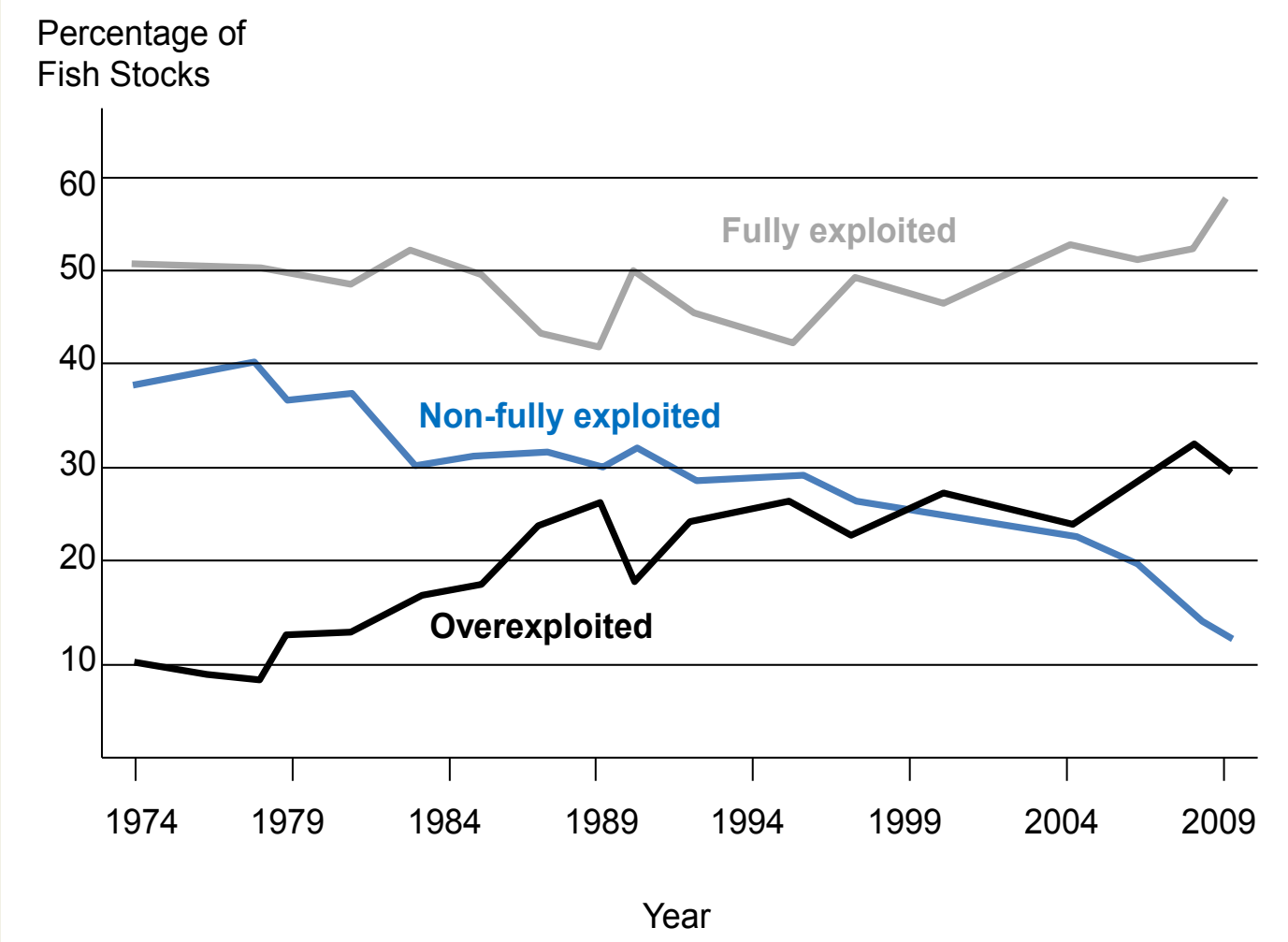
Sources: Data from Energy Information Administration http://www.eia.gov and http://inflationdata.com
Note: Prices in 2010 dollars; * indicates partial year data.

Declining Major Fisheries

Ocean Area	Estimated Annual Potential (million tons)	Year Potential Reached	Decline from Peak Yield
East Central Atlantic	4	1984	-22%
Northwest Atlantic	4	1971	-38%
Southeast Atlantic	3	1978	-53%
West Central Atlantic	2	1987	-28%
East Central Pacific	3	1988	-13%
Northeast Pacific	4	1990	-12%
Southwest Pacific	1	1991	-13%
Antarctic	0.2	1980	unavailable
World	82	1999	unavailable

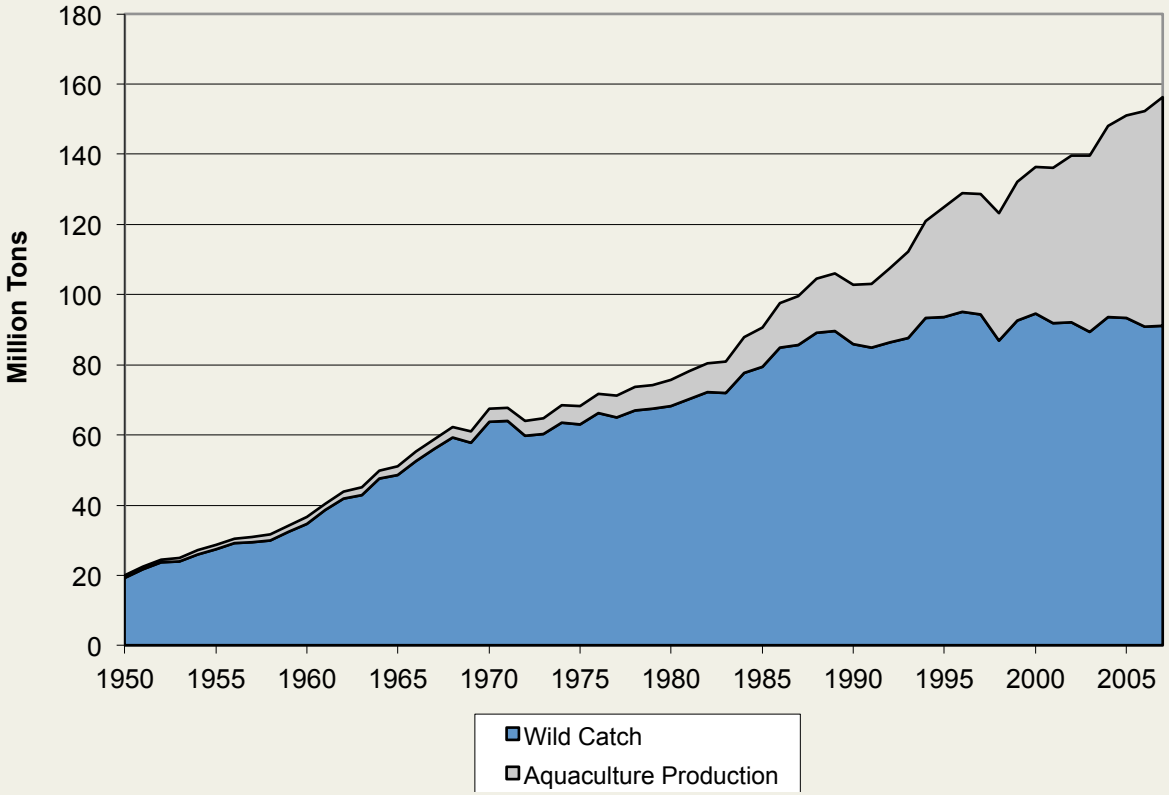
Sources: FAO, The State of World Fisheries and Agriculture, 1997; McGinn, *Safeguarding the Health of Oceans,* Worldwatch Institute 1999.

Global Trends in the Status of Fish Stocks, 1974-2009



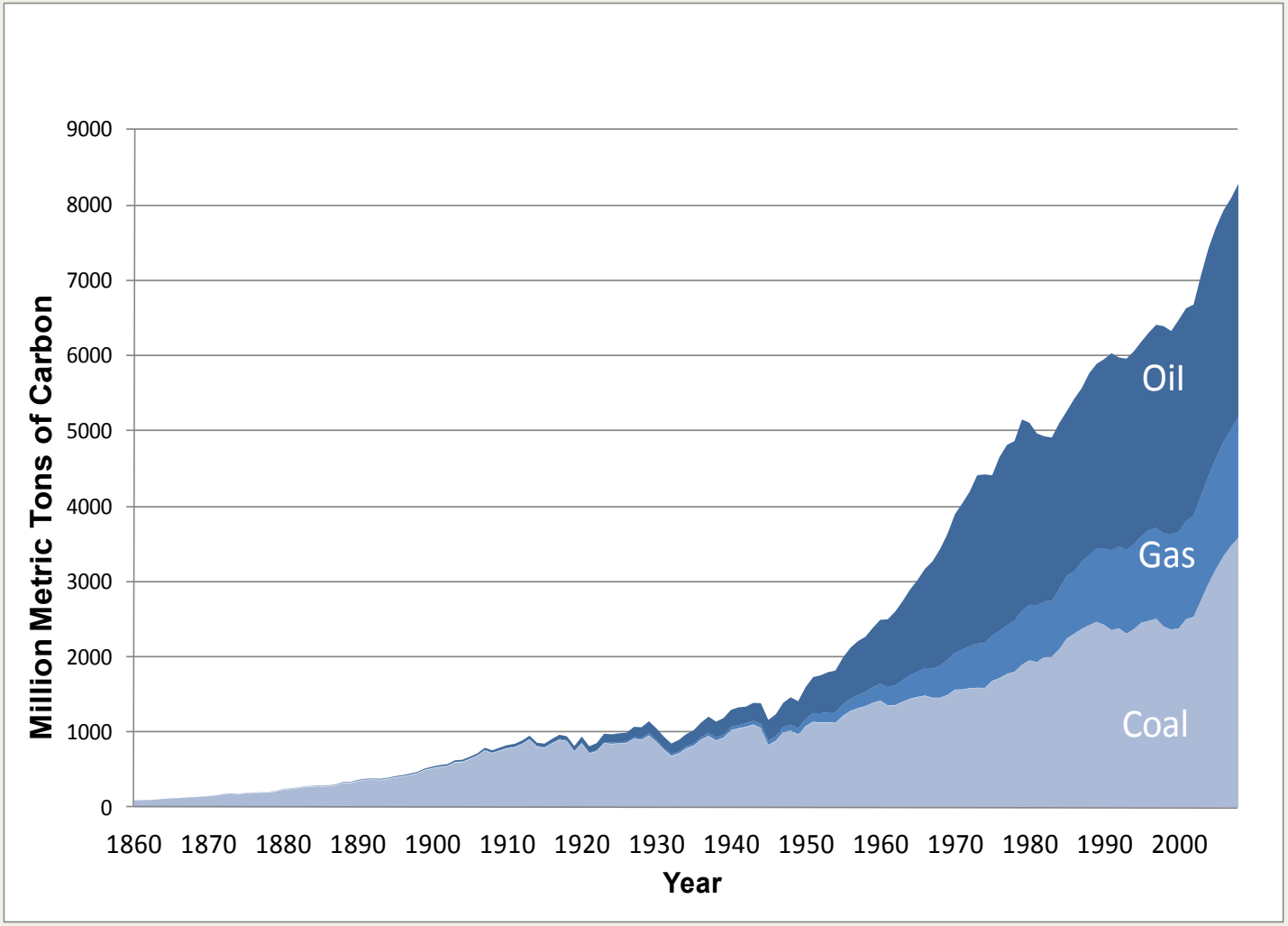
Source: FAO, 2012.

Global Fish Harvest, Wild Catch and Aquaculture, 1950-2007

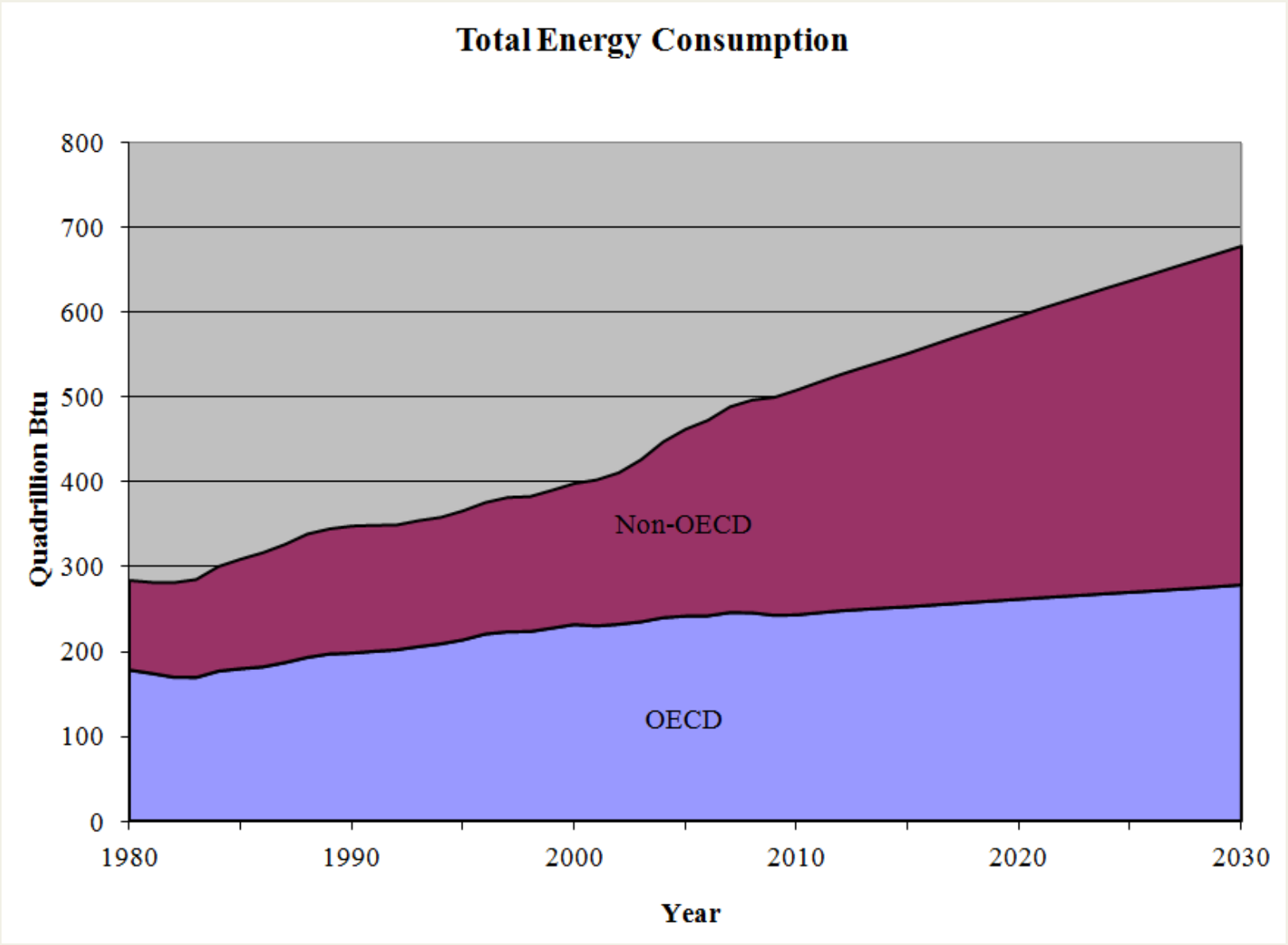


Source: U.N. Food and Agriculture Organization (FAO), FAOSTAT Statistical Database, http://www.fao.org/fishery/statistics/software/fishstat/en, updated February 2011; World Watch Institute, *Vital Signs Online.*

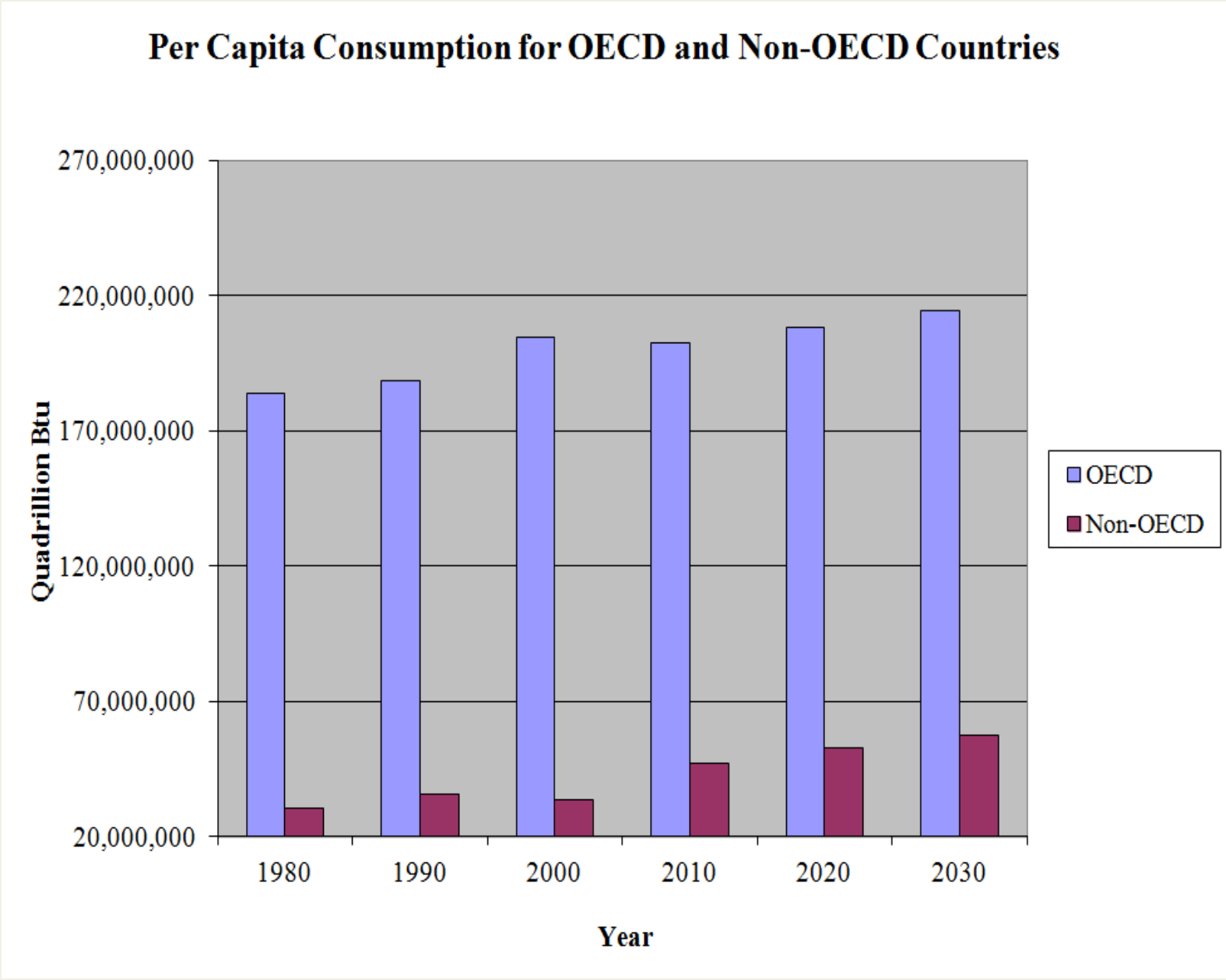
Global Carbon Emissions from Fossil Fuel Consumption, 1860-2008



Source: Carbon Dioxide Information Analysis Center (CDIAC), http://cdiac.ornl.gov/trends/trends.htm, accessed August 2012.

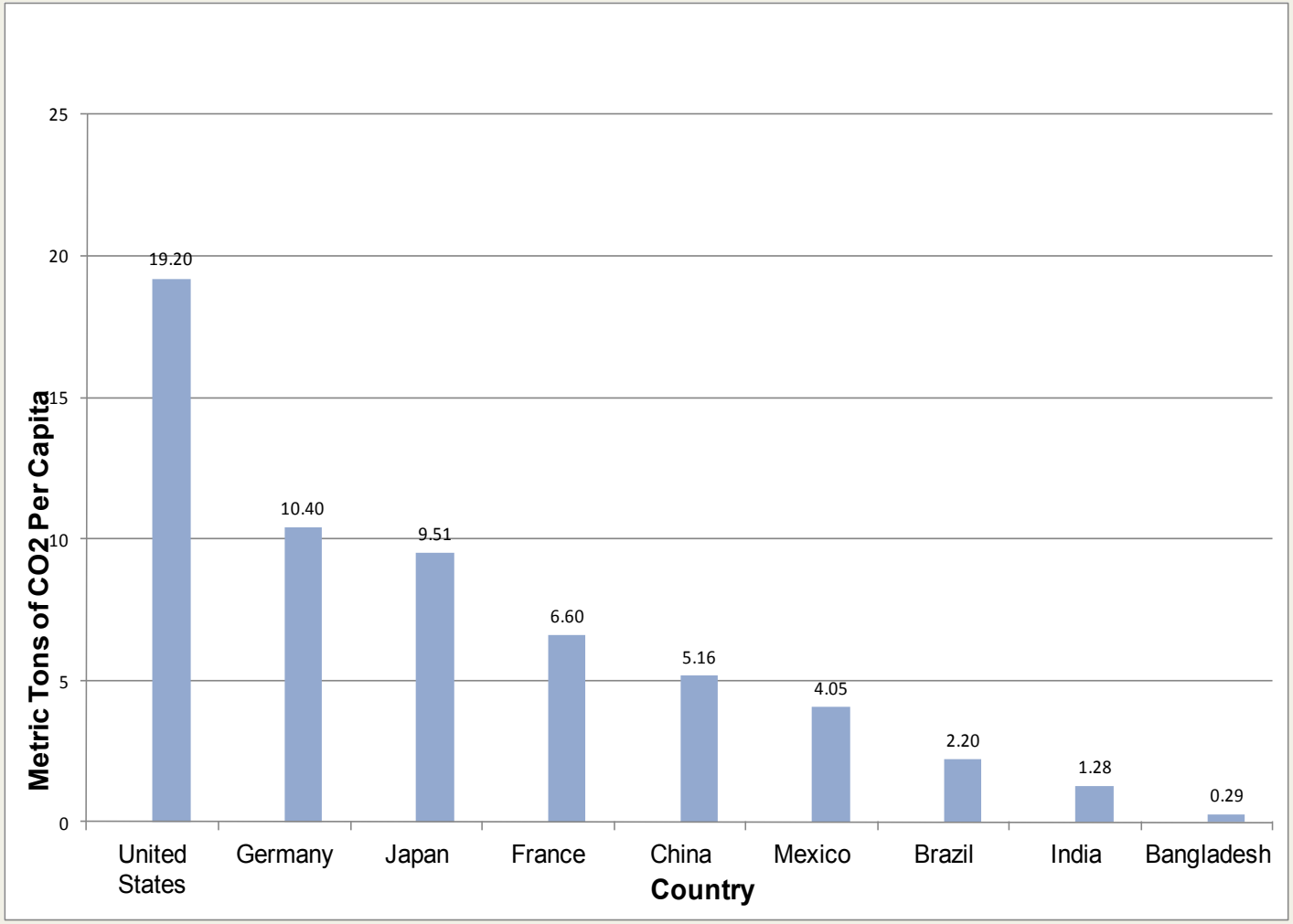


Source: U.S. Department of Energy, http://www.eia.doe.gov/oiaf/ieo/ieorefcase.html



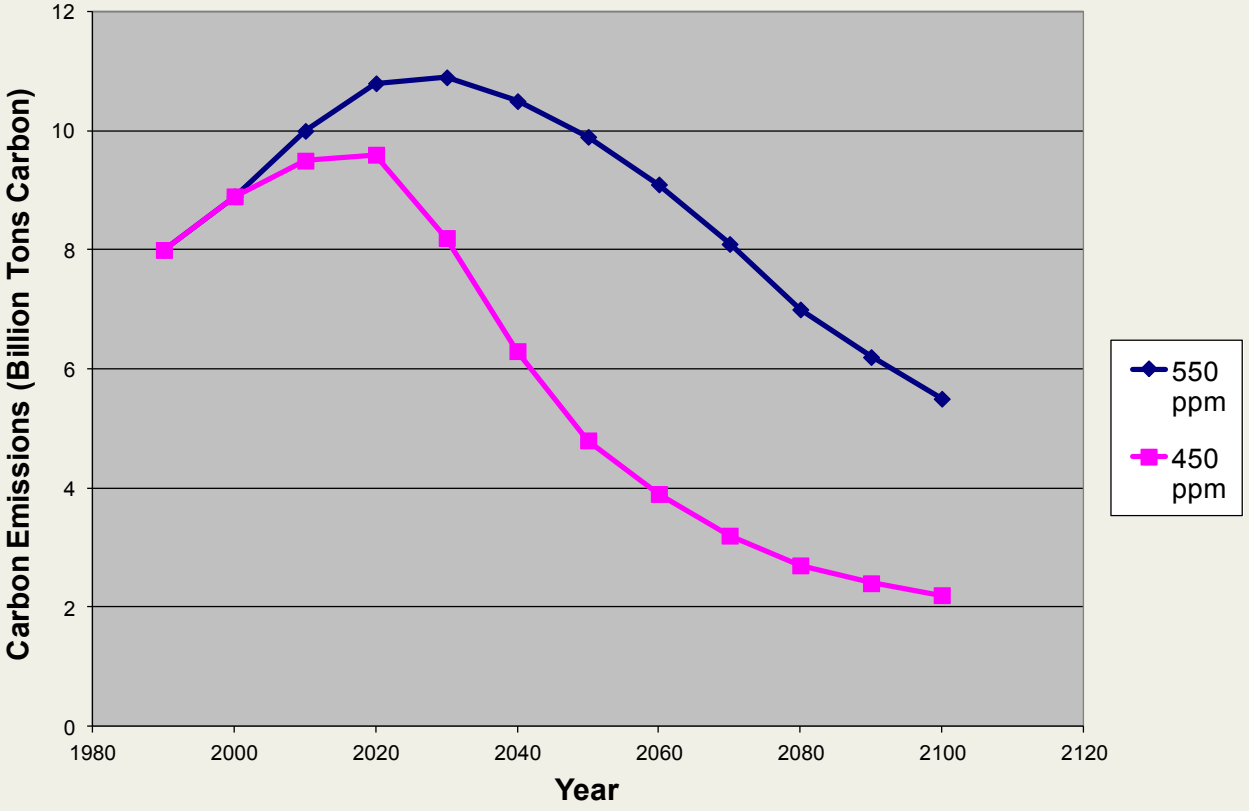
Source: U.S. Department of Energy, http://www.eia.doe.gov/oiaf/ieo/ieorefcase.html

Per-Capita Emissions of Carbon Dioxide by Country



Source: U.S. Department of Energy, International Energy Annual 2008.

Carbon Stabilization Scenarios (450 and 550 ppm CO_2)



Source: Adapted from Intergovernmental Panel on Climate Change, *Climate Change 2001: The Scientific Basis*, http://www.ipcc.ch/

Social Cost of CO_2, 2015-2050
(2007 Dollars)

	Discount Rate and Statistic			
Year	**5% Average**	**3% Average**	**2.5% Average**	**3% 95th percentile**
2015	$6	$24	$38	$73
2020	$7	$26	$42	$81
2025	$8	$30	$46	$90
2030	$10	$33	$50	$100
2035	$11	$36	$54	$110
2040	$13	$39	$58	$119
2045	$14	$42	$62	$128
2050	$16	$45	$65	$136

Source: U.S. EPA, The Social Cost of Carbon: Estimating the Benefits of Reducing Greenhouse Gas Emissions
http://www.epa.gov/climatechange/EPAactivities/economics/scc.html

United Kingdom estimates prices from $41 – $124 per ton of CO_2, central case of $83.

Price Trend Summary, 2000-2012

- Food Prices up 50-90%
- Mineral Prices up 50-200%
- Oil Prices up 200-300%, would be 300-400% with social cost of CO_2 @ $80/ton
- $80 social cost of CO_2 would double natural gas prices, quadruple coal prices

Theoretical Issues

- Market response to higher resource and energy prices – efficiency, substitution
- Externalities: inadequate market response
- Inequality: regressive effect of higher prices especially food and energy
- Unemployment: effect of slowing traditional growth mechanisms
- Adaptation to growth limits: “slower by design”
- Green Keynesianism: employment creation in services, infrastructure, energy transition

Examples of "Green" Macro Policy: U.S.

- $787 billion dollar stimulus package included about $71 billion for specifically "green" investments, plus $20 billion in "green" tax incentives.

- Energy efficiency in Federal buildings and DoD facilities -- $8.7 billion
- Smart-grid infrastructure investment -- $11 billion
- Energy and conservation grants to state and local governments -- $6.3 billion
- Weatherization assistance -- $5 billion
- Energy efficiency and renewable energy research -- 2.5 billion
- Advanced battery manufacturing -- $2 billion
- Loan guarantees for wind and solar projects -- $6 billion
- Public transit and high-speed rail -- 17.7 billion
- Environmental cleanup -- $14.6 billion
- Environmental research -- $6.6 billion

- Aggressive Federal policy action including "green" investments "probably averted what could have been called Great Depression 2.0 . . . without the government's response, GDP in 2010 would be about 11.5% lower, payroll employment would be less by some 8 ½ million jobs, and the nation would now be experiencing deflation." (Blinder and Zandi, "How the Great Recession was Brought to an End", 2010).

Examples of "Green" Macro Policy: Portugal

- Portugal government-led transition from fossil fuels towards renewable power, with the percentage of renewable supply in Portugal's grid up from 17 percent in 2005 to 45 percent in 2010.

- $22 billion investment in modernizing electrical grid and developing wind and hydropower facilities.

- Portugal will recoup some of its investment through European Union carbon credits, and will save about $2.3 billion a year on avoided natural gas imports.

"Portugal Gives Itself a Clean-Energy Makeover," *New York Times* August 10, 2010.

The Green Keynesian Solution

- Combination of Keynesian theory and ecological priorities
- Immediate task is to reinvigorate all economies using Keynesian methods oriented towards social and environmental goals
- Social investment and energy transition can promote full employment
- Carbon tax with rebate can be net revenue neutral, or revenue-generating as needed to reduce long-term deficits
- Barriers are political, not economic and technological

Redefining Consumption

- Economists tell us that we need increased consumption to get the economy back on track
- But increased social spending (e.g. on teachers, police, health care, infrastructure) poses a deficit threat and has to be cut back
- So why is one kind of spending essential but the other one bad?
- Partly anti-government bias (e.g. Tea Party) but partly neo-classical economic theory that rejects Keynesian deficit spending
- With less goods consumption but more consumption of social services and improved environmental services, we might be better off and promote economic recovery: "growth" of a sort, increasing employment, but not traditional growth in energy- and resource-intensive goods.

Redefining Labor

- Unemployment is clearly a social "bad"
- But shorter work hours have historically been a social "good" and even according to standard theory more leisure represents a net gain in "utility"
- If we are to exit the cycle of more consumption in order to promote more employment, we need work-sharing and shorter work weeks (Victor 2008, Schor 2010)
- Europe has followed this path, which has had positive social effects and minimized unemployment impacts
- Requires more social provisioning (health care, education) and cultural shift away from goods consumption

Redefining Capital

- Capital investment ("I") is a crucial component of GDP and essential to recovery
- But there is a critical distinction between energy-intensive and energy-conserving capital
- Investment can also be in human capital (all forms of education and training) and natural capital (land reclamation, environmental protection and pollution control, etc.)
- All of these contribute to employment and recovery, so no need to concentrate on energy-intensive capital

What about Deficits and Debt?

- Krugman: "Suppose that government uses borrowed money to buy useful things like infrastructure. The true social cost will be very low, because the spending will put resources that would otherwise be unemployed to work [and allow private debtors to pay down their debt] … the argument that debt can't cure debt is just wrong." ("Mr. Keynes and the Moderns", 2011)
- Europe's problems now arise from unwillingness to use European Central Bank to finance debt, allowing indebted players to recover. Instead, "austerity" policies make debt harder to manage and threaten major defaults and financial catastrophe.
- U.S. focus on debt reduction prevents further stimulus spending, threatens to derail weak recovery (like 1937).
- All based on what Keynes called "the Treasury view" or Herbert Hoover economics: balance the budget during recession
- Instead, the government needs to borrow excess savings (NYT October 25, 2011: "Banks flooded with cash") and put them to work. As economy recovers, deficit will decline.

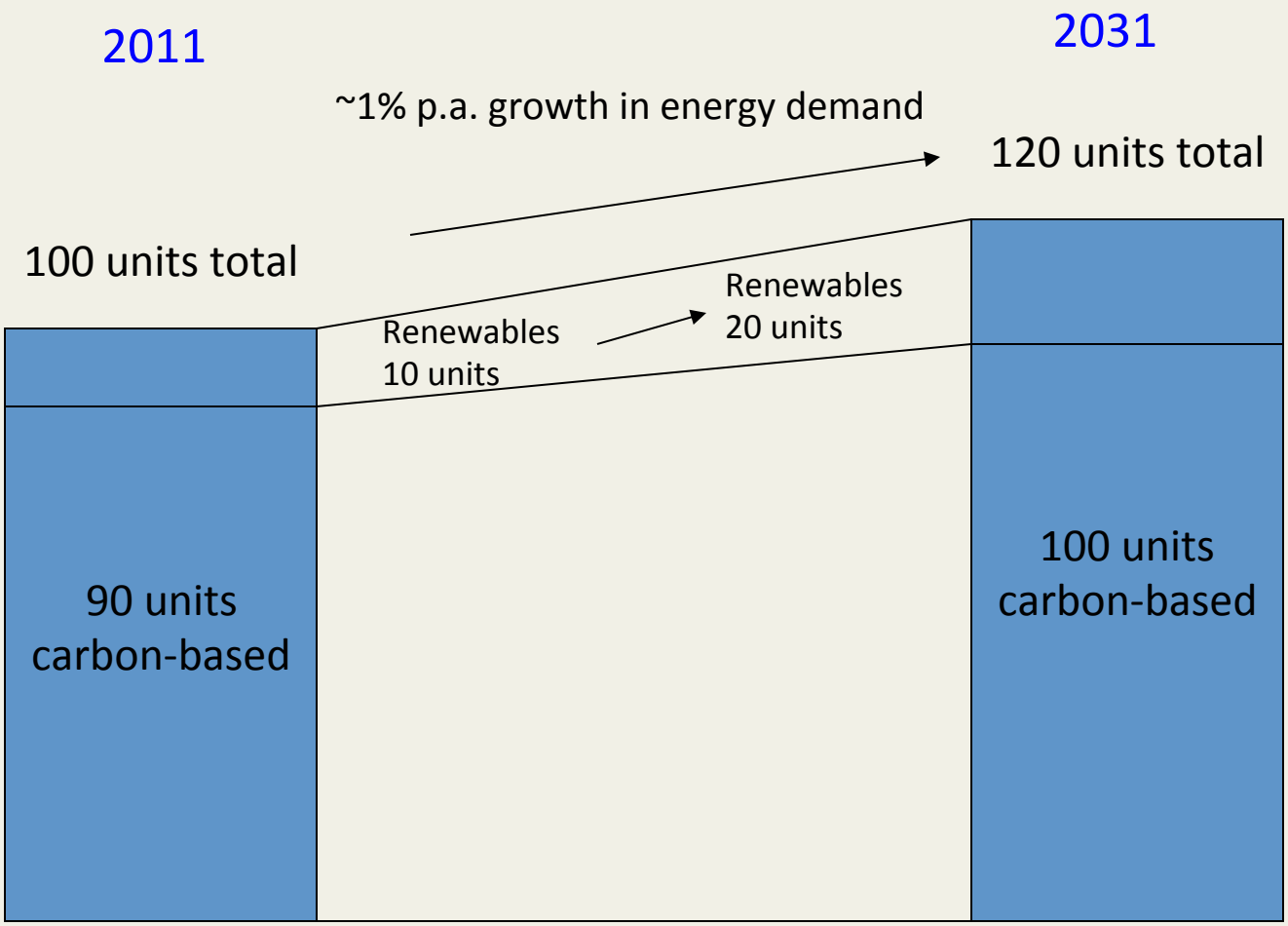
Policies for Full Employment

- Increased hiring in public sector: teachers, police, transit and park workers, etc.
- Large-scale building retrofit publicly financed but carried out by private contractors
- Increased public R&D expenditures with accompanying higher education investment ("Sputnik" precedent)
- Major energy efficiency and renewables investment, partly public and partly incentivized private investment
- Investment in public transit and infrastructure

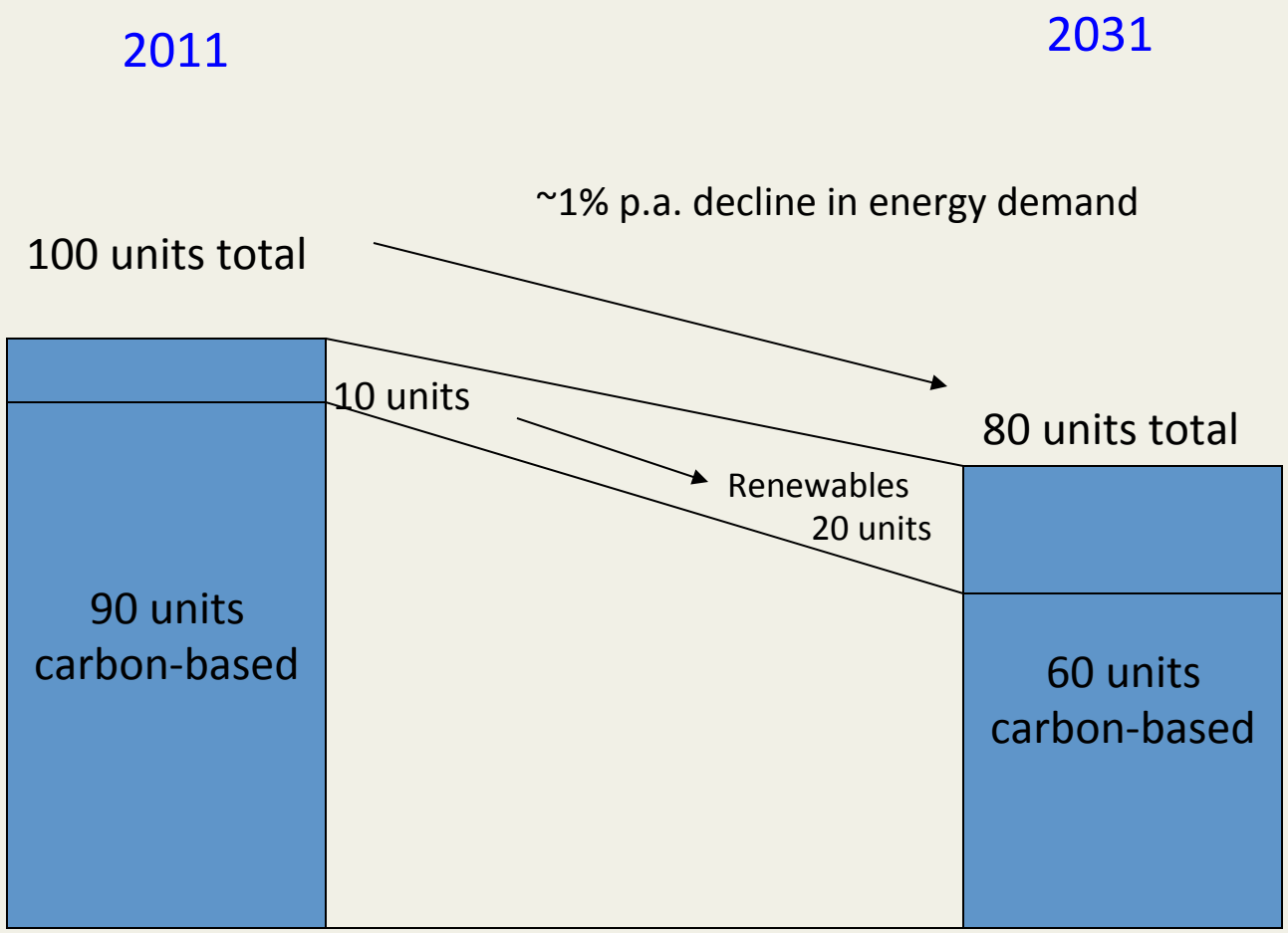
Policies For Climate Stabilization

- Carbon tax or equivalent (cap & trade with auction) – must be ≥ $100/MT C ($30/MT $C0_2$) and rise over time. (govt. estimates of social cost of carbon $21/t $C0_2$, Ackerman and Stanton $28-$893, rising to $64-$1550)
- Recycle revenues of ≥ $150 billion for energy efficiency, renewables, progressive rebates
- R&D investment ($3-12 billion)
- Infrastructure investment – hi-speed rail, public transit, green buildings
- Efficiency standards for cars, machinery, buildings
- Preferential credit or subsidy for energy efficiency investments

A Business as Usual Scenario



A Services, Efficiency, & Renewables Scenario



Based on modest investment in services, efficiency, renewables, with no loss in employment (probably a gain)