

Emissions Market Designs and Implications for Renewable Energy



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Contents

1. Should the design of emissions markets recognize renewables?
2. Options for market design to recognize renewables
3. A few concluding points on allocation



Argument against renewables has 2 legs:

1. Cap-and-trade systems are designed to *reduce emissions at lowest cost*, not boost a specific technology
2. An emissions cap on the power sector (theoretically) raises the price of electricity, so zero-emitting renewables get a benefit anyway: a higher price for power



Counter-arguments in favor of renewables:

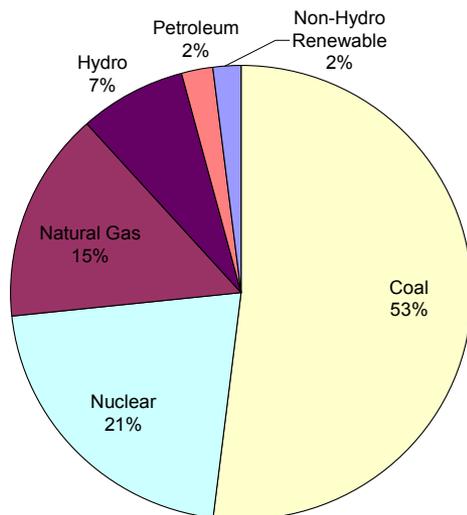
1. Cap-and-trade systems are designed to *reduce emissions at lowest cost*, not boost a specific technology
 - ...To help solve global climate change, renewable power must get up to scale quickly; recognition of clean, cost-effective generation is warranted
2. An emissions cap on the power sector (theoretically) raises the price of electricity, so zero-emitting renewables get a benefit anyway: a higher price for power
 - ...Markets for fuel and power are distorted by large subsidies for fossil fuels; boosting renewables levels the playing field



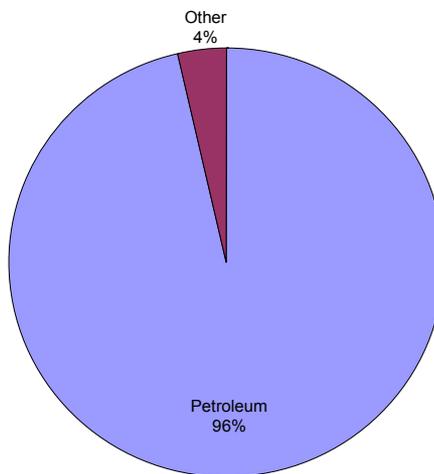
Energy needs met primarily by fossil fuels

U.S. Energy Consumption,
2002

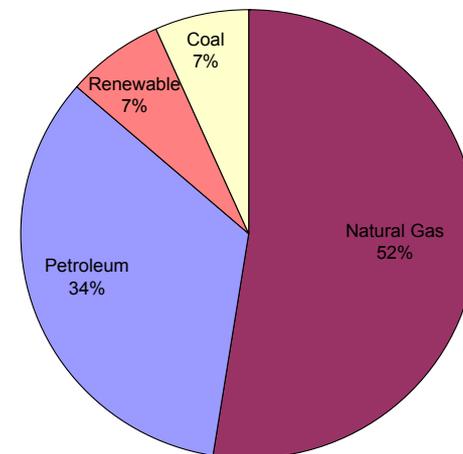
Electricity



Transport

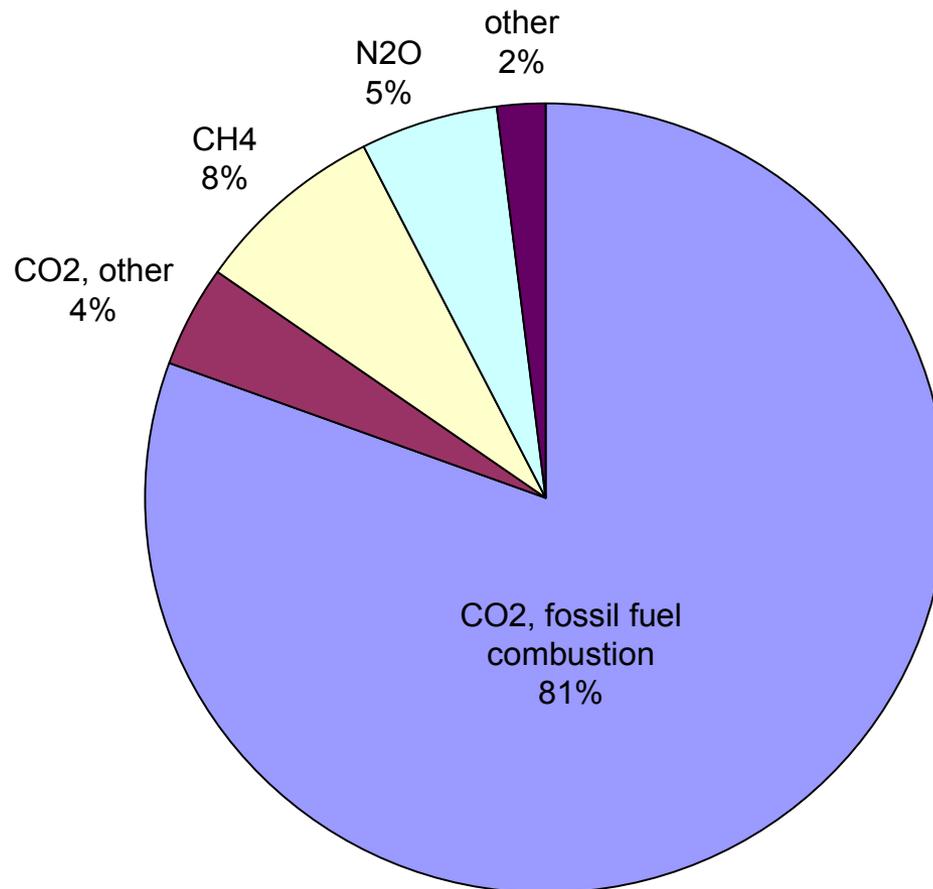


Thermal



Energy consumption drives GHG emissions

U.S. GHG Emissions by Type,
2003

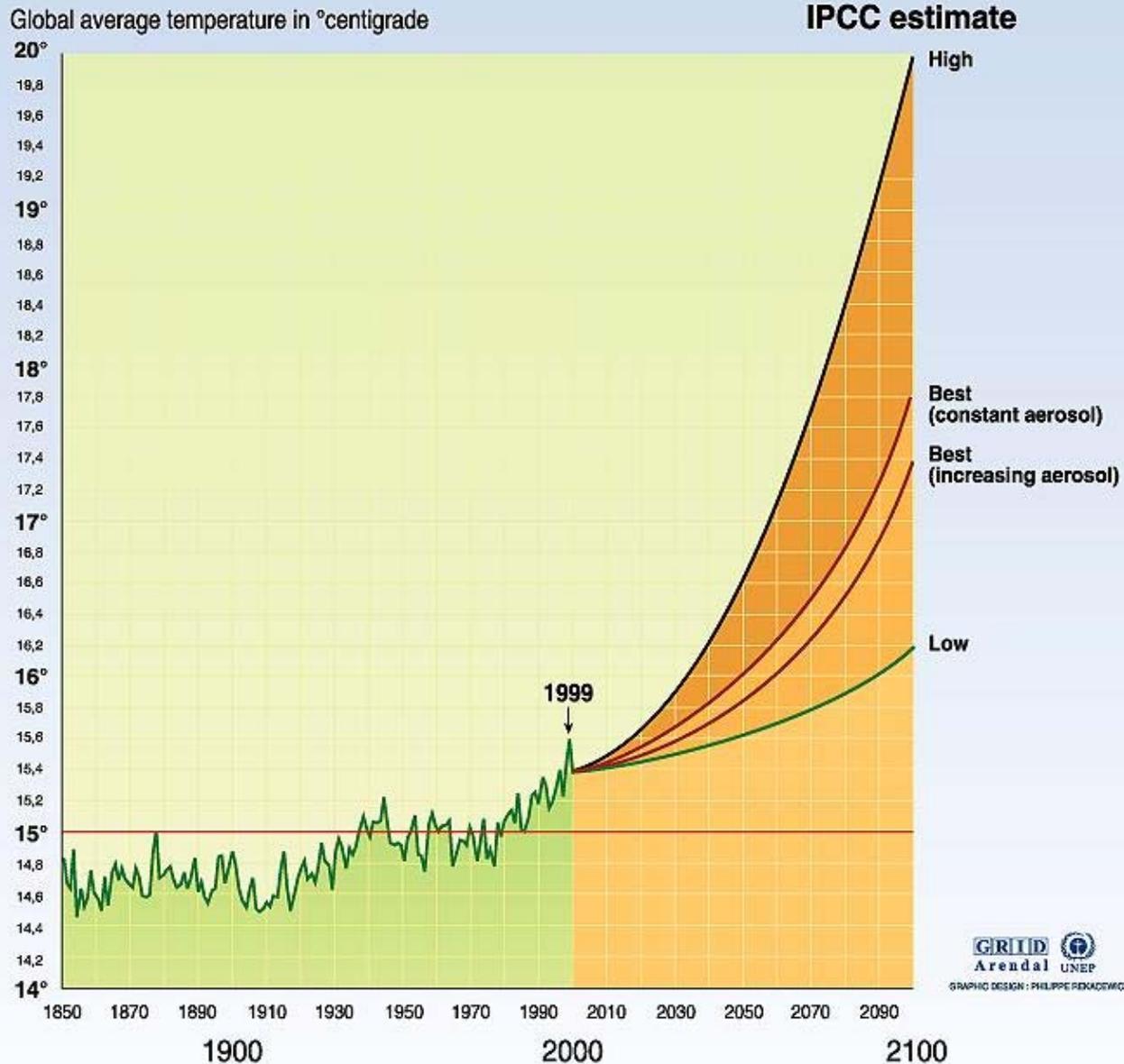


source: U.S. EPA Inventory of GHGs, 2005



Projected changes in global temperature:

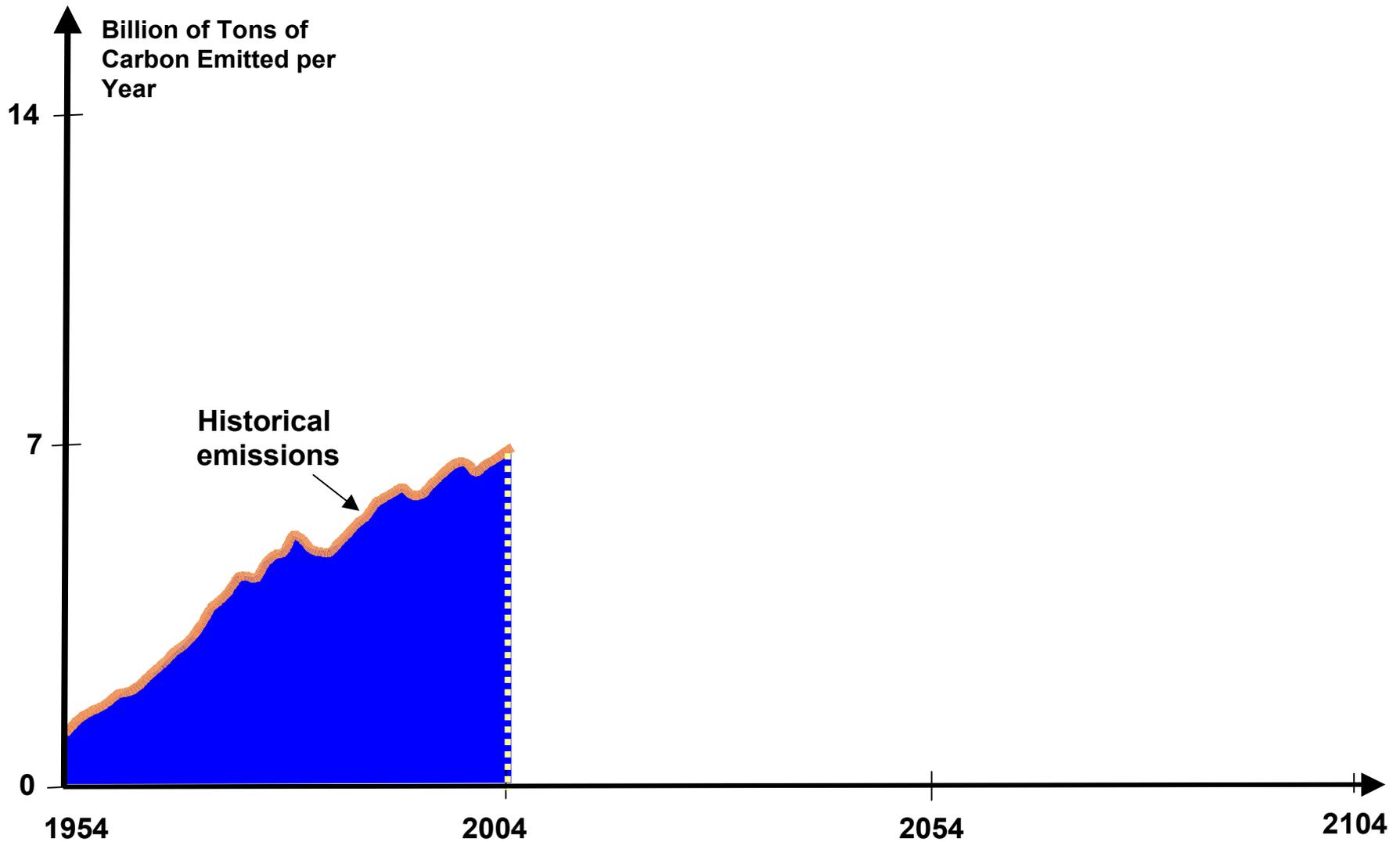
global average 1856-1999 and projection estimates to 2100



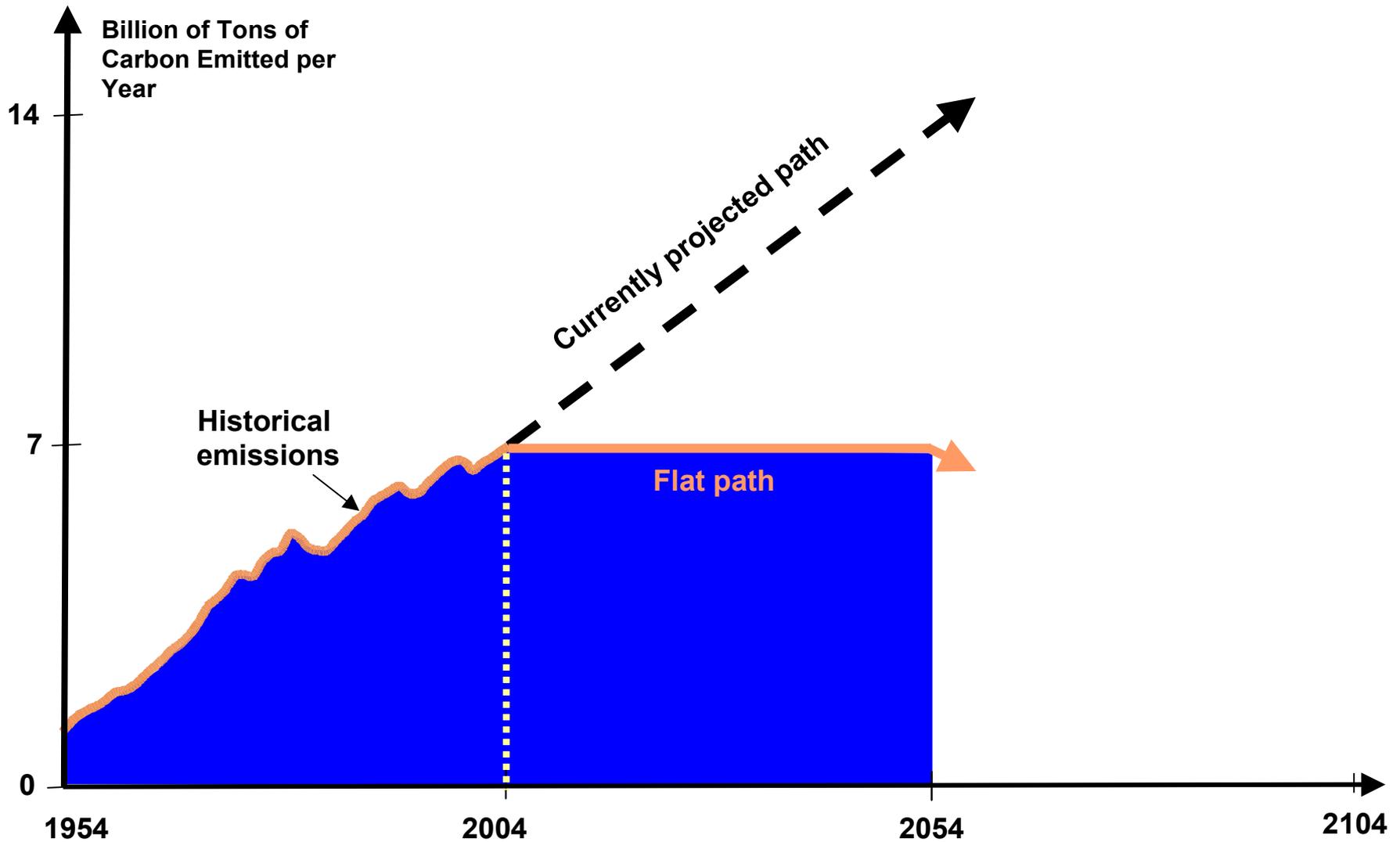
Source : Temperatures 1856 - 1999: Climatic Research Unit, University at East Anglia, Norwich UK. Projections: IPCC report 95.



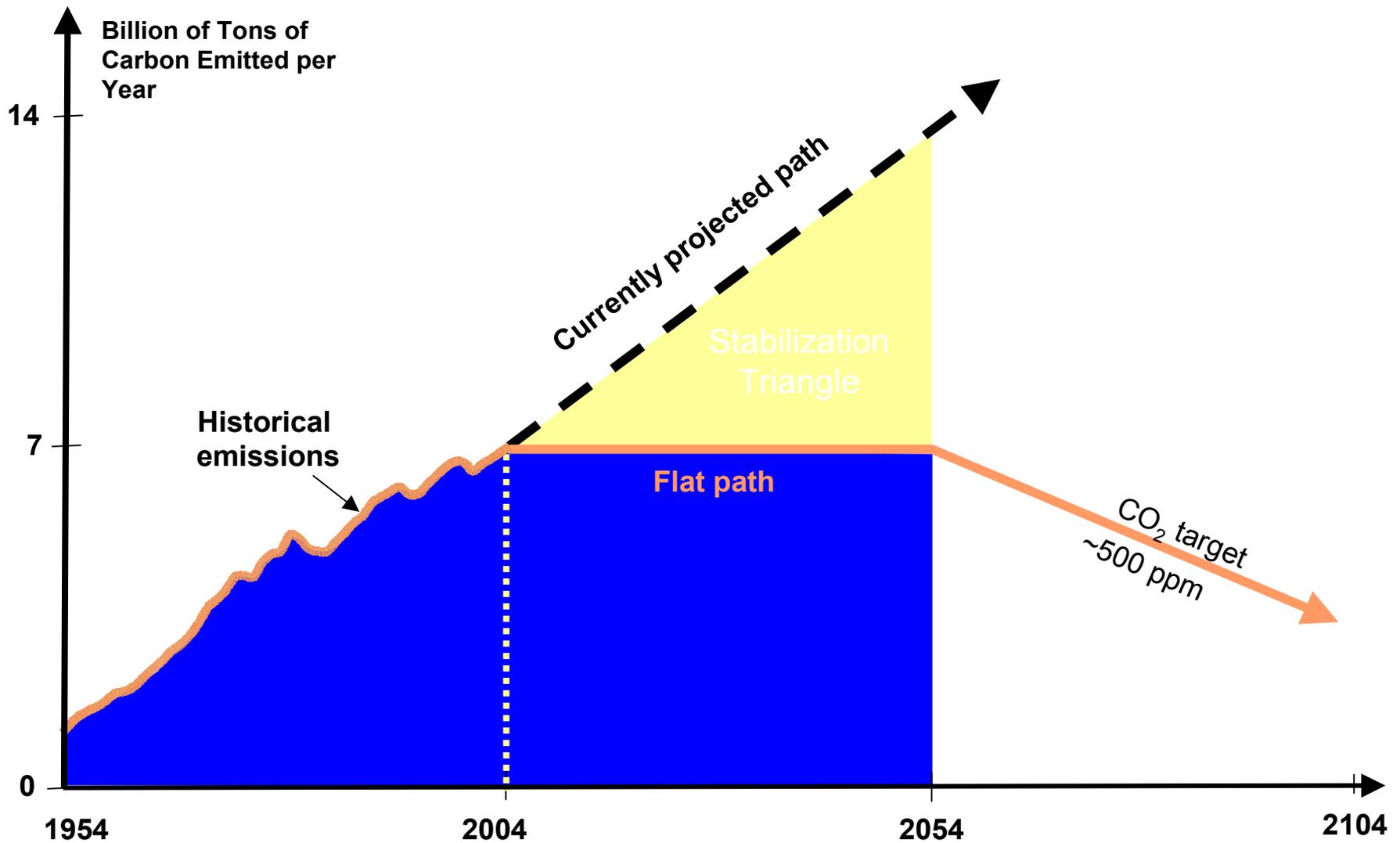
To stabilize, must ramp up multiple technologies



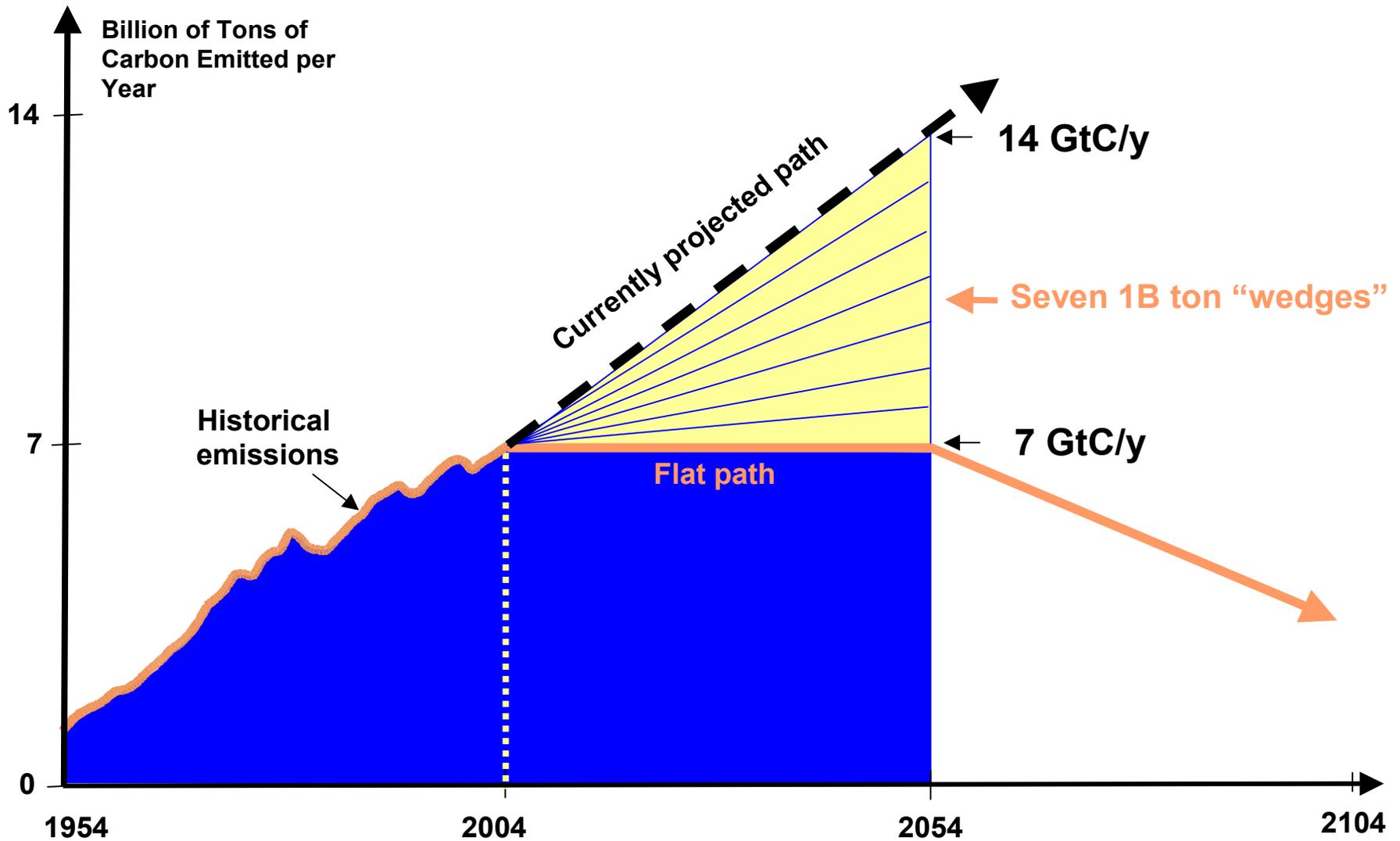
To stabilize, must ramp up multiple technologies



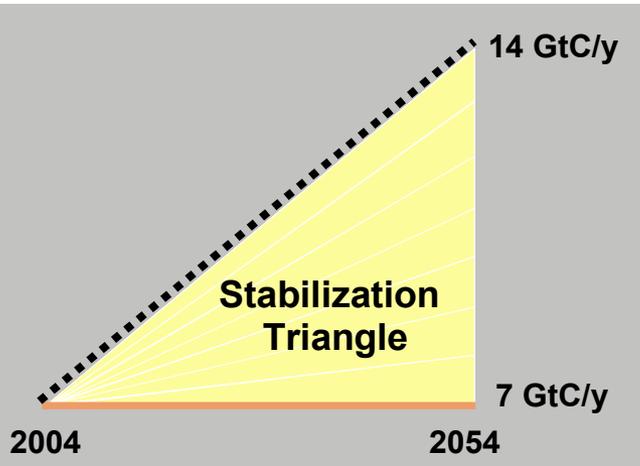
To stabilize, must ramp up multiple technologies



To stabilize, must ramp up multiple technologies



For renewables, extraordinary growth is required... quickly



1 wedge = 1 B tons
emissions reduction in 2054

Wind Power



- 2,000 GW new capacity needed*
- 50x current deployment
- 2 million 1-MW turbines
- add 100 TWh/yr each year for 50 yrs

Solar Power



- 2,000 GW new capacity needed*
- 700x current capacity
- 60x current annual rate of deployment

Biofuels

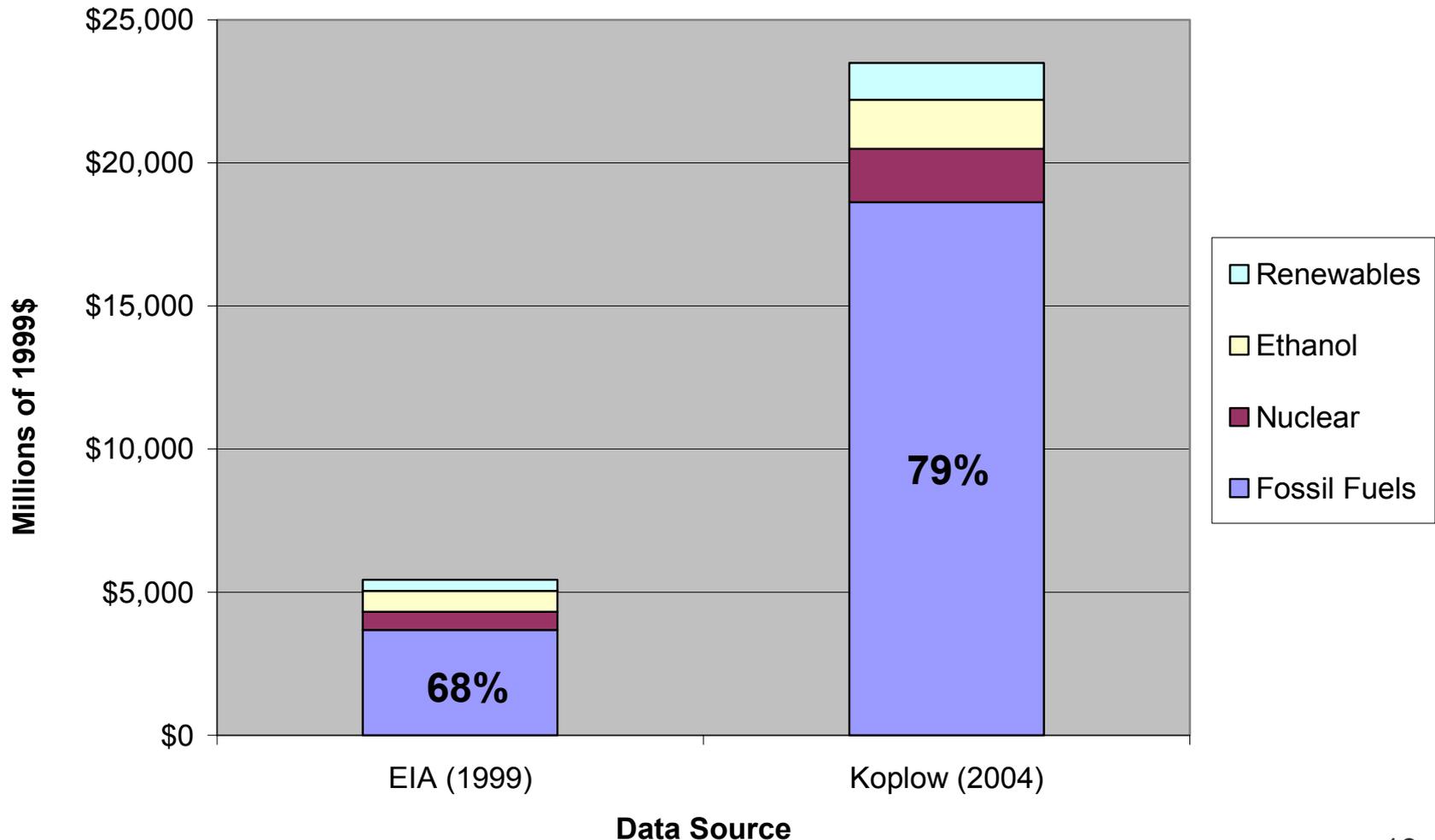


- Scale up current global ethanol production by 50x
- Plant an area the size of India with biofuels crops



Majority of energy subsidies go to fossil fuels

Annual Federal Energy Subsidies, 1999

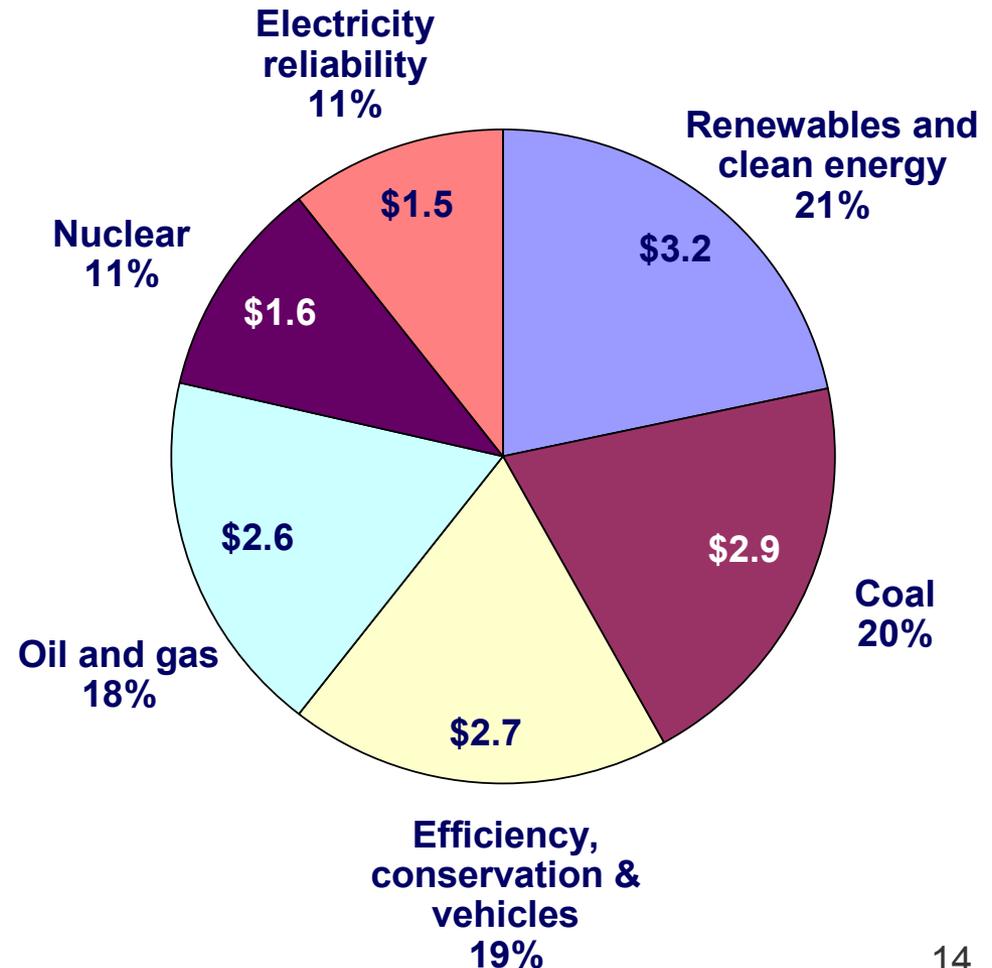


Energy Policy Act 2005: a modest improvement

Title:

- I Energy Efficiency
- II Renewable Energy
- III Oil and Gas
- IV Coal
- V Indian Energy
- VI Nuclear Matters
- VII Vehicles and Fuels
- VIII Hydrogen
- IX R&D
- X Department of Energy Mgt
- XI Personnel and Training
- XII Electricity
- XIII Energy Policy Tax Incentives**
- XIV Miscellaneous
- XV Ethanol and Motor Fuels
- XVI Climate Change
- XVII Incentives for Innovative Tech
- XVIII Studies

Gross Tax Expenditures = \$14.6 B (2005-15)



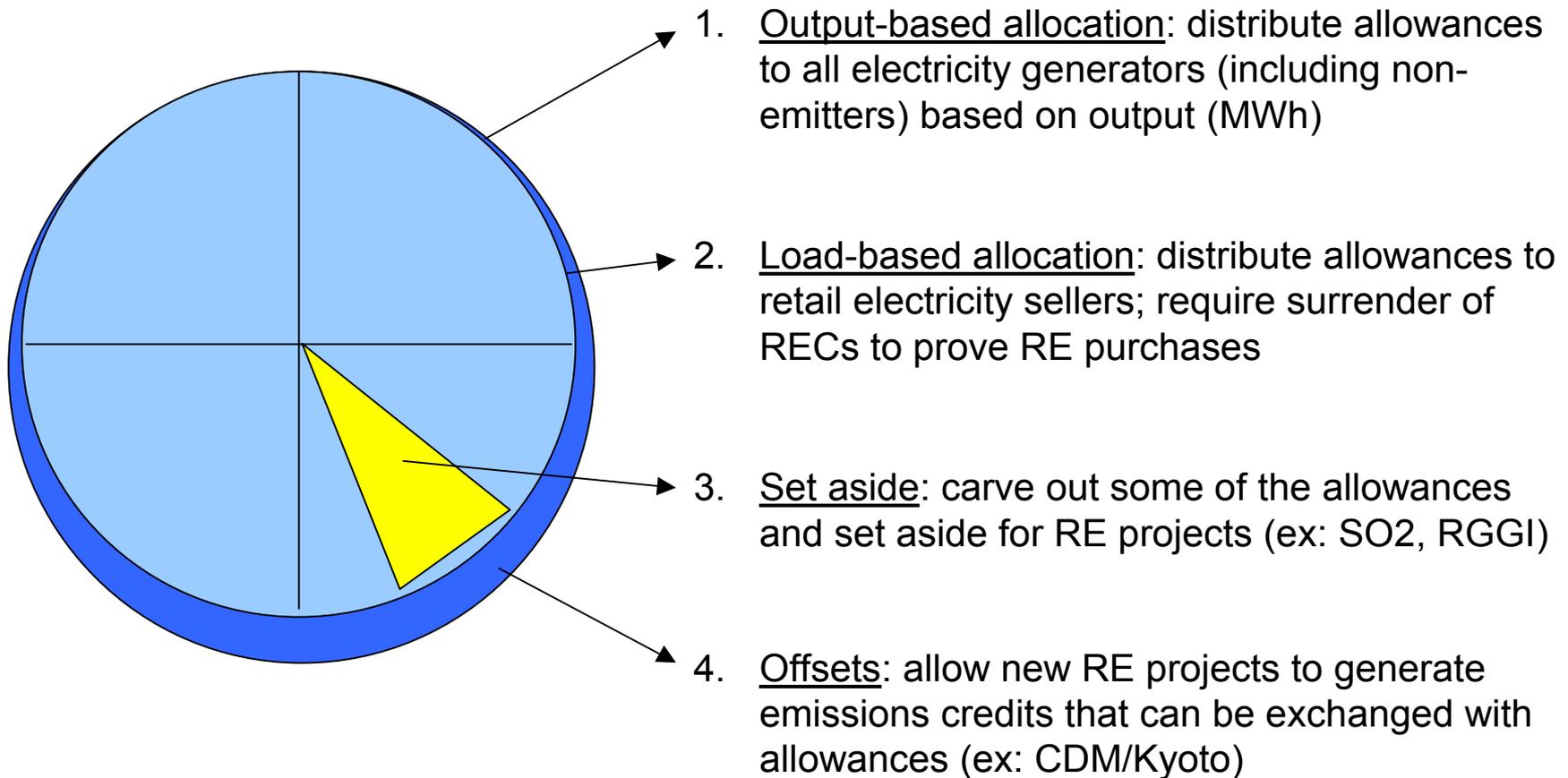
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Allowances and allocation: carving the pie

Options for allowances to directly support renewables:

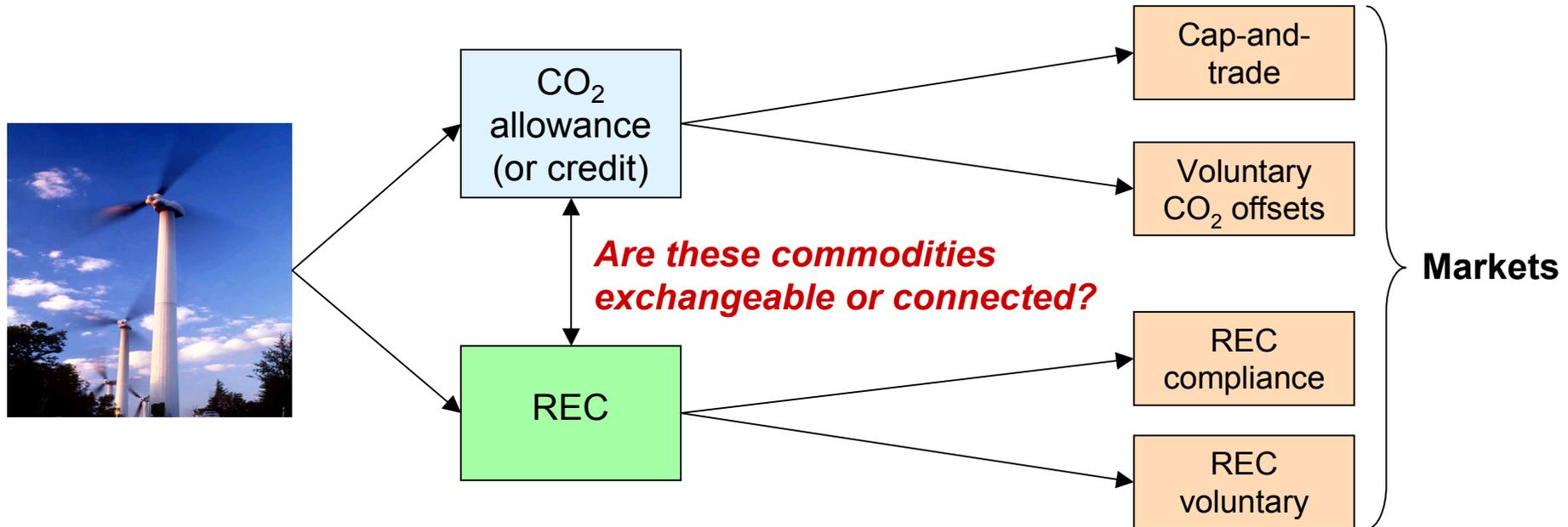


Output-based allocation may be most beneficial

	Pros	Cons
1. Output-based allocation	<ul style="list-style-type: none"> - Direct benefit to RE projects - New generation gets allowances - Rewards clean, efficient generation 	<ul style="list-style-type: none"> - ?
2. Load-based allocation	<ul style="list-style-type: none"> - Pushes suppliers to line up zero-and low-emitting resources - Can spur voluntary demand for RECs 	<ul style="list-style-type: none"> - Has not been tried before - Political resistance from fossils
3. Set asides	<ul style="list-style-type: none"> - Direct benefit to RE projects - In contrast with offsets, does not inflate the cap - Can be simple to administer 	<ul style="list-style-type: none"> - Requires application process - Transaction costs
4. Offsets	<ul style="list-style-type: none"> - Direct benefit to RE projects - Potentially unlimited number and type of RE projects that could qualify 	<ul style="list-style-type: none"> - Inflates the cap - Potentially high transaction costs, complex quantification, long-term MRV



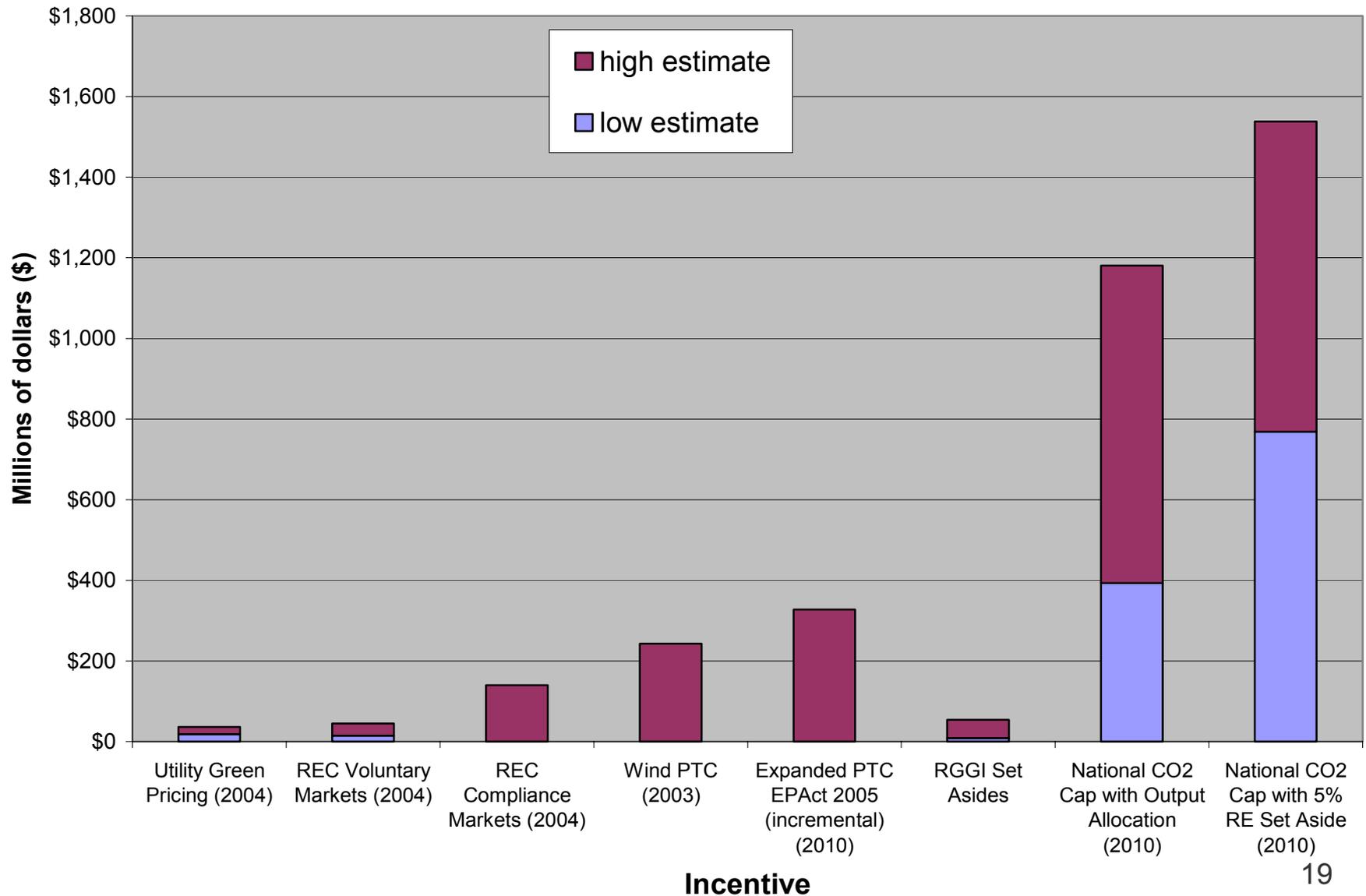
Where do RECs fit in?



- Not clear if or how RECs will “play” in emissions markets
- Involves property rights – who owns the CO₂ value?
 - absent regulatory clarity, could be the REC holder - or - nobody
- Can REC attributes be disaggregated?
 - may hurt marketing, but may improve revenue to RE projects
- Quantification? how do you estimate the CO₂ value of a REC?



Annual Value of CO₂ vs. RECs and PTC



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1

Will allowances be distributed free of charge?

no →

Government auction

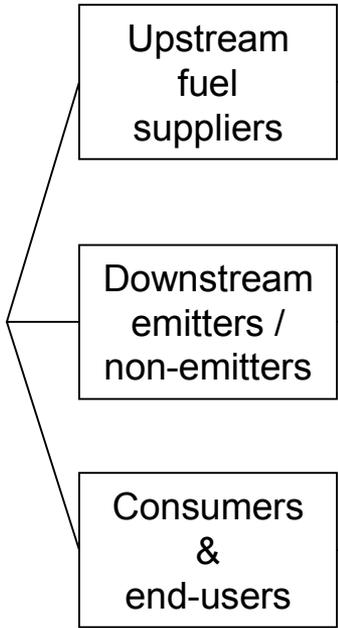
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Distribution of revenue

yes ↓

2

Who will receive the allowances?

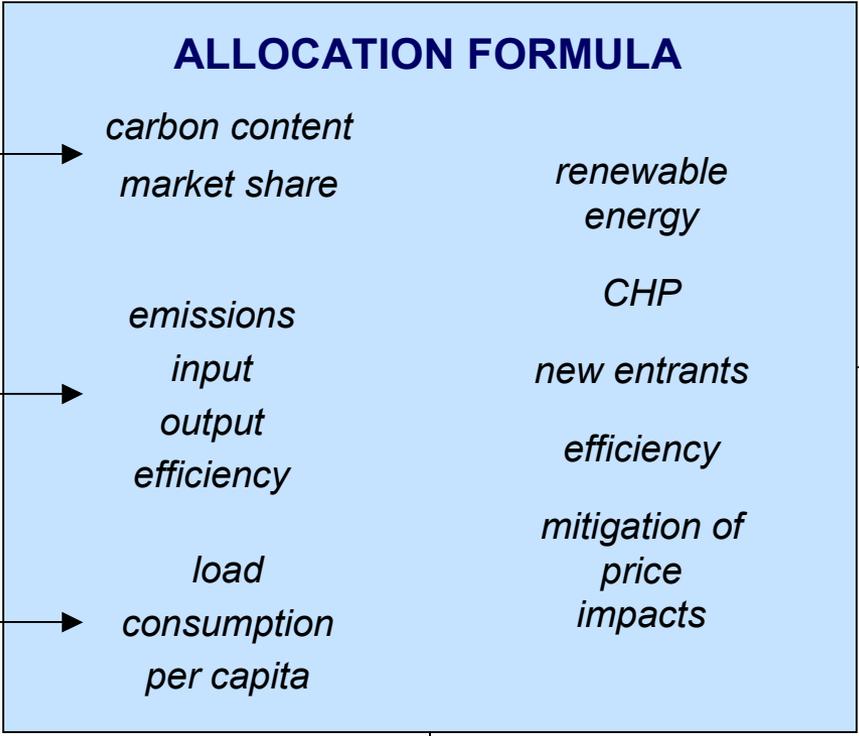


3

How will allowances be pro-rated among recipients?

4

Will allowances be designated for special incentives?



5

Will the allocation formula be updated? How often?

6

Will offsets be allowed in? What types?

↓

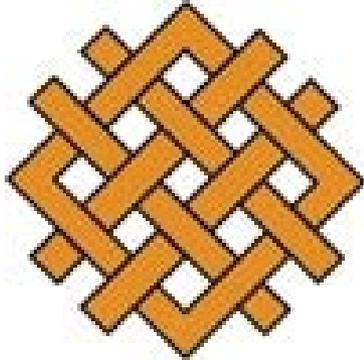
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Allocation is very political

- Creates clear winners and losers
- Distributes a valuable commodity that never existed before – a lot is at stake
- Affects the operation and cost-effectiveness of a program
- Affects asset values
- Raises fundamental questions of fairness, e.g., if RE gets allowances, should nuclear?
- RE advocates should organize to make voice heard; seek natural alliances (e.g., CHP, CCGT advocates)



Thank You



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Our work is concentrated on achieving progress toward four key goals:

- protect Earth's living systems
- increase access to information
- create sustainable enterprise and opportunity
- reverse global warming

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