Climate Policy in a Portfolio of Energy Policies

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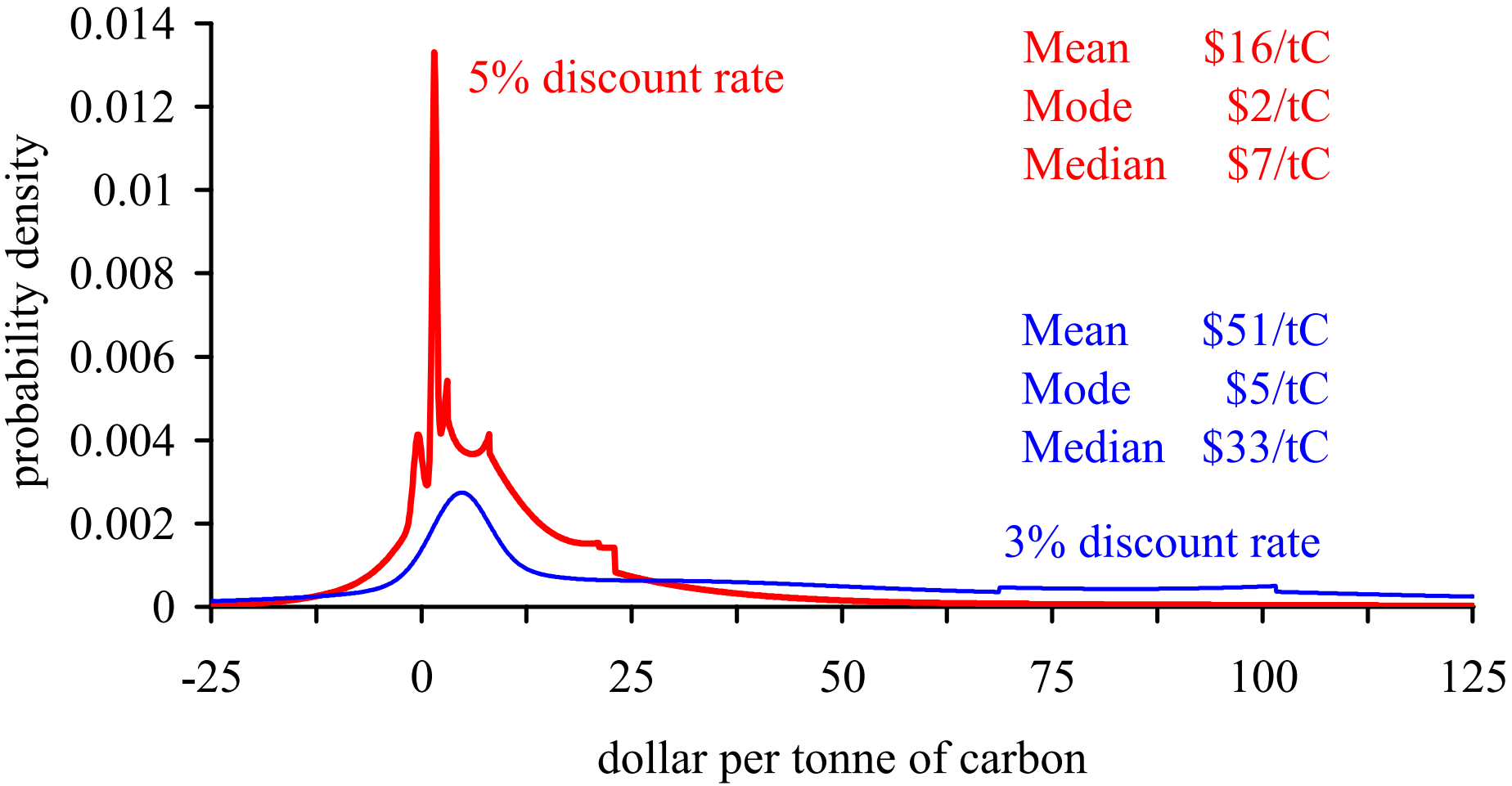
A Meta-Analysis of the Marginal Damage Costs



Social Cost of Carbon

- The social costs of carbon is low, does not justify a lot of emission reduction
- One would have to push discount rate below what is common even moral, or equity weights above what is usual, if at all appropriate
- The certainty equivalent social cost would be a bad, even misleading approximation (Tol, *GEC*, 1999)
- Would bogeymen help? A THC collapse would bring a benefit of .1% of GDP (Link and Tol, PEJ, 2004) or a loss of .1% of GDP (Link and Tol, subm., 2006)
- A WAIS collapse may increase SLR impact by one or two orders of magnitude, but the effect on GDP would still be small (Nicholls et al., subm., 2006)

Uncertainties & Portfolios

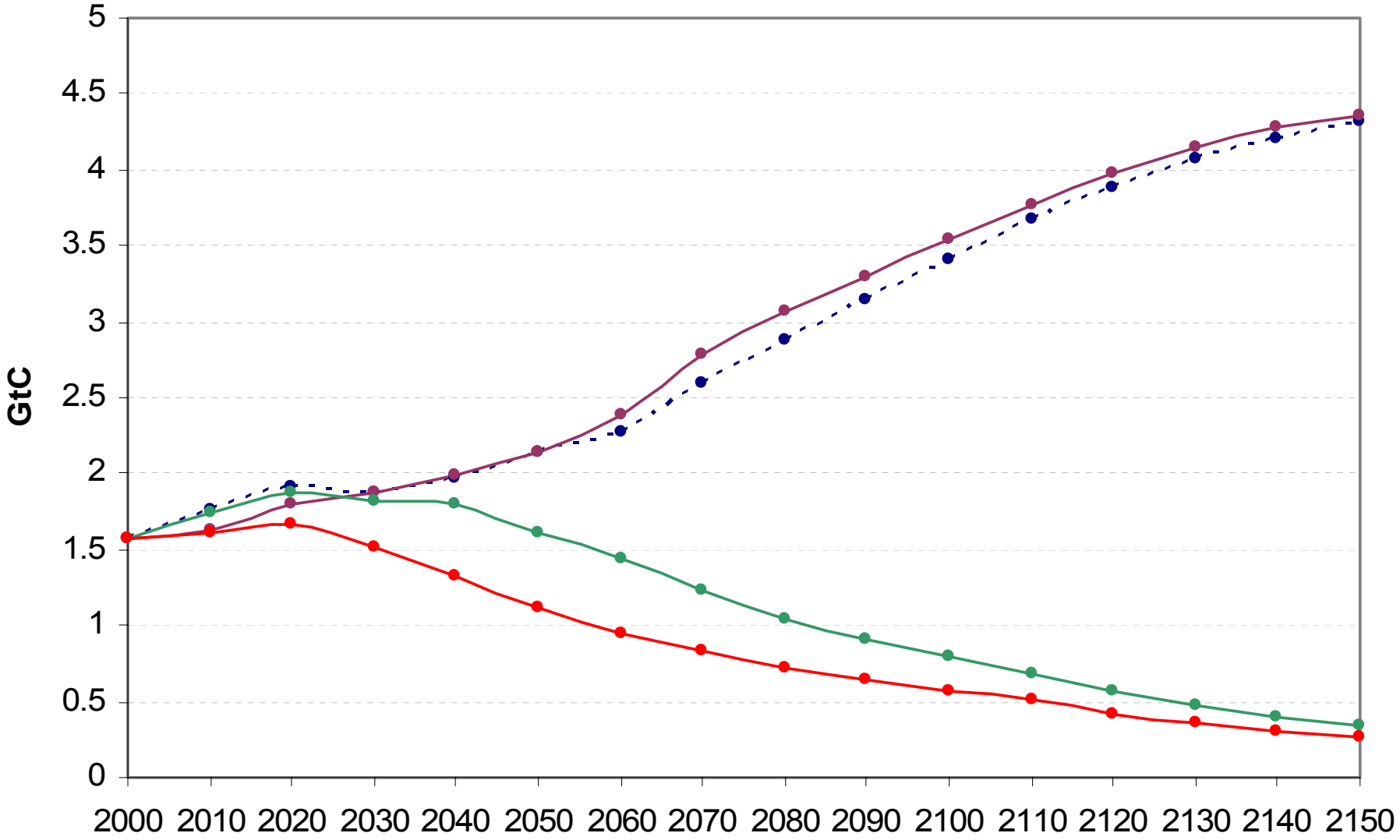
- Climate change may or may not be the largest environmental problems of our times, but it for sure is the most uncertain
- Stock returns are uncertain too, and a smart investor builds a portfolio that reduces risks
- Returns to education are uncertain as well, and a smart student selects those courses that leave many employment options open
- The case for a portfolio approach to climate policy has been made, albeit rather on the basis of the non-linearity of costs

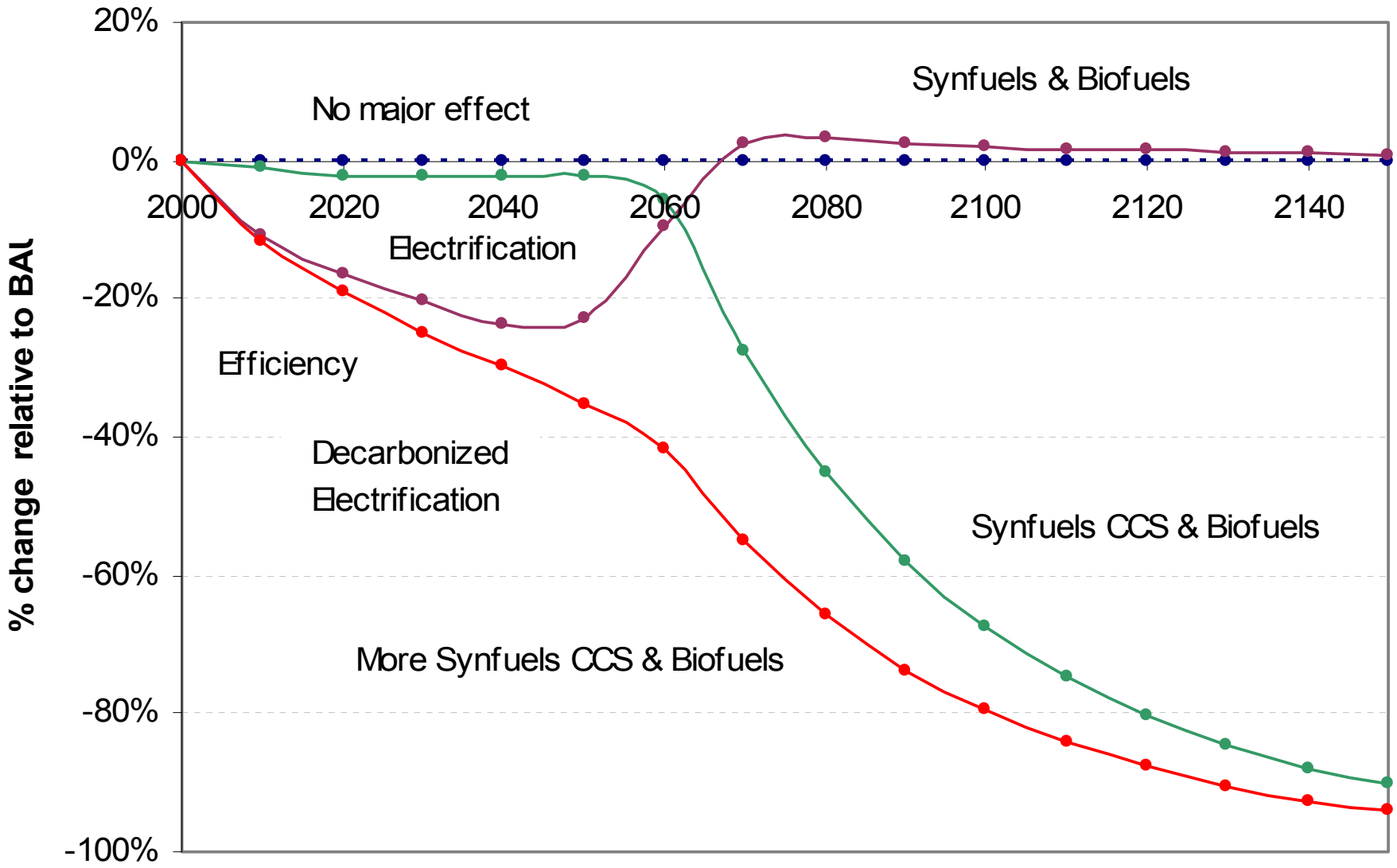
Uncertainties & Portfolios -2

- The case for win-win policies has been made too, but largely qualitatively
- Estimates of the ancillary benefits of climate policy assume that
  - Policy is small or the system linear
  - Uncertainty does not matter
  - Climate is prime
- Uncertainty analyses of climate change are mostly limited to the choice of target
- I am not aware of any study on domestic coalition building with multiple issues

Oil Security

- The people who care least about climate policy, care most about oil security policy
- Are the two policies at odds? Or can a coalition of the willing-something-else be build?
- We did something inappropriate
- We took MERGE, and put an oil import constraint on the USA – as proposed in Bush' latest State of the Union
- We also applied a middle-of-the-road climate policy, and studied synergies

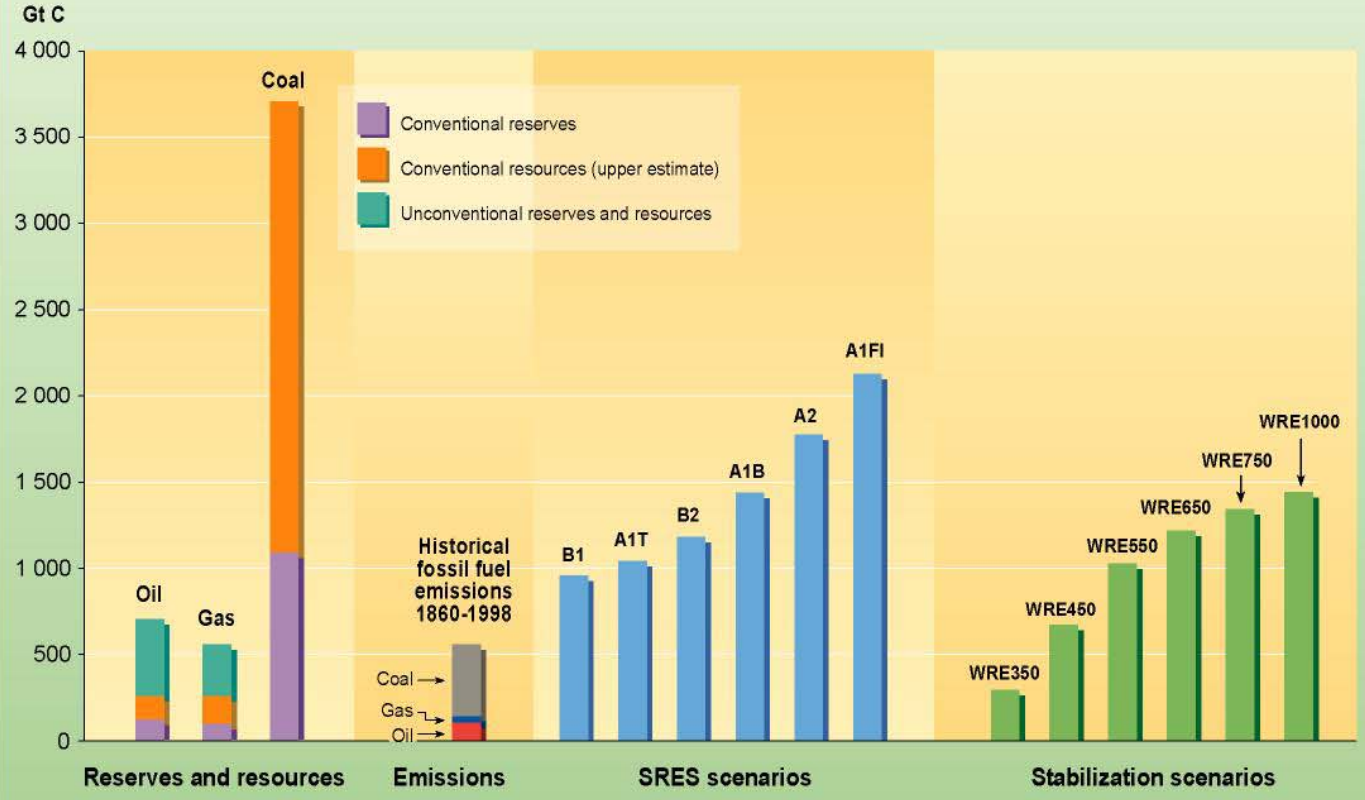

GtC
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
2000
2010
2020
2030
2040
2050
2060
2070
2080
2090
2100
2110
2120
2130
2140
2150


20%
0%
-20%
-40%
-60%
-80%
-100%
2000
2020
2040
2060
2080
2100
2120
2140
% change relative to BAU
No major effect
Synfuels & Biofuels
Electrification
Efficiency
Decarbonized Electrification
Synfuels CCS & Biofuels
More Synfuels CCS & Biofuels

The Long Term

- During this century, we will run out of conventional oil and gas

Carbon in fossil fuel reserves and resources compared with historical fossil fuel carbon emissions, and with cumulative carbon emissions from a range of SRES scenario and TAR stabilization scenarios up until the year 2100



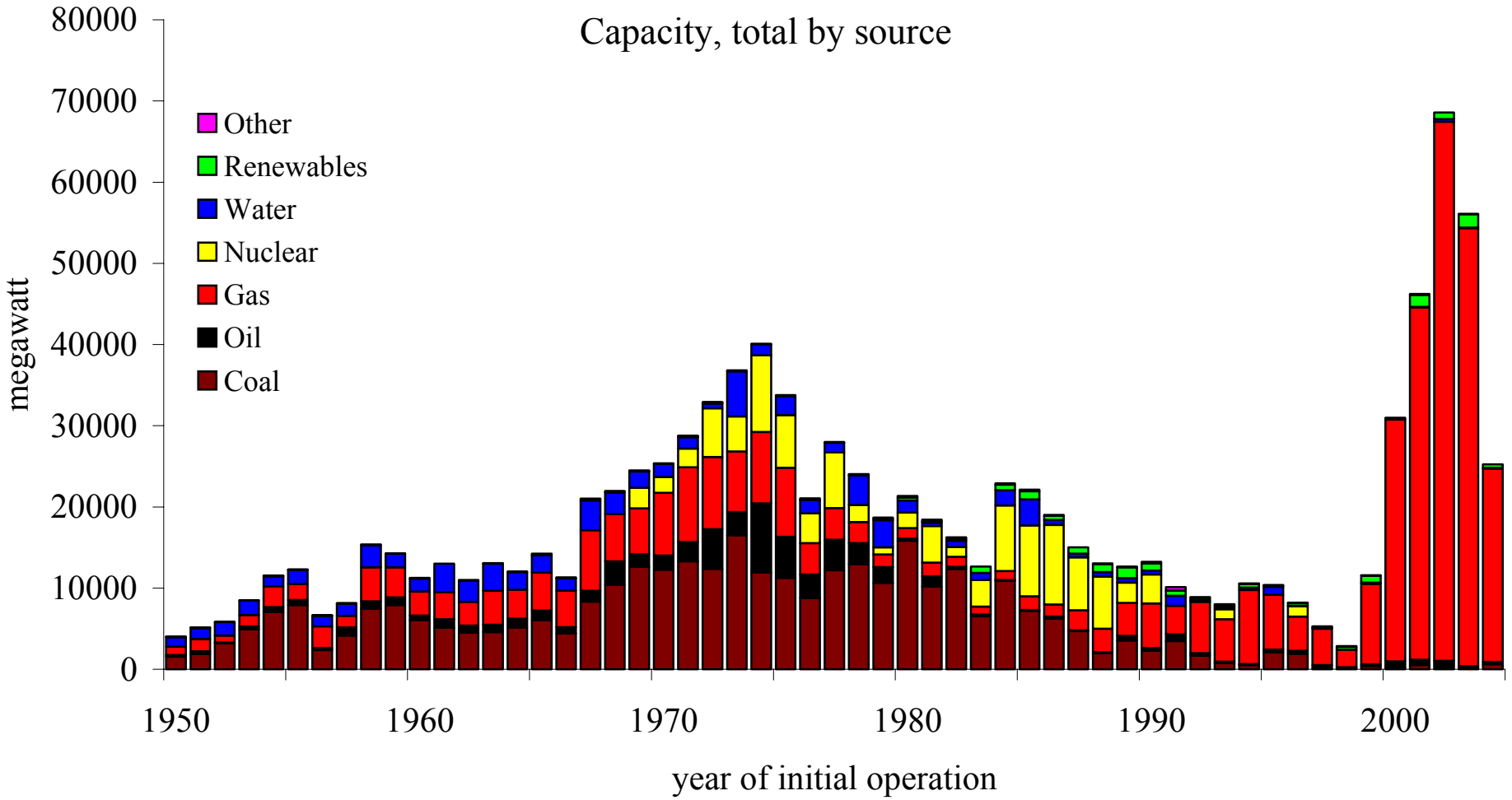
SYR - FIGURE 7-5

The Long Term

- During this century, we will run out of conventional oil and gas
- There are three alternatives
- Renewables and nuclear – small climate problem
- Unconventional oil and gas (tar sands, clathrates) – medium climate problem
- Coal – large climate problem
- Each alternative requires major investments, major R&D, and geopolitical realignment, and there will be substantial other environmental problems

The Long Term -2

- Perhaps we should overhaul the energy sector only once, instead of twice
- This would require coordination between climate and energy policy – and all climate policy has to do is pull the switch – the heavy lifting is done by energy policy
- Note, however, that we can burn as much conventional oil and gas as we want – ExxonMobil and Saudi Arabia would accept this policy, as the real problem is coal
- Besides the long-term investment problem, there is a medium-term too



Energy investment has come in waves, and so will replacement investments. This implies that timing is more crucial than a standard economic analysis would have you believe. Unfortunately, data like this are for the US only.

Conclusions

- Climate policy is for the long haul, a century of continuous pressure in a single direction
- Climate policy could de-politicised, or become a substantial source of tax revenue – but the aim is zero emissions
- I would rather put climate in a portfolio of energy policies
- The benefits of climate policy would extend well beyond climate, and people from different political colours would support climate policy (but may call it differently)

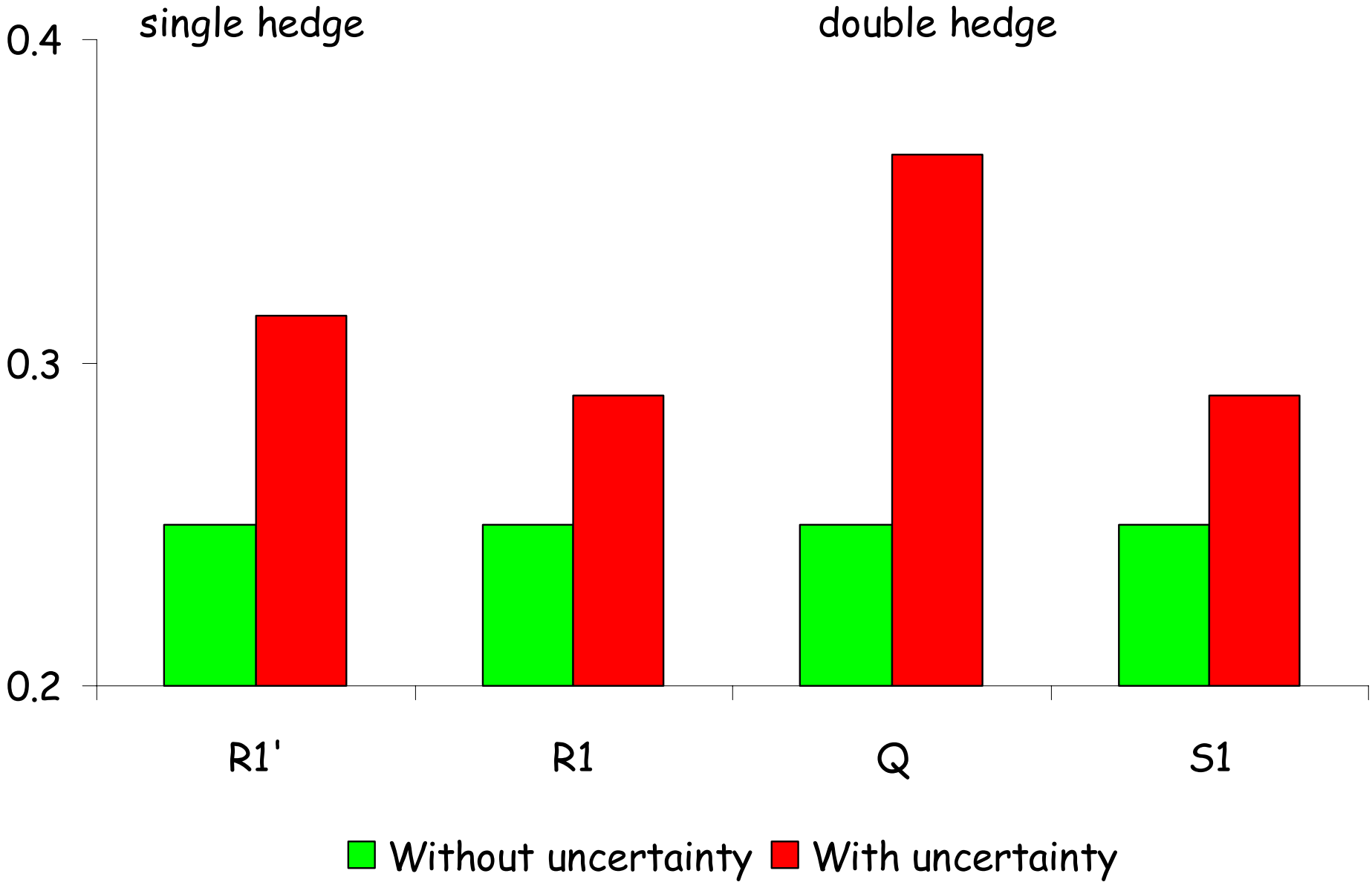
Hedging

- With hedging, you do more in the earlier periods to avoid having to accelerate policy too much in later periods
- With three instruments and two goals, this becomes

$$\min_{R_1,S_1,Q,R_2,S_2} C = \alpha e^{R_1} + \kappa e^{Q} + \lambda e^{S_1} + \beta e^{R_2} + \mu e^{S_2} \text{ s.t.}$$

$$R_1 + \gamma R_2 + \delta Q \geq \begin{cases} T_L & p \\ T_H & 1-p \end{cases}$$

$$S_1 + \varphi S_2 + \vartheta Q \geq \begin{cases} V_L & q \\ V_H & 1-q \end{cases}$$


single hedge
double hedge
0.4
0.3
0.2
R1'
R1
Q
S1
Without uncertainty
With uncertainty