

New Scenarios: The short and long of it (with a postscript on a muddle)

Global Environmental Scenarios: Interrogating
the practice and the politics

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Outline

- Going short--today to 2030
 - Transitions
 - Data and Measurement Issues
 - Intangible Capital
 - Demographics
 - Energy Demand
 - Downscaling
- Going Long – post 2100
 - Demographics
 - Energy Demand
 - Energy Supply
- Likelihoods – the story of a muddle



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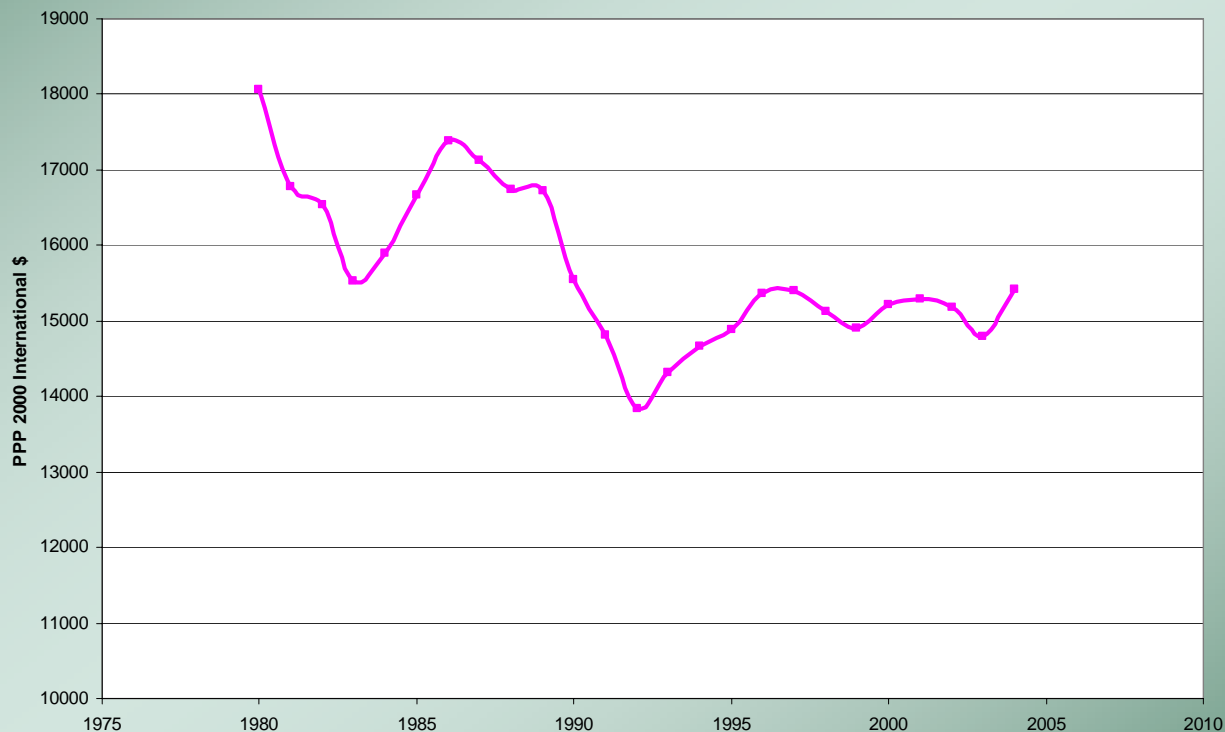
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Transitions

- If: A scenario foresees strong economic growth ala A1 worlds
- We need plausible regional or national level logics to motivate changes in current trends
- E.g.
 - Brazil
 - Africa

Brazil – static to declining labor productivity

Brazil Output per Person in the Labor Force



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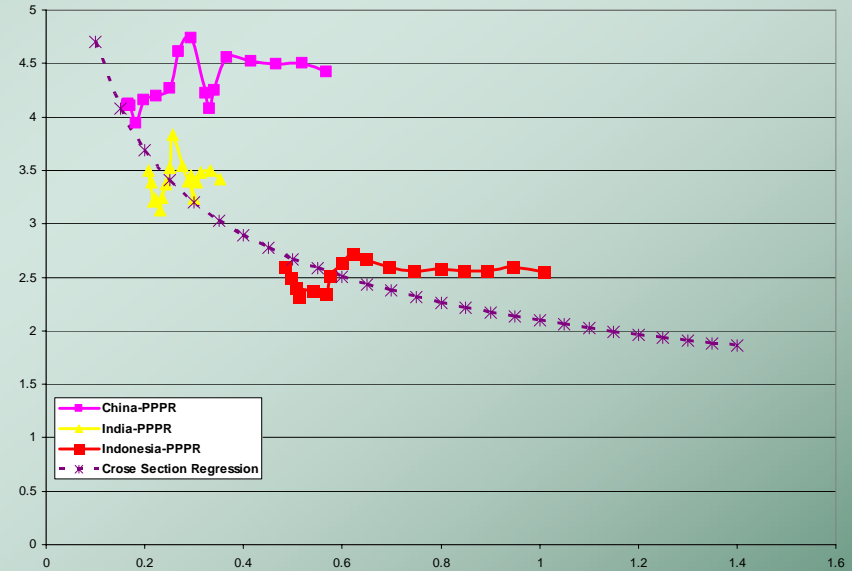
Data and measurement issues

- Data is a constant issue.
 - GTAP is a recommended data source
 - Many IO tables in GTAP date from the early 90's.
- Measurement:
 - PPP/MER is neither well understood nor well represented in existing data sets
 - Properly measured PPP growth rates will be less than properly measured real local currency growth rates
 - Yet, most data sets assume the two growth rates are equal.



PPP Cross Section Regression and Country Level history are not consistent

- The PPP/MER issue is but one aspect of a complex set of issues surrounding economic growth
- Conditional Convergence
- Limits on long term growth
 - Natural resources
 - Health
 - ...



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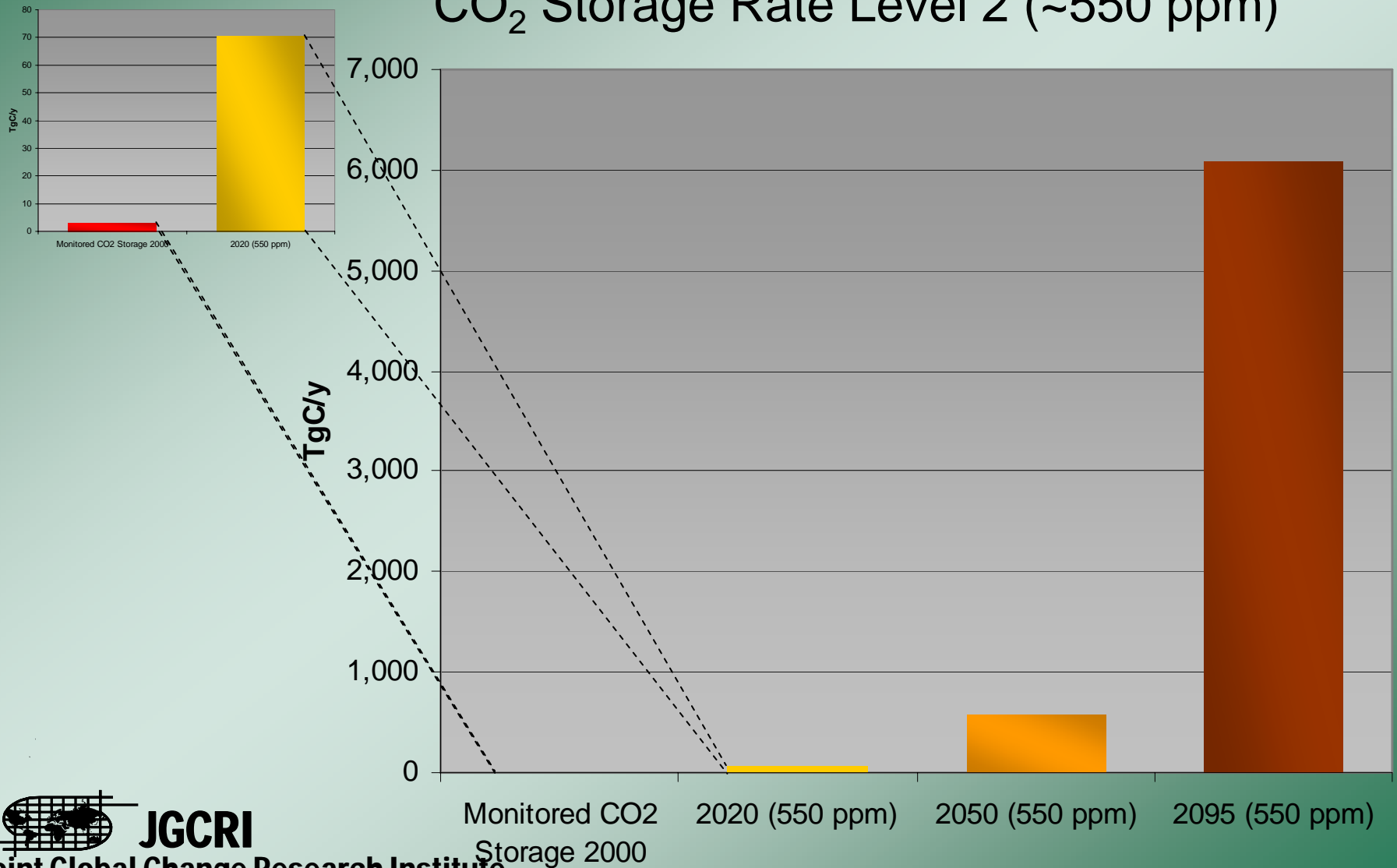
Intangible Capital

- The changes coming under mitigation and climate change will force us to learn how to do new things.
- Knowing how to do things is a major component of intangible capital
- Zero order Intangible Capital = Tangible Capital
- There may be some bumps in the road as we learn how to do large scale things fast
- Intangible Capital and Economic Growth
- <http://www.bsos.umd.edu/econ/hulten/IntCapital.pdf>



In the long-term the scale challenge grows exponentially

CO₂ Storage Rate Level 2 (~550 ppm)



Demographic Issues

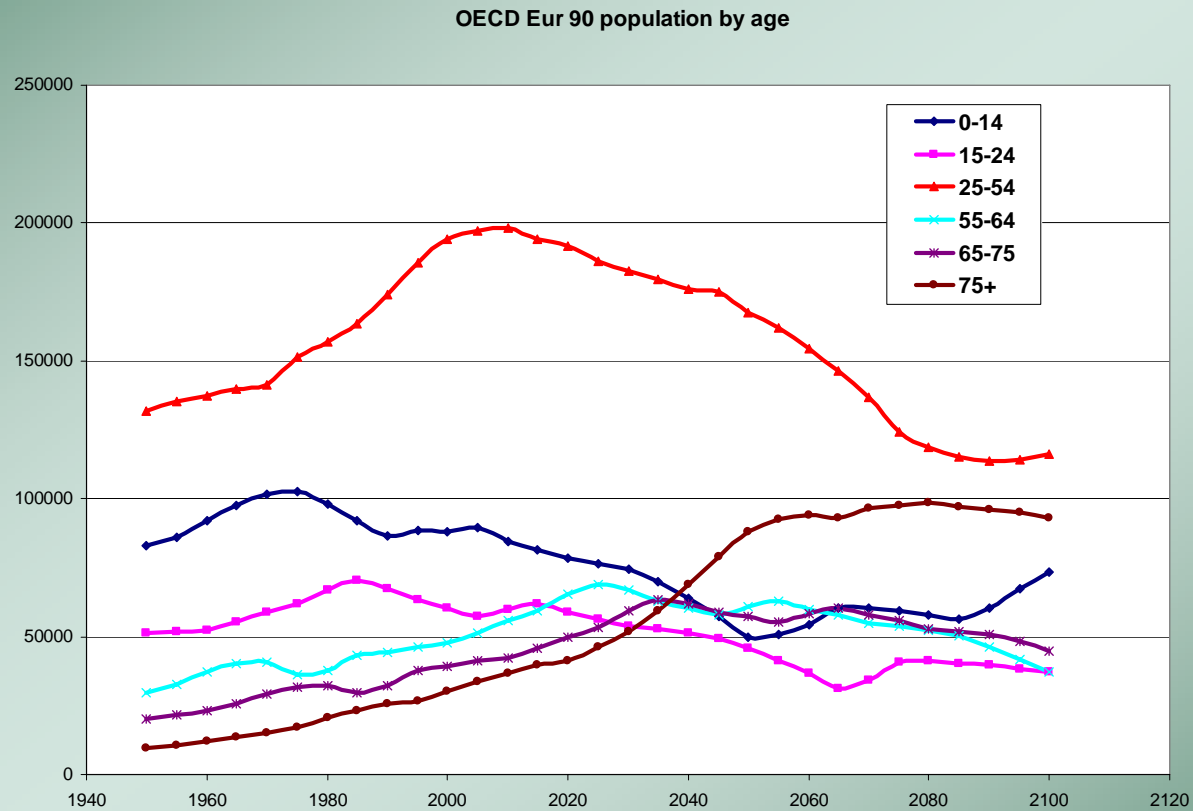
- Age Structure and Labor Force growth
- Consistency of story line implications for key drivers of fertility and life expectancy with demographic scenarios



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Demographics: Age composition will be novel and will not stabilize



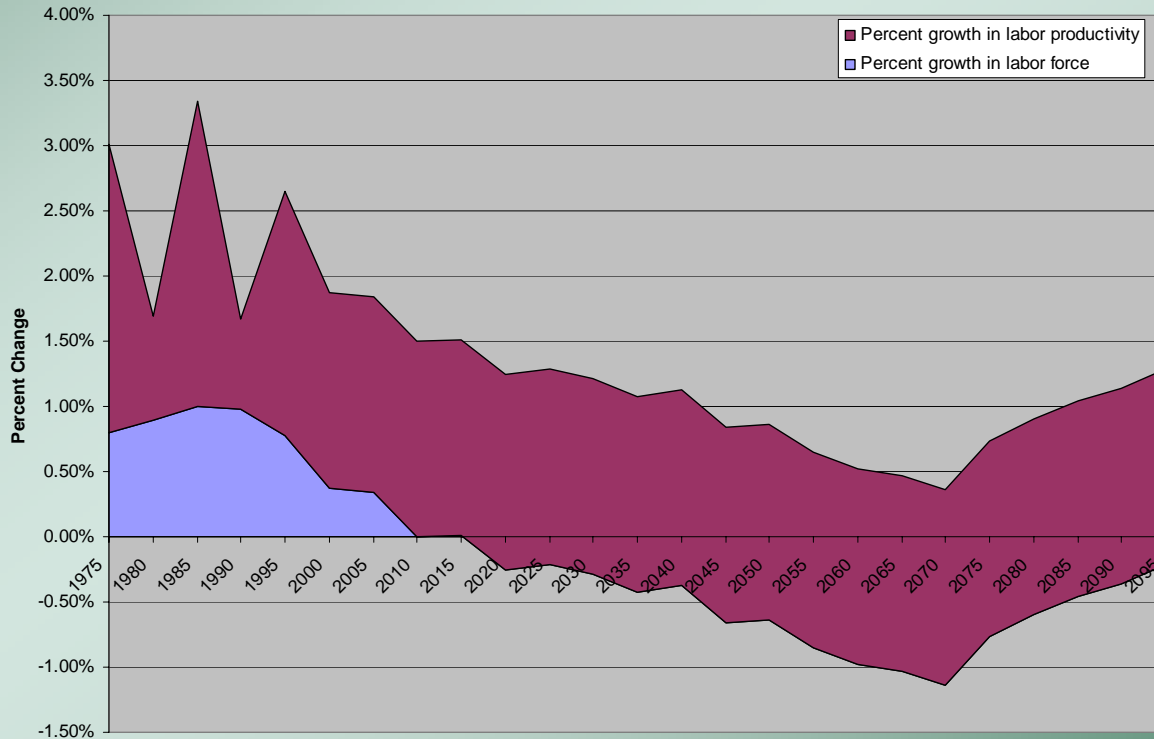
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Growth in output will decline as Labor Force growth declines.

Declines in Labor Force relative to Population will cause per capita incomes to fall faster

Western Europe GDP growth rates

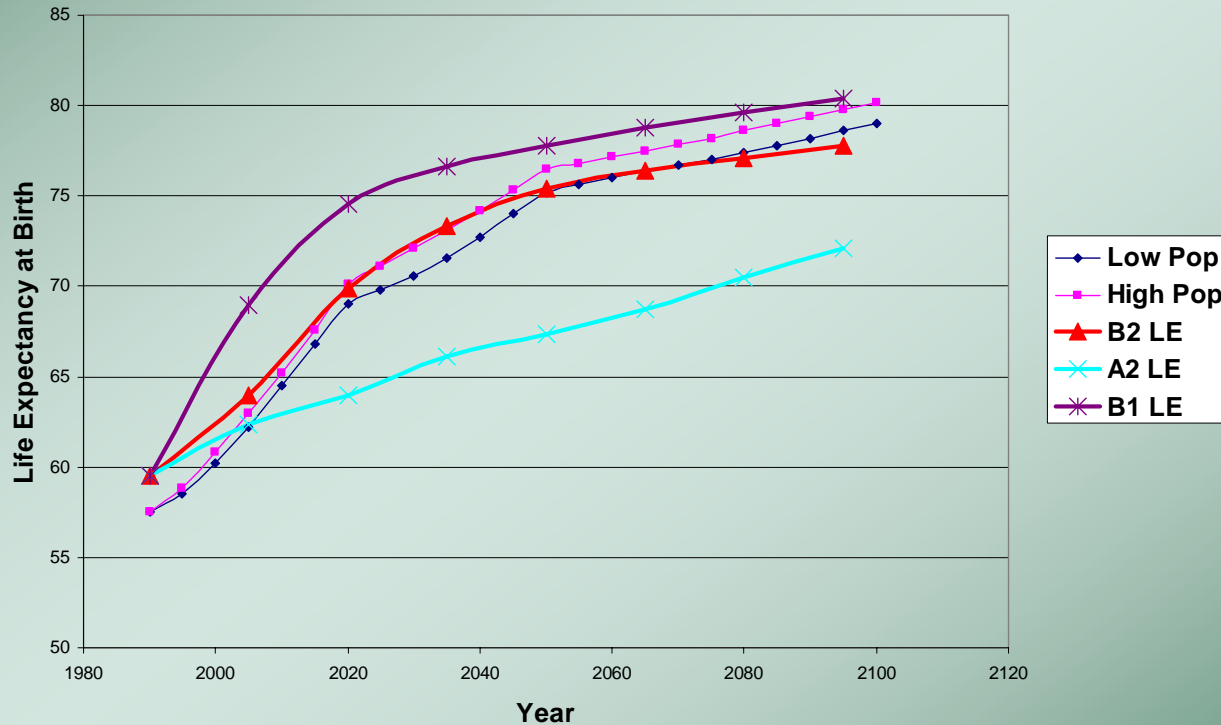


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Drivers for a simple health model give a significantly different long term evolution of life expectancy

Comparison of Life Expectancy for SRES and LE Model



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Long run demand for energy services is critical

- Will China look like the US or Europe when per capita income reaches 20K PPP?
- How will the demand for transportation grow—especially air travel?



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Downscaling

- Good impacts analysis requires climate and socio-economic data at a much finer scale than either climate models or IA tools provide
- Simple algorithms have been shown to produce ‘stupid model results’, creating credibility issues.
- Current generation is much better but still does not incorporate such things as the trend of US population to move 1) south and west and 2) toward the coast.

Going Long

- There is a need to examine drivers for emissions post 2100
- Population x per capita energy consumption x carbon intensity of energy supply can drive C emissions.
- We can develop similar simple drivers for other emissions.



Scenario Likelihood – the story of a muddle – with implications!

- The Problem
- An Idea
- Reality strikes
- Implications
- Where next??



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Likelihood

- An ongoing issue—both in response to SRES and in CCSP methods paper
- A complex problem
 - Formal likelihood of an individual scenario is zero
 - Yet our judgment may well be that case a is more likely than case b
- Proposal: Use Conjoint Choice analysis to develop group based judgments on scenario likelihoods

What is conjoint choice?

- Long history in marketing
 - Describe a commodity as a collection attributes
 - Ask respondent to chose between two sets of attributes
 - Use multinomial logit to analyze data—make predictions about market behavior
- A Alberini et al adapted technique to analyze adaptive capacity. “Using expert judgment to assess adaptive capacity to climate change: evidence from a conjoint choice survey”, GEC May 2006

Proposal is to use similar technique to study scenario likelihood problem

■ Requirements

- Set of attributes for scenarios
- Ability of respondents to make judgments on which case is more likely

■ Issues

- What attributes to use
 - Eg include institutional capacity or value systems
- How to create cases
 - Random combination of attributes
 - Restrict some combinations as impossible
 - Use actual model runs

Problems:

- What is the potential set of scenarios over which to assign probabilities? (the sample space problem).
- Will the introduction of new alternatives change the relative likelihoods of already included scenarios? (the independence of irrelevant alternatives problem).
- Will a repetition yield the same results? (the replication problem).
- Intuition pump: use a horse race as an analogy.



Larger set of issues:

- We need a way to extend the community of creators and users of climate change scenarios.
- Can we find a productive way to use enquiry tools like conjoint choice to enable this expansion?
- We can clearly run a horse race on the existing SRES scenarios. Should we do this? What else might we do in the same exercise?