How to Make CCS an Affordable Reality in Developing Countries?

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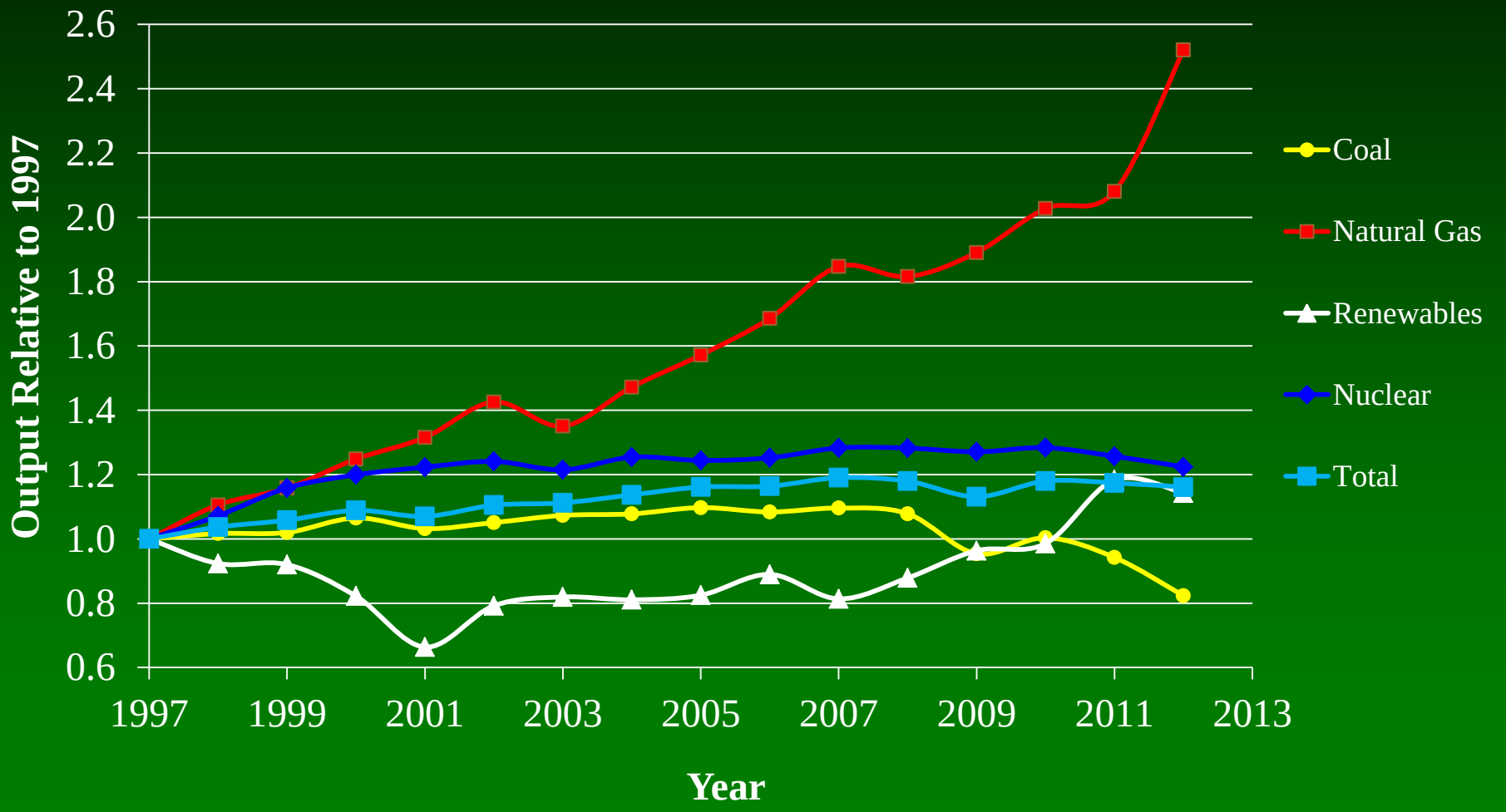
October 9, 2013

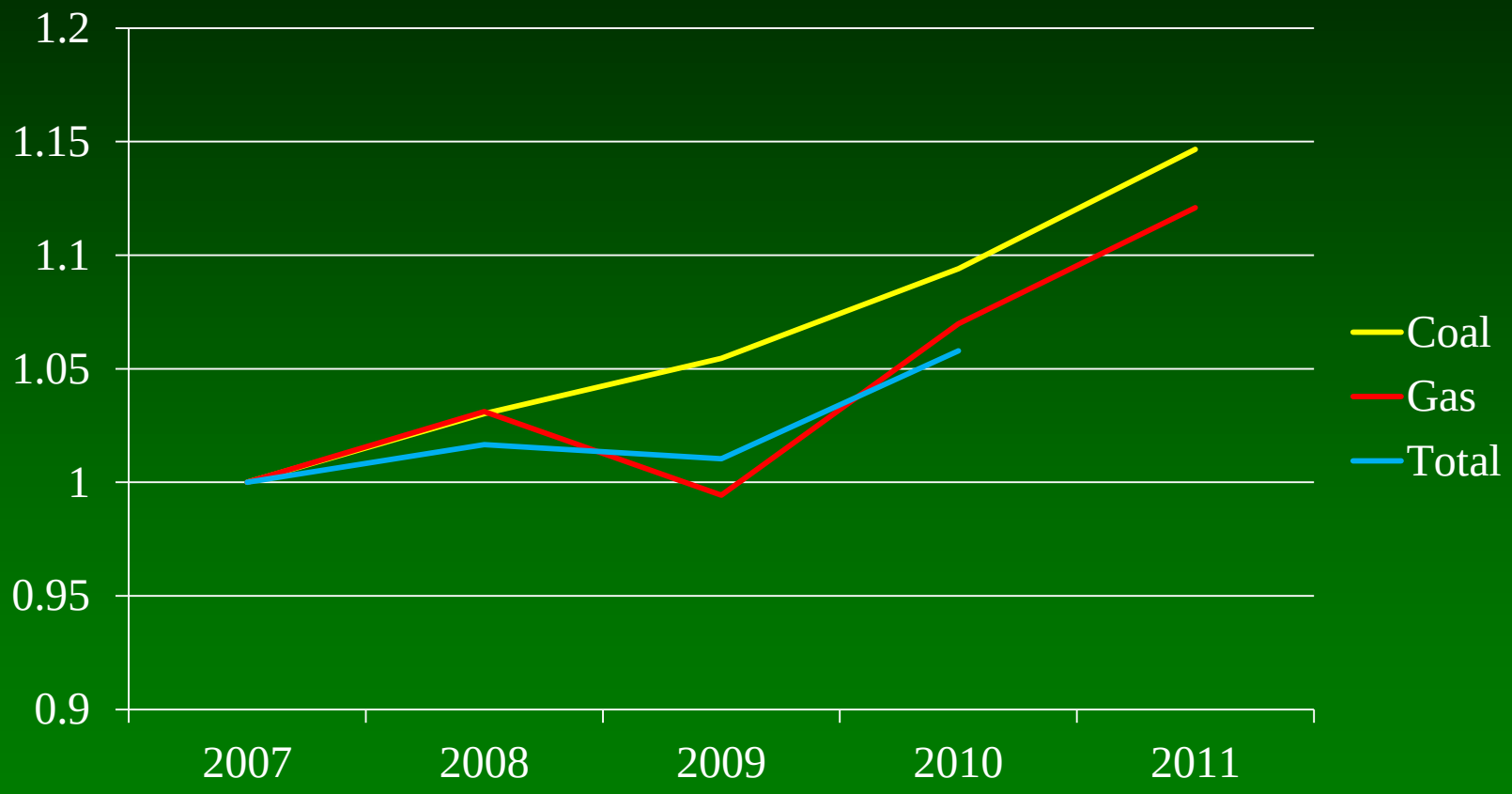
Overview (1)

- Carbon Dioxide Capture and Storage (CCS) is the only technology available to drastically reduce CO_2 emissions from fossil fuels that also allows the world to continue to reap their benefits without the negative impacts associated with climate change.

US Electricity Generation by Fuel Output Relative to 1997



World Energy Consumption Relative to 2007



Overview (2)

- CCS is dependent on climate policies to drive it, and the current political environment for climate policy is unwelcoming.
- Since it is almost always cheaper to emit to the atmosphere than sequester, CCS opportunities are limited to niche areas until carbon policies are put in place.

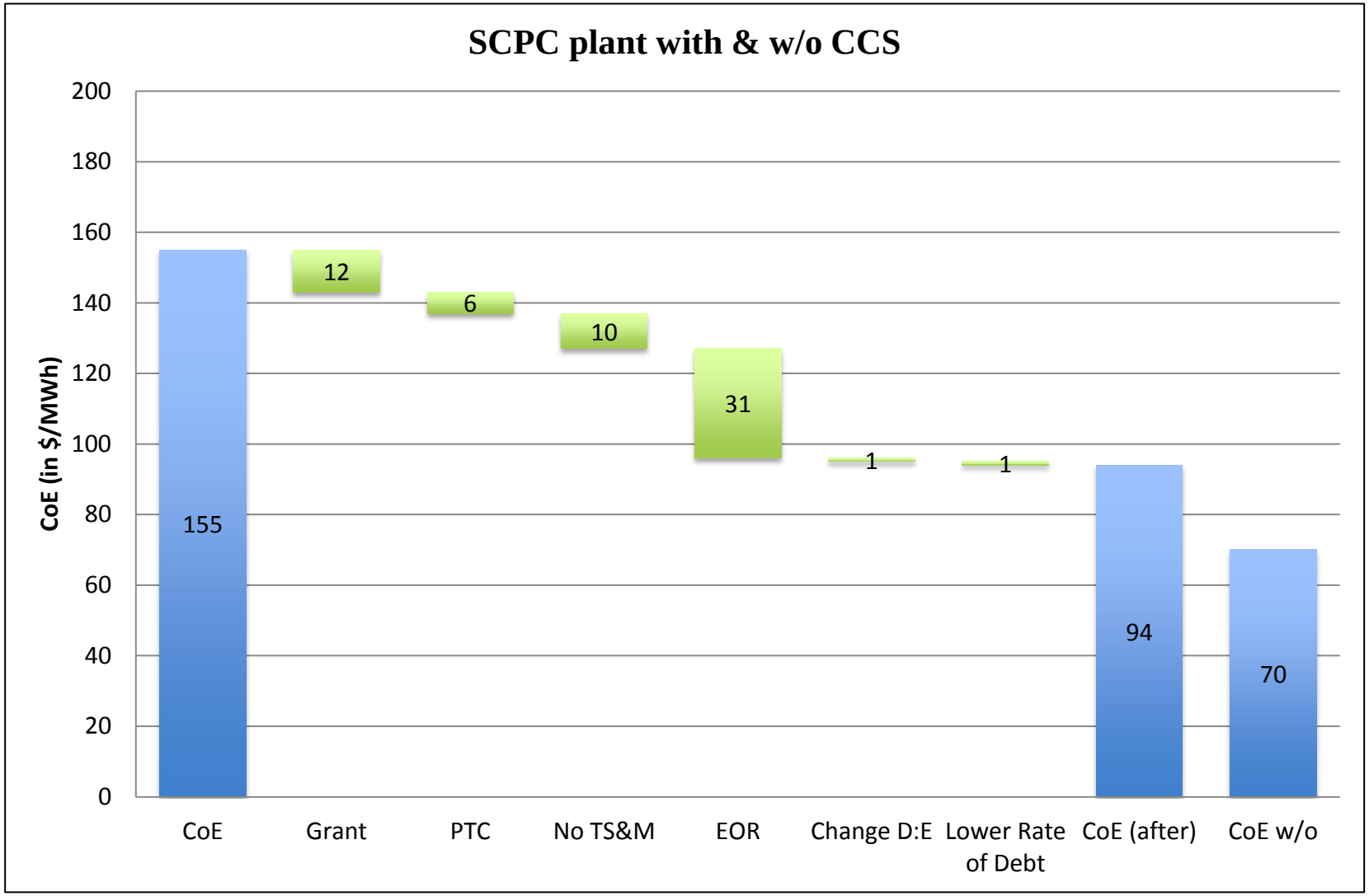
CCS Today

- All major components of a carbon capture and sequestration system are commercially available today.
- Today we operate at a million ton (Mt) scale
- In order to have a significant impact on climate change, we need to operate at the billion tonne (Gt) per year level
- This implies that 100s and eventually1000s of CCS facilities will need to capture and store their CO_2

Large-Scale CCS Projects

- There are 7 large-scale (>1 Mt/yr) operating CCS projects worldwide (none at power plants)
- There are several projects currently under construction (two at power plants)
- While dozens of projects have been announced over the past decade, large-scale CCS projects are extremely difficult to develop and we are seeing many cancellations worldwide.

Project Economics - SCPC



From: Raveendran, S.P., "The Role of CCS as a Mitigation Technology and Challenges to its Commercialization," M.I.T. Masters Thesis, May (2013).

CCS Costs

- For an N^{th} plant
  - \$50-\$100/tCO_2 avoided for power plant sources
  - ~75% increase in COE

CCS Technology Development

- There are many pathways that can lower CCS costs
- It will always cost more to capture than not capture
- CCS development (similar to all large energy system development) is expensive
- While R&D support is important, creating markets for CCS is essential

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