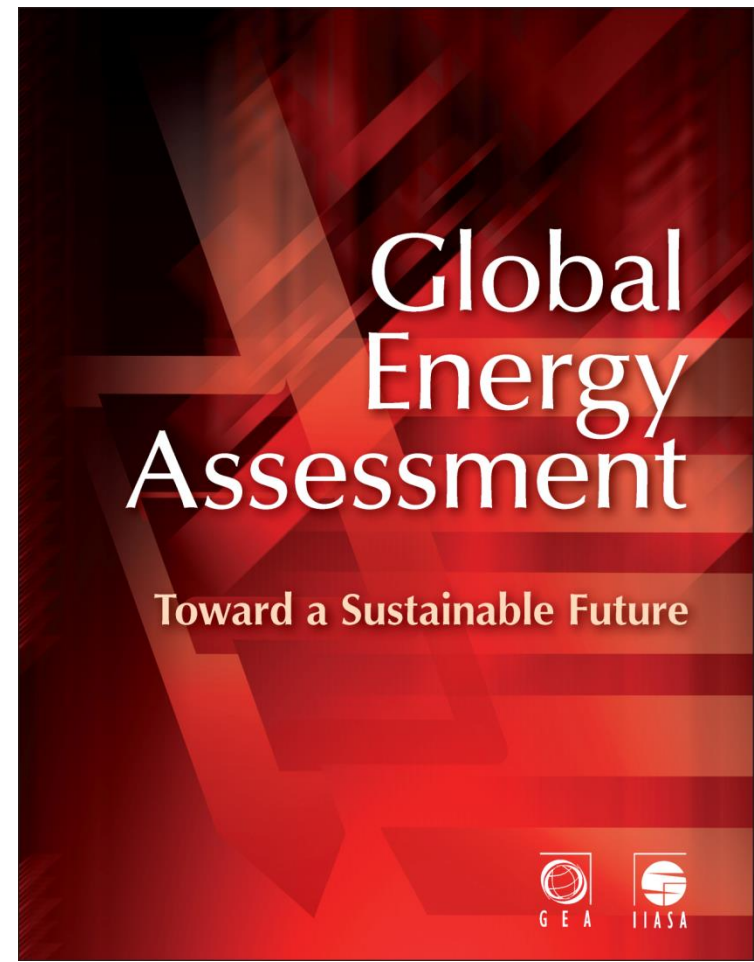


Global Energy Assessment: Exploring pathways to a more sustainable future

Anand Patwardhan

Clean Energy Ministerial

April 2013



- **Total Effort: 300 Authors; 200 Reviewers
> 6 years >> 6m € and >> 100 p-years**
- **# of Reviewer comments: >6000**
- **# of Language Editors:15**
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- **# of Figures: ~ 650**
- **# of Tables: ~ 380**
- **# of References: >7000**
- **# of Pages (Published): ~1864 Pages**
- **Single volume of 5.5 kg**

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- United Nations Foundation (UNF)
- United Nations Industrial Development Organization (UNIDO)
- US Environmental Protection Agency (US EPA)
- US Department of Energy (DOE) through Global Environment and Technology Foundation
- World Bank/ESMAP
- World Energy Council (WEC)

GEA Council

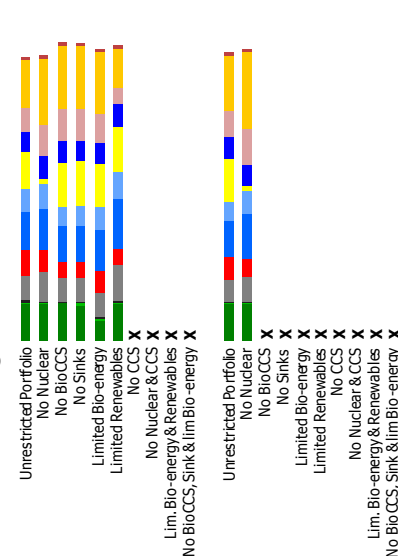
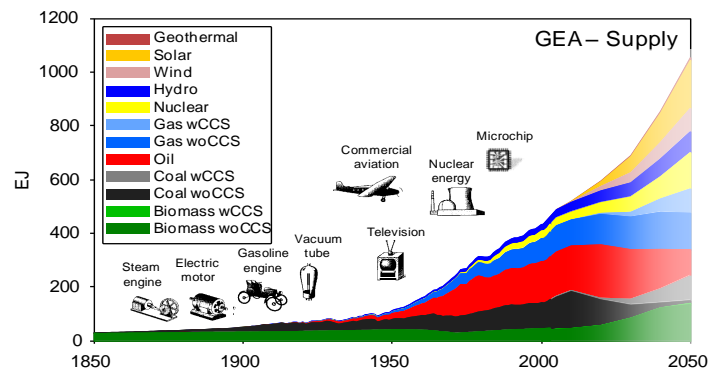
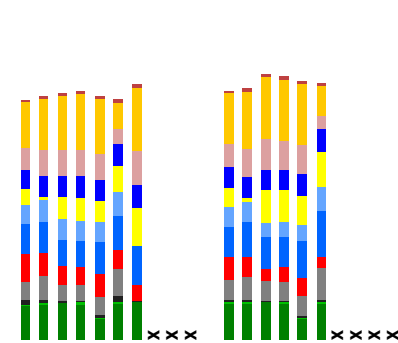
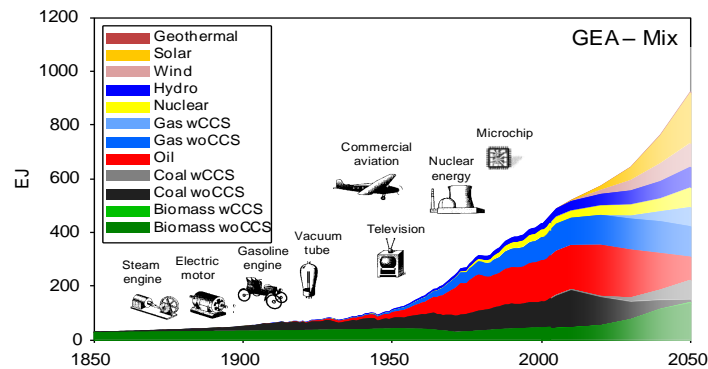
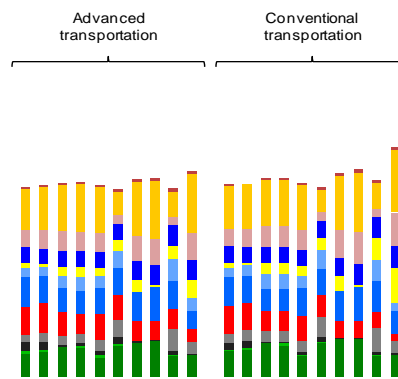
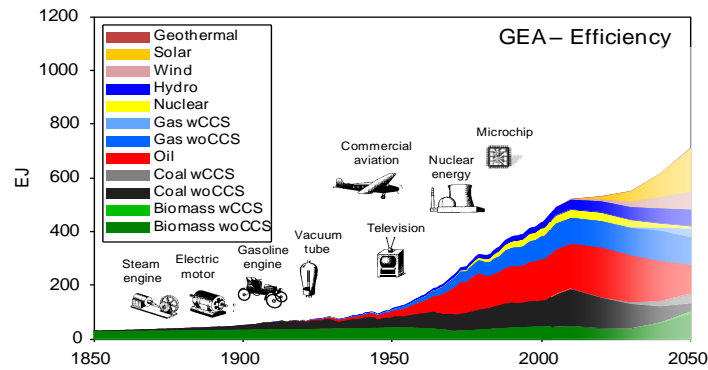
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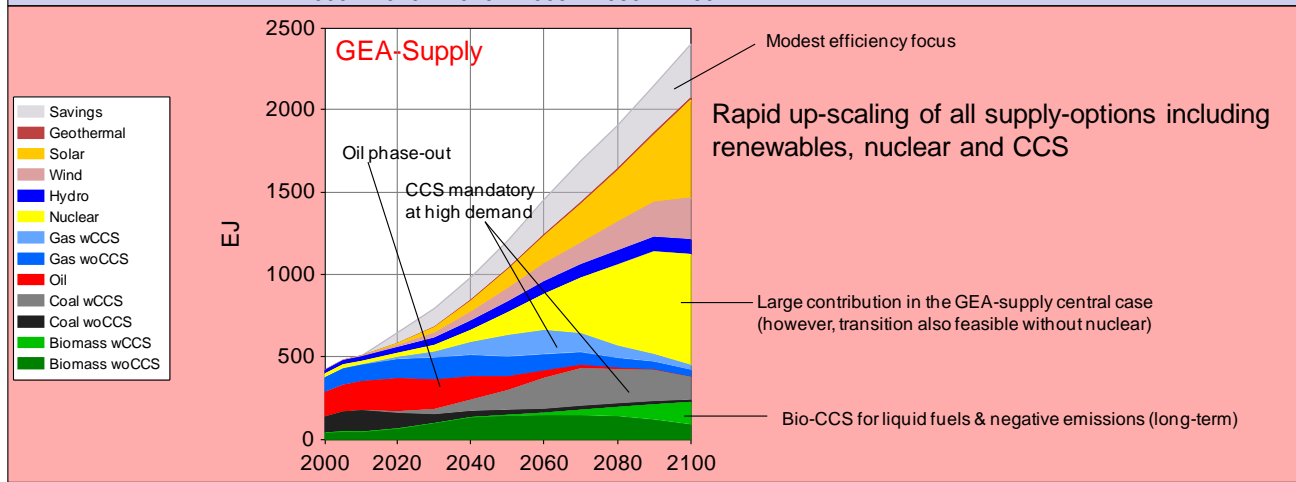
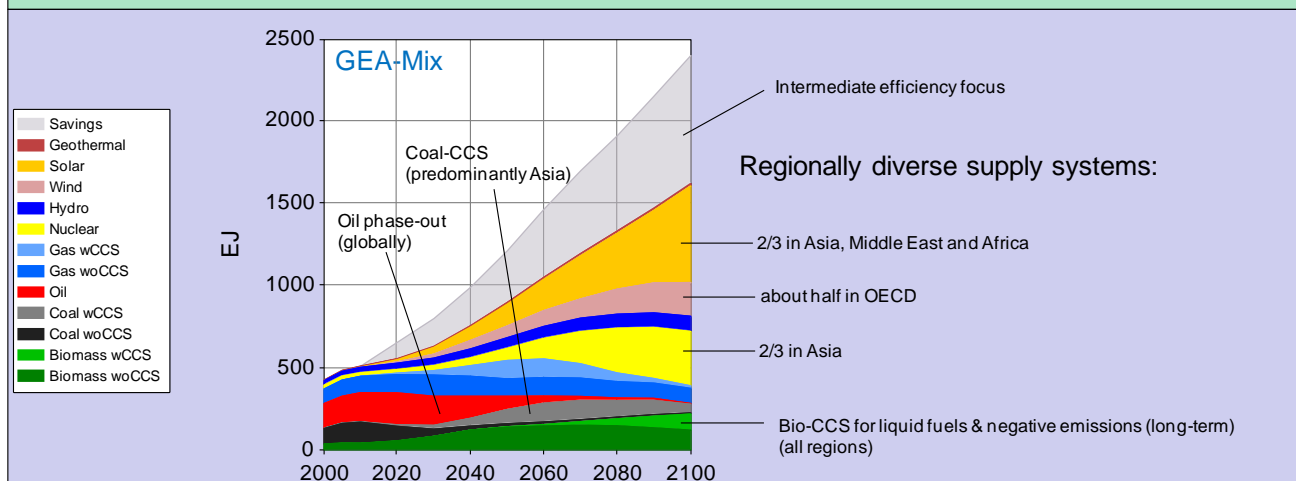
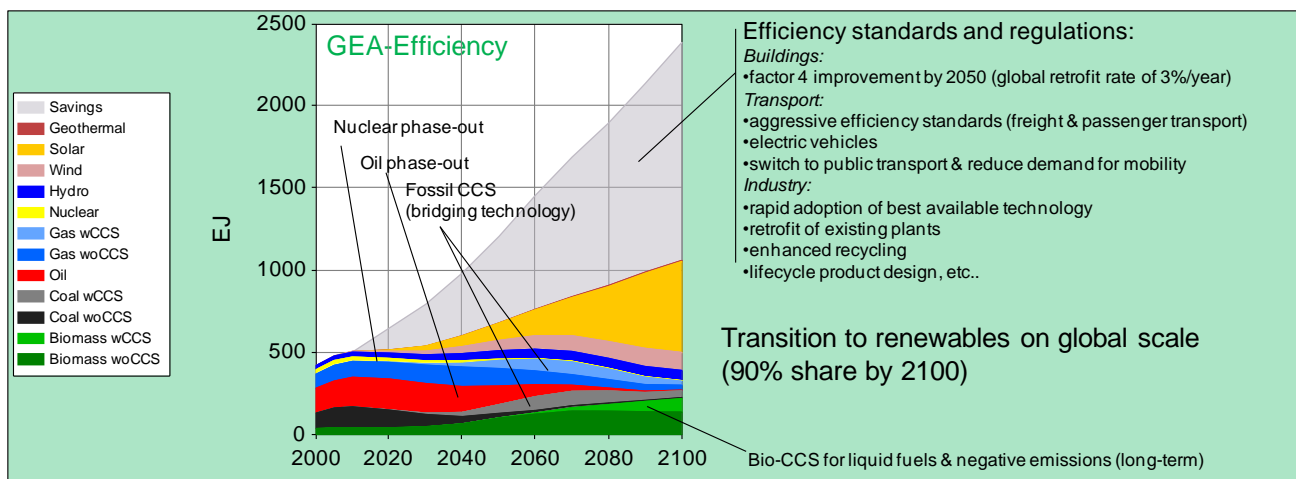
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Key ideas

- The development of pathways that simultaneously address multiple energy challenges
 - Energy access, energy security, climate protection and reducing environmental impacts and ancillary risks
- There are many such viable pathways with different combinations of energy supply and demand options
 - Rapidly increase in renewable energy technologies and in energy efficiency are common elements in all pathways
- Early action is important for energy efficiency and renewable energy technologies
 - Avoiding the risk of lock-in, supporting learning to drive costs down and redirecting RD&D to widen the menu of technology options
- Policy integration enables multiple entry points for change
 - Connecting energy and non-energy policies

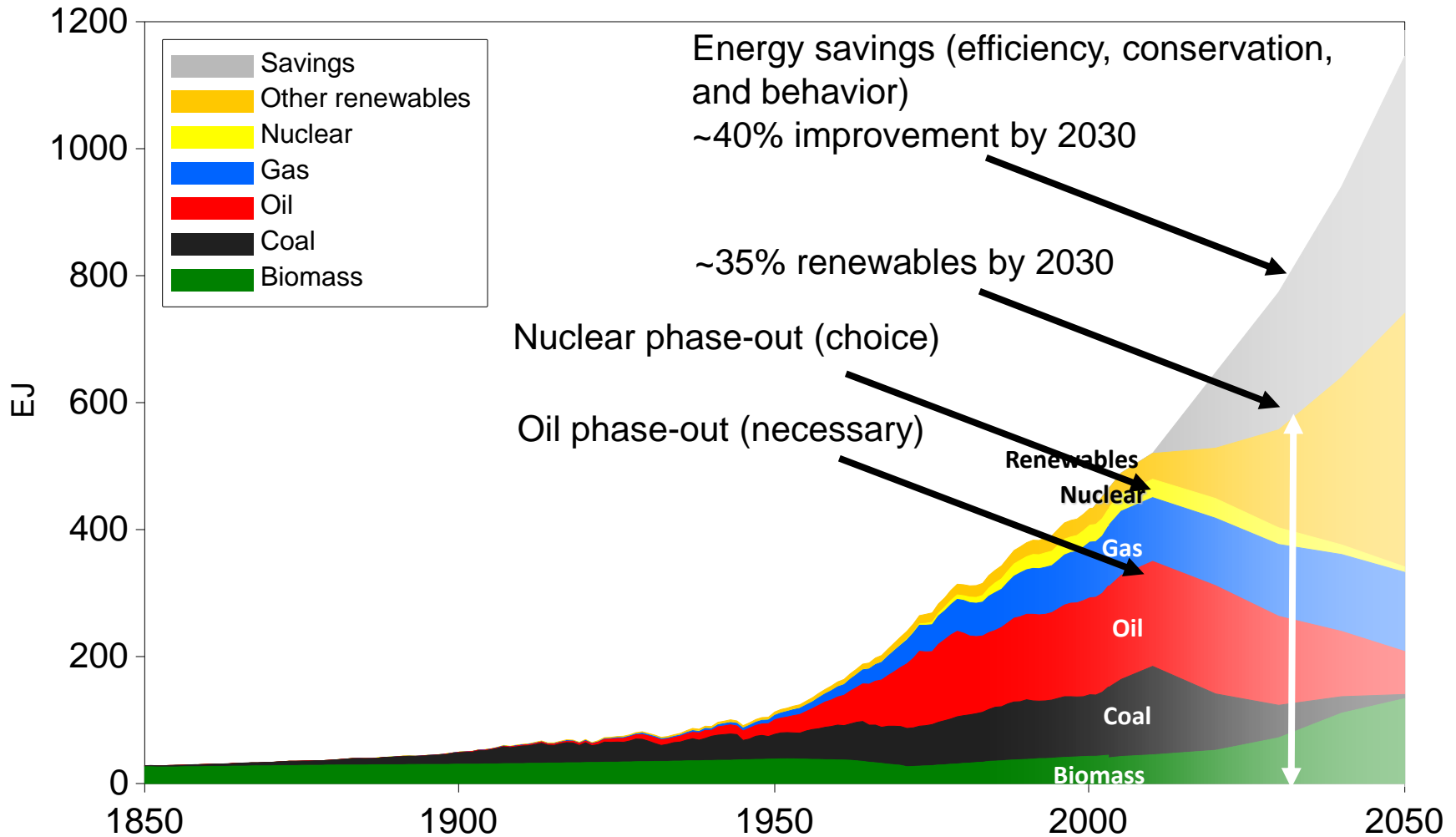


- 60+ pathways grouped into 3 broad clusters – efficiency focus, large heterogeneity, high demand; sensitivity analyses to evaluate different situations
- Common elements
 - ↑ Energy efficiency
 - ↑ Renewable energy
 - Modernization of fossil fuel system
 - Efficiency focus creates supply-side flexibility



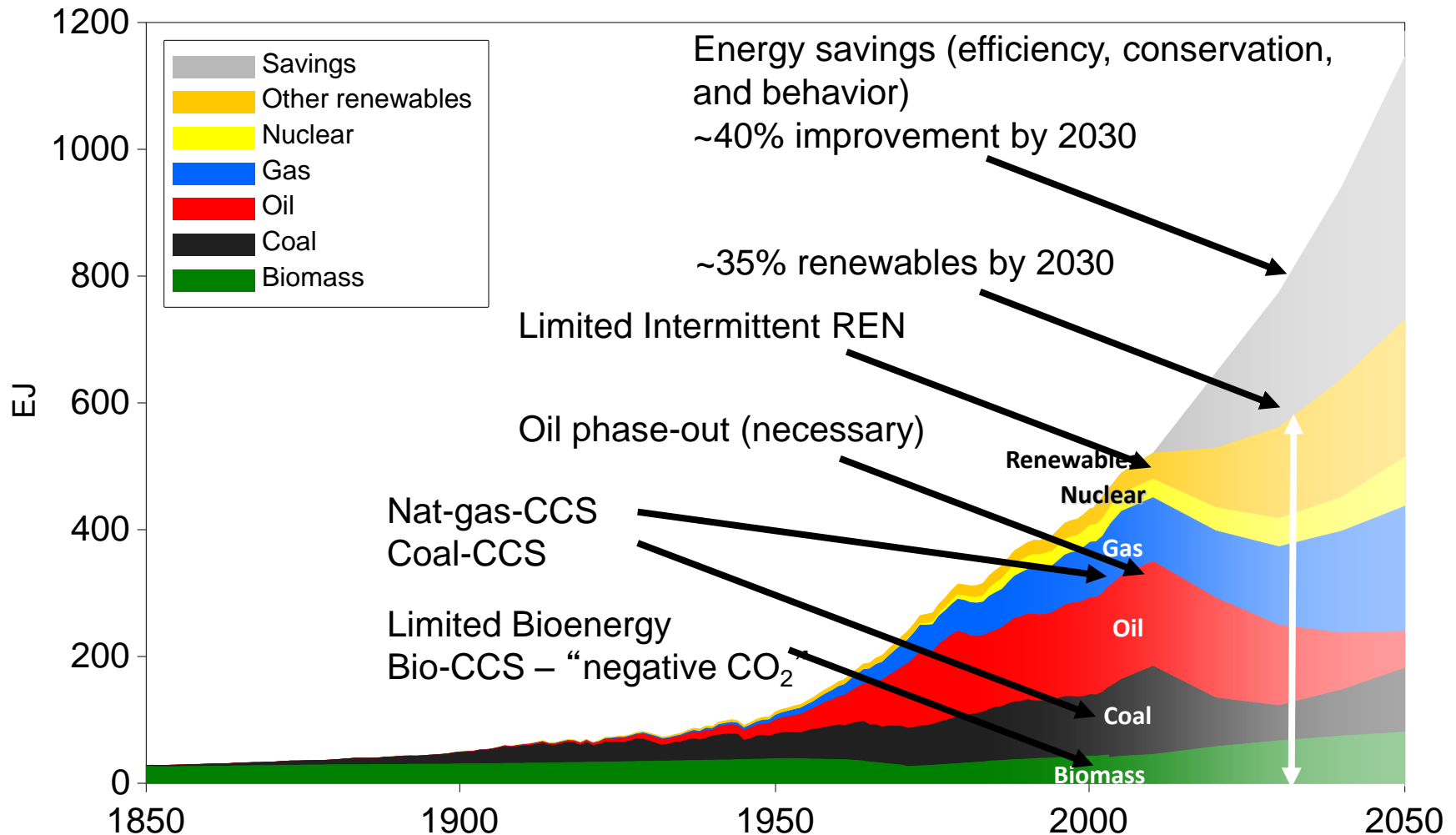
Global Primary Energy

no CCS, no Nuclear



Global Primary Energy

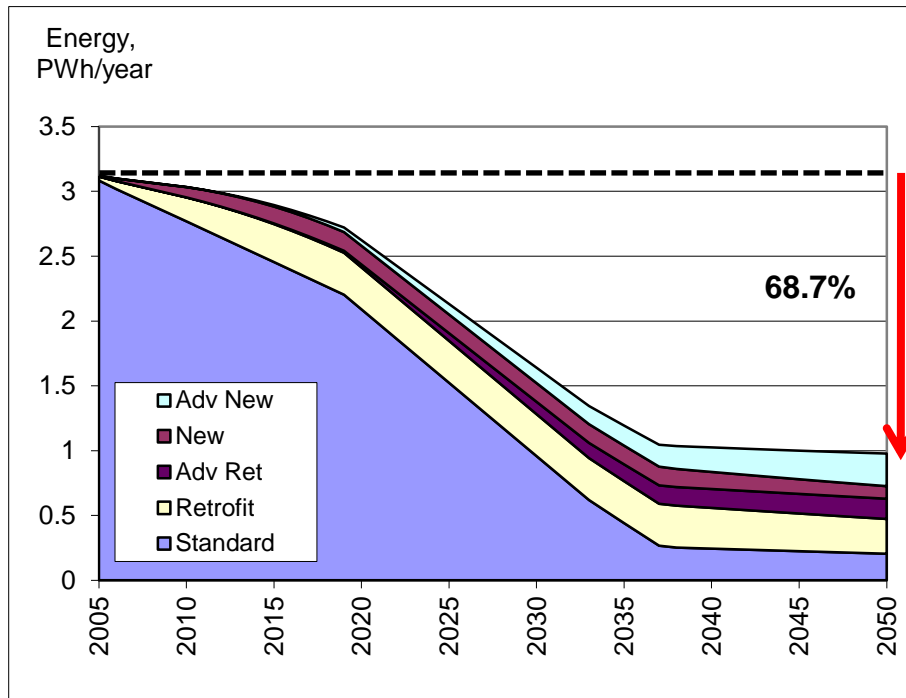
lim. Bioenergy, lim. Intermittent REN



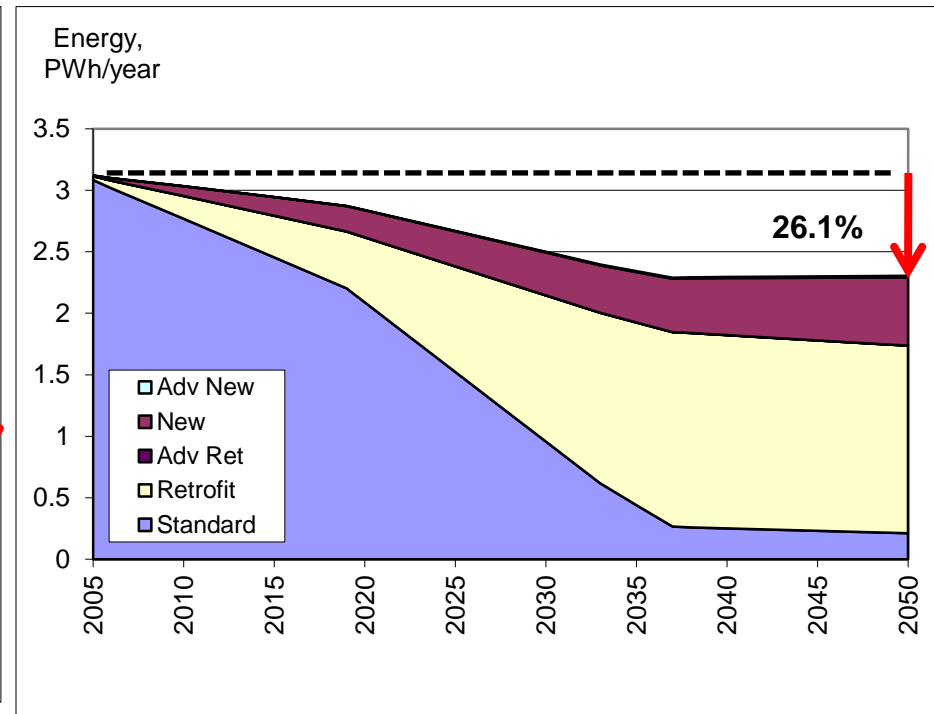
Source: Riahi et al, 2011

Early action to avoid lock-in: The lock-in risk for Western Europe

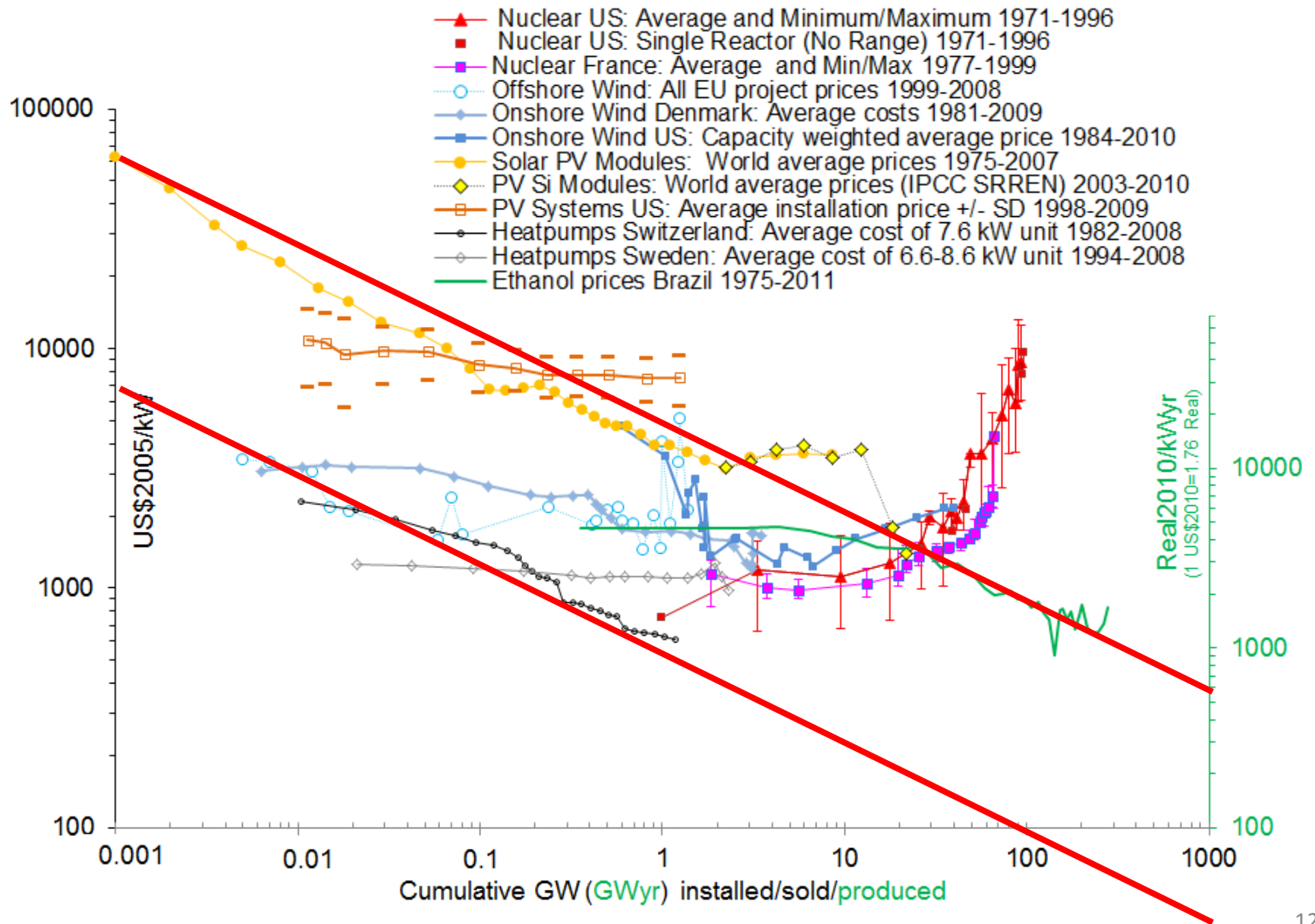
Thermal Comfort Final Energy, state-of-the-art scenario



Thermal Comfort Final Energy, suboptimal scenario

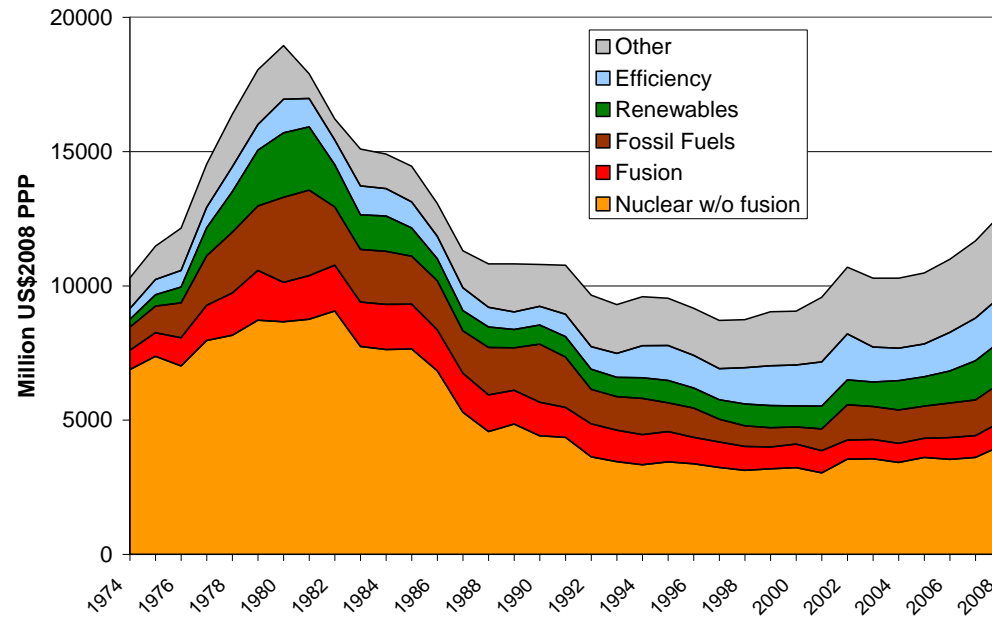


Supply Technologies Cost Trends



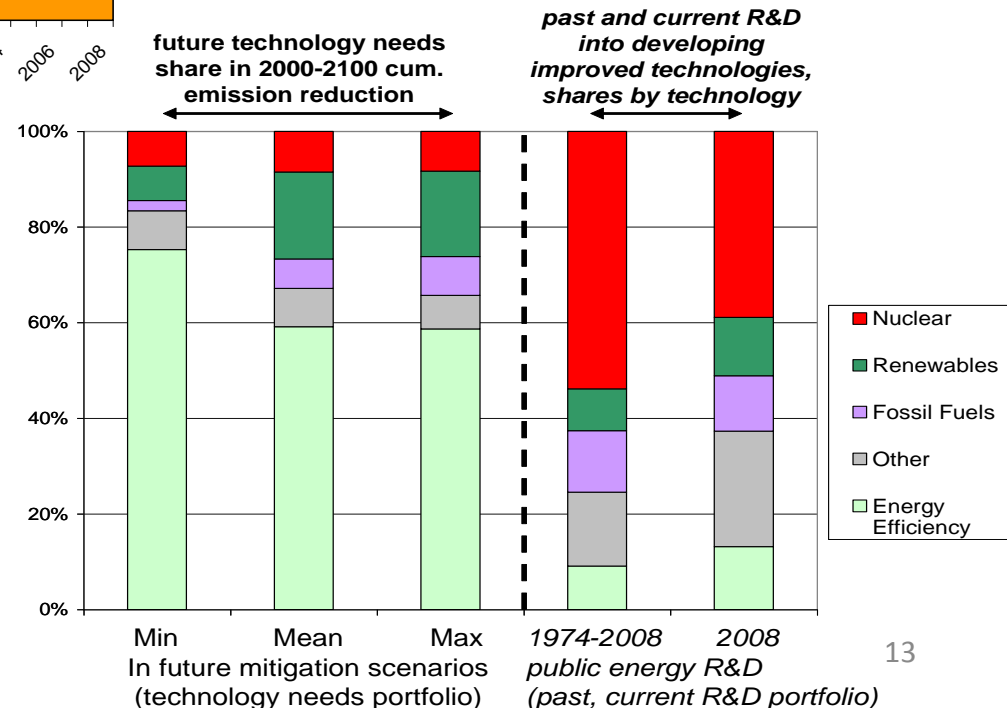
Source: GEA, Chapter 24, 2012 and Grubler and Wilson 2012, in press

New Directions for R&D

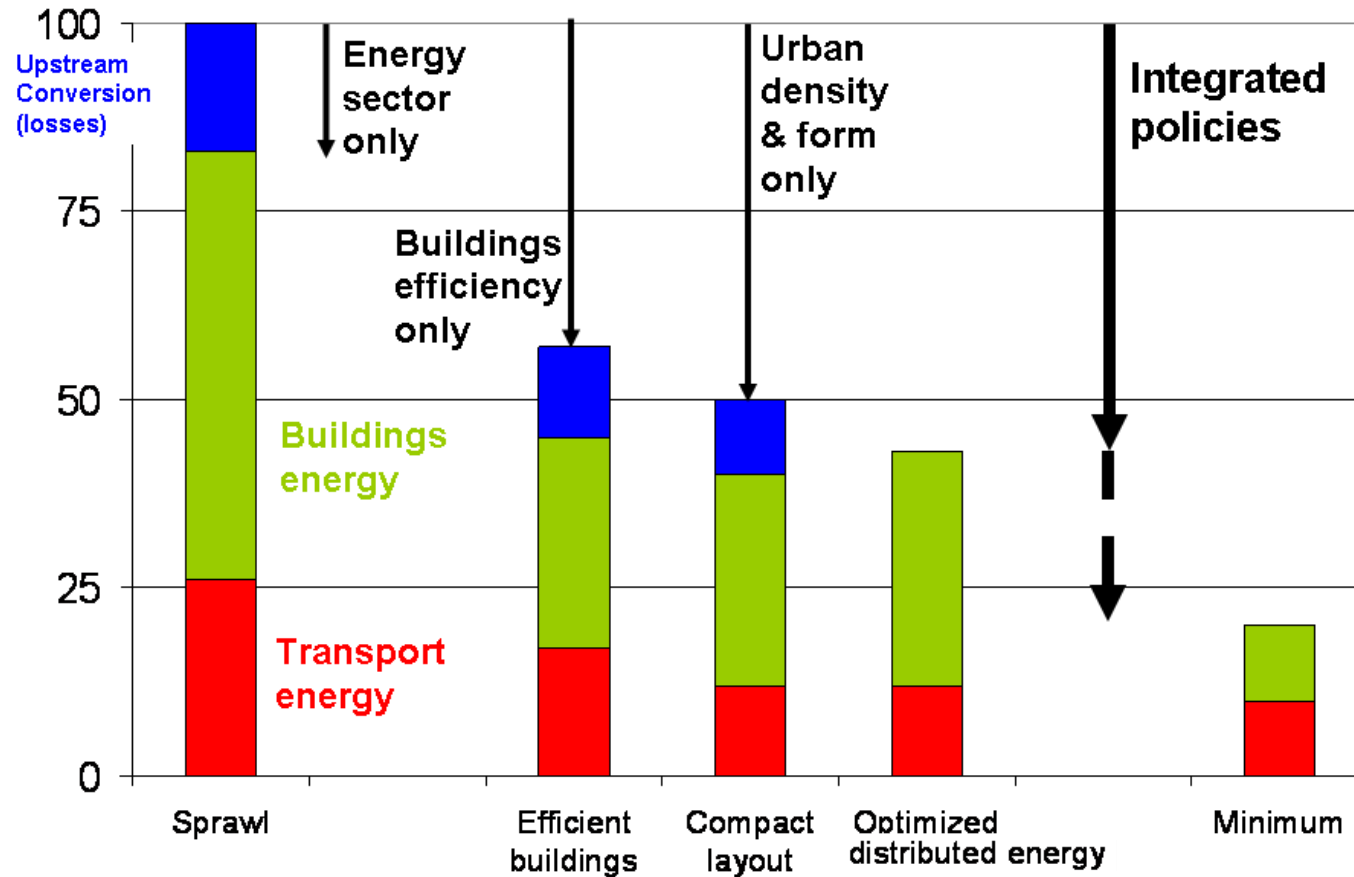


Public Sector Energy RD&D in IEA Member countries by major technology group

Distribution of past and current energy R&D as compared to future technology needs from the pathways analysis



Policy Integration at the Urban Scale



Simulated energy use for an urban settlement of 20,000 inhabitants using the SimCity Model combining spatially explicit models of urban form, density, and energy infrastructures, with energy systems optimization.

Concluding thoughts

- Heterogeneity in circumstances, contexts and priorities will require variety in policy “packages”. Recognition of multiple benefits allows different entry points for change
- Technology is important, but equally important to address critical issues related to implementation: institutions, consumer preferences & market behavior, skills & capacities
- Early action is essential to avoid negative lock-in, create positive lock in and accelerate the technology cycle
- Energy policies need to be coordinated with policies in sectors such as industry, buildings, urbanization, transport, health environment etc. to have real impact
- Next steps:
 - While the GEA is complete, and the assessment report has its own value, there is a need for ongoing scientific and technical input into the policy process at different levels
 - Could leverage capabilities of institutions such as IIASA to serve as anchors around which the broader scientific community is mobilized to address policy questions

GEA Database

www.iiasa.ac.at/web-apps/ene/geadb

