



International Institute for
Applied Systems Analysis
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science for global insight

Identifying Energy Policy Synergies and Interlinkages through Systems Analysis

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IIASA, International Institute for Applied Systems Analysis

Sustainable development means overcoming several energy challenges



Energy Poverty



Energy Security



Land Use & Forests



Climate Change

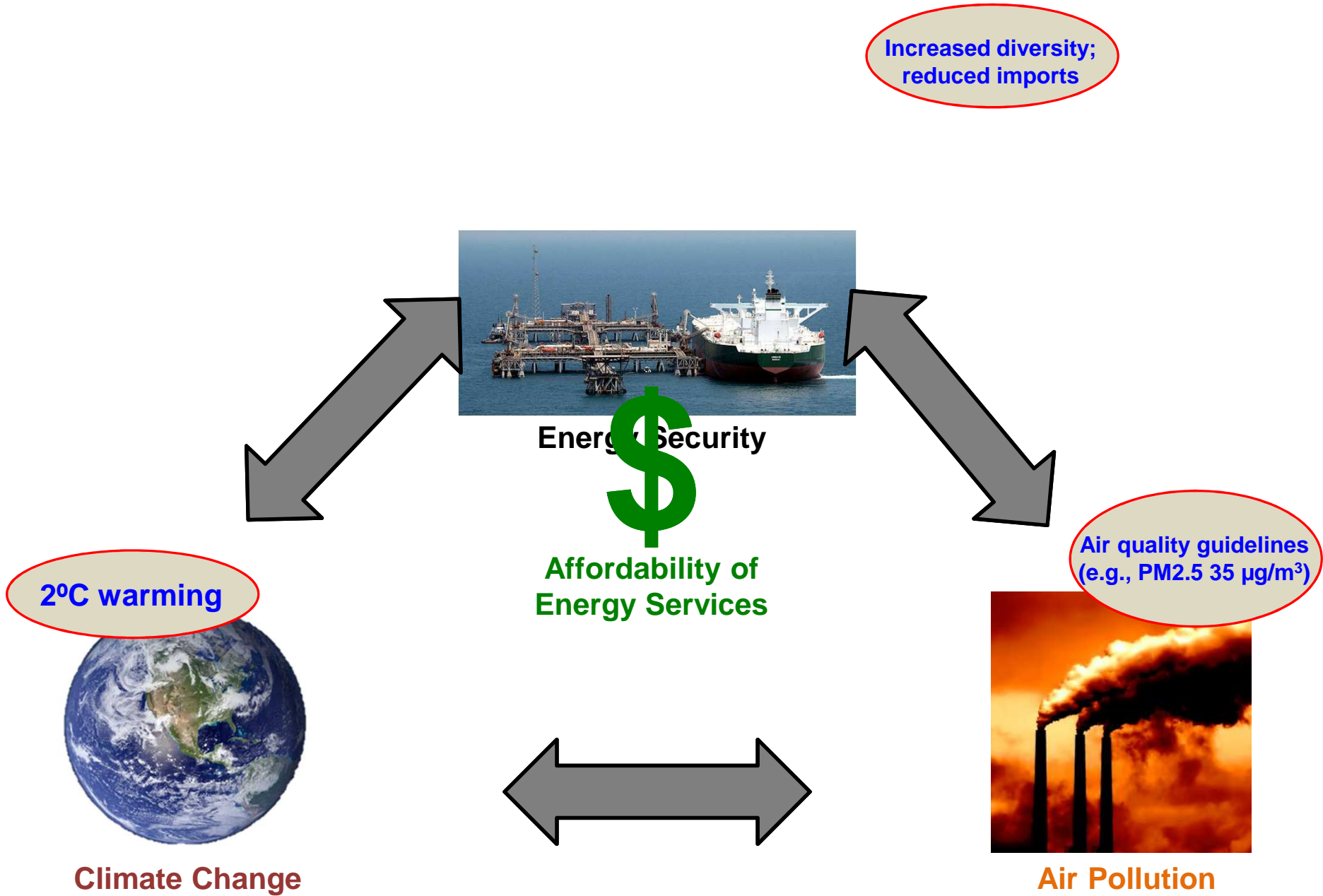


Water



Air Pollution

Image sources: NASA, <http://www.powernewsnetwork.com/white-house-releases-plan-to-cut-oil-imports-by-13-by-2025/1798/>, <http://wheresmyamerica.wordpress.com/2007/08/26/i-cant-see-my-america/>, <http://www.americanprogress.org/issues/green/report/2009/05/14/6142/energy-poverty-101/>, <http://today.uconn.edu/blog/2010/12/reclaiming-water-a-green-leap-forward/>, http://te.wikipedia.org/wiki/%E0%B0%A6%E0%B0%B8%E0%B1%8D%E0%B0%A4%E0%B1%8D%E0%B0%B0%E0%B0%82:Forest_Osaka_Japan.jpg



Why the lack of progress?

- **Short term vs. Long term**



- **Local/National vs. Global**



- **Add-on solutions vs. Structural changes**



Need to find new ways to frame these important issues

- **Integrated perspective is key**
- **Enormous synergies exist between the three objectives:**
 - Climate change mitigation
 - Energy security enhancement
 - Air pollution and health impact reduction

Policies of varying stringency were modeled



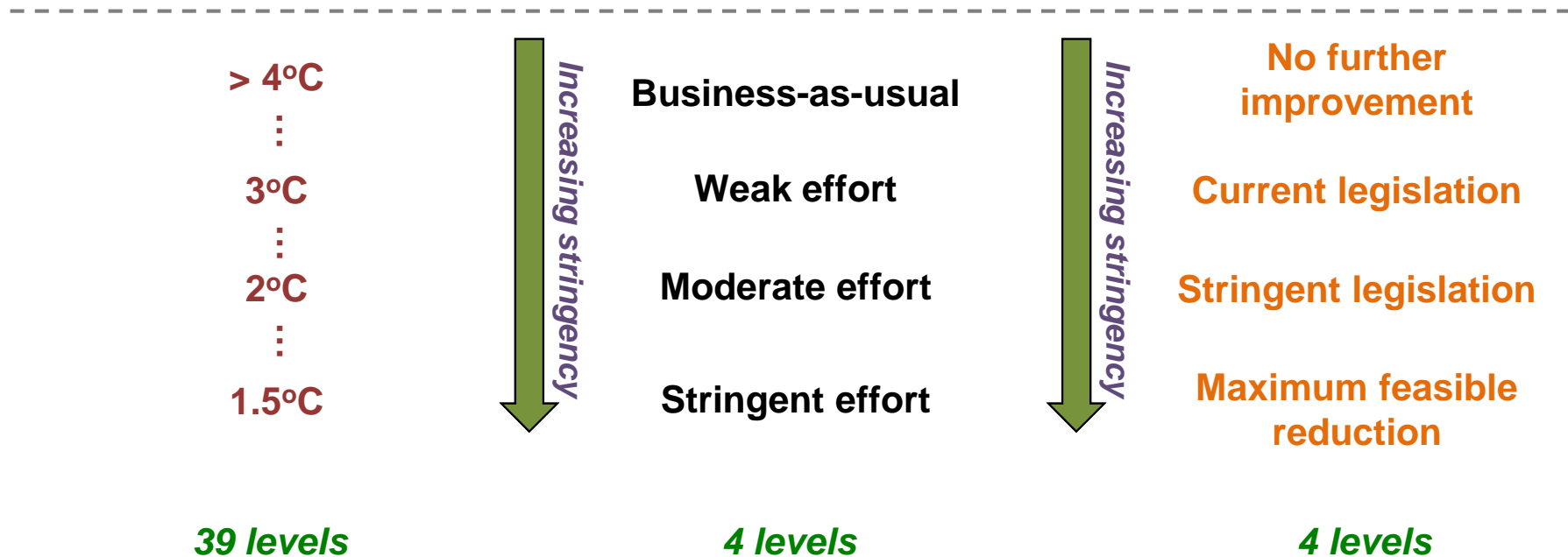
Global warming



Energy imports and diversity



Air pollution framework (PM, SO₂, NO_x, BC, ...)



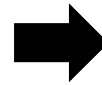
A large scenario ensemble was generated



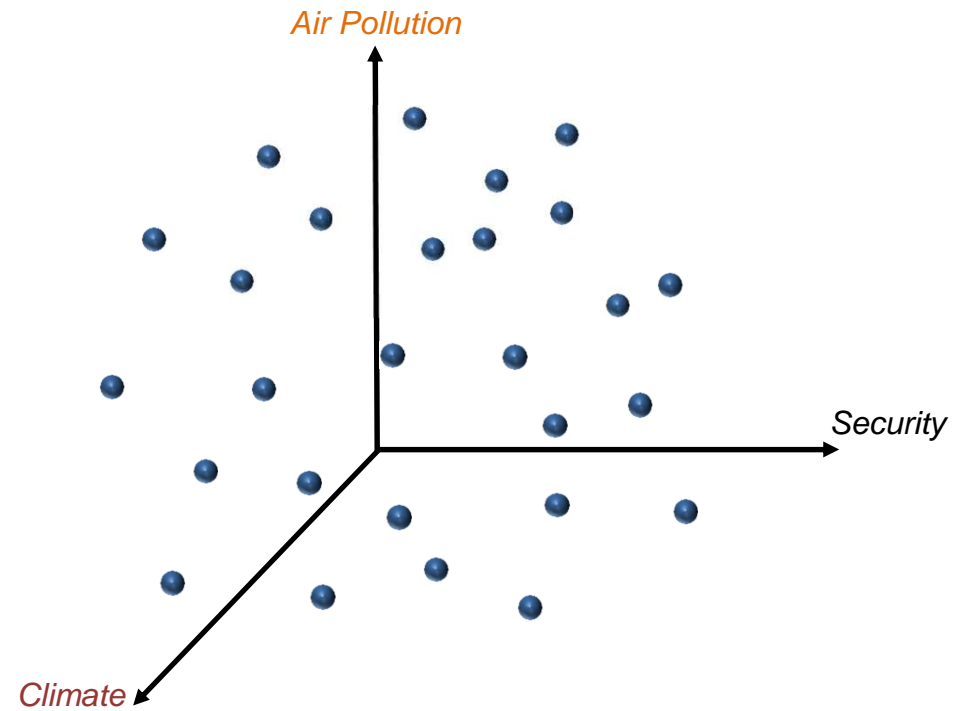
Climate Change



Energy Security



Air Pollution



>600 unique scenarios spanning the feasible scenario space (climate-pollution-security futures)

Synergies of *energy efficiency and decarbonization* accrue in multiple dimensions

1. **Co-benefits for air pollution and human health**

→ improved air quality (22-32 million fewer disability-adjusted life years globally in 2030)

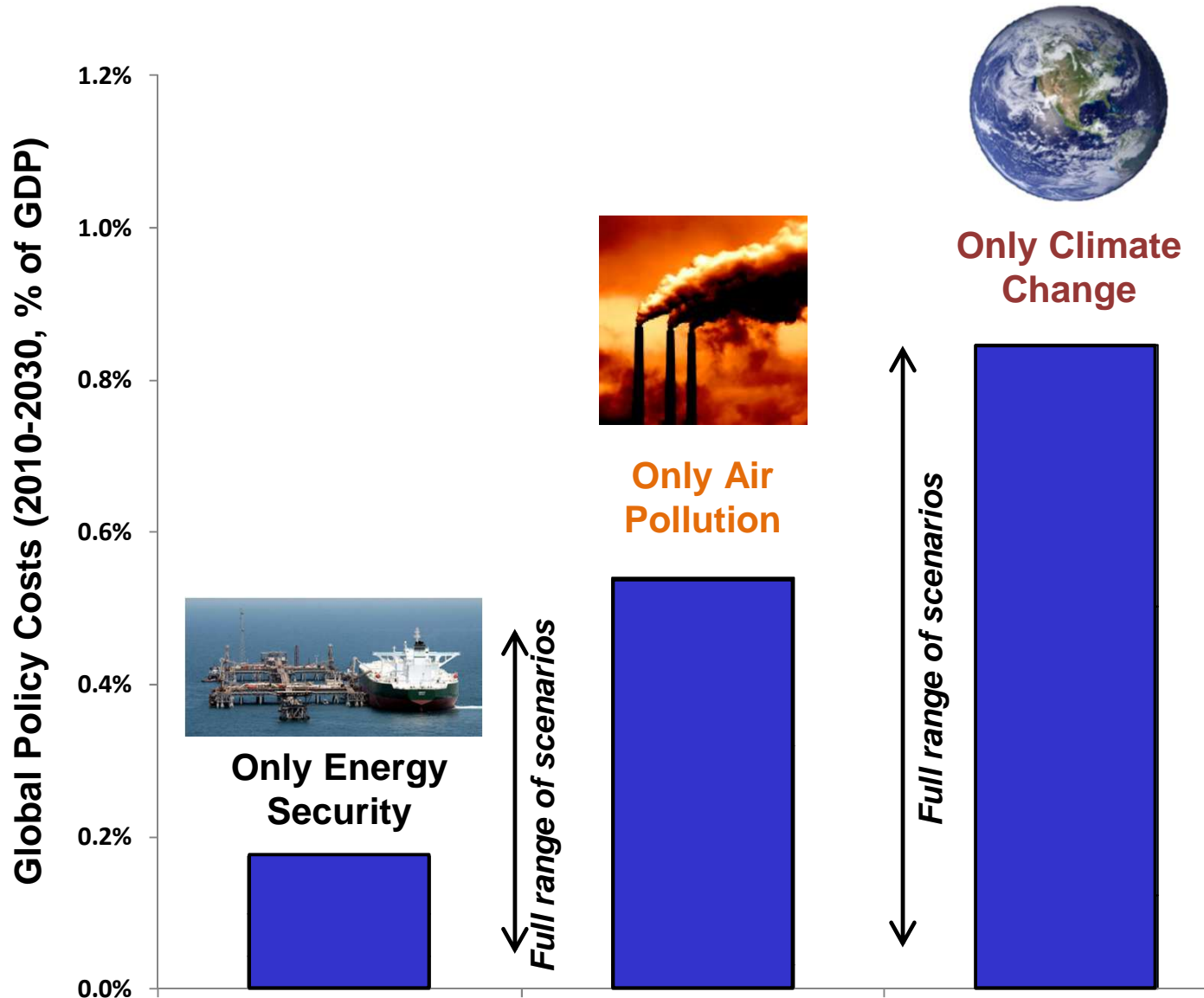
2. **Synergies for improved energy security**

→ more dependable, resilient, and diversified energy portfolios

3. **Cost savings and spillovers**

→ up to \$600 billion/yr in reduced pollution control and energy security expenditures by 2030 (0.1-0.7% of GDP)

An integrated approach saves >\$5 trillion (~0.5% of GDP)



Systems analysis provides a lens through which complex interlinkages can be explored

