

Book Launch

Asia's Energy Challenge Key issues and policy options

Edited by

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Background

- *Asia's Energy Challenge* is a collective volume of background papers prepared for ADO 2013 special theme chapter
- The book lays out key issues in Asia's energy security
- It sets forth a wide range of policy options to secure ample, affordable, and clean energy for tomorrow's Asia

Contents

- The volume is arranged in 4 parts
- Part I: Asia's energy challenge
 - Lee, Park and Saunders summarize Asia's energy challenge in a big-picture overview and highlight the central messages
- Part II: Energy security, sustainability, and affordability
 - Oil expert David Isaak reveals the disturbing prospect of Asia's seemingly relentless appetite for imported oil, but also identifies concrete policy options

Contents

- Part II: Energy security, sustainability, and affordability
 - Norberto Fueyo et. al provide a quantitative assessment of Asia's energy future along each of the three dimensions. They then identify great scope for the regional integration of energy systems in fostering renewable energy.
 - Part II ends with an in-depth and ethically troubling look by Benjamin Sovacool at the current state of energy poverty in Asia, and the prospects and policy options for advancing energy affordability and access

Contents

- Part III: Energy and the environment
 - Benjamin Sovacool examines the four-pronged environmental risks associated with Asia’s growing energy use—climate change, air pollution, water availability and quality, and land-use change—and he argues that energy prices must internalize the hidden external costs of energy sources.
 - Deepak Sharma et al. investigate the potential for energy efficiency improvements to reduce emissions, and find the welfare benefits to be substantial.

Contents

- Part IV: Options for energy supply and integration
 - Michael Ross analyzes the prospects for unconventional gas and renewable sources, such as wind and solar power. He finds the potential limited in short run, but promising over a longer horizon.
 - Jong Ho Hong et al. explore power sector issues in the major economies of Asia, and find substantial room for improving the efficiency of power systems. They also call for a major policy push toward renewables.

Contents

- Part IV: Options for energy supply and integration
 - Rogner and Nam undertake an in-depth analysis of nuclear power in Asia, finding that it possesses favorable economics and can mitigate GHG emissions, but there are modest safety, proliferation, and waste disposal risks.
 - Minsoo Lee, Donghyun Park and Harry Saunders then highlight the significant benefits to be derived from the regional cooperation and integration of energy markets and infrastructures

Contents

- Part IV: Options for energy supply and integration
 - Norberto Fueyo et al. offer a detailed look at the energy–economy structure of China and India over the next 25 years. They delve into the underlying forces that kept energy intensity high and environmental performance poor. They then evaluate specific policy initiatives that can help correct these problems.

Contents

- Part V: Key findings and policy recommendations
 - Lee, Park and Saunders conclude the volume with a summary of key findings, along with policy recommendations that suggest a pathway for resolving Asia's formidable energy challenge. A bold, aggressive, comprehensive policy action is urgently called for.

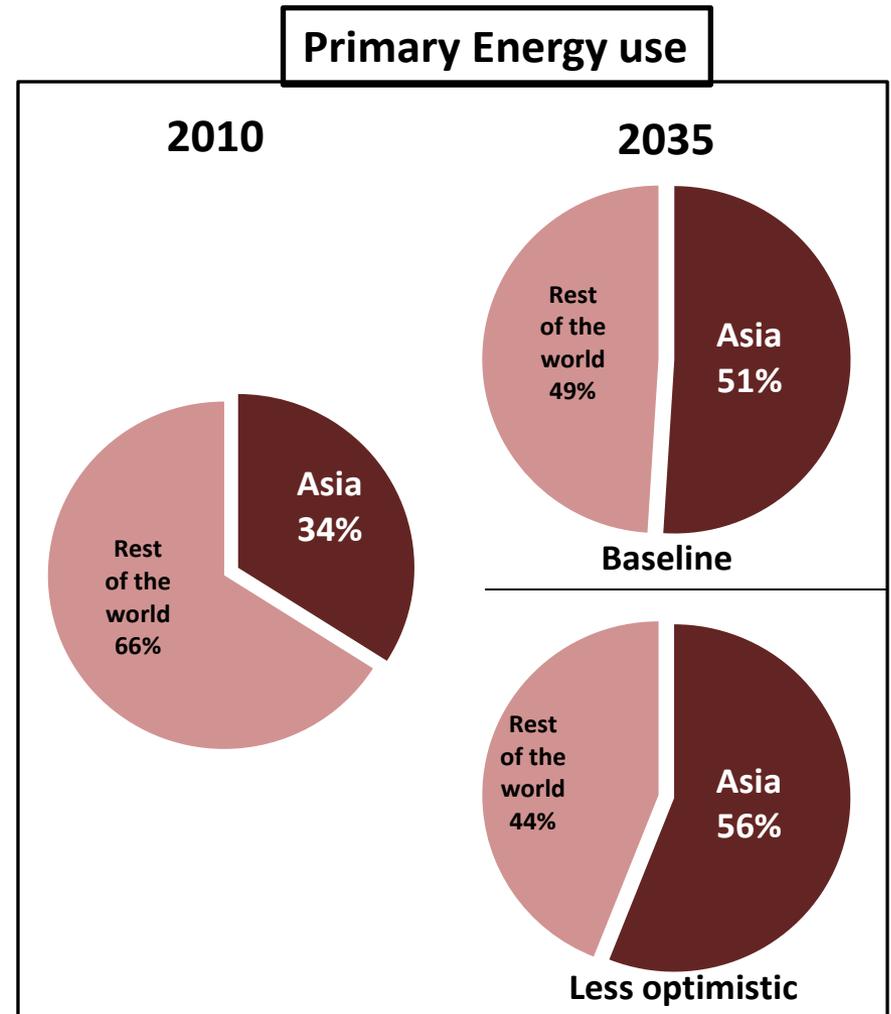
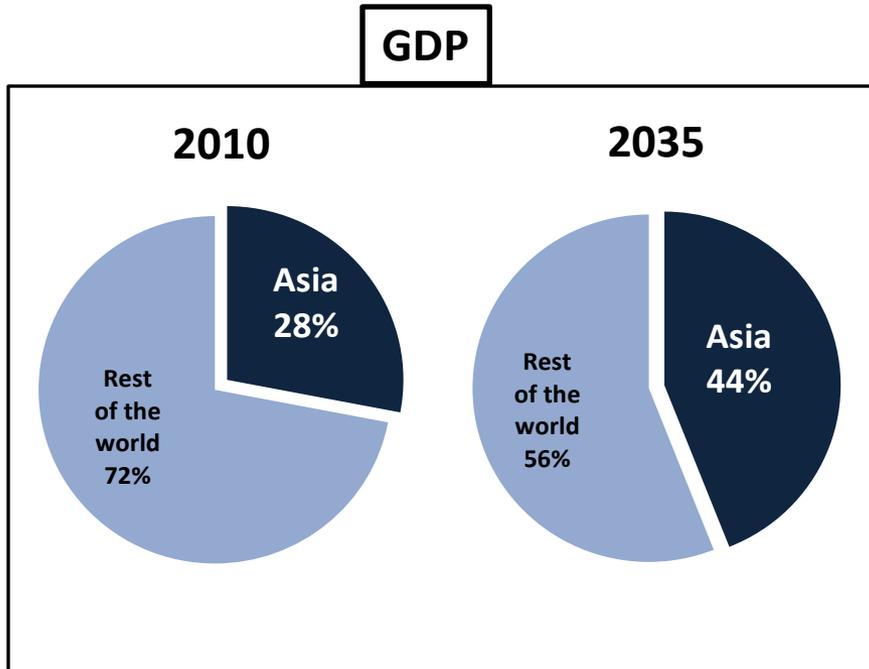
Key messages

- Rapidly growing Asia confronts a daunting energy challenge in the decades ahead
- More specifically, energy security poses 3 difficult strategic challenges
 1. Securing an adequate physical energy supply
 2. Building environmental sustainability
 3. Ensuring affordable energy access for all Asians
- To further complicate matters, the strategic challenges conflict with each other and entail tough dilemmas

Key messages

- The region can meet its energy challenge, but there is no single magic bullet. Instead what is required is a steady yet concerted effort on multiple fronts.
- Region must efficiently manage its rising demand, aggressively explore new energy supply sources and new technologies, and progressively promote the regional cooperation and integration of energy markets and infrastructure

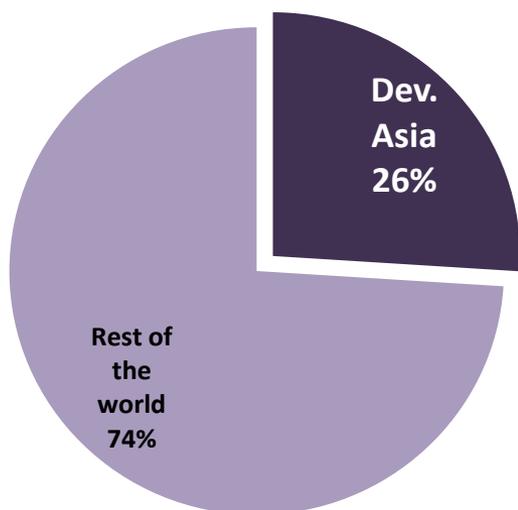
Energy needs for the Asian Century are critical



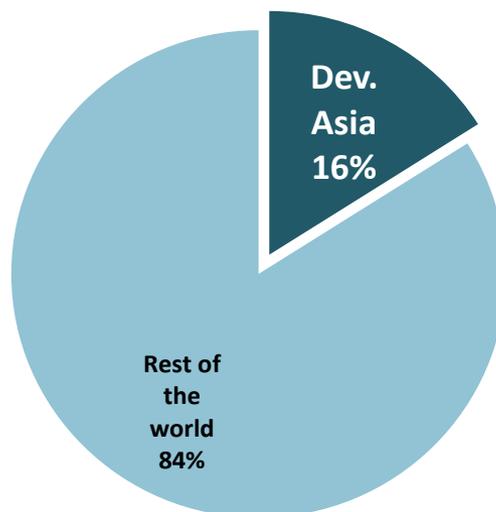
⇒ *Is this energy future realistic?*

Asia's endowment is not enough

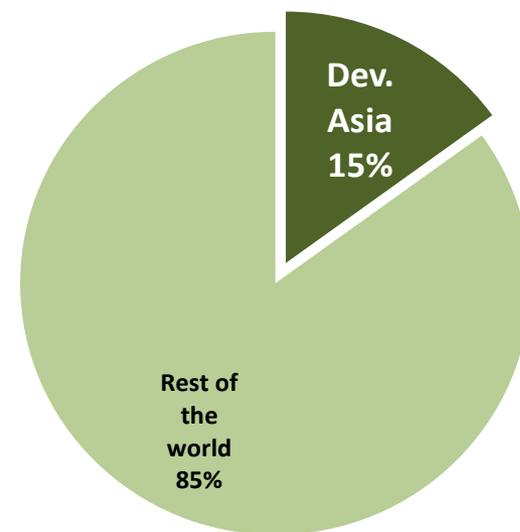
Proven reserves of coal, 2011



Conventional natural gas reserves

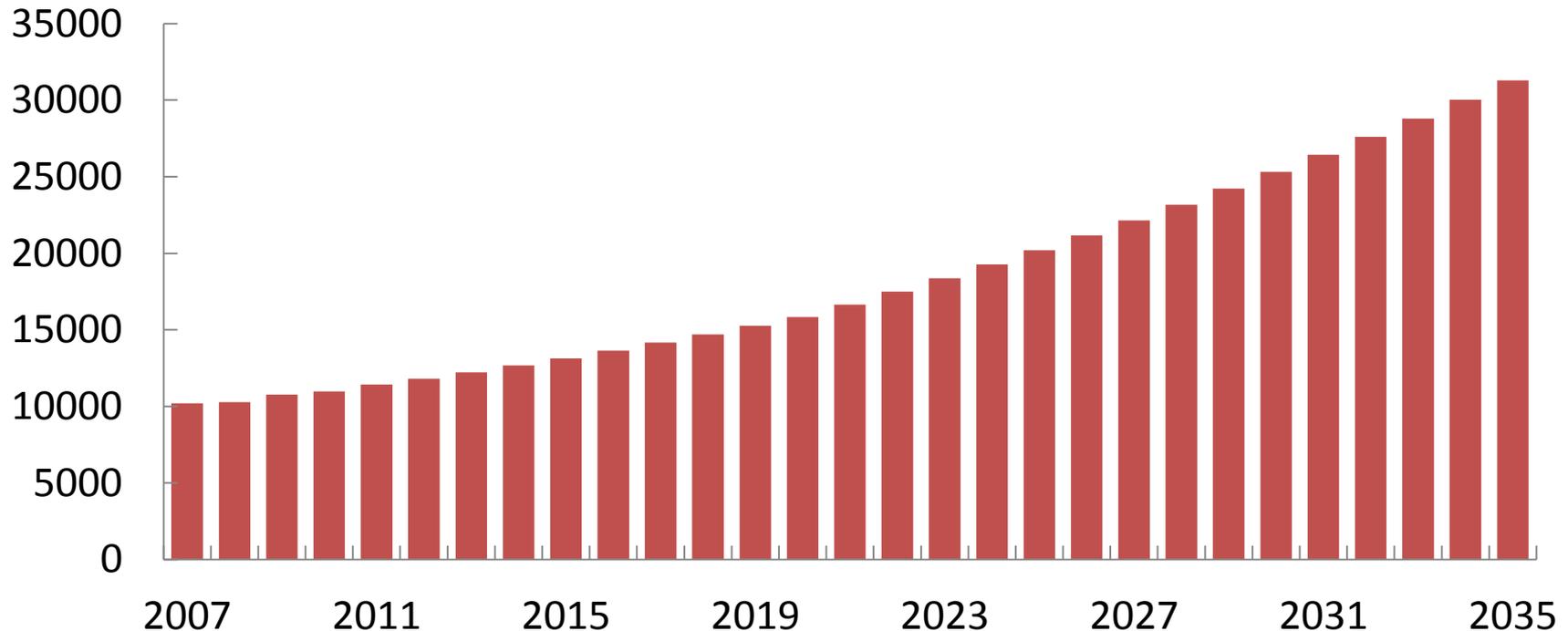


Technically recoverable oil and natural gas liquids



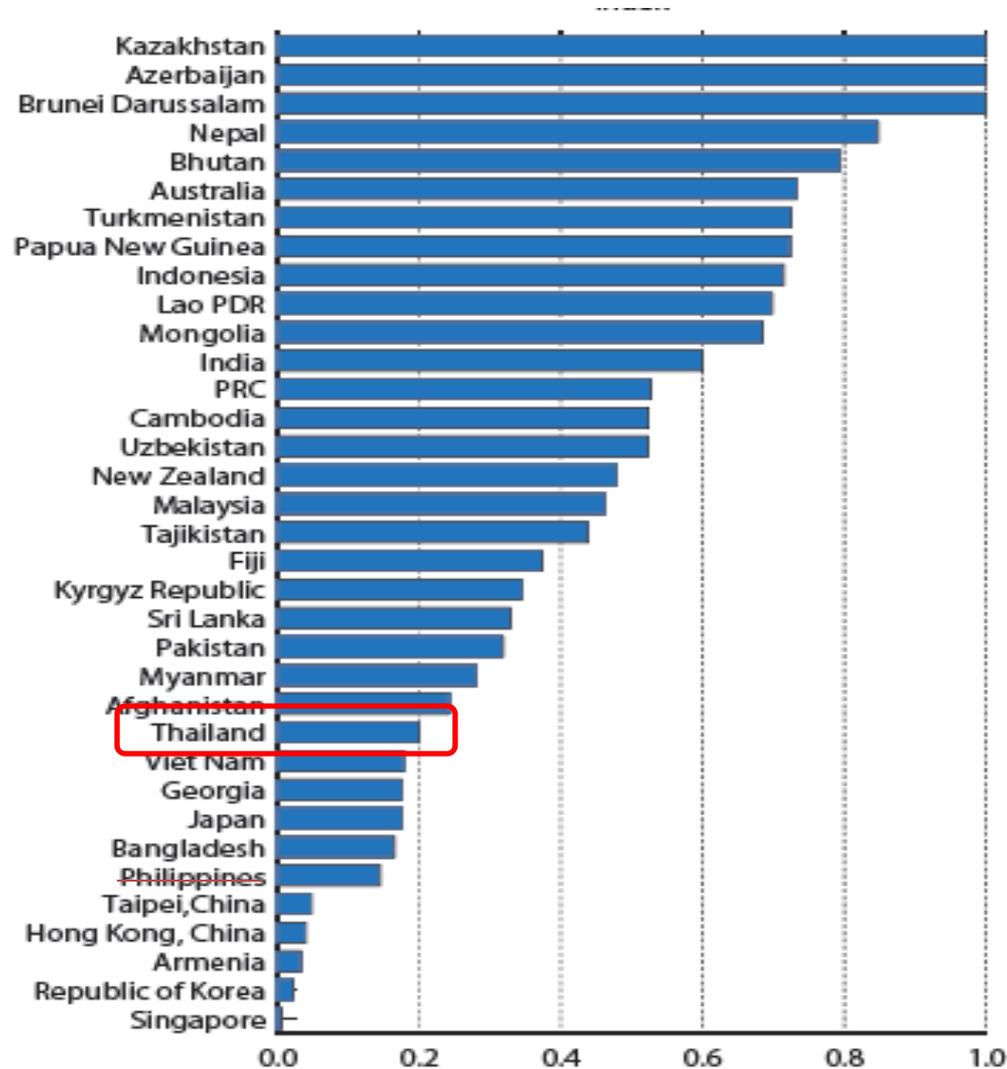
Oil imports will triple by 2035

Projected oil import requirements
(thousands of barrels per day)



⇒ ***Reliance on Middle East suppliers will increase***

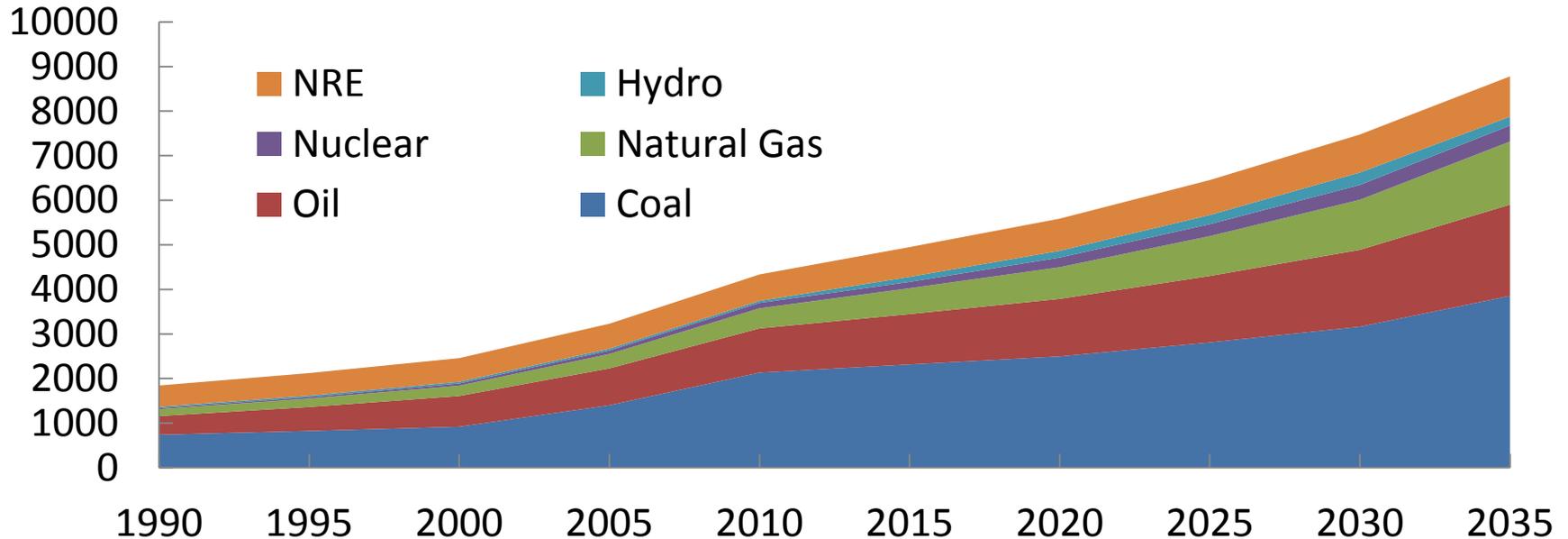
Projected energy self-sufficiency index, 2035



Only 3 economies in Asia will be energy self-sufficient by 2035!

Dependence on fossil fuels will grow

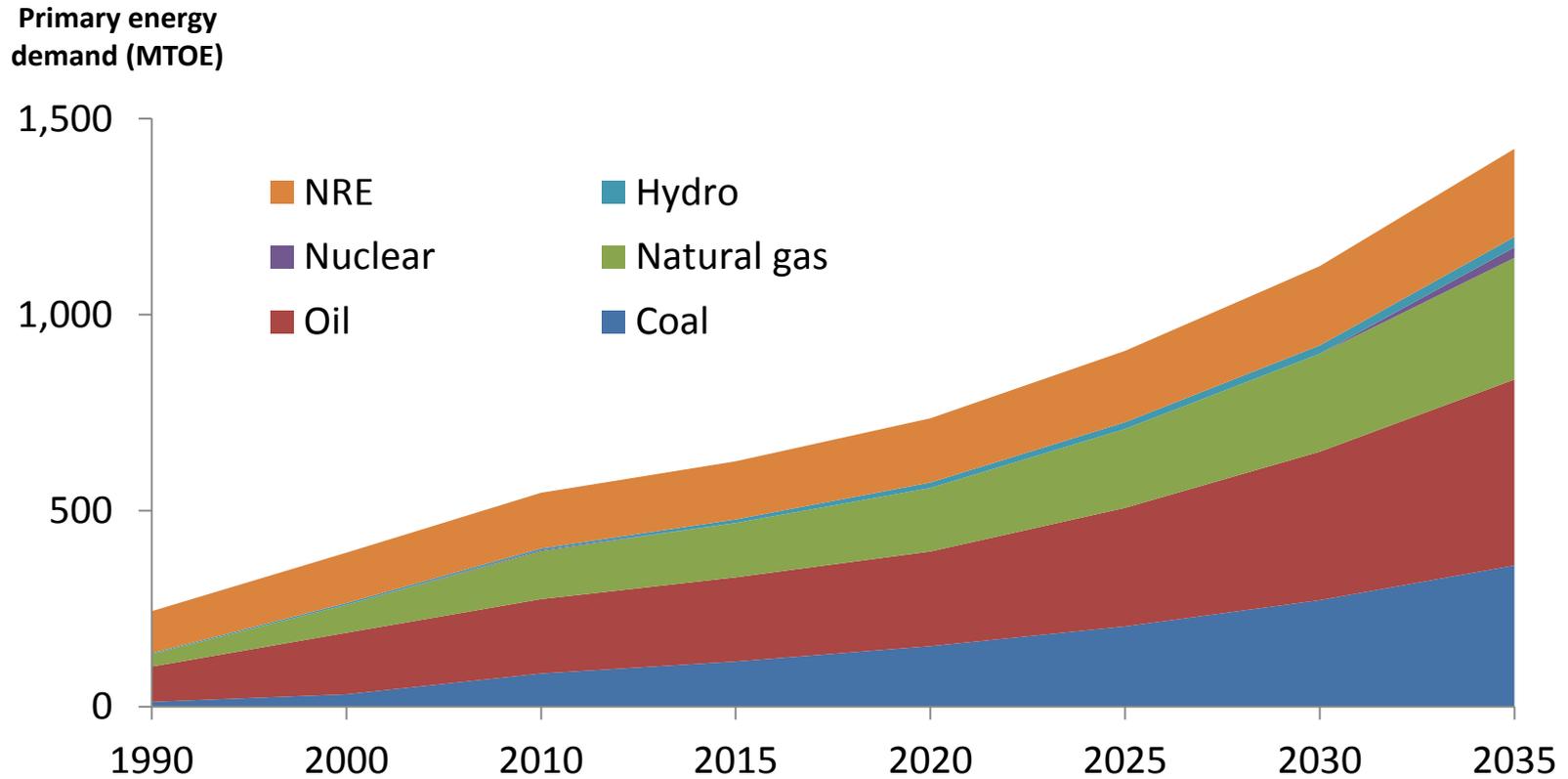
Primary energy demand (MTOE)



MTOE= million tons of oil equivalent, NRE=new and renewable energy

***Without radical changes to its current energy mix,
by 2035 , coal use will increase by 81%
oil consumption will double
natural gas use will more than triple***

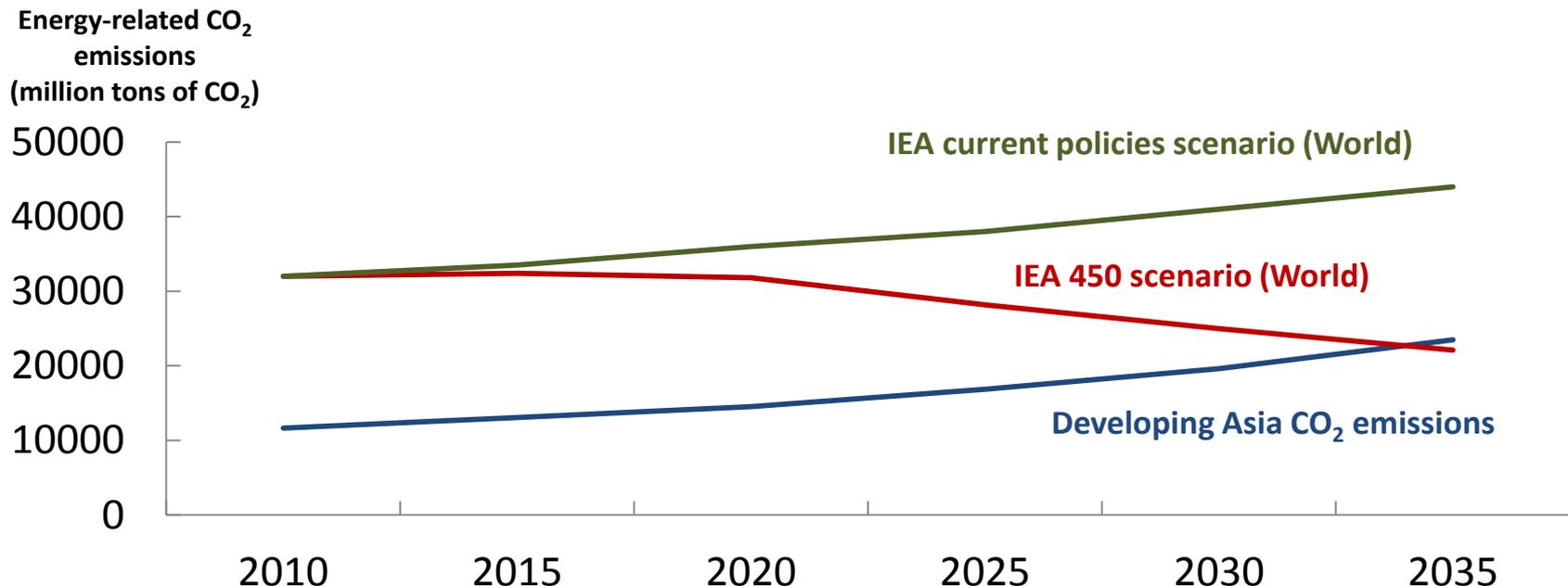
Primary Energy Demand: Southeast Asia



MTOE= million tons of oil equivalent, NRE=new and renewable energy

High dependence on fossil fuel!

By 2035, Asia's emissions alone will swamp global limits

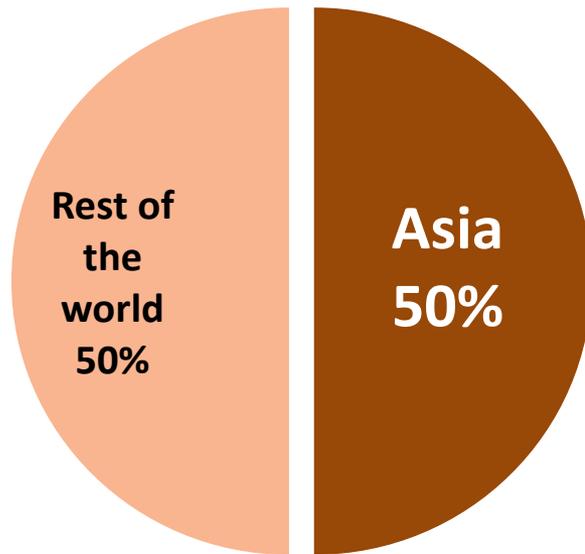


Note: The 450 scenario calls for limiting CO₂ emissions so as to stabilize their atmospheric concentration below 450 parts per million, to limit the average global surface temperature increase below 2 degree Celsius over the pre-industrial average level.

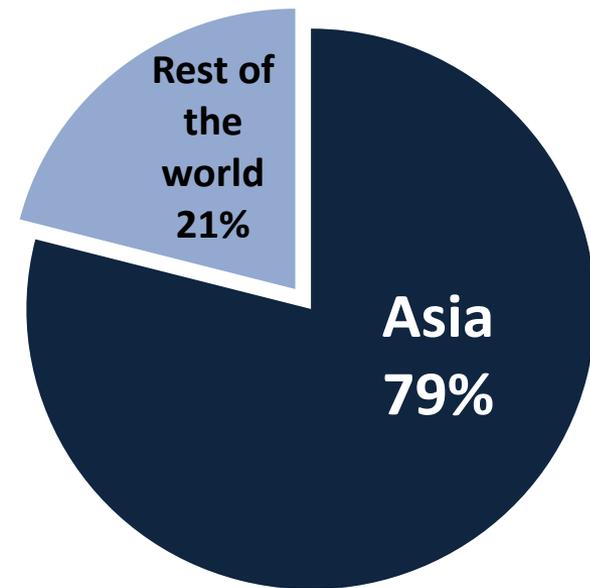
⇒ ***Continued reliance on fossil fuels will double CO₂ emissions to 24 billion tons by 2035***

Asia is home to most of the world's energy poor

Without access to electricity



Dependent on traditional fuels

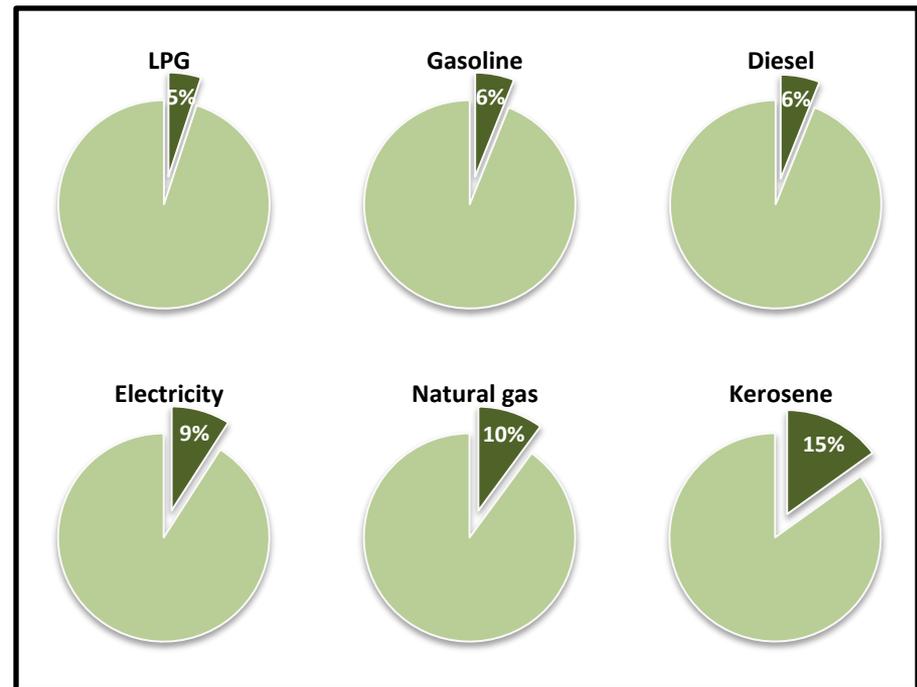


⇒ *Affordable energy is key to inclusive growth*

Reducing general fuel subsidies will curb demand growth

- **Fossil fuel subsidies are large**
 - 4% of GDP in Bangladesh and Pakistan
 - over 2% of GDP in India, Indonesia, and Viet Nam
 - 0.7% of GDP in the Philippines in 2011
- **Yet the main beneficiaries are not poor**

Share of fossil-fuel subsidies received by the poorest 20th percentile, 2010



⇒ ***Replace general subsidies with targeted subsidies***

Taxing GHG emissions: Reduce energy consumption & Develop new clean technologies

- Market energy prices rarely reflect the true price of energy when such negative externalities as pollution are factored in
- Faces two difficulties
 1. Free Rider
 2. Undercuts affordability and slows economic activity
- Ways to address them:
 1. Requires “International Policy Coordination”
 2. Revenue Recycling

Harness renewable energy supplies such as solar and wind...

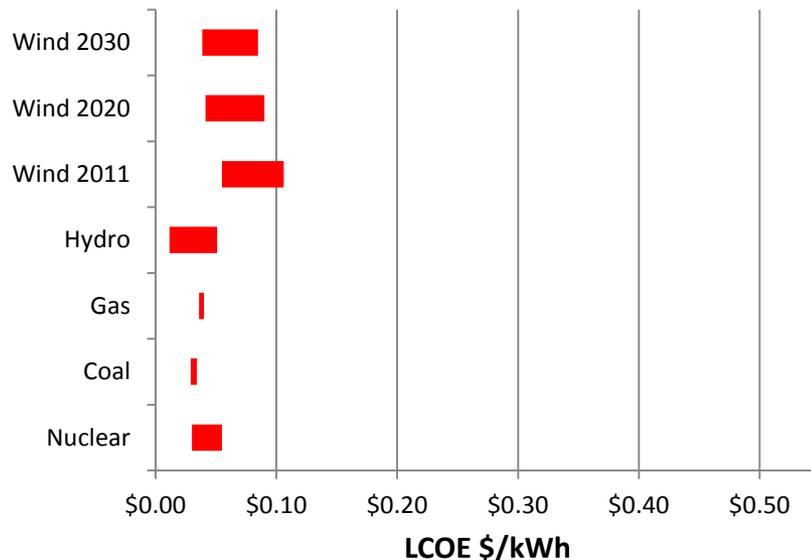
- Installed capacity has grown from negligible to 82GW for wind (36% of the global total) and 20GW for solar (29% of the global total) in 2011
- Great potential for further expansion
- Many Asian companies are world leaders in the manufacture of solar power equipment
- Wind and solar are cost competitive in some remote Asian communities

...and hydropower and biofuels

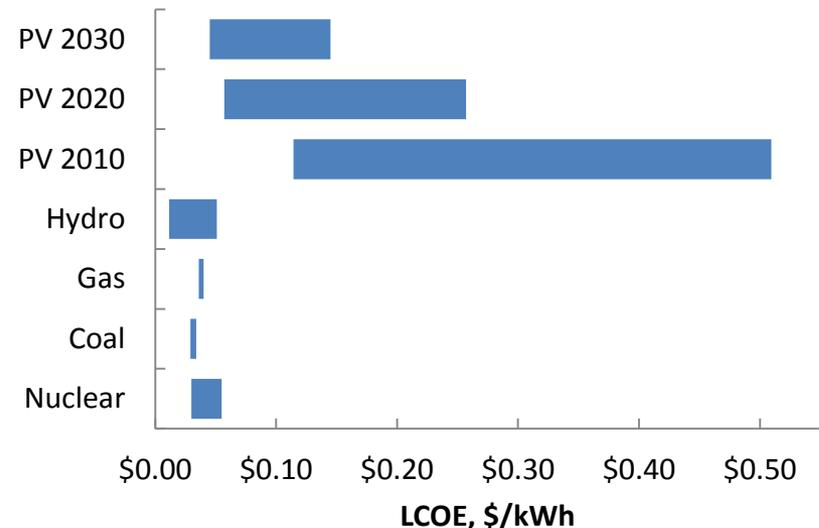
- Hydropower is well-established, but only 20% of resources have been developed
 - ⇒ Address community displacement, loss of agricultural land, and environmental concerns
- Asia is not a major biofuel producer, but new technologies that do not compete with food raise expectations

Renewable energy sources alone are not enough

Relative cost of electricity generation by wind power, People's Republic of China



Relative cost of electricity generation by solar, People's Republic of China



kWh = kilowatt hour; LCOE = levelized cost of energy; PV = photovoltaic

⇒ ***Renewable energy sources not yet cost competitive***

Shale gas could offset coal use

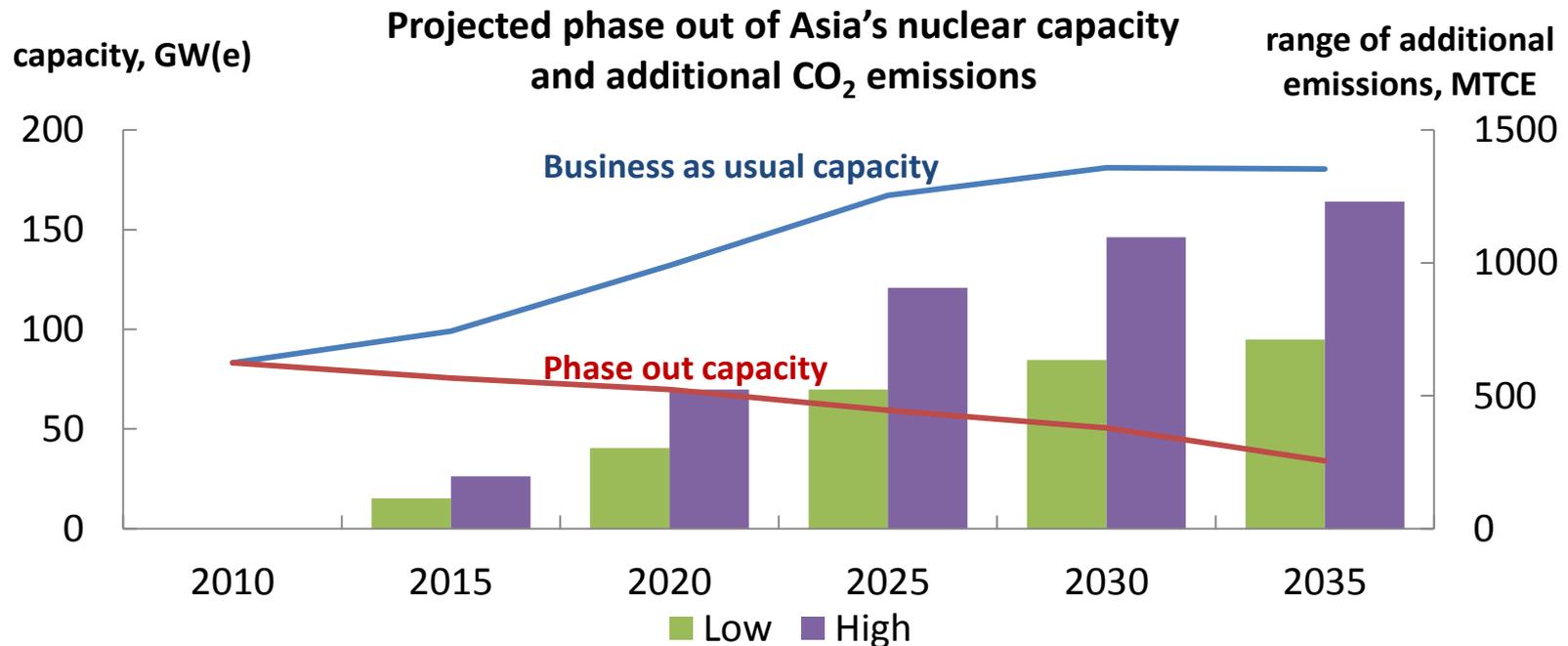
- PRC has the largest shale gas resources in the world at nearly 20% of total
- Technical uncertainties like leakages and water contamination make extraction difficult
- Development on densely populated land would be challenging

Top shale gas resource locations

Rank		Rank	
PRC	1	Poland	11
United States	2	France	12
Argentina	3	Norway	13
Mexico	4	Chile	14
South Africa	5	India	15
Australia	6	Paraguay	16
Canada	7	Pakistan	17
Libya	8	Bolivia	18
Algeria	9	Ukraine	19
Brazil	10	Sweden	20

⇒ ***Unconventional gas could provide a cleaner bridge to a future that is less dependent on fossil fuels***

Nuclear power reduces CO₂ emissions



GW(e)=gigawatts of electric output; MTCE=metric tons of carbon equivalent

⇒ ***Phasing out nuclear will increase the Asian power sector's CO₂ emissions by 8%–13% in 2035; however, proliferation, waste management, and safety issue***

Regional integration multiplies the benefits

- Connecting electricity grids and gas pipeline can create economies of scale that improve efficiency
- Demand management and expansion of clean, affordable energy supply become more effective with regional cooperation and integration
- Integrating power transmission in GMS would:
 - Save \$14 billion over 20 years by substituting hydropower for fossil fuels
 - Reduce CO₂ emissions by 14 mil tons per year by 2020
- But political and regulatory barriers inhibit market integration

Policy recommendations

- Establish a pan-Asian energy market by 2030
 - Set up ministerial level task force to study European experience
- Every watt counts
 - Based on country circumstances, manage demand and expand supply of clean, affordable energy
- R&D is key to modernizing the energy sector
- Support energy affordability and extend power to the poorest