Achieving energy security in Central Asia: Role or Renewable Energy

CAREC-ADBI Conference, Baku, Azerbaijan, 12-13 March 2018

Roundtable discussion: policies to promote renewable energy and enhance energy security in Central Asia

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Book Launch

Asia's Energy Challenge

Key issues and policy options

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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

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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

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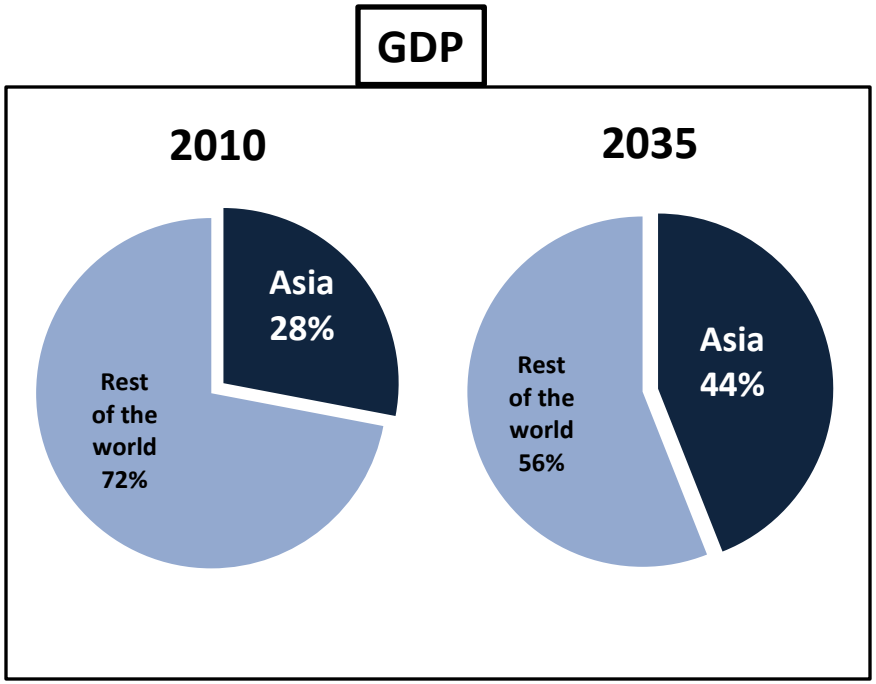
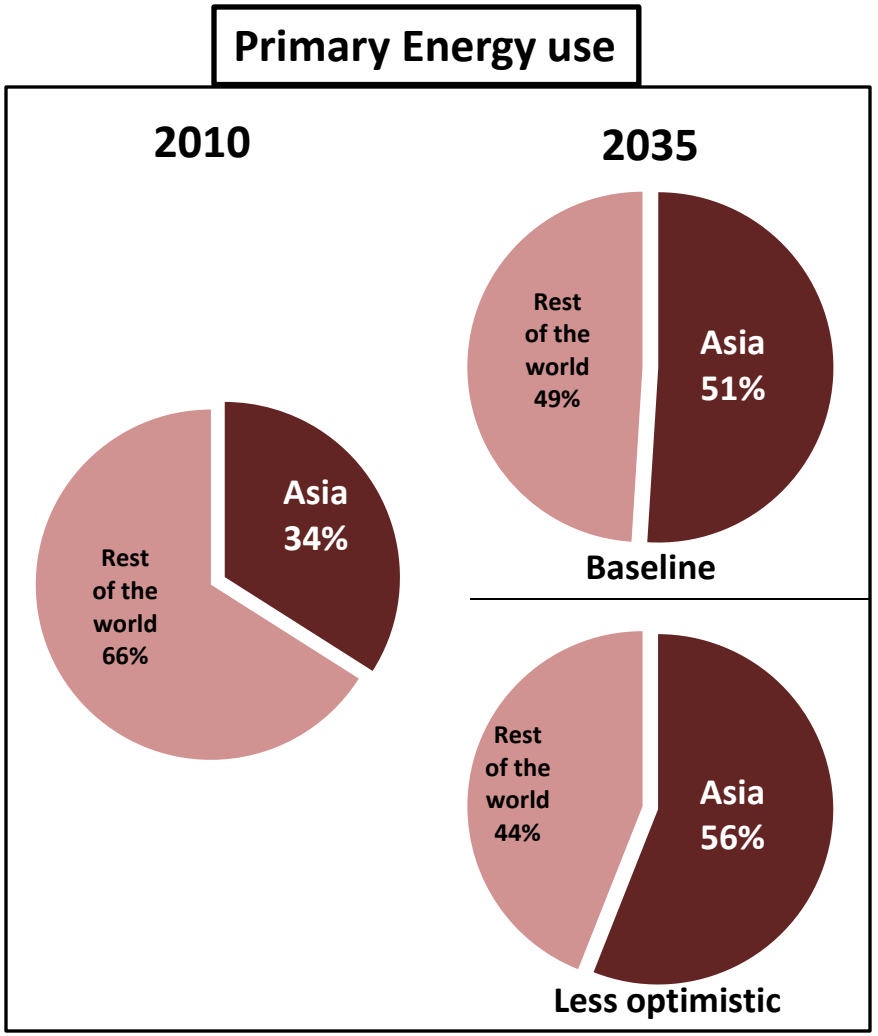
Energy needs for the Asian Century are critical





⇨ *Is this energy future realistic?*

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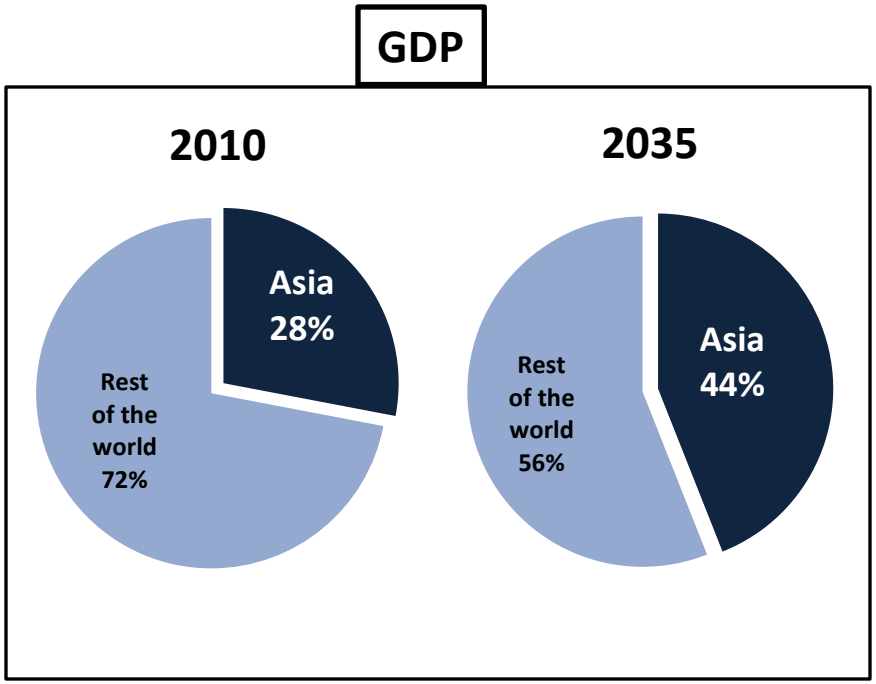

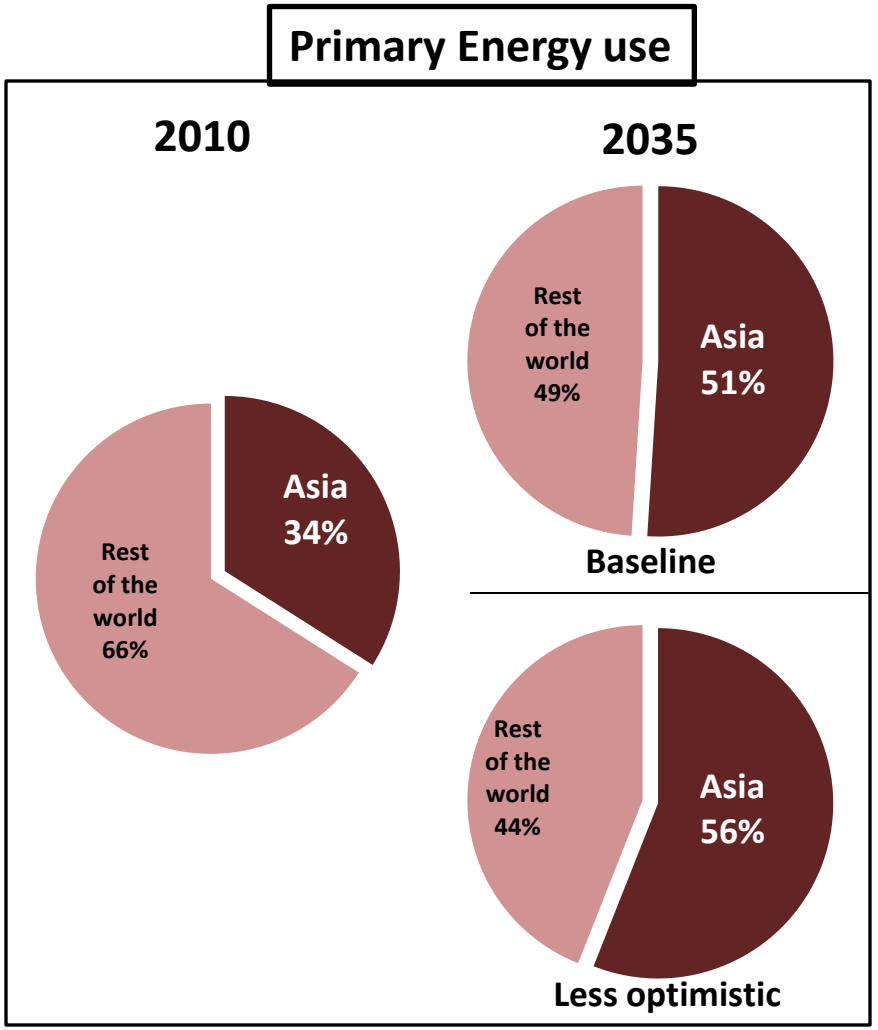

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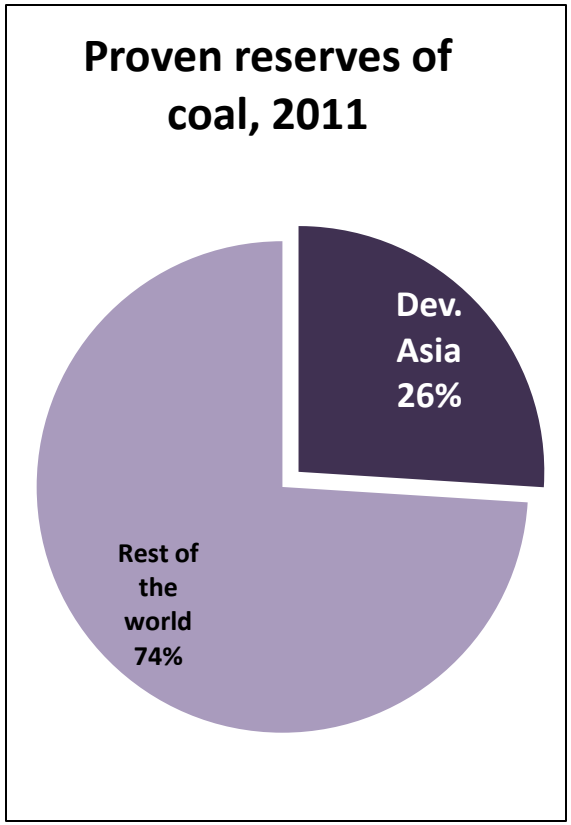
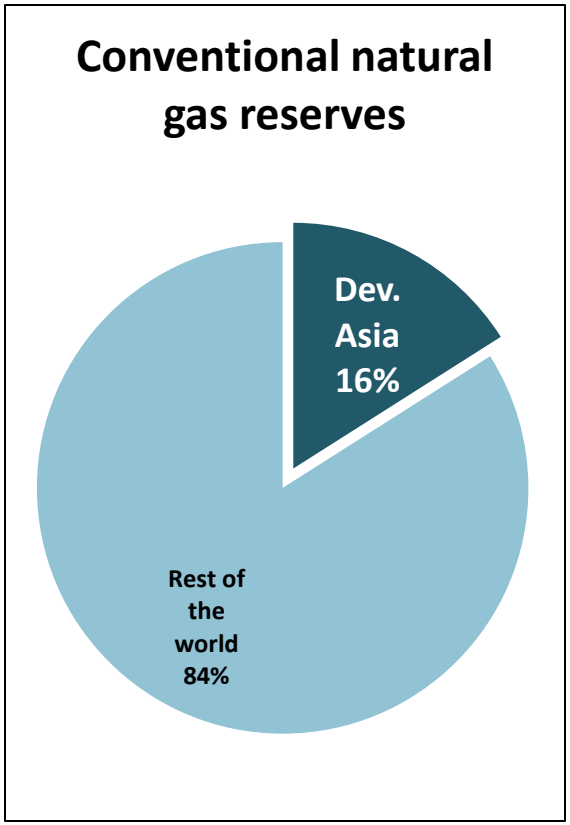
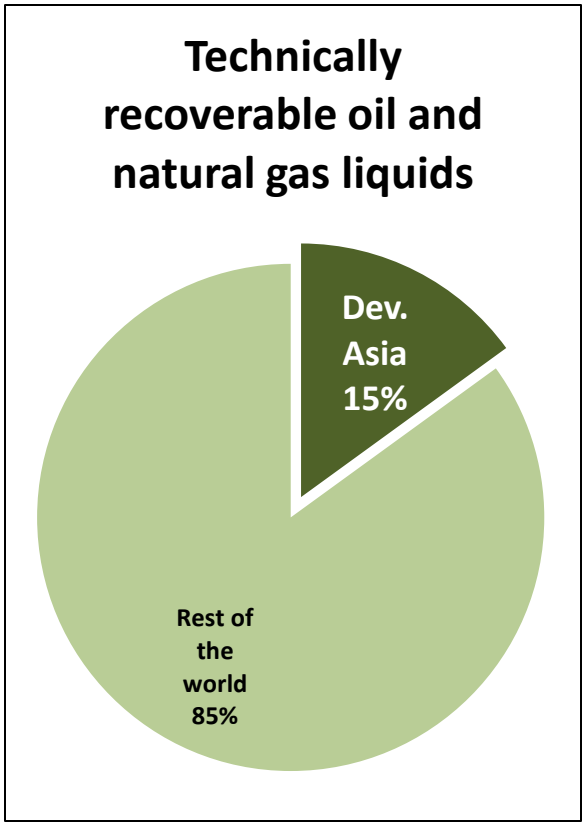
Asia's endowment is not enough







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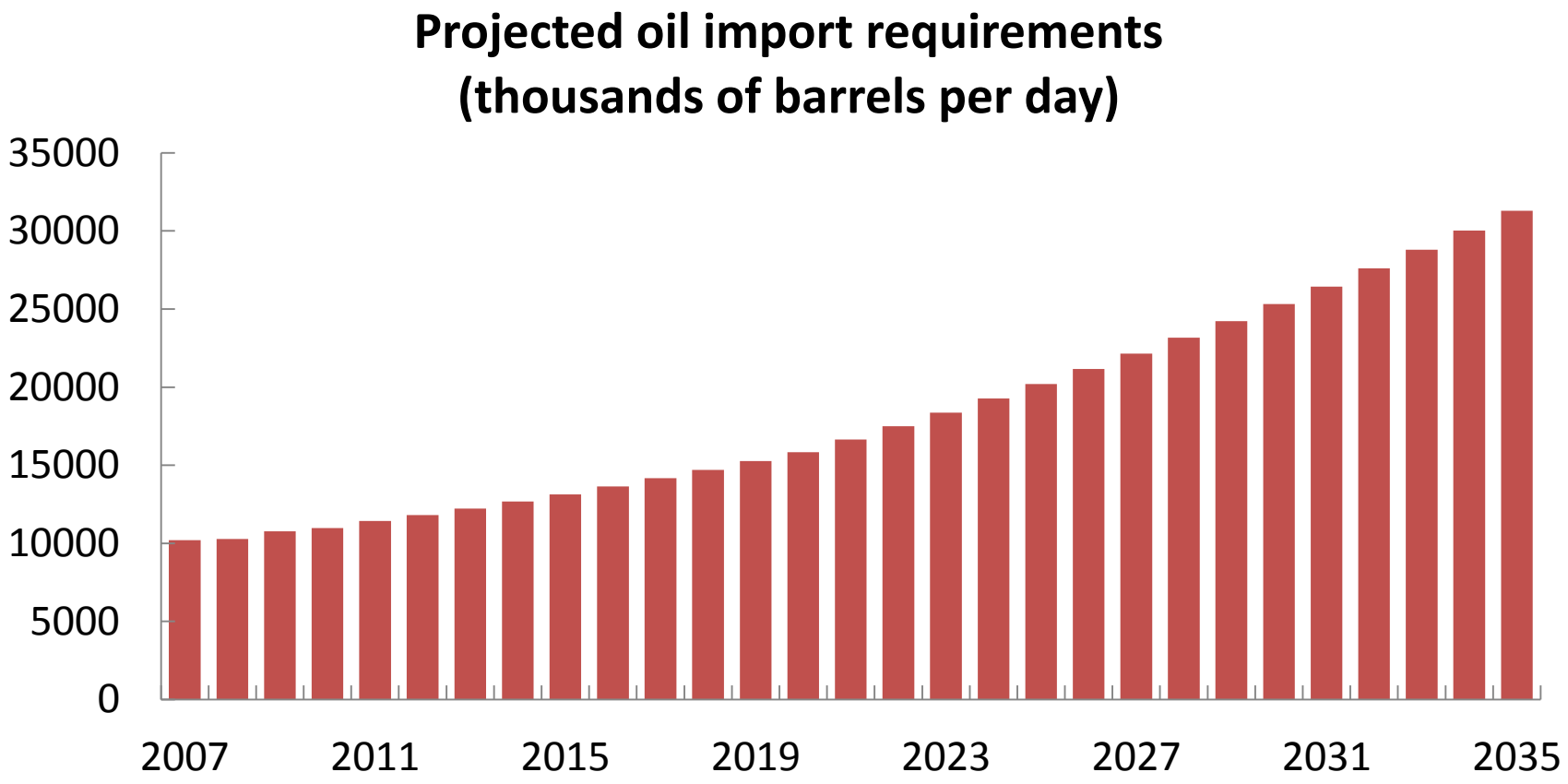
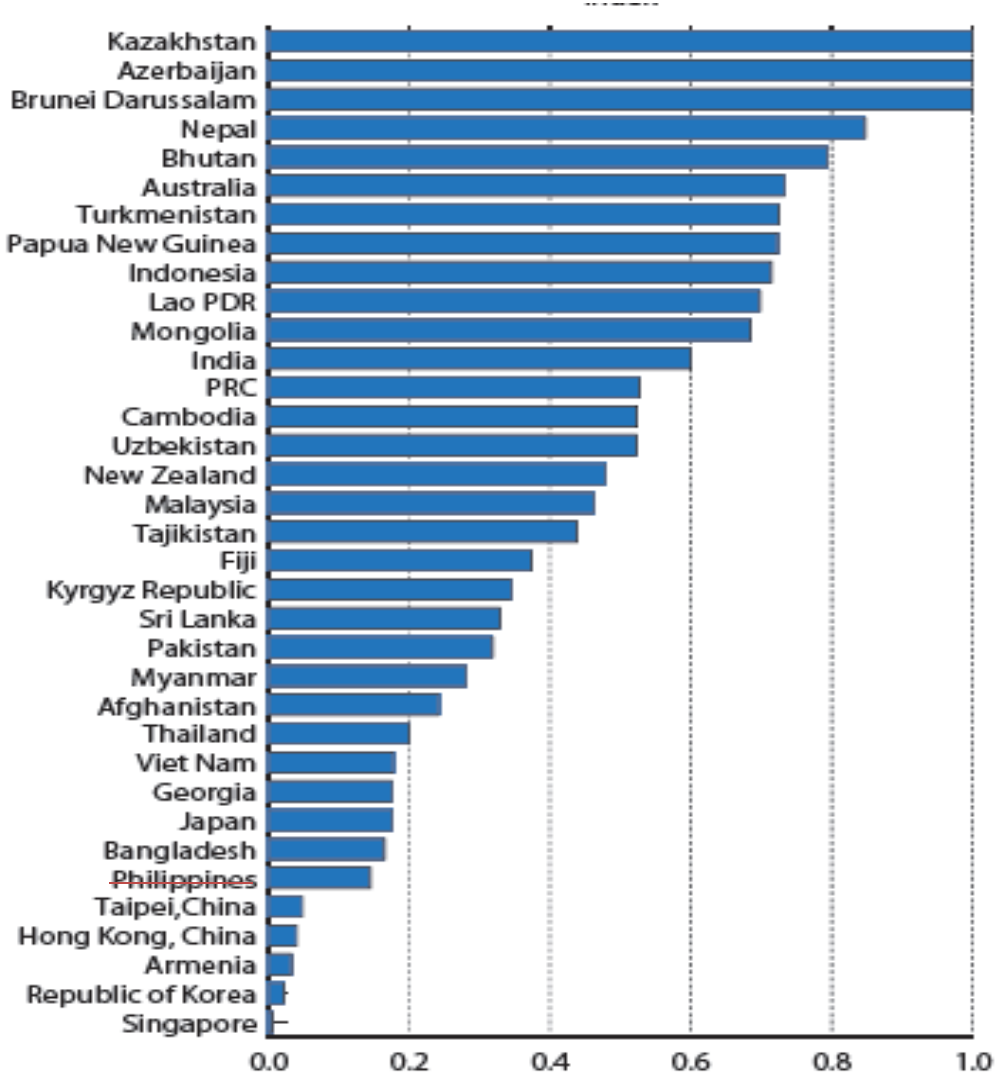
Oil imports will triple by 2035



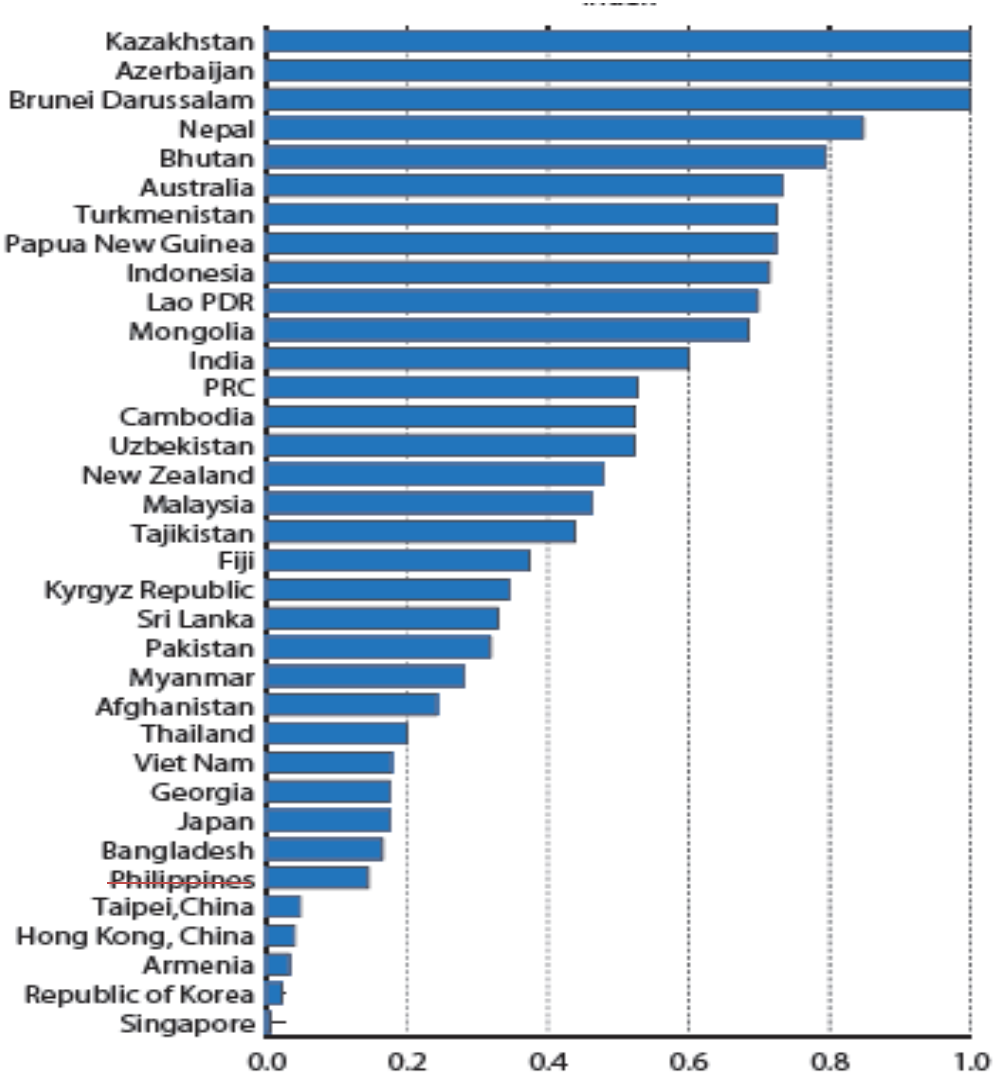
⇨ ***Reliance on Middle East suppliers will increase***

Projected energy self-sufficiency index, 2035



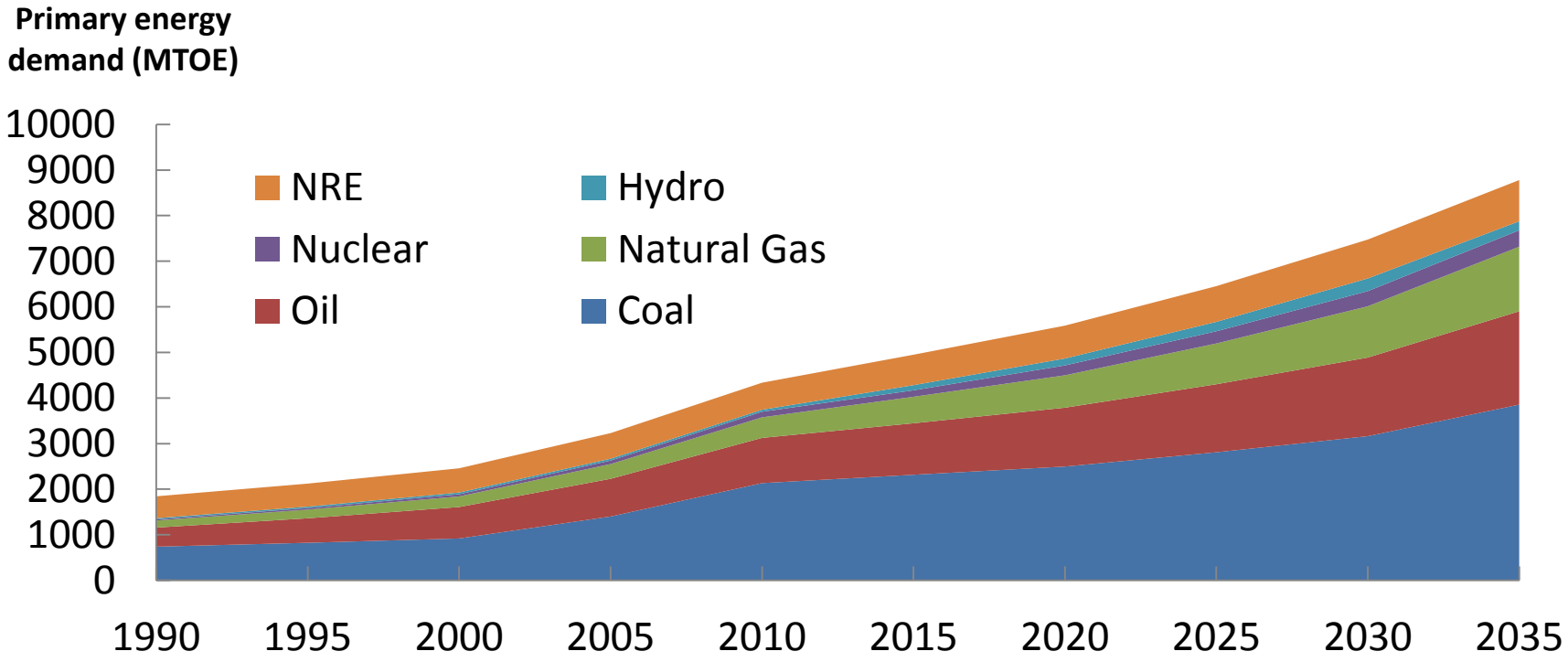
Only 3 economies in Asia will be energy self-sufficient by 2035

Projected energy self-sufficiency index, 2035



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

Dependence on fossil fuels will grow



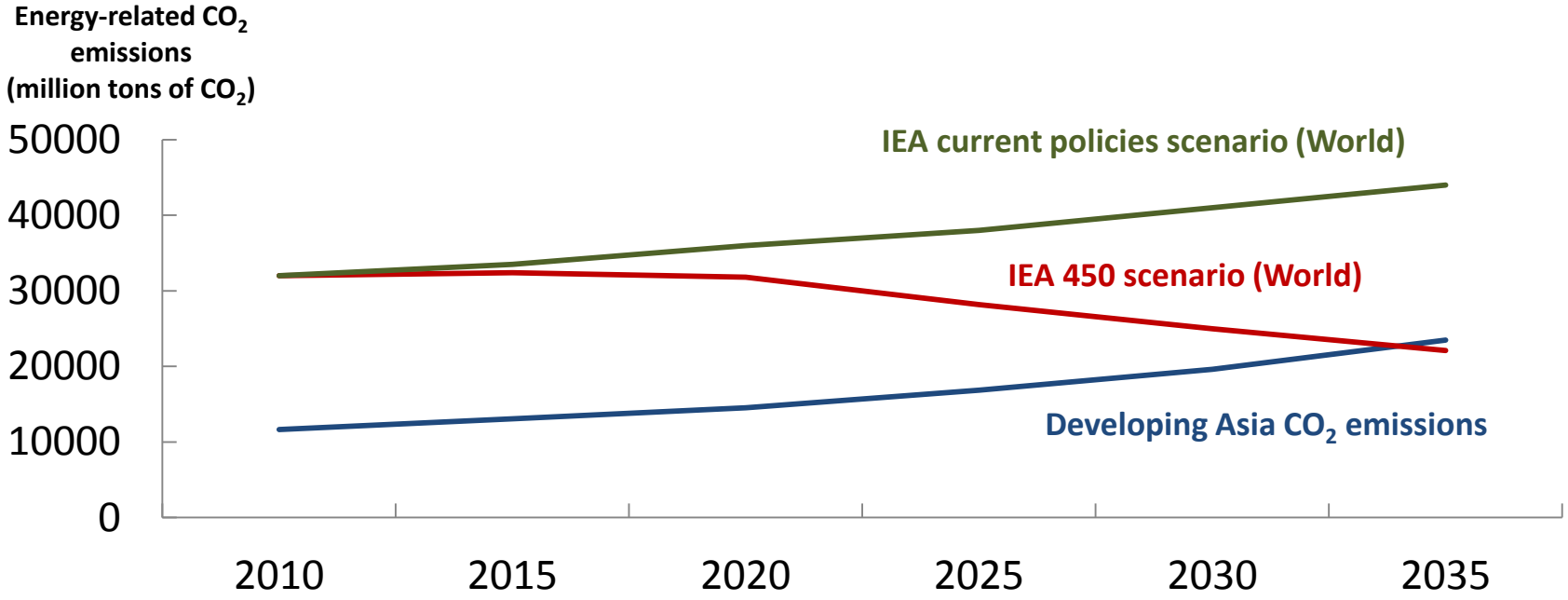
MTOE= million tons of oil equivalent, NRE=new and renewable energy

Without radical changes to its current energy mix, by 2035 , <u>coal</u> use will increase by <u>81%</u>

<u>oil</u> consumption will <u>double</u>

<u>natural gas</u> use will more than <u>triple</u>

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



Note: The 450 scenario calls for limiting CO_2 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 CO_2 emissions to 24 billion tons by 2035

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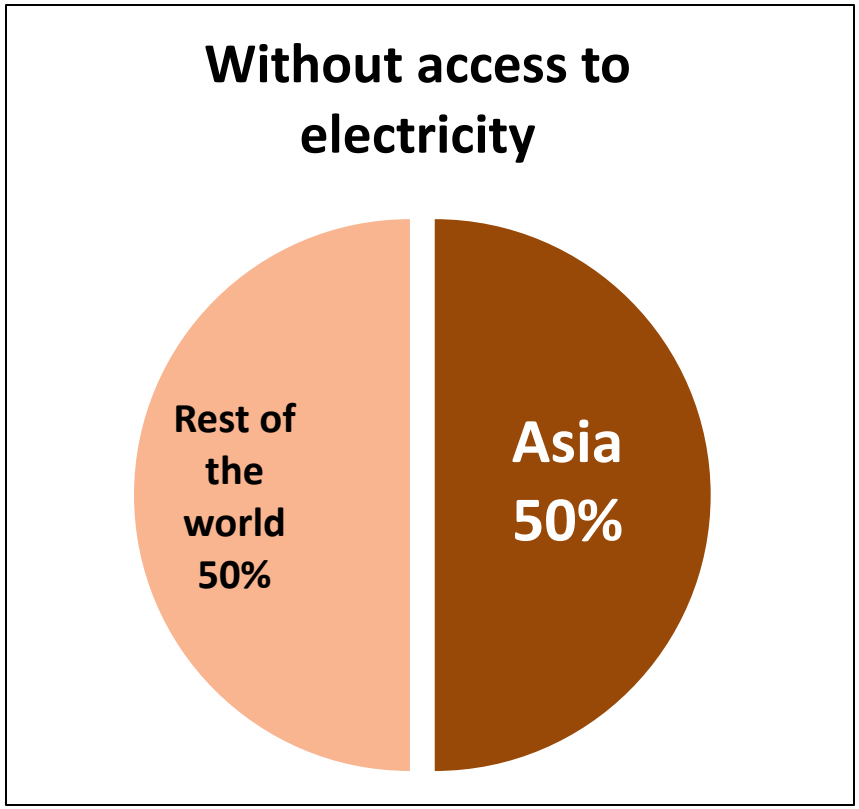
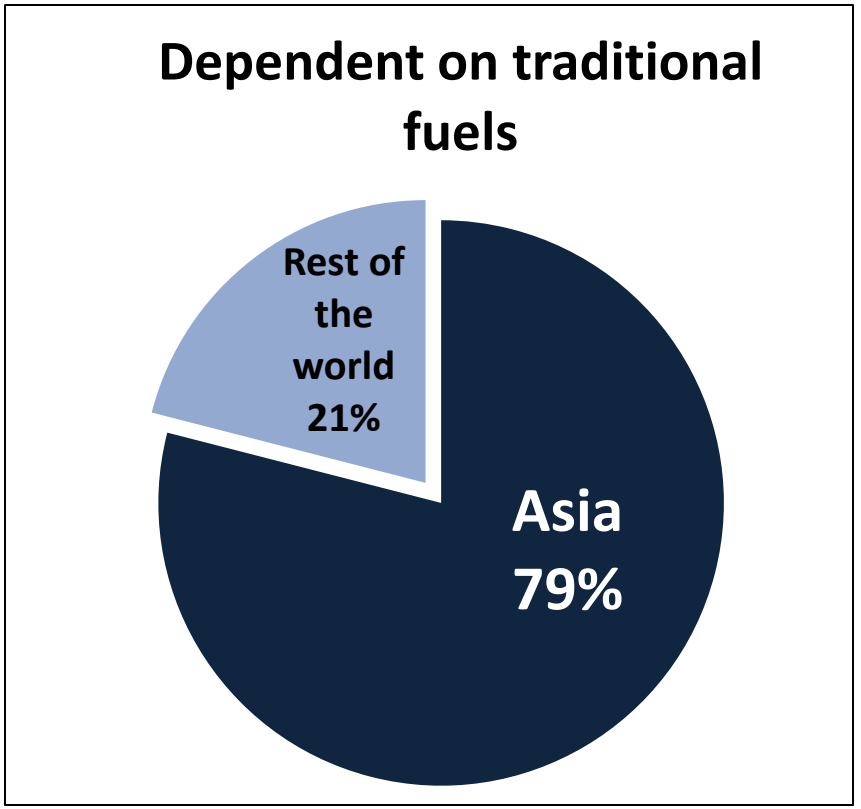
Asia is home to most of the world's energy poor





⇨ ***Affordable energy is key to inclusive growth***

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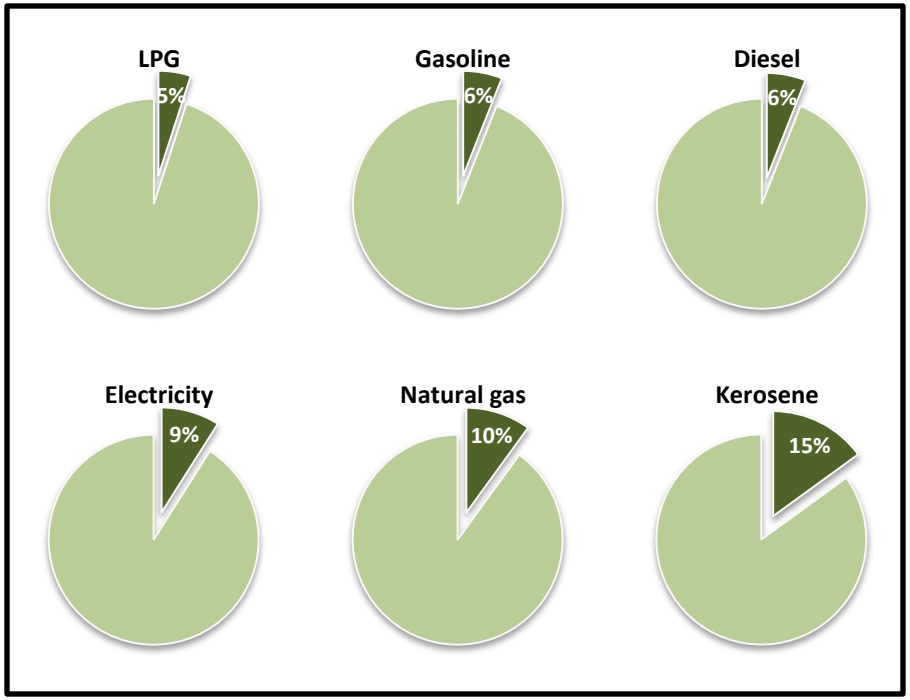
Reducing general fuel subsidies will curb demand growth

- **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

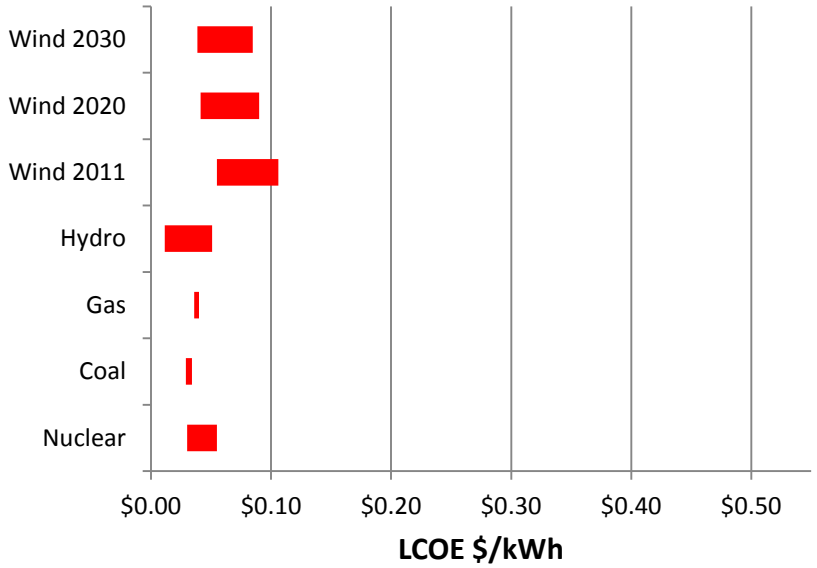
- Hydropower is well-established, but only 20% of resources have been developed

  ⇨ Address community displacement, loss of agricultural land, and environmental concerns

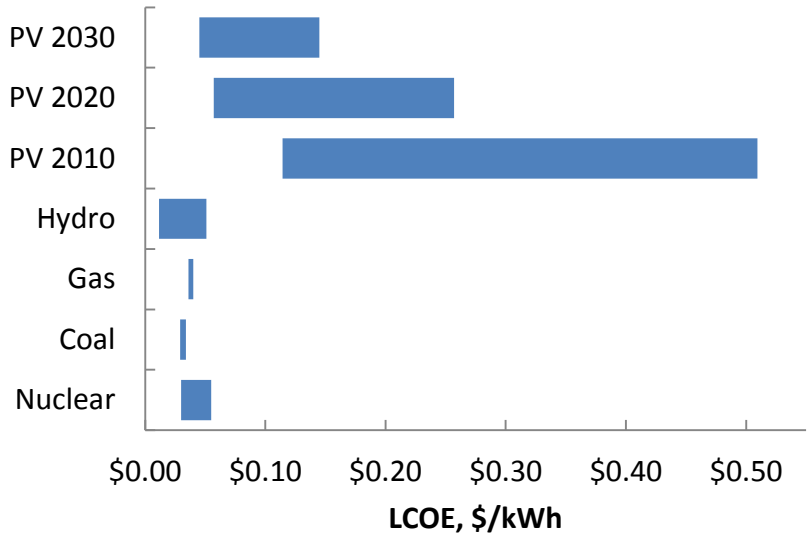
- Asia is not a major biofuel producer, but new technologies that do not compete with food raise expectations

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***

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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 CO_2 emissions by 14 mil tons per year by 2020
- But political and regulatory barriers inhibit market integration

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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

Policy recommendations: smart grids and integrating renewables

- To promote renewable energy, smart grids that integrate renewables into the mainstream electricity network will play a greater role in regional cooperation and integration.
  - The fundamental reason is that the sources of renewable energy are often distant from main demand centers
  - For example, wind power from sparsely populated Mongolia can provide electricity to the PRC
  - More generally, by linking supply centers and demand centers at reasonable economic cost, smart grids can act as a catalyst for developing renewable energy in the region.

Policy recommendations: smart grids and integrating renewables

- As Asia's energy system evolves toward higher share of renewables, it needs to be more intelligent.
  - Renewables such as solar and wind are intermittent resources that cannot be relied to deliver power at the time it is needed. For example, solar is available only during the day.
  - Integrating renewables into the power grid poses big technological challenges, but smart systems can take advantage of time-of-day demand differences across time zones and can shift power across large geographic areas.

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Policy recommendations: smart grids and integrating renewables

- A related issue is the need to incorporate distributed energy generation systems.
  - Distributed power generation is generation not from centralized power plants but from small local sources distributed throughout the region --- for example, local biomass and waste-based power systems.
  - Sometimes it is most efficient to join local sources together in “microgrids” that operate locally but are connected to the main grid.