

India's Energy Security

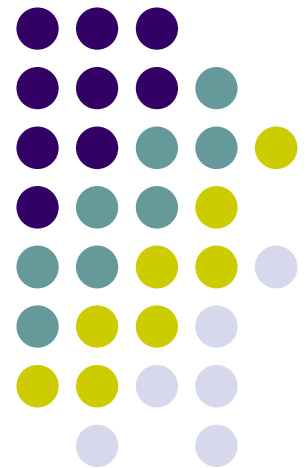
Ligia Noronha

Michael Hintze Visiting Senior Fellow on Energy Security, CISS,
University of Sydney

&

Director, TERI, New Delhi

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Themes



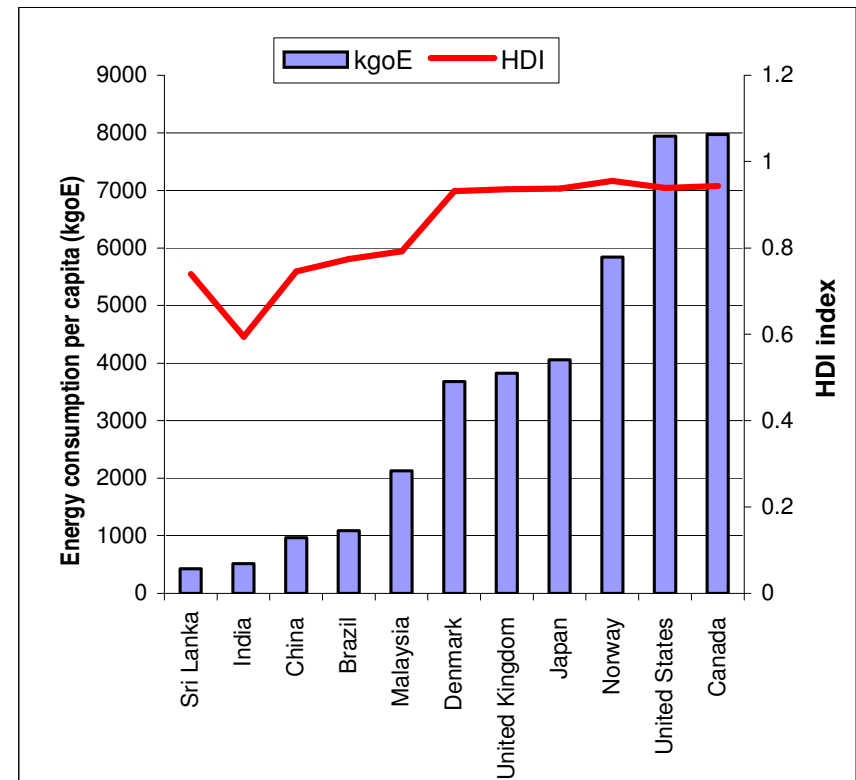
1. Energy security concerns of an emerging economy are different from those of a developed or even a less developed economy
2. India's energy security concerns are primarily linked to its fossil fuel & import dependence
3. To create energy change, need to understand sources of dependency
4. Alternative energy sources form part of strategy to rebalance the energy mix; but still constitute a small share
5. External energy securing strategies involve foreign policy and security policy

Energy and Poverty



- **1/3 of population below income level of \$1 a day**
- **Per capita commercial energy consumption is about 20% of the world average, 4% that of the US and 28% that of China**
- **600 million Indians live without electricity**
- **700 million still use traditional biomass for cooking**
- **Environmental and health implications- 3.5% of national burden of disease attributable to solid fuel use (WHO, 2007)**
- **Lack of access to modern energy exacerbates illiteracy, gender disempowerment, poor health & and hence contributes to a low HDI**

Energy use and HDI linkages



Source: Data from World Bank 2005; UNDP 2005

Growth Imperatives



- High projected economic growth rates (8-10%p.a)
- Large and growing population
- Growing middle class
- A large energy efficient world class industrial sector co-existing with an inefficient SME sector

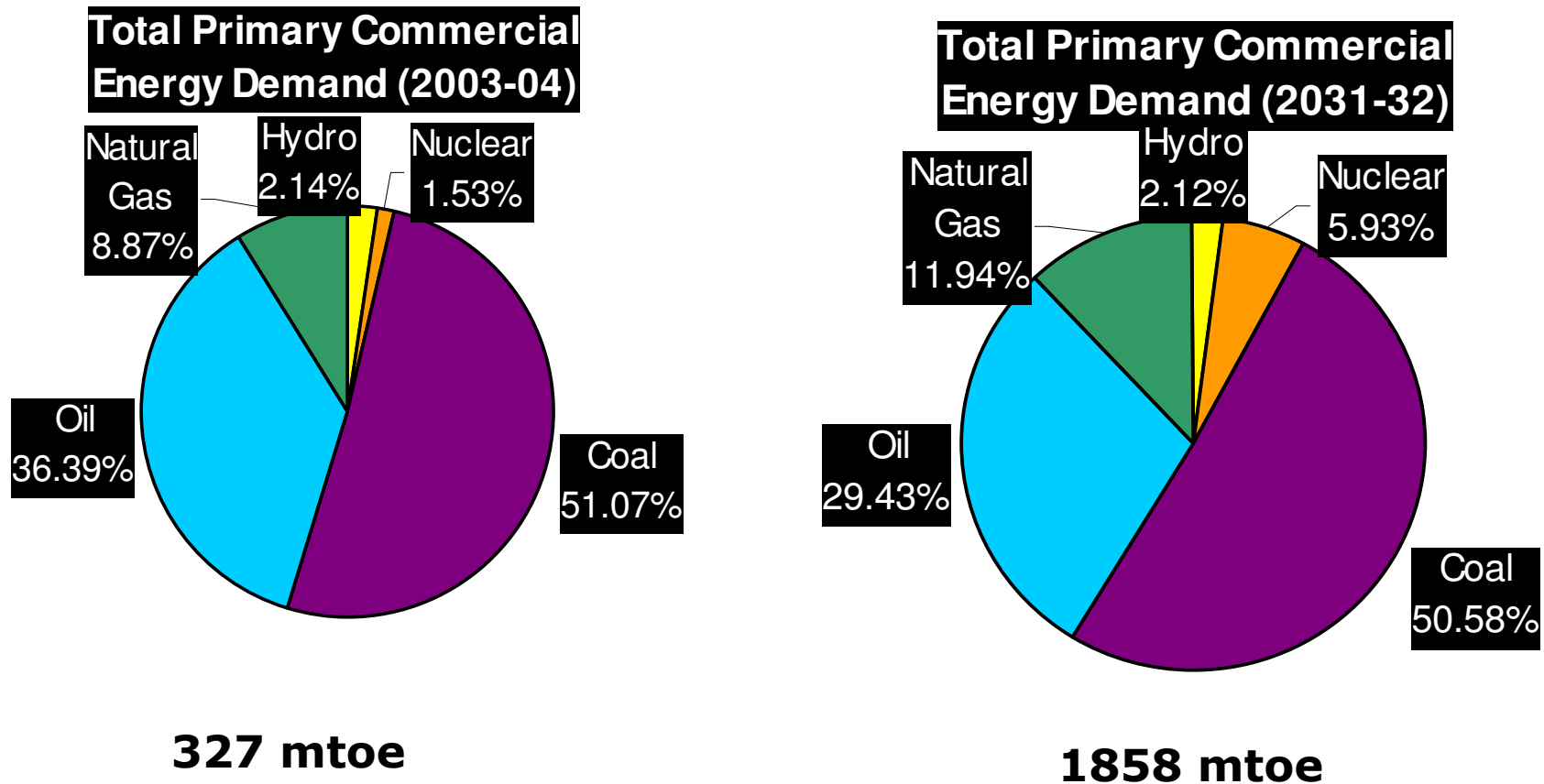
Energy Security



- *“The ability to supply lifeline energy to all citizens irrespective of their ability to pay for it as well as meet their effective demand for safe and convenient energy to satisfy their various needs at competitive prices, at all times and with a prescribed confidence level considering shocks and disruptions that can be reasonably expected”.*

(Integrated Energy Policy, GOI)

Energy needs to deliver growth 2003/04 – 2031/32



Dominance of coal expected to continue under the BAU case



Constraints to energy change

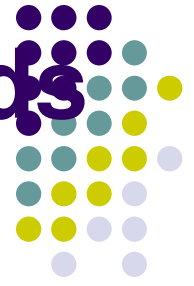
‘Path dependence is not “inertia” rather it is the constraints on the choice set in the present that are derived from historical experiences in the past. Understanding the process of change entails confronting the nature of path dependence in order to determine the nature of the limits of change that it imposes in various settings.’ (North 2006, p52)

Sources of path dependency

a movement away from the present pattern of energy use is constrained by a combination of these four sources of internal path dependency

- **beliefs and perceptions**
- **institutions and organizations**
- **technology**
- **relative prices.**

Implications of energy resource needs

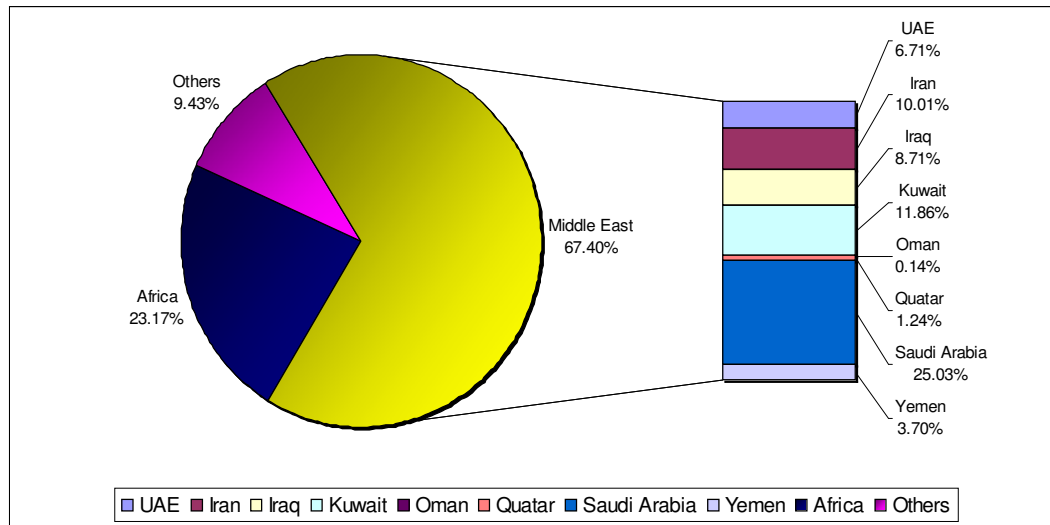


National

- But no path breaking solutions in sight over next couple of decades
 - Dominant role of coal & oil: import implications
 - High dependence on fossil fuels; per se not an issue for security, but imports & carbon constraints relating to fossil fuel use pose a new concern
 - Concentrated sources of fuel imports
- Global
 - India's projected share in 2030 world supplies range from:
 - OIL – 5.8- 8%
 - Gas – 2.4-4.5%
 - Coal - 16.7-26.5%

Concentrated sources of imports

Oil



Data Source, IEP, 2006

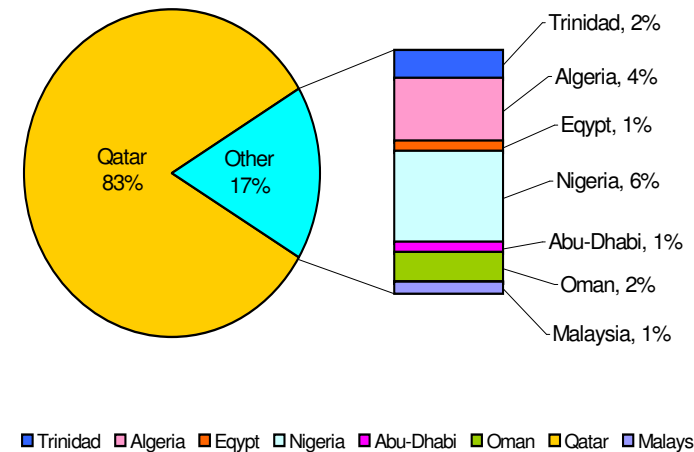
Current imports (% Requirements)

70% Oil

17% Natural gas

12% Coal

LNG



Data Source: CEDIGAZ, July, 2008

Coal: Australia, Indonesia, China and South Africa

Concerns over dependence



- Resource availability
- Delivery to market: investments, labour, technology, drilling infrastructure
- Sudden disruptions due to terrorist attacks, unrest, etc
- “Choke points” in supply route from the region

Oil price vulnerability



Impacts on economic security

- Impacts of high oil prices on the poor
 - Evidence of slide down the energy ladder
 - Reduced household spending on education
 - Extra load especially on women to supplement family income in urban India
- At the height of the oil prices in July 2008, for example, the cost of importing oil was almost half of India's commodity exports; and about 6% of GDP;

Source: TERI_ UNDP study, 2007

What is India doing to address energy security challenges?



- Domestic
 - Enhanced search for domestic resources
 - Focus on domestic potential for other energy sources: renewables, nuclear,
 - Energy efficiency measures
- External
 - Strategic diversification of supply sources
 - Overseas investments in energy resources
 - Energy collaborations & partnerships
 - Greater presence and role of the Indian navy in securing SLOCs

Contrasting rationalities over energy ties & engagements



OECD concerns

- Hurts IOCs as they perceive India & China companies competing unfairly
- Reduces oil available to others as it is taken off the global market
- Reduces the ability of OECD countries to further own foreign policy agenda on democracy & governance

Alternate perspective

- A large number of international companies have been doing business with these countries for long;
- Emerging consumer countries need to access “unlocked up” resources, niche areas
- Increases global energy resource availability
- Greater conflict or incentives toward greater stabilization?

Enhancing role of Renewable Energy

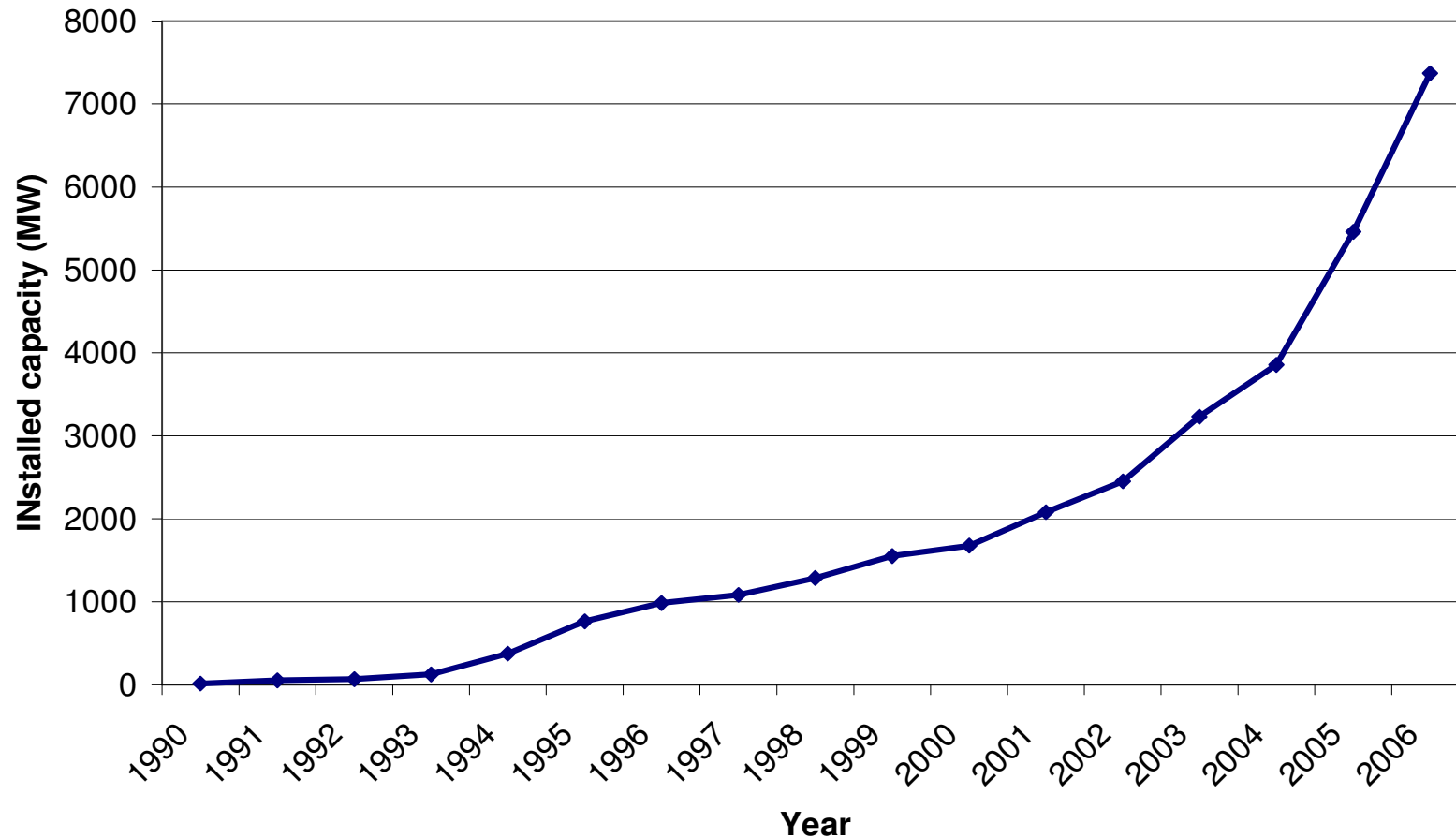


- In Grid-connected Electricity
- Distributed generation of electricity and heat
 - Rural
 - Industrial,
 - Institutional, commercial and community
- Sustainable buildings
- Bio-fuels for transportation

Renewable electricity share in installed capacity



Total installed capacity as on 31.3.2008- 144 GW; 33% RE- 48 GW (hydro and new) ; of which 12 GW are new RE



Source: GOI, MNRE, 2009

The Nuclear Energy Imperative



- ***Integrated Energy Policy of 2006***

- *"Nuclear energy theoretically offers India the most potent means to long-term energy security. India has to succeed in realising the three-stage development process and thereby tap its vast thorium resource to become truly energy independent beyond 2050. Continuing support to the three-stage development of India's nuclear potential is essential."*

- ***NAPCC, 2008, p 37***

- *"Promotion of nuclear energy through enhancing nuclear capacity and adoption of fast breeder and thorium-based thermal reactor technology in nuclear power generation would bring significant benefits in terms of energy security and environmental benefits, including GHG mitigation."*[

What can nuclear energy contribute to India's electricity?



Particulars	Domestic Resources	Electricity potential	
		GWe-Yr	MWe
Uranium-Metal	61,000 t		
In PHWR		330	10,000
In FBR		42,200	5,00,000
Thorium-Metal	2,25,000 t		
In Breeders		1,50,000	Very large

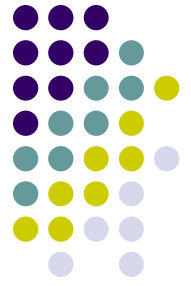
Source: Department of Atomic Energy, GOI

Some Challenges ahead for nuclear energy



- Public perception is not known
- Fuel Processing and waste disposal issues
- True costs of nuclear power plants unclear
- Financing uncertain
- Human Resources in short supply
- Challenges for large scale deployment of NPP:
Land, water,
- Reforms in the oversight process
- A comprehensive liability regime needed

Conclusions



- While current per capita energy consumption in India is low, high economic and population growth rates to 2050 have serious implications for demand of global energy resources in future
- While the emergence of domestic capitalism and a growing middle class demands scale and efficiency in energy supplies, democracy necessitates attention to the provision of basic energy services
- Growth imperatives and different sectoral growth paths have important implications for energy demands over time.
- The sources of our hydrocarbon path dependence need to be recognized; they signpost way to change; The current concern with energy insecurity is essentially linked to this path dependence.
- India understands the need to move to less carbon intensive paths; but India needs time to make the transition.
- Nuclear energy theoretically offers India the most potent means to long-term energy and climate security. But many unfinished agendas here around concerns



Thank you