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Coping With the Energy Challenge

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Outline

- Objective
- The Energy Challenge
- Key Interventions
- Selected Success Stories
- Coping with the Energy Challenge: A Toolkit
- Conclusion

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Objective

- To discuss the energy challenges faced by most countries that are net energy importers (specially poor ones)
- To inform and provide guidance to USAID Missions and Regional Bureaus on what type of interventions should be considered to address some of the key energy challenges
- To illustrate successful interventions
- To introduce a structured approach to understand possible types of interventions to cope with high energy prices

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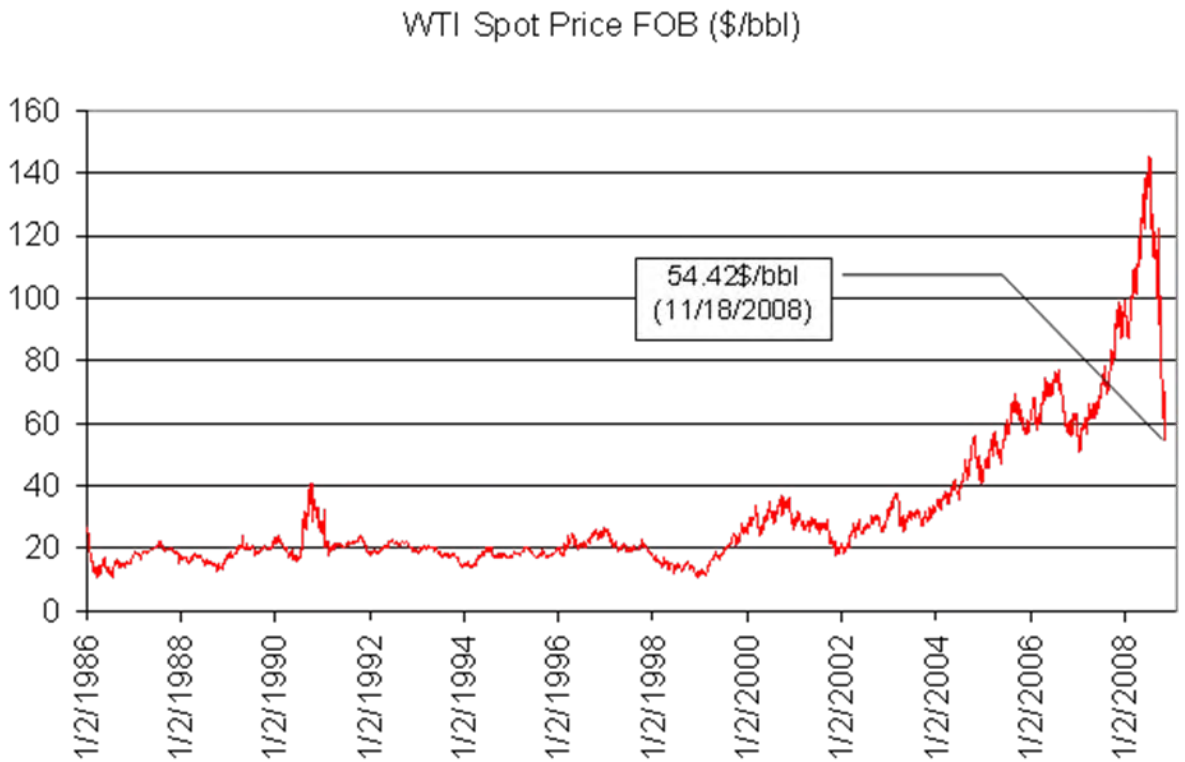
The energy sector poses different challenges to developing countries

- Price level and variability: Energy prices volatile and likely trending upward
- Energy Security: Many LDCs net importers. Energy Security and foreign exchange rate concerns
- Domestic Stability: High energy prices can result in violent protests
- Fiscal space and human capital development: High energy subsidies creates significant government budget constraints, shifting resources from social and basic infrastructure programs
- Economic growth: Government often involved with energy production/distribution prone to corruption, threatening the reliability and quality of supply, thus imposing significant costs on an economy
- Climate change: Energy consumption is directly linked with global climate change

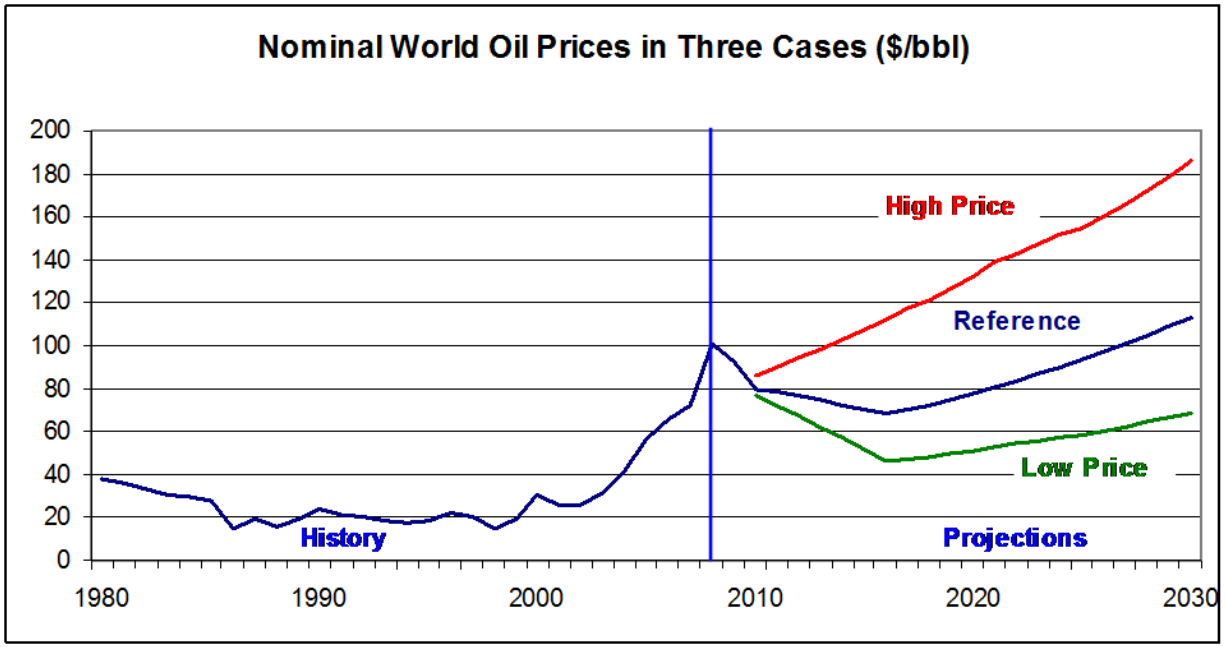
Challenge: how to organize and manage the energy sector so as to deliver the most benefits at the lowest cost

After a continuous increase since 2001 from 20 $/bbl to 140$/bbl, oil price has started to decline…



Source: EIA

…However, high oil prices and economic effects are here to stay..



Source: EIA. International Energy Outlook. September 2008

The EIA defines the three cases based in four factors: growth in world liquids demand, high production costs for accessible non-OPEC conventional liquids resources, OPEC investment and production behavior, and the cost and availability of unconventional liquids supply.

…While Energy Access Varies Greatly by Region

Region (2005) *(in Developing Countries)*	*Electricity Coverage (%)*	*Un-served Population (millions)*
• Sub-Saharan Africa	26	547
• North Africa	95	7
• South Asia	52	706
• East Asia & China	88	223
• Middle East	78	41
• Latin America	90	45
TOTAL	**75**	**1,577**

Poorer countries suffer the most under higher oil prices…

- All Very Low Income countries and 70% of Low Income Countries are Net oil importers
- Poorer countries have higher percentage of Net Oil Import/GDP and therefore are more vulnerable to an oil shock.
- Poorer countries have weaker economies to cushion the negative impacts

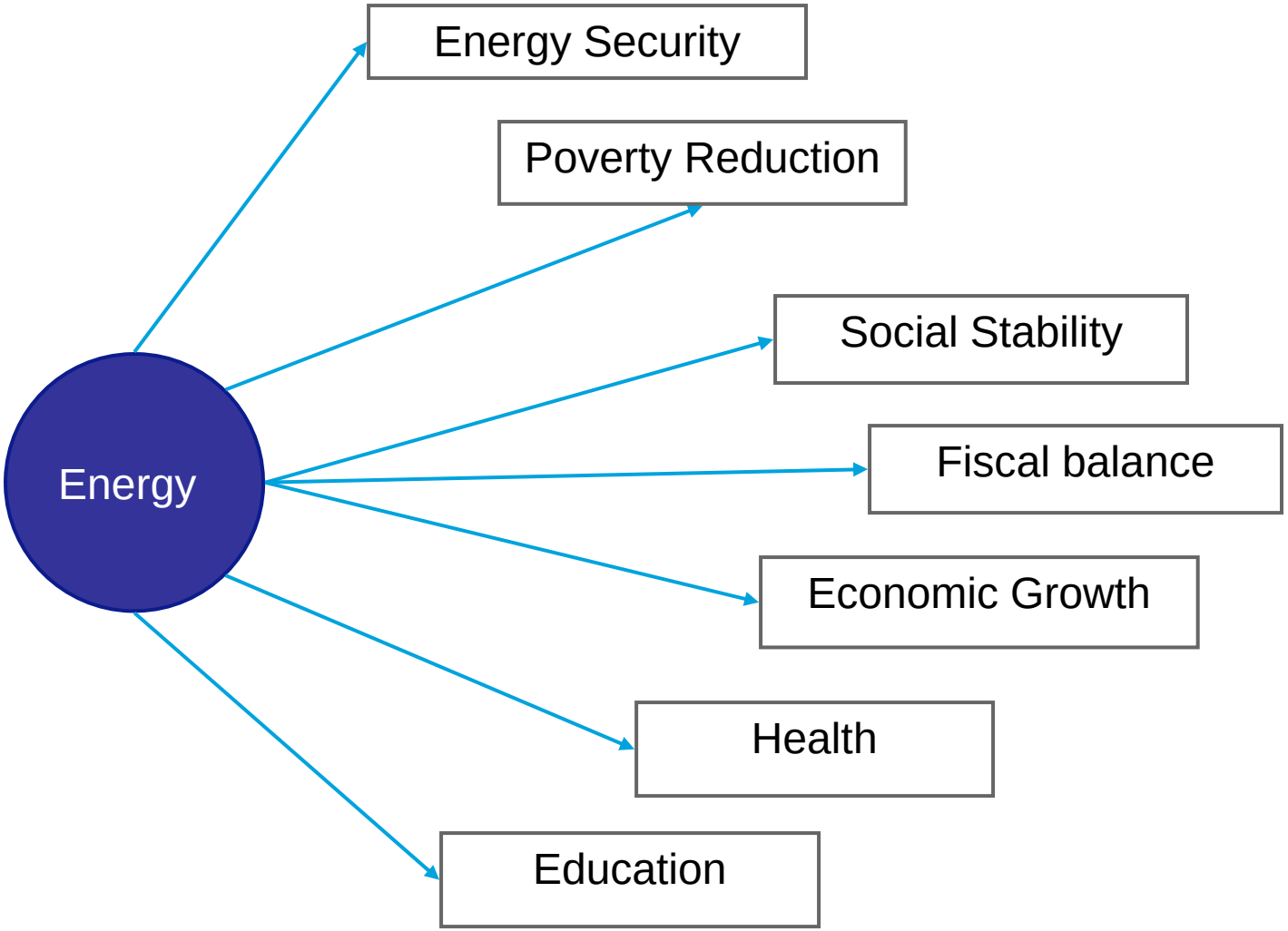
Percentage Change in GDP by a US$10 a Barrel Rise in Oil Prices*

Per Capita income (1999-2001 US$)		*Net Oil Import/Export as % of GDP*	*% Change in GDP*
Net Oil Importers			
Very Low Income	<300 *[18]*	-4.52	-1.47
Low Income	>300 and <900 *[22]*	-3.75	-0.76
Middle Income	>900 and <9000 *[36]*	-2.72	-0.56
High Income	>9000 *[21]*	-1.49	-0.44
Net Oil Exporters			
Low Income	>300 and <900 *[10]*	21.88	+5.21
Middle Income	>900 and <9000 *[17]*	22.96	+4.16
High Income	>9000 *[7]*	19.93	+1.50

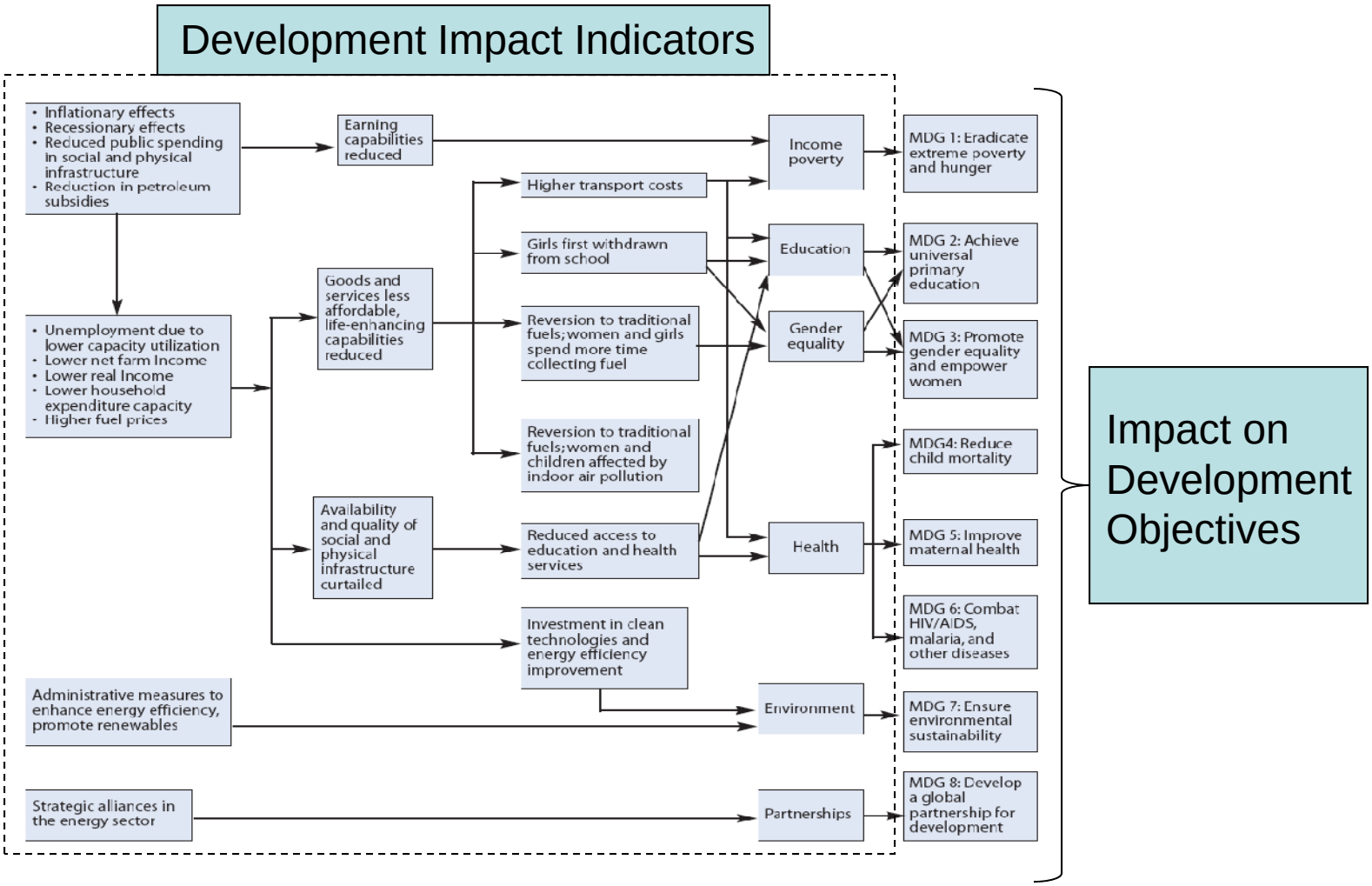
* Base Oil price of US$23.55

Source: The Impact of Higher Oil Prices on Low Income countries and on the Poor. ESMAP (2005)

…Posing serious challenges to a wide range of development objectives…



…Through a variety of causal-effect linkages



Source: UNDP. Overcoming Vulnerability to Rising Oil Prices (2007)

Energy Security

- Net importers risk that energy supplies or access to lower cost supplies will be disrupted

Country examples:

- Georgia's risky dependence on Russian oil & gas
- Latin American dependency on Venezuela's subsidized oil
- Restriction of Imported Bolivian Natural Gas to Brazil
- South Africa electricity rationing its exports to Mozambique, Zimbabwe, Namibia and Swaziland

Social Stability

- High energy prices fuel violent public protests and threaten social stability.

- Recent examples:
  - Guinea: In 2007, energy price increases of 63% resulted in violent protests and 200 people dead.
  - Lebanon: In May 2008, protesters and police clash in riots against rising fuel prices, leaving five people killed and forty injured.
  - Indonesia: Daily protests erupted after Indonesia withdrew energy subsidies in June 2008 and fuel prices jumped 30%.
  - Nepal: The pump price of gasoline and diesel jumped 25% in June 2008, sparking street protests.

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The Energy Challenge

Guinea

Indonesia

Lebanon

Nepal

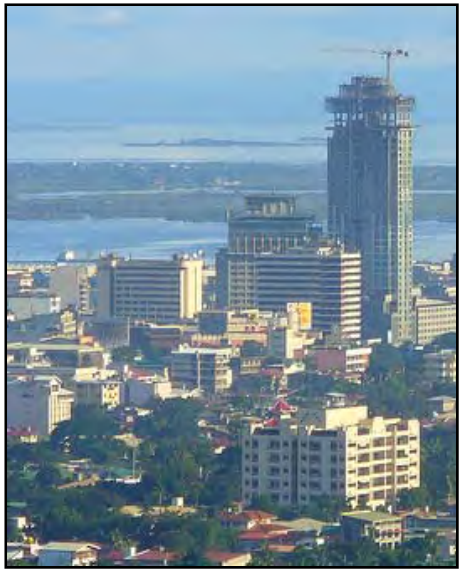
Fiscal Balance

- High energy subsidies creates significant government budget constraints, shifting resources from social and basic infrastructure programs.

- Country examples:
  - Malaysia: Fuel subsidies cost the govt. $17 billion this year, four times more than what it pays for national defense, education and health care.
  - India: Power subsidies cost the Government of India $3 billion in 1999. Theft alone cost Indian states more than $4.4 billion a year.

Economic Growth

- Energy is critical for manufacturing, tourism, ICT, etc.
- Country examples:
  - Philippines: The Visayas region is suffering from electricity shortages and high prices.
    - Tourism on Panay Island is suffering.
    - Foreign call centers and IT business are not establishing new offices in Cebu.
  - Pakistan: Power rationing and shortages in Karachi have had serious impacts on industry.
    - 16 major textile units and 15,000 cottage industrial units closed down.
    - Losses caused by load shedding as of mid 2008 were around $400 billion.



Downtown Cebu

Health & Education

- Reliable electricity is critical for operation of medical equipment and refrigeration of vaccines, medicine, and blood supplies.
- Energy is needed for lighting and heating of schools

- Country examples:
  - Haiti: Hospital Petit Goave goes without electricity due to high fuel prices. The hospital's blood bank and supplies including HIV rapid test kits, reagents, blood, vaccines, etc. are sometimes stored at room temperature.
  - Tajikistan: Energy shortages closed down schools for two months during the 2007/8 winter; school attendance plunged. Most of the nation's 3800 primary schools and 400 kindergartens have "almost no, or very limited, heating."

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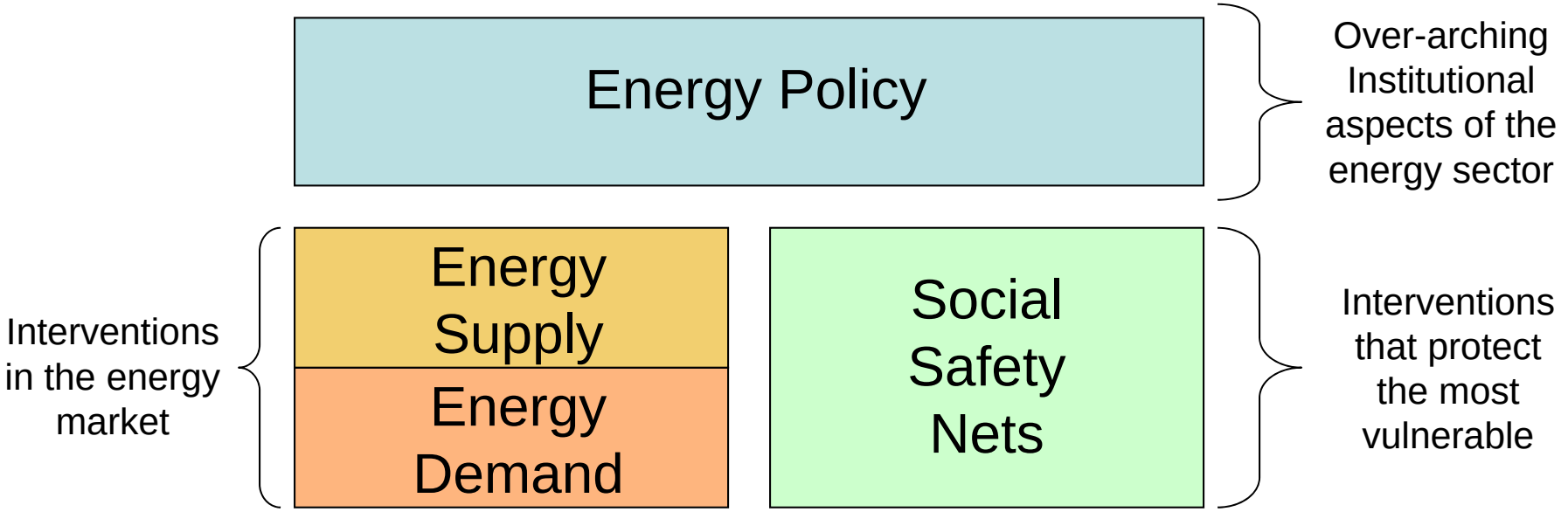
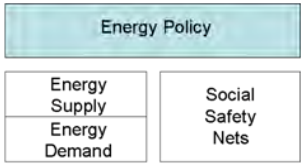
Key Interventions are structured in four key areas: Energy Policy, Energy Market (Supply and Demand) and Social Safety Nets



Key Interventions



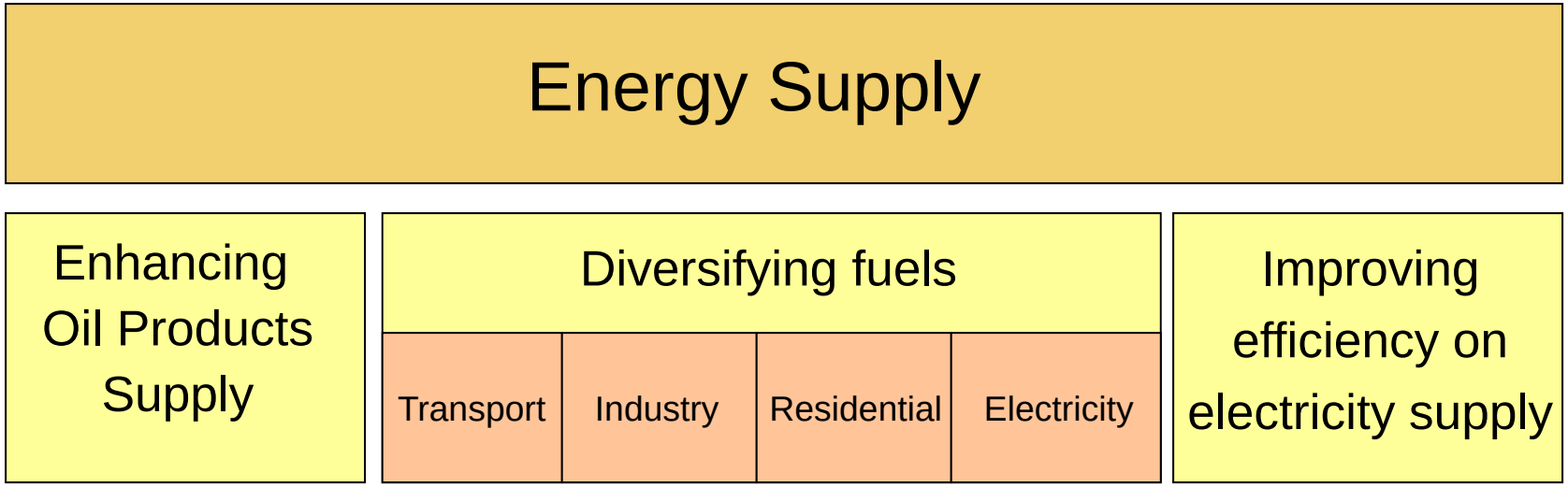
Interventions in Energy Policy aim to improve the long-term energy sector performance, planning, and reform sustainability

Energy Policy

- Strengthening the legal and regulatory framework
- Defining the Energy Strategy
- Creating an institutional enabling framework

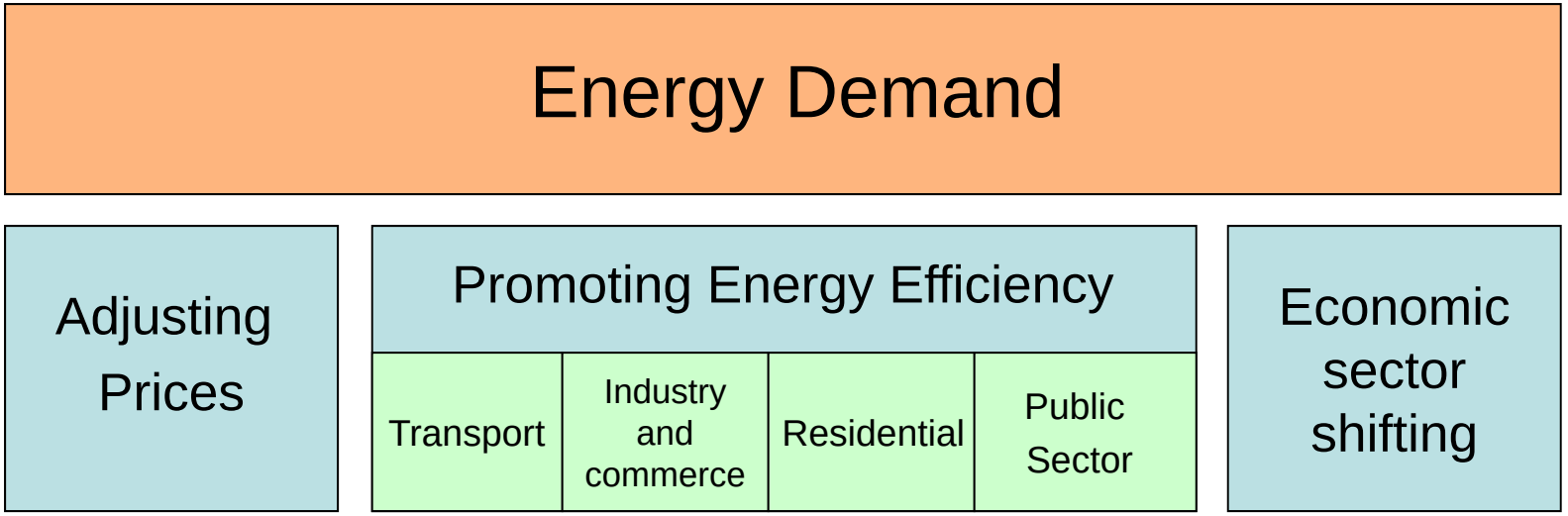
Key Interventions

Energy Supply interventions look at ways to improve the energy supply conditions (quantity, price and risk) to the country



Key Interventions

Energy Demand interventions explore approaches to reduce the energy intensity from the demand side



Key Interventions

Social Safety Nets Interventions aim to protect the most vulnerable against high energy prices, promoting the access and affordability of energy services

Social Safety Nets

- Promoting access to energy services
- Designing appropriate tariffs
- Implementing targeted subsidies

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Brazil – Diversifying energy consumption in the transport sector…

- Oil Shocks 1970s → Brazil to promote diversification energy consumption transport sector through the introduction of Biofuels and Natural Gas

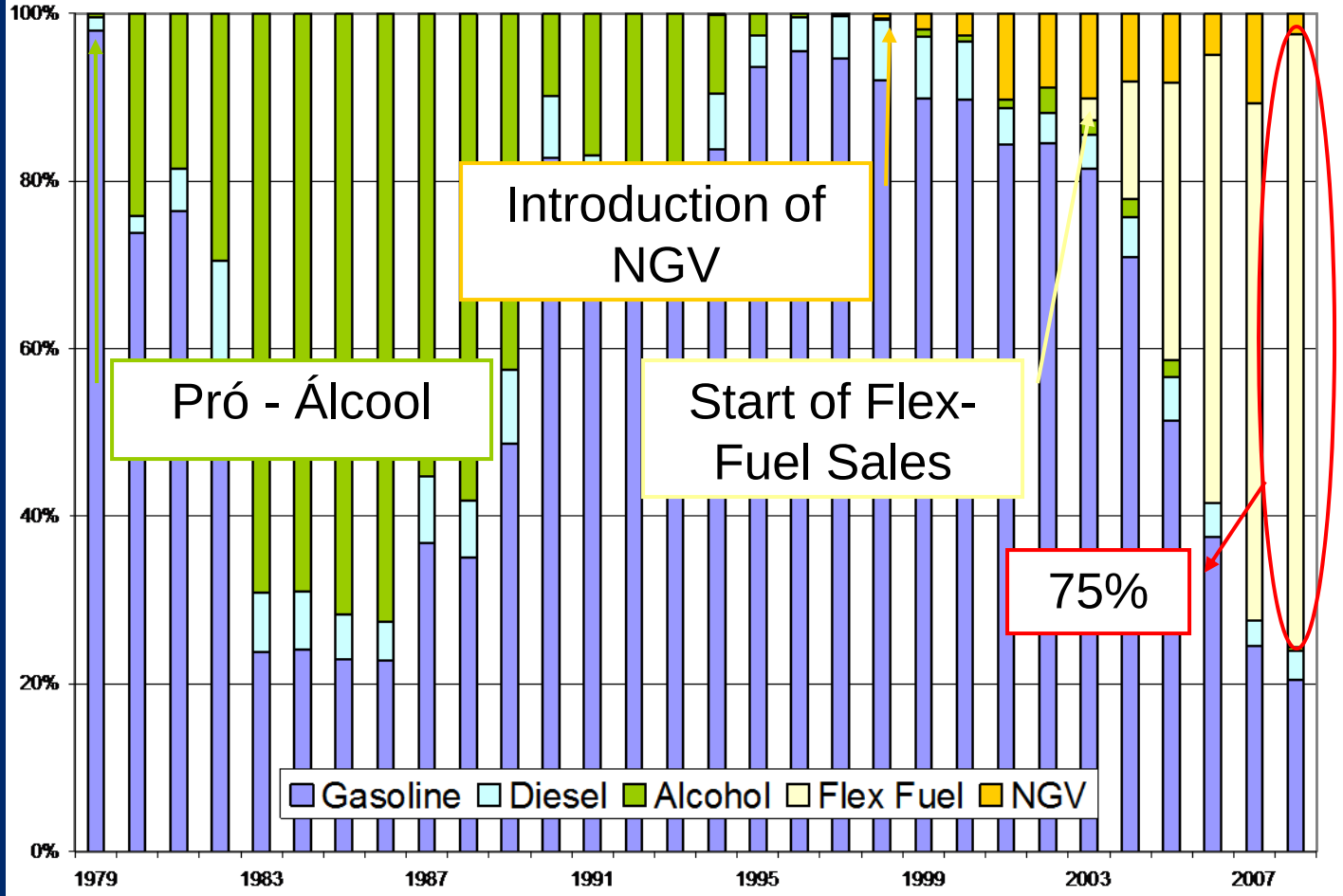
- National Alcohol Program (*Pró-Álcool*). Started in 1975
  - Mandatory blend of ethanol fuel with gasoline (10%-22% 1976-2007, 25% since 2007)
  - Guaranteed remuneration to ethanol producer (no longer applied)
  - Ethanol price lower than gasoline price (no longer applied)
  - Low-interest loans for ethanol producers (no longer applied)

- Development of Natural Gas Vehicles (NGVs). Started in 1999
  - Public investment in refueling points
  - Initial conversion of public transport fleets
  - Subsidies to conversion of Gasoline vehicles

- Development of Flexible-fuel vehicles. Started in 2003
  - Automotive manufacturers introduced flex-fuel vehicles which can use any mixture of gasoline and alcohol

Brazil – …by changing the vehicle fleet…

Brazilian Light Vehicles Market Sales



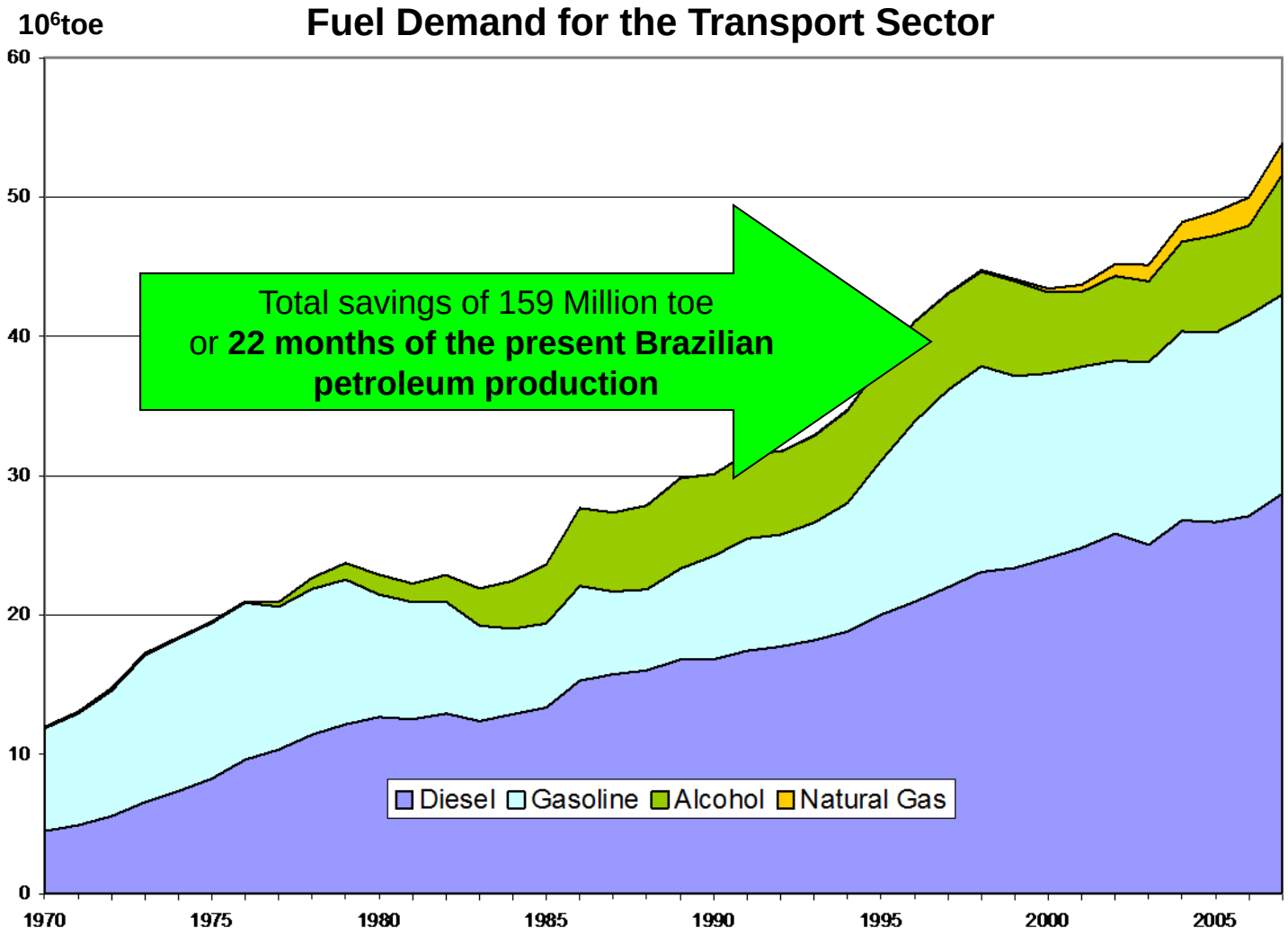
Source: Anfavea 2008

Fleet Composition (Oct-08)

NGV:	6%
Flex Fuel:	25%
Alcohol:	4%
Diesel/Gasoline:	65%

The market share of Diesel/Gasoline vehicles decreased by **35%**

Brazil – …with impressive results in the fuel consumption mix



Fuel composition (2007)

Natural gas: 4%

Alcohol: 16%

Gasoline: 27%

Diesel: 53%

Source: Ministry of Mines and Energy. Brazilian Energy Balance 2008

Philippines - A successful Energy Efficiency (EE) Program…

- In 1997, imported 80%+ of energy consumption, 51% oil-based.

- 2000 - 2004, the Department of Energy (DOE) launched several EE initiatives towards energy independence.

- **National EE Program** goals: average annual energy savings of 10% and reduction of 12% in oil imports over 10 years, through three key areas:
  - Alternative Fuels and Technologies (Transport and Electricity sector)
  - Electricity Efficiency and Conservation
  - Fuel Efficiency and Conservation (Transport and Industry sectors)

- The government took the lead through the **Government Energy Management Program**, goal of 10% reduction in its energy consumption

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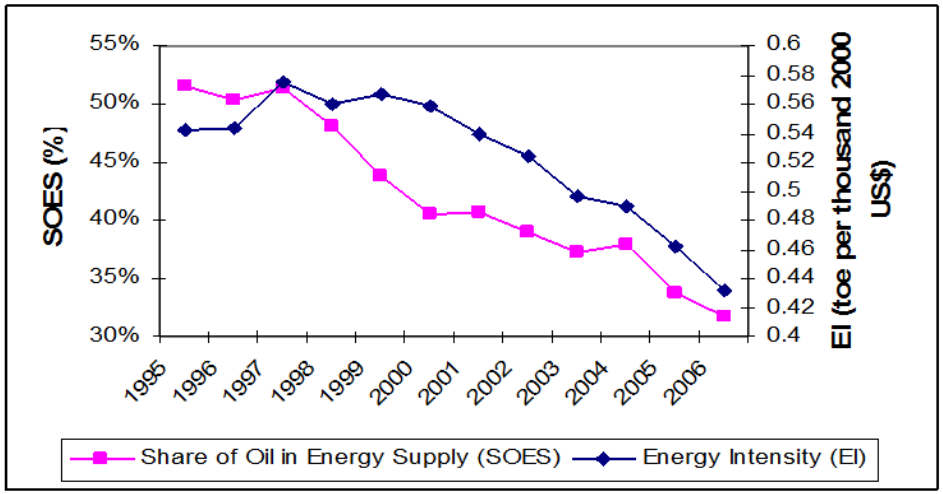
Selected Success Stories

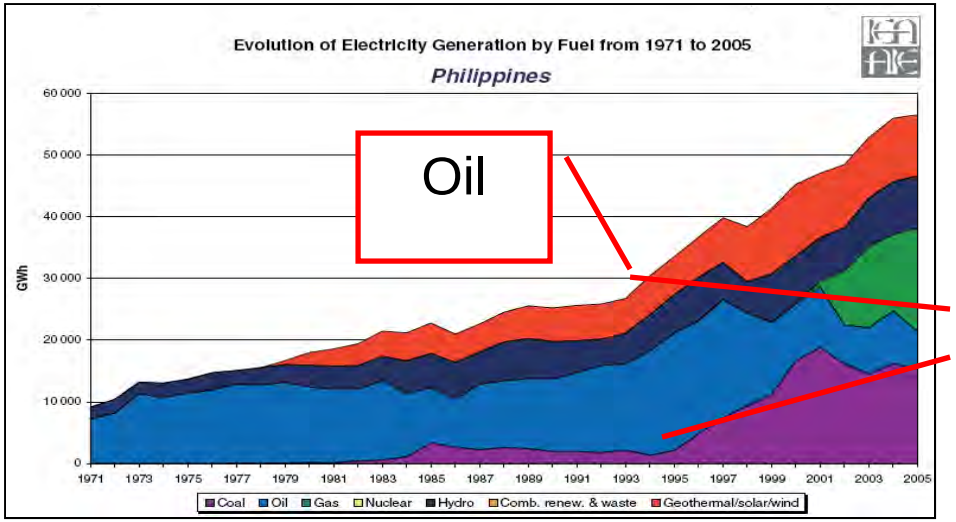
Energy Demand

Adjusting Prices	Promoting Energy Efficiency				Economic sector shifting
	Transport	Industry and commerce	Residential	Public Sector	

…with remarkable results

- **Energy Self-Sufficiency ↑**
  20% (1997) → 40% (2005)
- **Share of Oil in Energy Supply ↓**
  51% (1997) → 32% (2006)
- **Government Savings** under the energy conservation initiative
  23% in energy and 13% in fuel
- **Energy Intensity ↓**
  25% over the last decade, at a 3% annual rate





Source: IEA Database 2008

Successful interventions should consider the following dimensions

Efficiency

- Package of coordinated interventions increase the efficacy compared with single measures
- Each country needs to adapt the interventions to its own circumstances

Sequence

- Incentive prices that reflect the real costs: A condition for successful energy interventions
- Need of a favorable and stable institutional framework

Timeline

- Energy sector reform takes time to implement
- There are interventions that have an impact in the short term (e.g. DSM programs) and other in the long term (e.g. Renewable energy projects)

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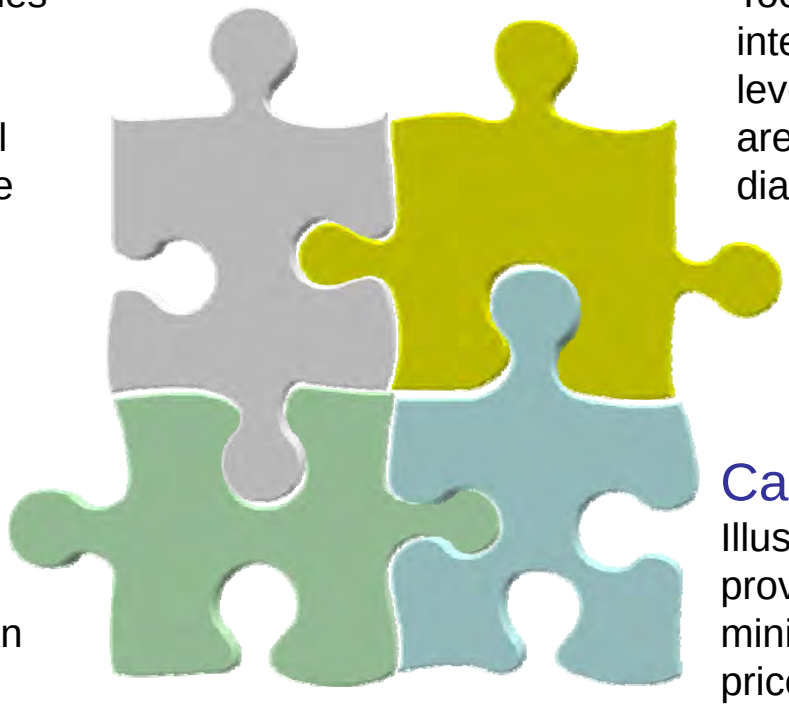
A comprehensive toolkit to help USAID missions design programs with effective approaches to cope with higher oil prices in their countries by:

- Assessing and measuring the vulnerability of a country to a high oil price scenario
- Identifying the most critical areas affected by higher oil prices
- Providing a menu of effective interventions linked to those critical areas in selected sectors
- Providing an extensive reference bibliography to support the design of the selected interventions
- Illustrating the program implementation with case studies of successful interventions

Diagnostic Tool

Measures the vulnerability to high oil prices through a series of key indicators. By comparing them with reference levels, the tool will highlight the most vulnerable sectors of the country.



Menu of Interventions

Linked with the Diagnostic Tool, provides effective interventions at different levels of detail to the critical areas identified in the diagnostic tool

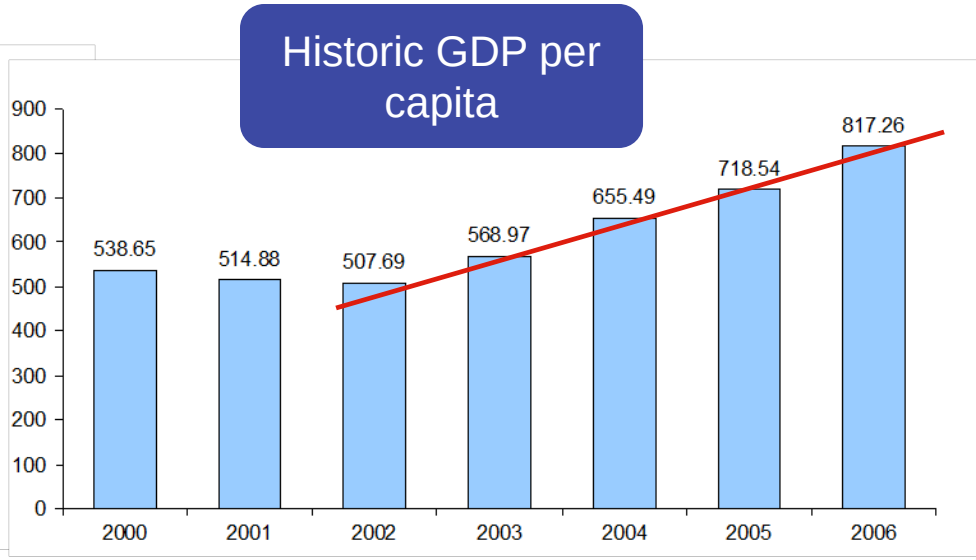
Bibliography

Provides references from the literature on the various interventions of the menu. An hyperlink will connect the menu of interventions with a brief description of the document and to the full report in the CD

Case Studies

Illustrate projects that proved successful in minimizing the impact of high oil prices. They will also identify key factors underlying a set of interventions to be successful in a given country

Using Pakistan as an example- Economic dimension indicators

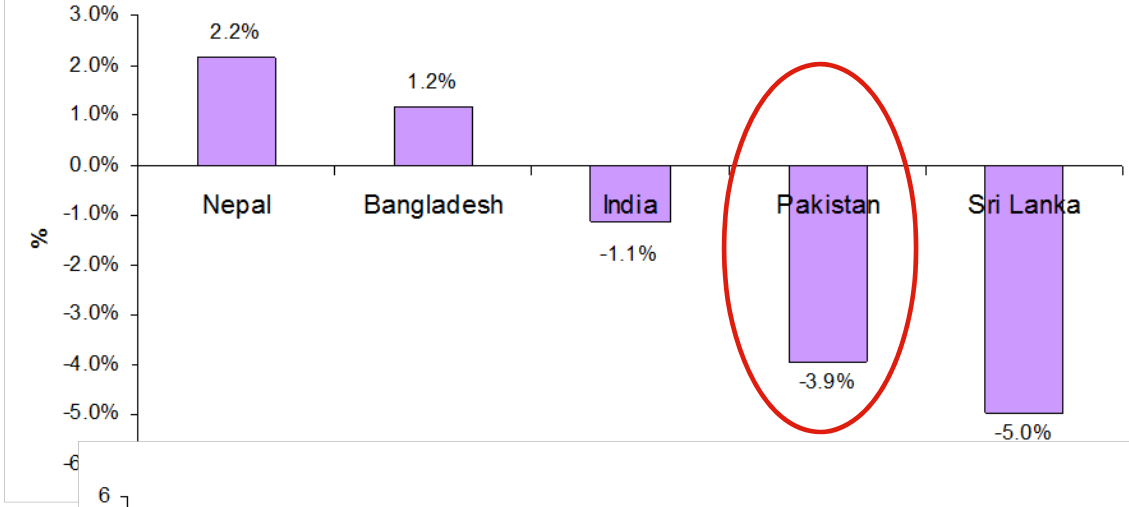


Source: International Monetary Fund, World Economic Outlook Database, April 2008

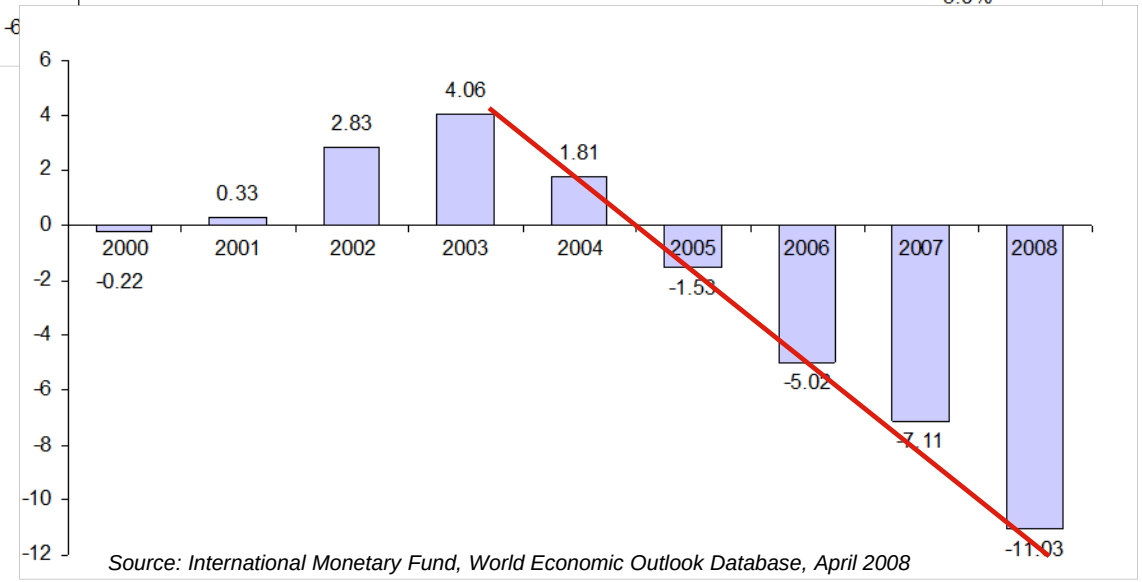
Pakistan's economic engine is relatively strong with respect to peers in region, and recovering rapidly since 2002

…but its current account balance is deteriorating rapidly, making it very difficult to absorb impacts of high oil prices….

Current account balance in 2006 as % of GDP



Historic current account balance



Source: International Monetary Fund, World Economic Outlook Database, April 2008

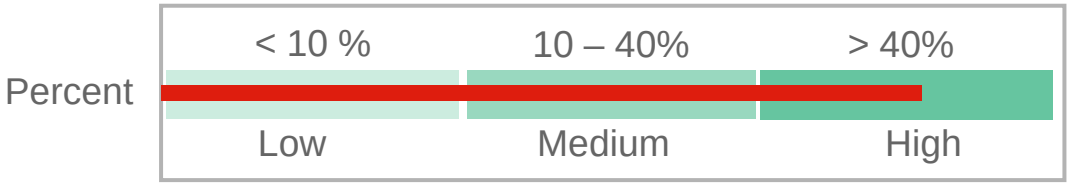
…Pakistan's energy market indicators do not help and are contributing to balance deficits and slowing down economic growth

Oil self-sufficiency or oil dependence (OSS) 2006	Ratio	(0) – (-0.29) / (-0.30) – (-0.59) / (-0.60) – (-1)	- 0.8	
Share of oil in total primary energy (SOES) 2006	Percent	<10% / 10-60% / >60%	37%	
Energy Intensity (EI) 2006	Toe / 000 US$	< 0.3 / 0.3 – 0.5 / > 0.5	0.624	
Net Oil imports over GDP 2006	Percent	< 2% / 2 – 5% / > 5%	7.5%	

Low / Medium / High

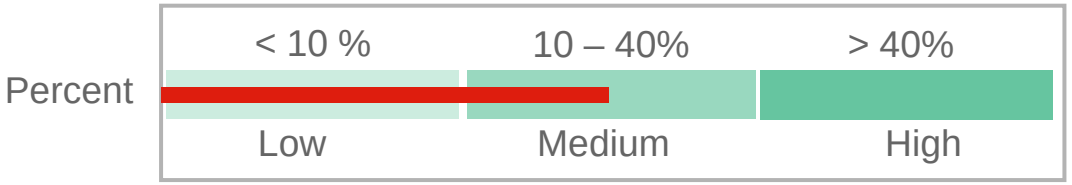
… sub-sector indicators identify key areas where interventions will have a greater impact in reducing Pakistan's vulnerability

Share of oil for transport uses in Oil Con. 2006



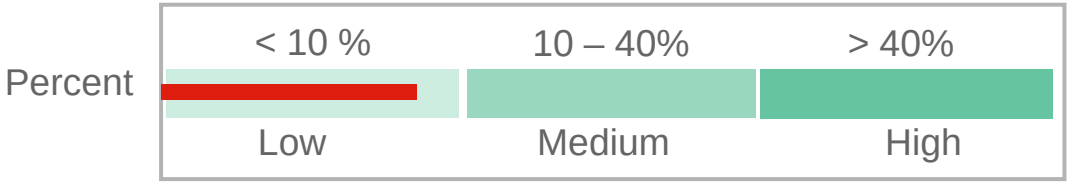
47%

Share of oil for electricity in Oil Con. 2006



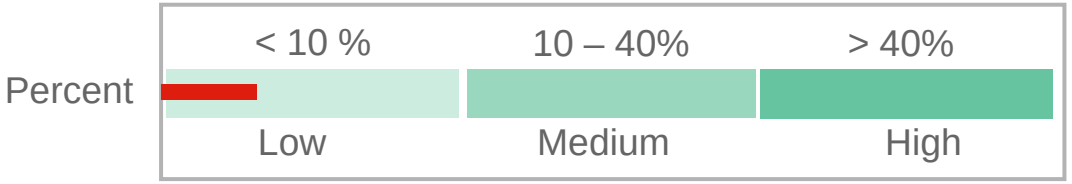
35%

Share of oil for industry in Oil Con. 2006



9%

Share of oil for households in Oil Con. 2006



3%

…based on Pakistan's vulnerability and sub-indicators encountered, the following interventions would minimize impacts of high oil prices

Condition:	Indicator:
Heavy oil importer	OSS: -0.8
Significant Oil Con. on TPES	SOES: 37%
High energy intensity	EI: 0.624

How vulnerable is the Pakistan?

Condition:	Indicator:
Heavy consumption of oil in transport sector	47%
Medium consumption of oil in electricity sector	35%
Heavy Concentration of electricity con. In residential	46%

What sectors are more vulnerable?

Interventions

Diversifying fuels to access cheaper sources

- Transport → Switching to alternative fuel motors → Mandate use of CNG public transport
- Switching to alternative fuel motors → Promote alternative-fuel automobiles
- Electricity → Developing Renewables → Establish energy renewable legislation
- Developing Renewables → Joining regional power pools

Promoting Electricity Efficiency in the residential sector

- Electricity → Promoting EE Households → Large-Scale CFL program

What can be done to reduce vulnerability?

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Conclusion

- Energy is critical for development and affects almost all other sectors
- Most USAID-assisted countries are oil-importing and affected by the current energy-challenge
- There are interventions that can help to meet the energy challenge
- USAID/EGAT developed a toolkit to help diagnose key problem areas and identify potential interventions
- The Energy Team is available to assist Missions in assessing the energy challenge and developing programs to address challenges.