



The Importance of Alternative Fuels Technology and Energy Efficiency to Resiliency in the Energy Sector

Lourdes Maria A. Capricho
Chief Science Research Specialist

E-Power Mo! Energy Consumers and Stakeholders Conference

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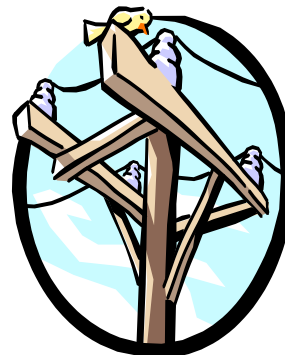
Importance of Energy

- ✓ Providing the “ability to do work”
- ✓ heart of economic activity – utilization is manifested by the economic development

Energy source is finite



Radiant



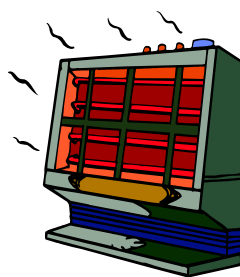
Electrical



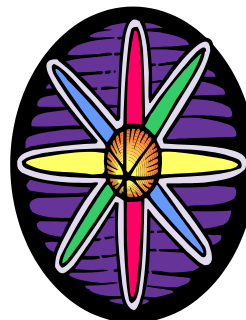
Chemical



Sound



Thermal



Radiant

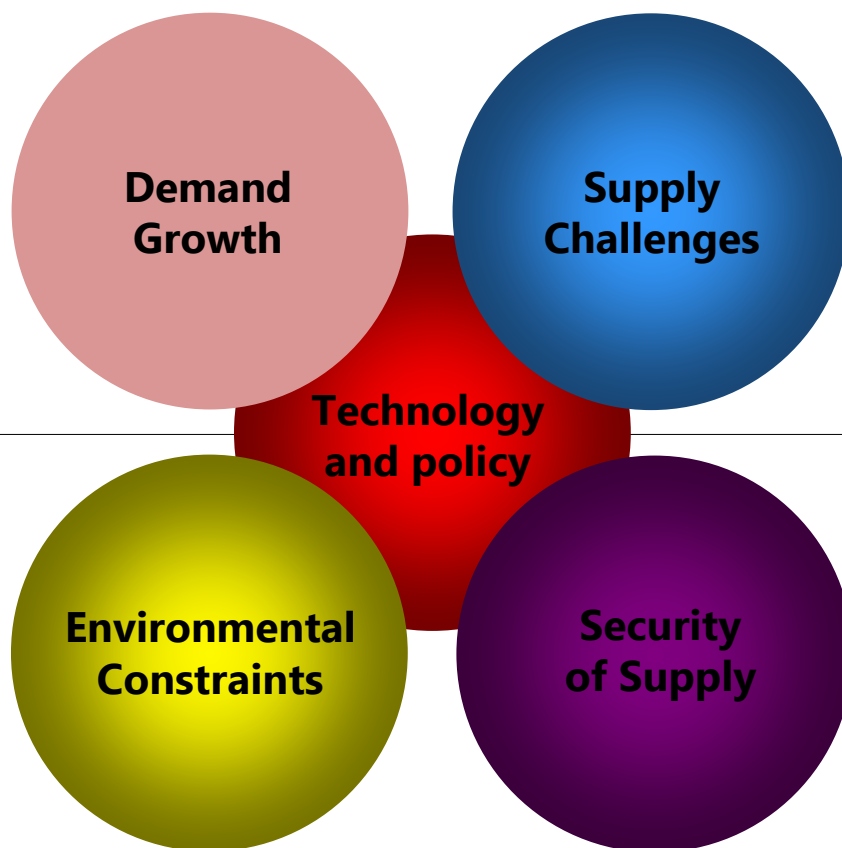


Mechanical

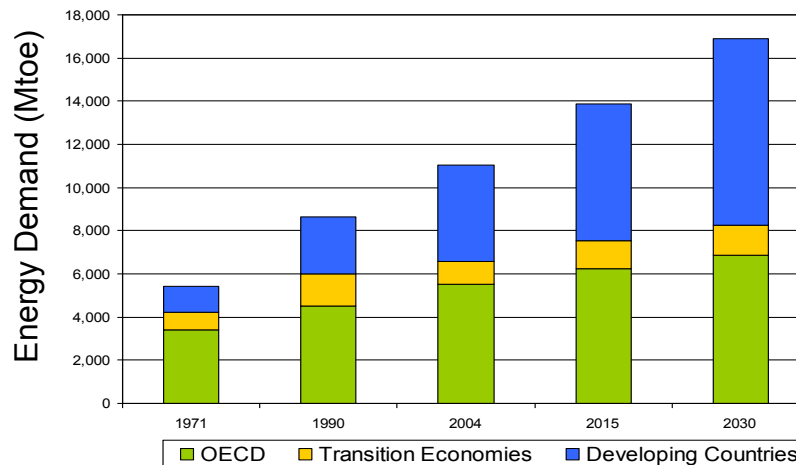


Magnetic

key drivers of the energy future

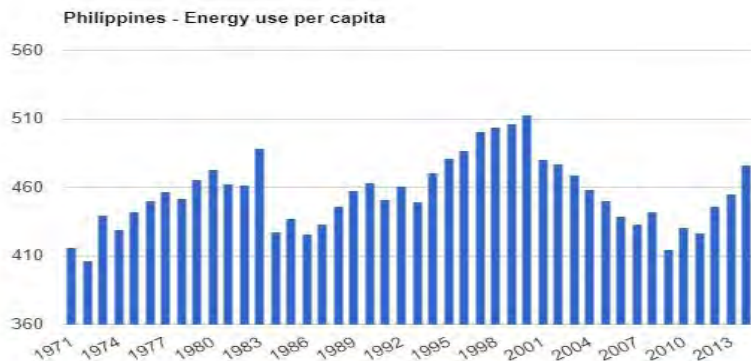


Global Energy Demand Growth by Region (1971-2030)



Demand Growth

Energy demand per capita



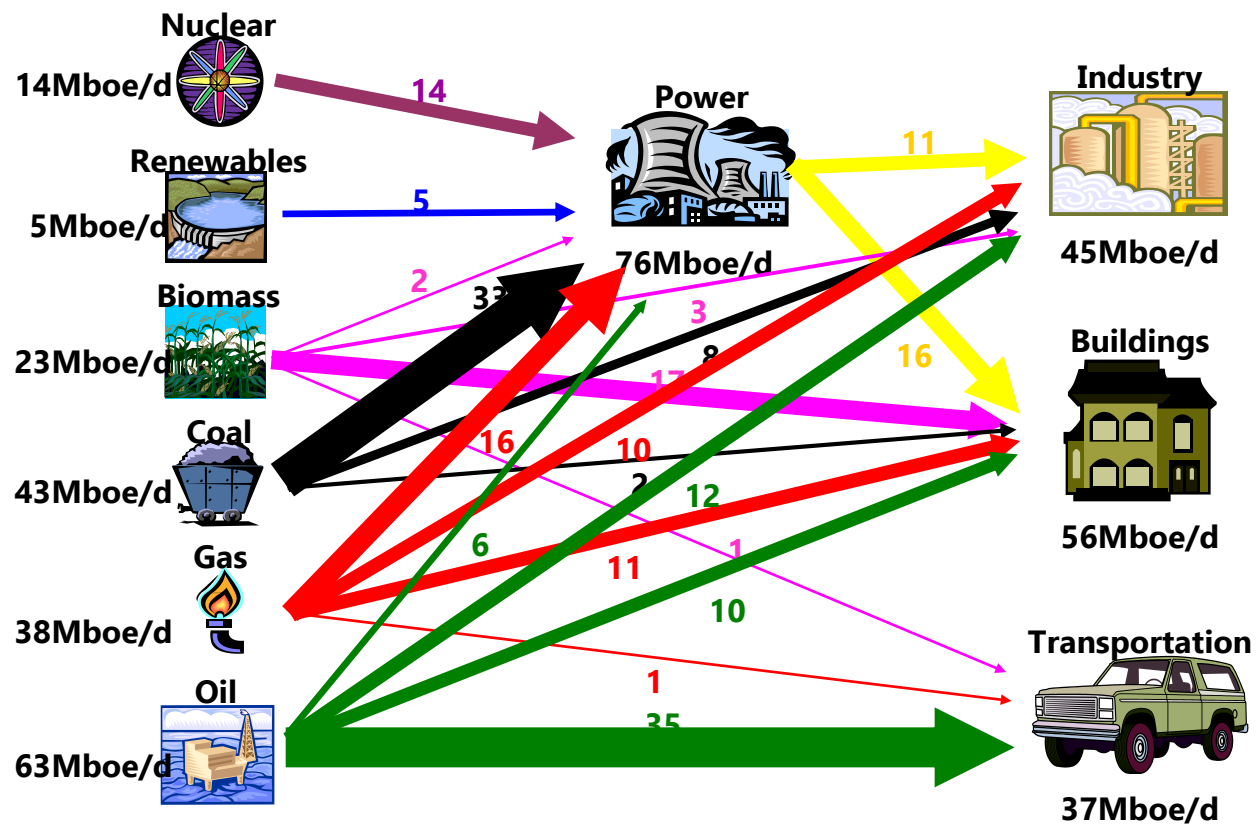
Source: TheGlobalEconomy.com, The World Bank

Projections 2000-2050

	2000	2050
Global population (in millions)	6065	9030
Energy demand (quads)	385	1500
North America	90	120
Latin America	35	150
Europe	110	130
Africa	15	200
Asia	135	900
Carbon emission (gigatons/year)	7	26

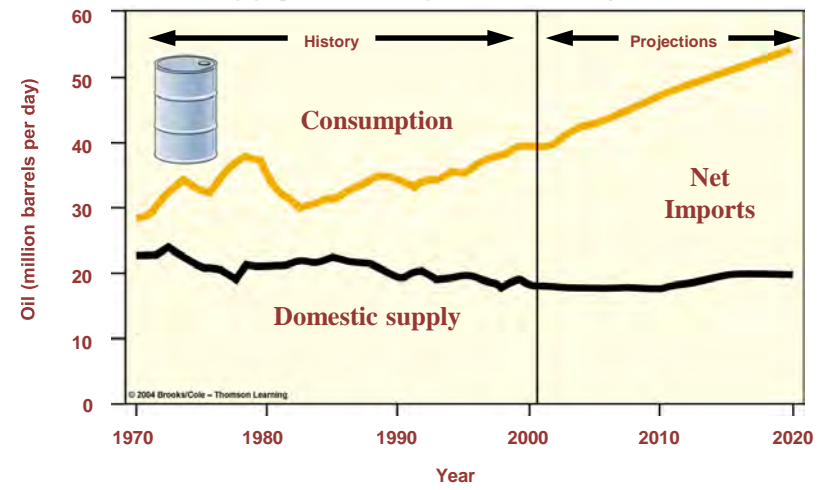
Supply Challenges

global energy supply & demand (total = 186 Mboe/d)

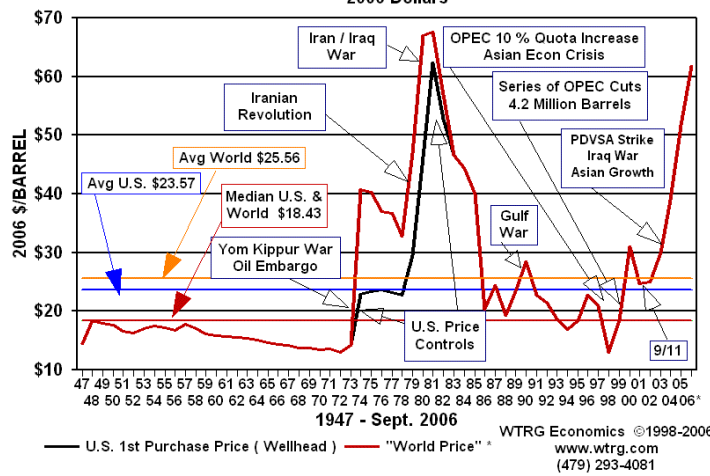


Security of Supply

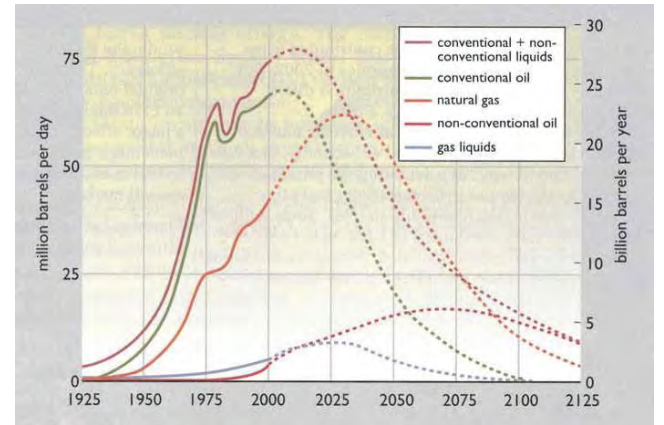
supply, consumption, and imports



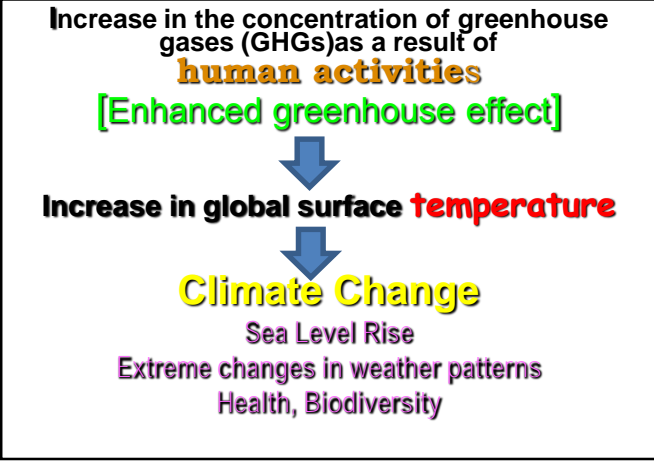
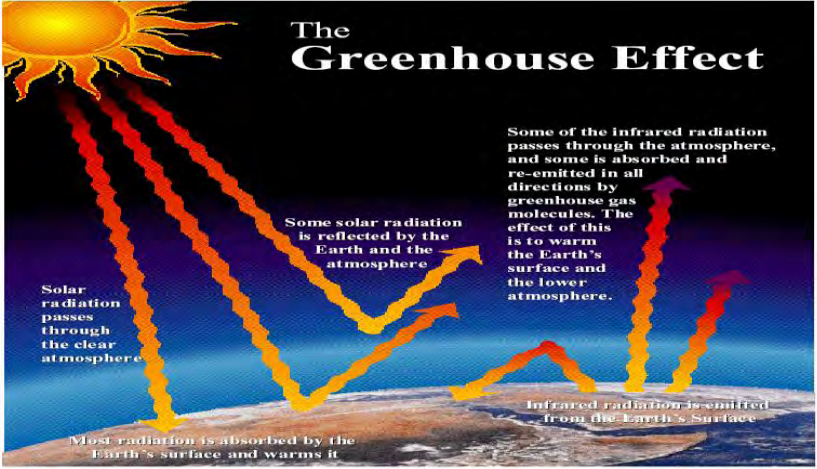
Crude Oil Prices
2006 Dollars



Oil & Gas Production Forecasts



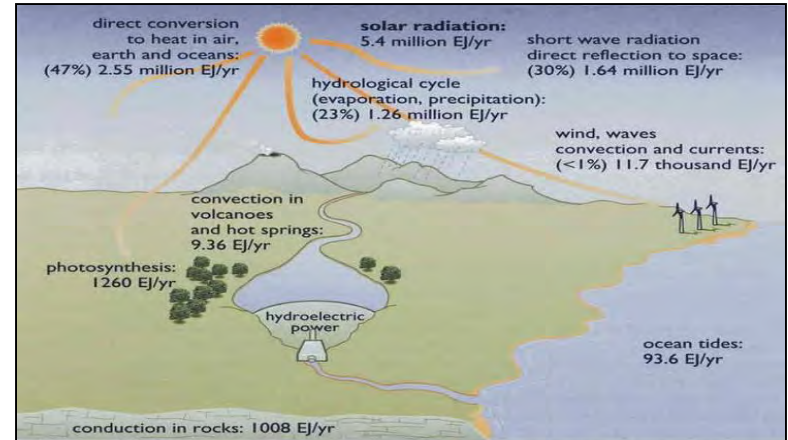
Environmental Impacts



By burning fossil fuels due to industrialization and to sustain our modern lifestyle, the level of GHGs increase rapidly causing climate change.

- EFFECTS:**
- Coastal erosion
 - Hurricanes/Storms
 - Floods
 - Health issues

Sources of New Energy



Technology and policy

Some Energy Technologies

Primary Energy Sources:

- Light Crude
- Heavy Oil
- Tar Sands
- Wet gas
- CBM
- Tight gas
- Nuclear
- Coal
- Solar
- Wind
- Biomass
- Hydro
- Geothermal

Extraction & Conversion Technologies:

- Exploration
- Deeper water
- Arctic
- LNG
- Refining
- Differentiated fuels
- Advantaged chemicals
- Gasification
- Syngas conversion
- Power generation
- Photovoltaics
- Bio-enzymatics
- H₂ production & distribution
- CO₂ capture & storage

End Use Technologies:

- ICEs
- Adv. Batteries
- Hybridisation
- Fuel cells
- Hydrogen storage
- Gas turbines
- Building efficiency
- Urban infrastructure
- Systems design
- Other efficiency technologies
- Appliances
- Retail technologies

evaluating energy technology options

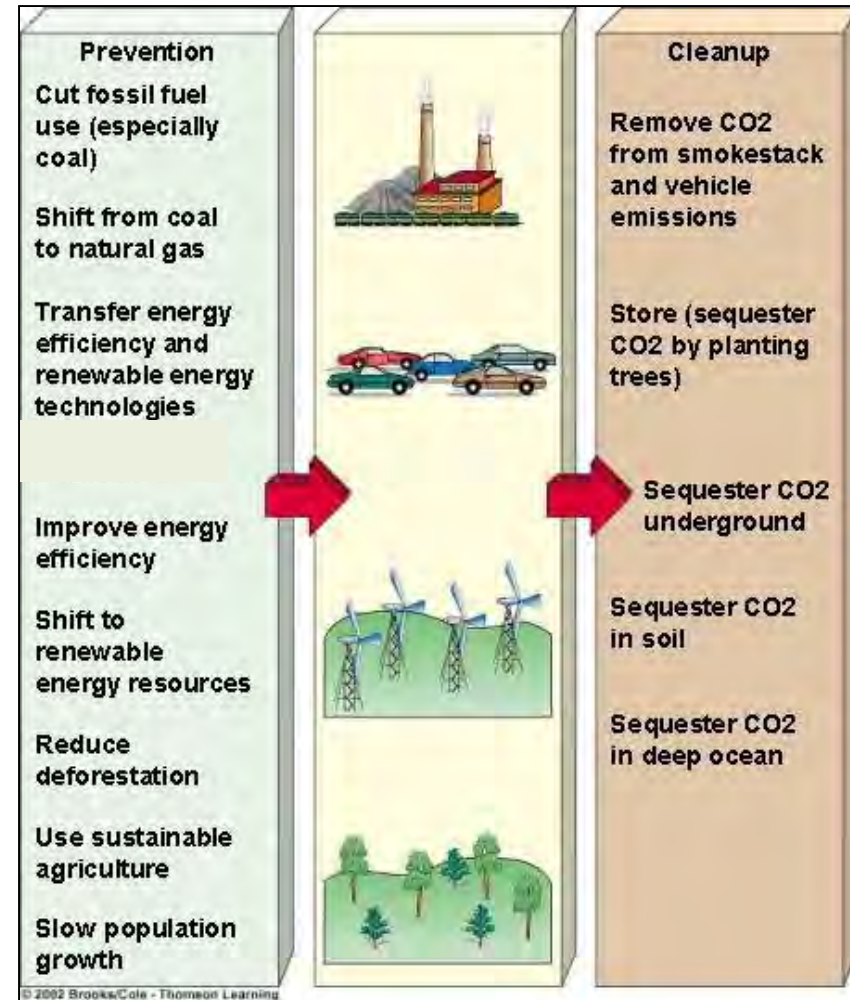
- Current **technology status** and plausible **technical headroom**
- **Budgets** for the three E's:
 - **Economic** (cost relative to other options)
 - **Energy** (output how many times greater than input)
 - **Emissions** (pollution and CO₂; operations and capital)
- **Materiality** (at least 1TW = 5% of 2050 BAU energy demand)
- **Other costs** - reliability, intermittency etc.
- Social and political **acceptability**

we also must know what problem we are trying to solve!

What to be done? To be Energy Resilient

Options

- Do nothing
- Do more research
- Act now to reduce risks
- Act now no-regrets strategy



What Can Be Done?

- “Supply-side Policies” – increasing domestic supply/
production
 - Public policies to increase domestic supply and reduce reliance on foreign oil.
 - Open for oil/gas exploration
 - Develop natural gas supply infrastructure
 - Option for nuclear source of energy
 - Add more coal-burning power plants
- “Demand-side Policies” - decreasing domestic consumption
 - Conservation
 - Better energy efficiency
 - Better fuel mileage vehicles
 - Better home/office energy usage
 - Developing non-fossil fuel energy sources

Certificate of Savings issued by the DOE and DBM from 2010 to 2017

ACTUAL SAVINGS attributed to Lighting and A/C Retrofits and application of Energy Conservation Measures in 256 Government Buildings

256
Gov't.
Bldgs

Energy: **67 GWH**
Deferred Cap.: **63 MW**
Peso Equivalent: **Php 533.33 Million**

SAVINGS

Equivalent to **13 Mall Of Asia (MOA)**

(Reference: 5 MW S/S cap. of MOA)

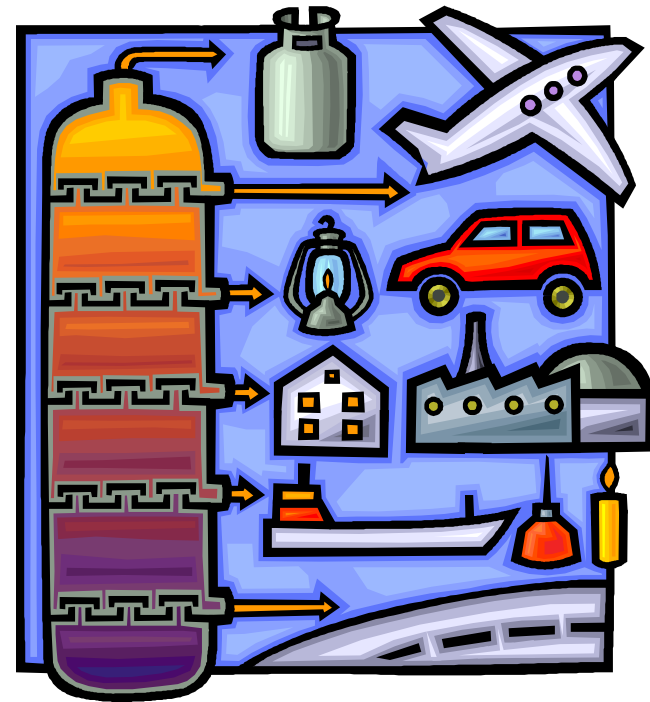
ECONOMIC IMPACT

- **1 x 63 MW unit VIRTUAL Power Plant**
- Amount: **\$ 136 Million**
- GHG Reduction: **34,247 MtCO₂**

Electricity Savings based on the Certificate of Savings Issued 2010-2017



With the modern world depending upon coal, oil and gas for a majority of its energy needs and the prediction that the world will nearly double its need for energy resources in several decades, it is important to conserve energy and to investigate alternate energy resources





- The earth's inhabitants must take a serious look at energy resources, use and conservation.

Thank You!



(+632) 479-2900



name@doe.gov.ph



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