

Regional Energy Outlook

MIDDLE EAST

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Problem Statement



- George Olah, Nobel prize winner, stated that "oil and gas resources under the most optimistic scenario won't last much longer than through the next century. I suggest we should worry much more about our limited and diminishing fossil resources."

Non-renewable fossil fuels, Chemical

Engineering News, issue 11, 1991, p. 50-51

- "Without energy, advanced economies cannot sustain their standard of living. Without energy, developing and emerging economies will never attain the growth and quality of life to which they aspire and to which they are entitled." (Conn 2006, BP)

Problem Statement



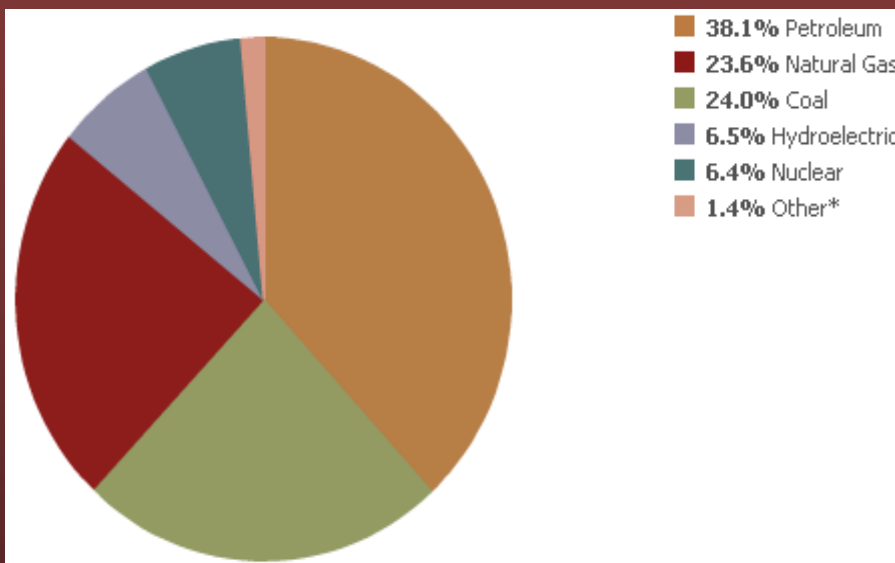
Magnitude of the problem

- Increase in population directly correlates with an increase in energy demand
- Development is connected to energy consumption patterns
- A large portion of the world's energy is generated from non-renewable resources which are being depleted
- Degradation of the quality of energy sources is occurring globally

The Middle East



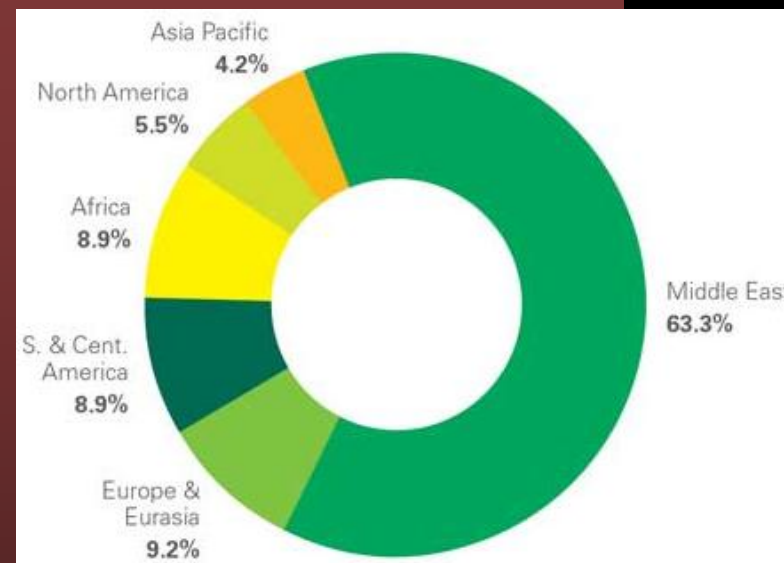
World Energy



Sources of Energy

(Energy Information Administration, 2003)

* Includes geothermal, solar, and wind power

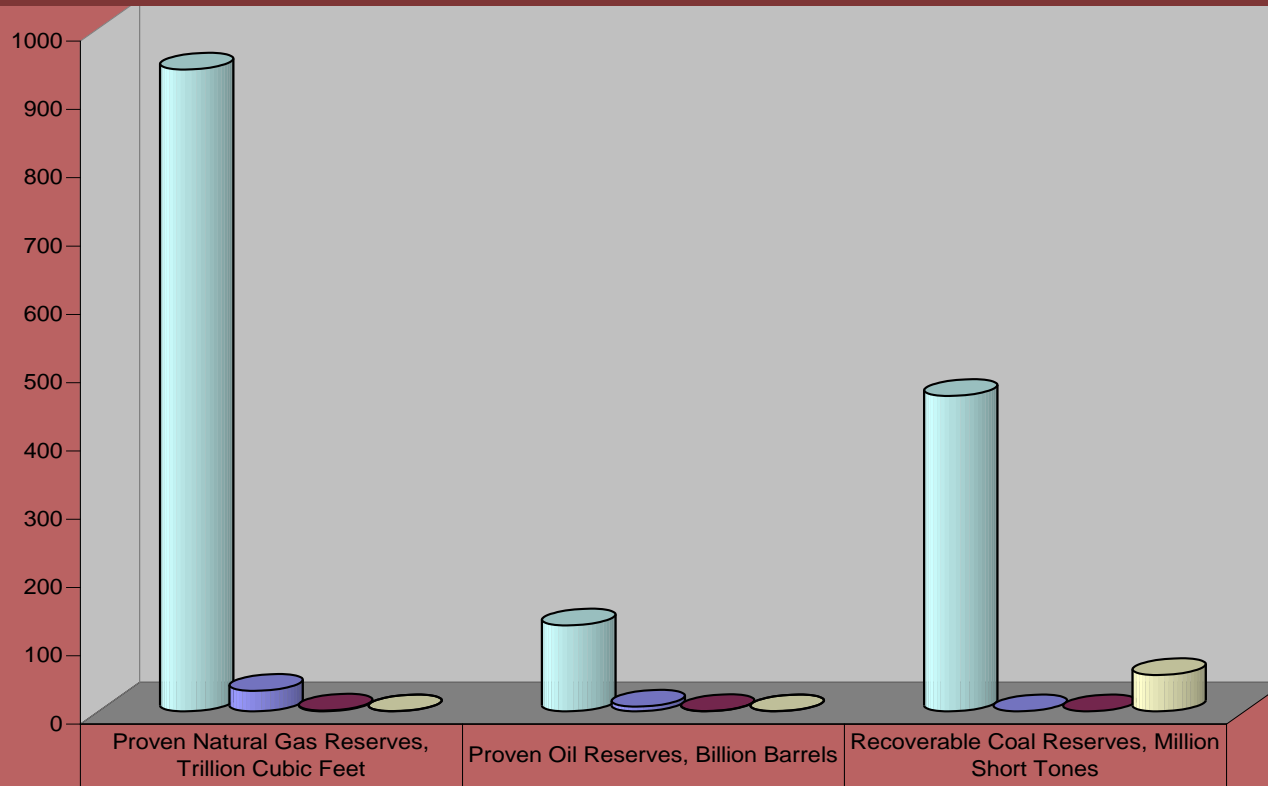


Distribution of Proven Reserves 2003

(Percentage)

(BP Statistical Review of World Energy, 2004)

Energy Reserves



	Proven Natural Gas Reserves, Trillion Cubic Feet	Proven Oil Reserves, Billion Barrels	Recoverable Coal Reserves, Million Short Tones
Iran	940	125.8	461.9
Azerbaijan	30	7	0
Israel	1.4	0.6	0
Turkey	0.3	0.3	53.1

Iran Azerbaijan Israel Turkey

*based on IEA Energy Statistics

Energy Consumption

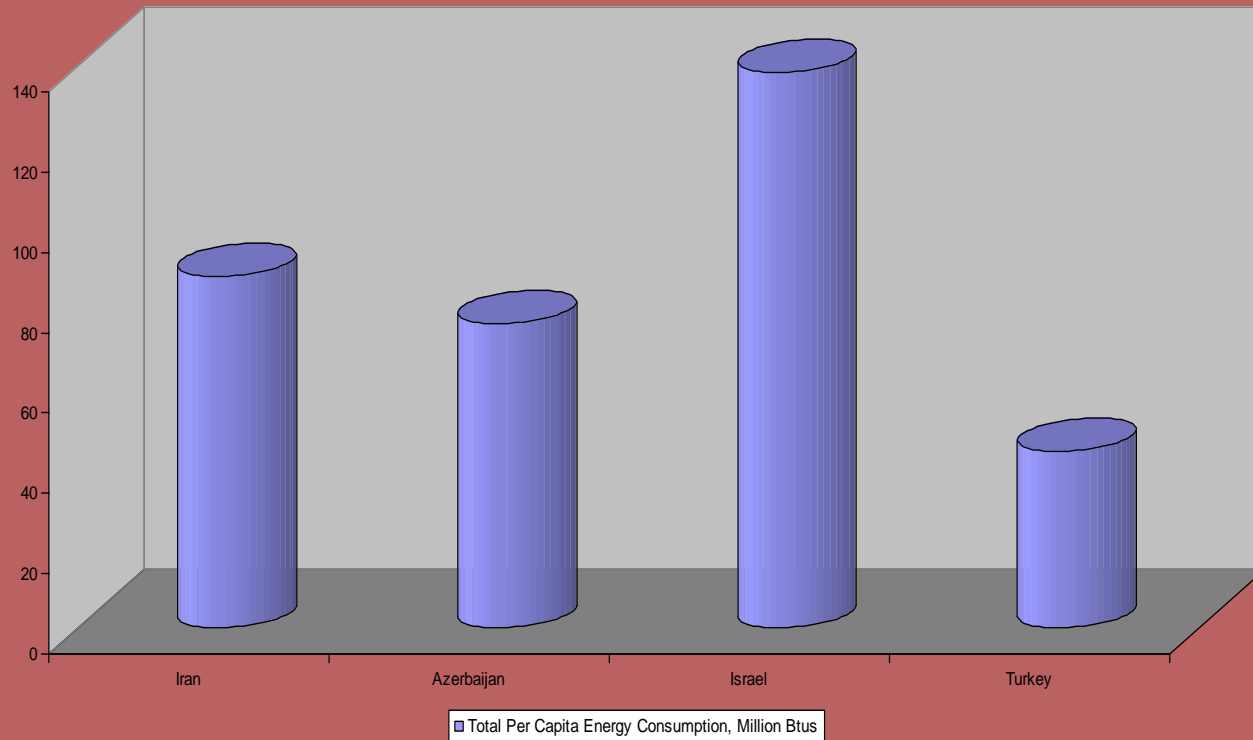


Total Per Capita Energy Consumption (2003E), Million Btus	Iran	Azerbaijan	Israel	Turkey
	87.6	75.8	138.7	44
Energy Consumption by source (%)				
Natural Gas	46	51	0	16
Oil	48	42	59	39
Coal	2	0	38	30
Hydroelectric	2	4	0	5
Nuclear	0	0	0	0
Other Renewable	2	0	3	9
Energy Consumption by sector (%)				
Industry	25.5	25.4	17	37.5
Transport	28.7	19.4	33	22.4
Agriculture	4.2	1	1	5.1
Commercial and Public Services	7.8	5.5	8	5.8
Residential	32.8	44.1	23	29.2
Non specified	1	4.6	18	0

Energy Consumption



Total Per Capita Energy Consumption, Million Btus

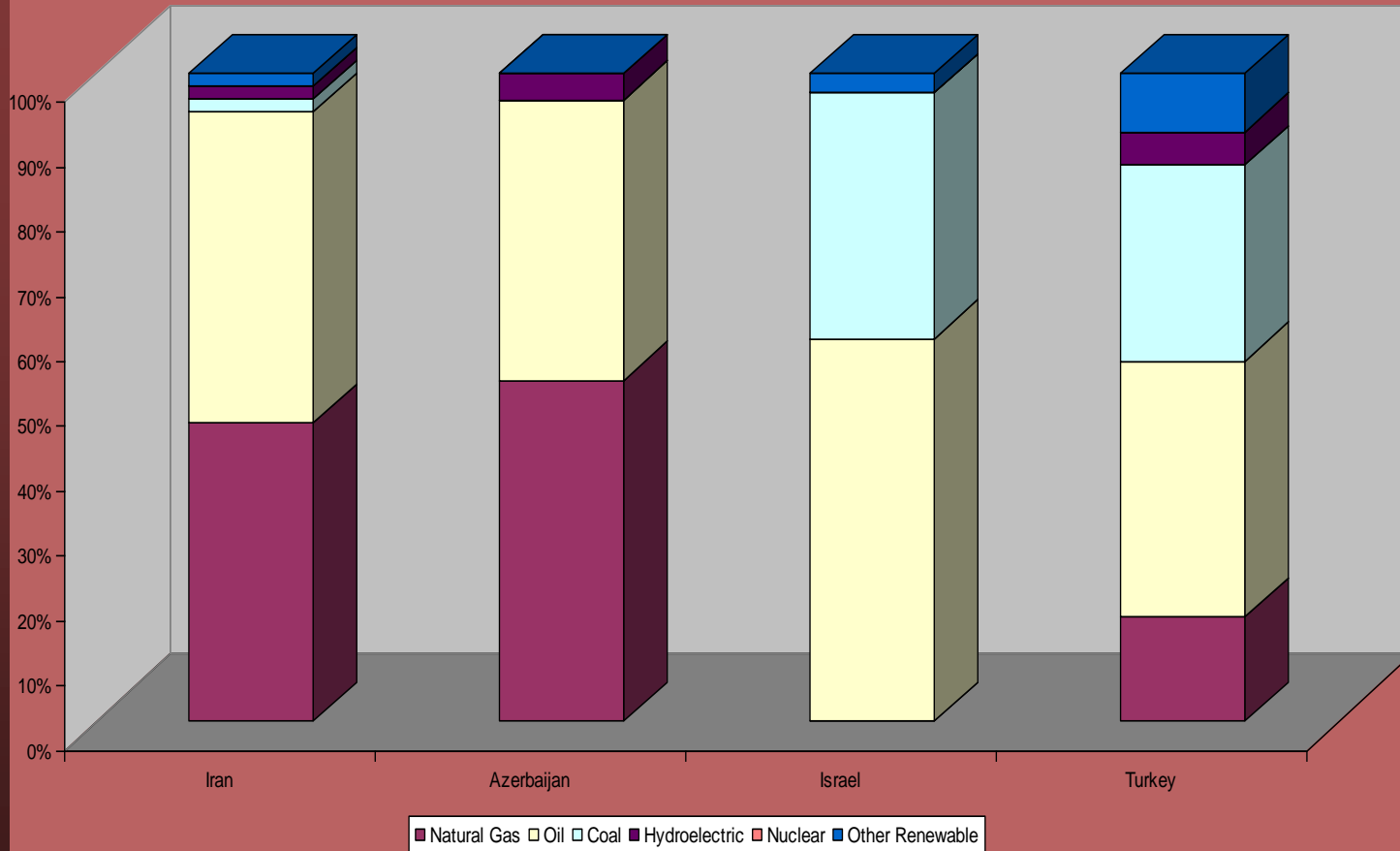


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Energy Consumption



Energy Consumption By Source

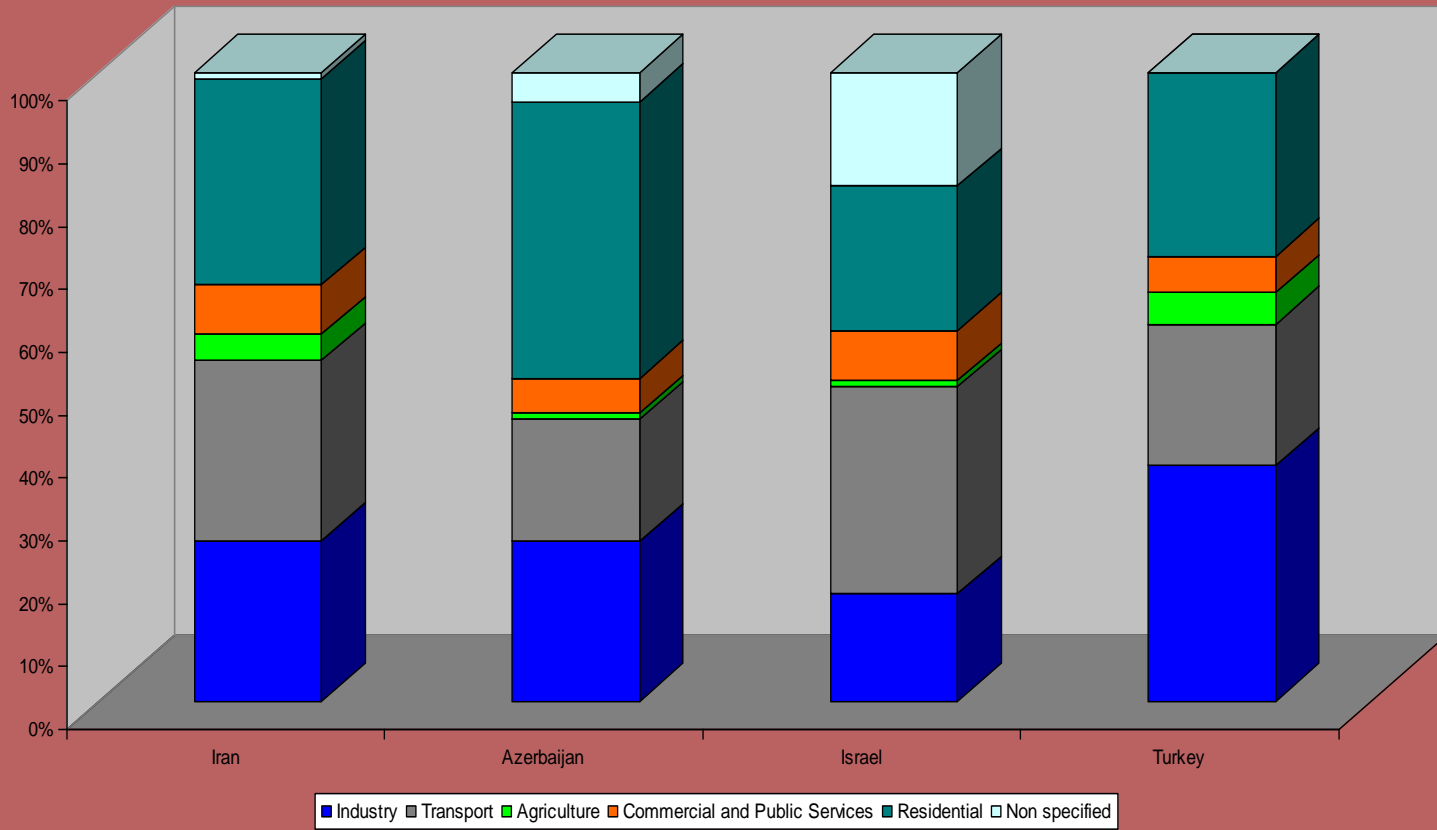


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Energy Consumption



Energy Consumption by Sector

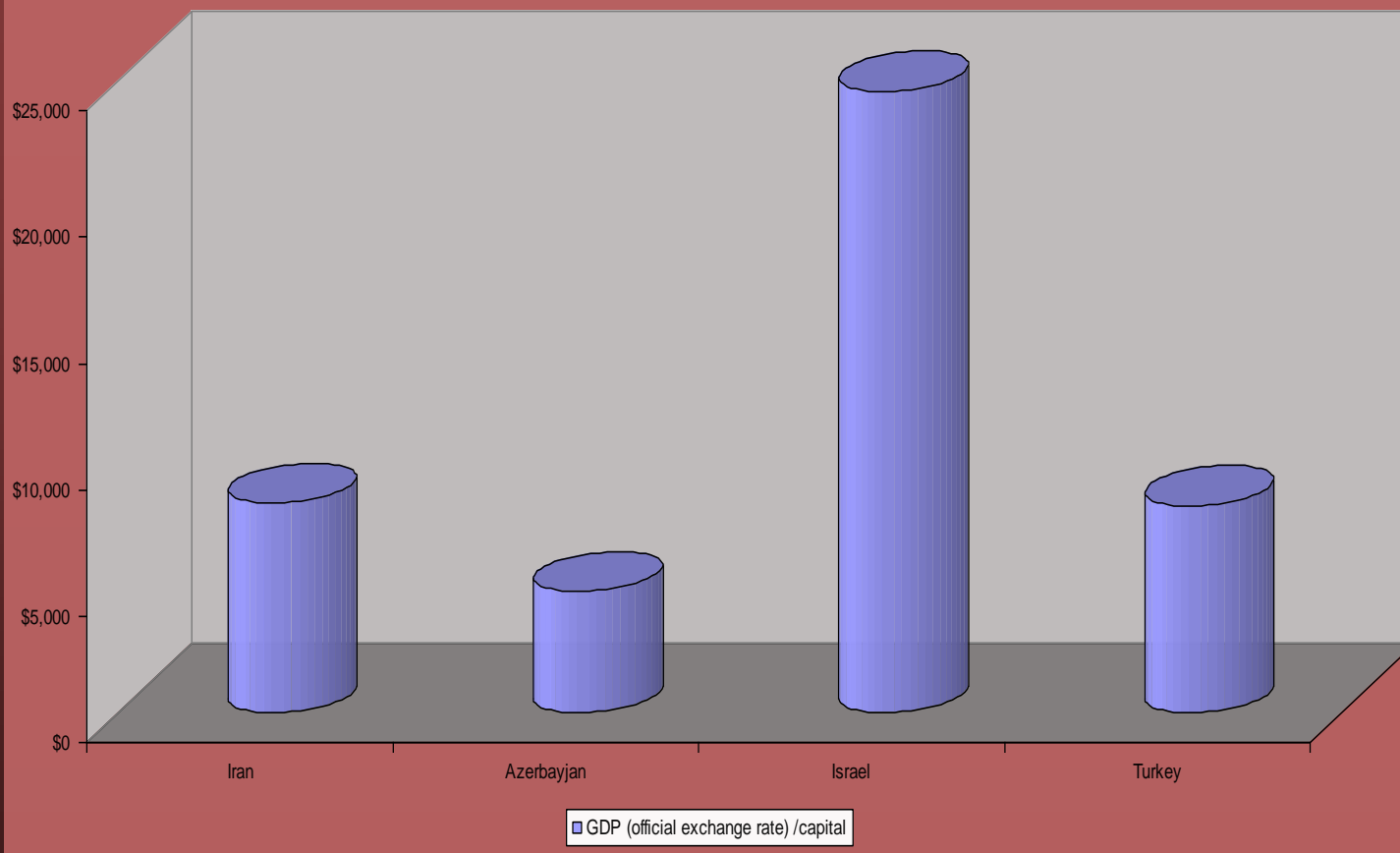


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GDP

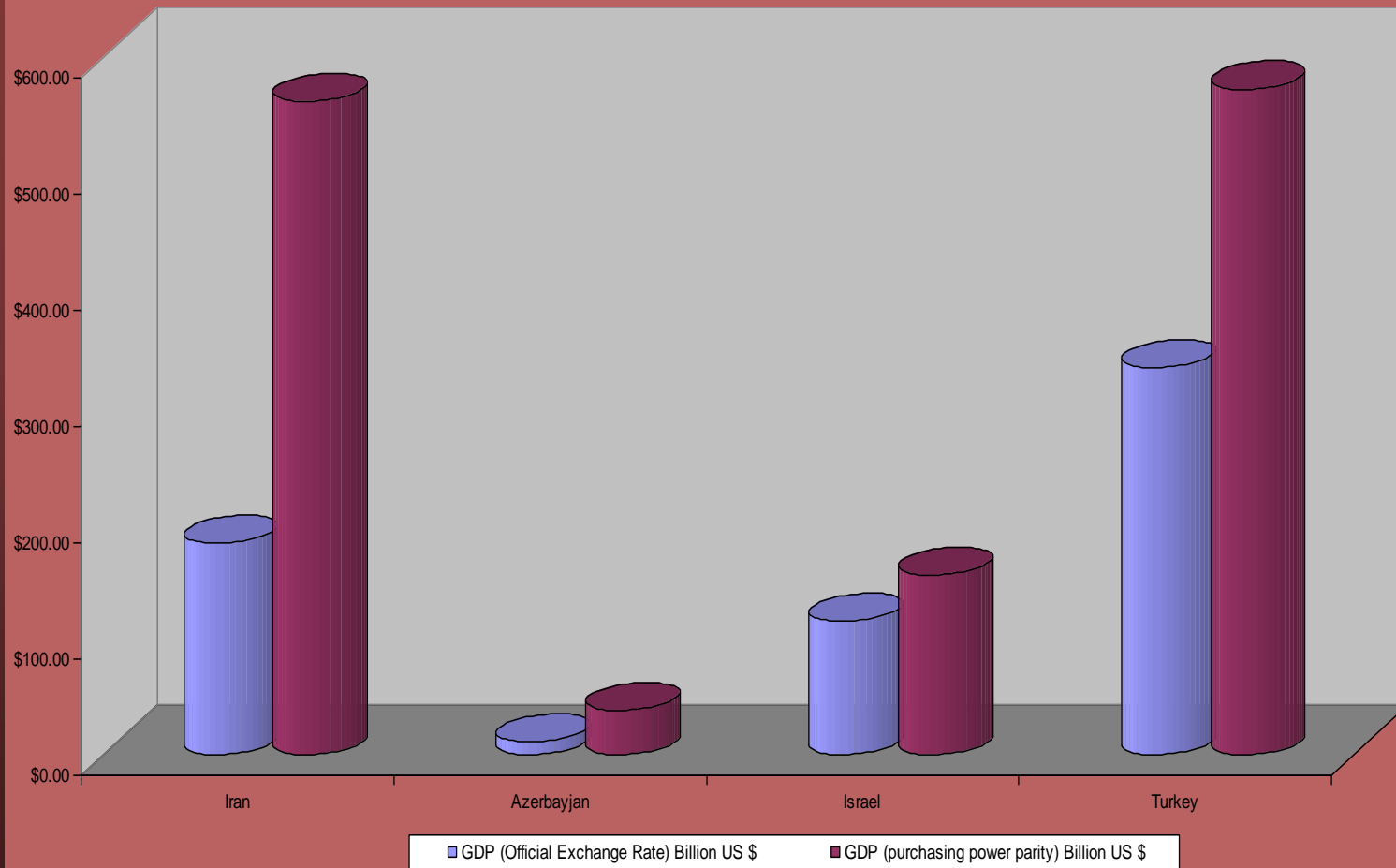


GDP (official exchange rate) /capital



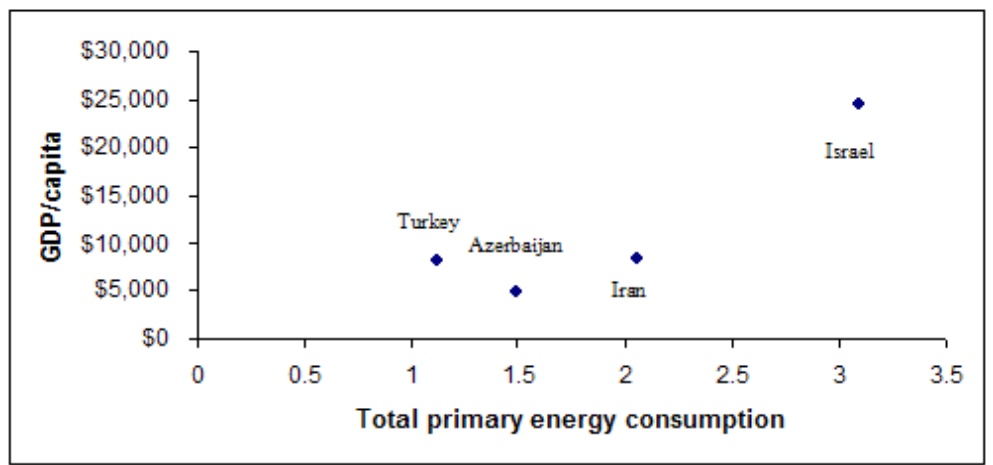
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GDP PPP vs. GDP Exchange Rate



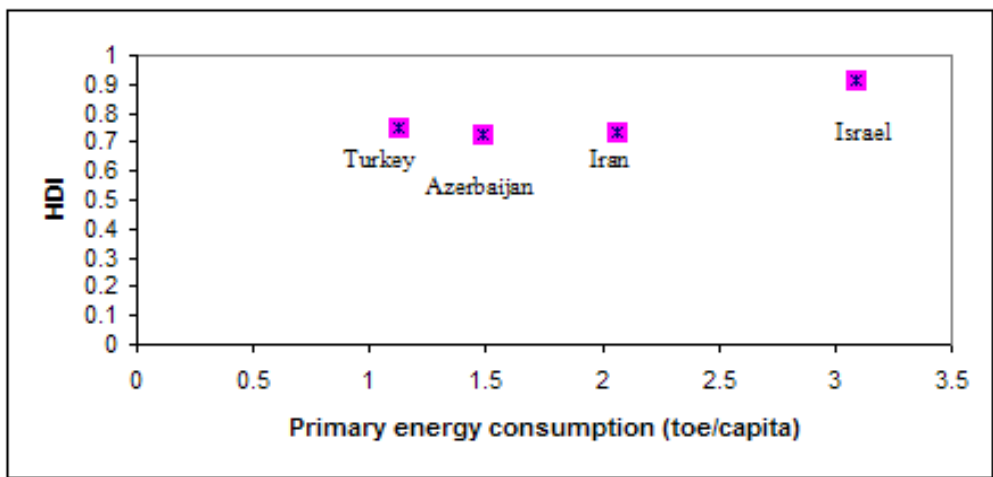
*based on IEA Energy Statistics

Development Status



GDP versus total primary energy consumption for all four countries.

Based on 2005 GDP (PPP) per capita
Data from IMF, and IEA Statistics



HDI versus primary energy consumption.

Based on 2005 UN, Human
Development Index Report

Future Trends and *the Sustainable Vision*



- A substantial increase in population which begins to slow around 2050
- Increasing urbanization
- Increase in energy consumption and demand
- *Energy sources which are reliable, affordable, accessible, and with minimum environmental impact.*
- *Further development which would improve the quality of life and conserve energy resources.*

Challenges along the Sustainable Pathway...



- Economic limitations
- The problem of scale: International, National, Local, Regional, Household, Individual
- Cultural challenges (e.g., lack of environmental awareness)
- Governmental inefficacy and / or corruption
- Rapid population growth, i.e. service provision cannot keep up with demand

Alternative Energy Pathway: Power Generation



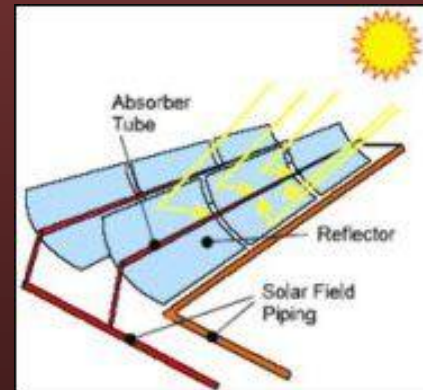
Biogas: generation of electricity from human and animal waste



PETAL (photon energy transformation astrophysics laboratory) for the generation of solar electricity



solar electric power plants



Concentration of the sun's energy and energy storage for generation of power in any condition

Building



Mud building from natural materials



Insulation and passive solar heating

Mobility



- Cars: hybrid, biomass fuels
- Improved public transportation
- Encourage bicycle use

Industry and Manufacturing



- Co-generation
- Efficiency

The Re-Vision?



- The Individual
- Indigenous Knowledge
- Site appropriate design, e.g., permaculture and urban agriculture
- Localized economy
“Small is Beautiful”

Toward a Sustainable Energy Future



Thank You for Your Attention

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