Human Development and Global Energy Security

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Mississippi Technology Alliance

Strategic Biomass Solutions™
www.technologyalliance.ms

Energy

- Energy is one of the basic needs for the survival of mankind in addition to
  - Food
  - shelter and
  - healthcare

Energy is the largest industry on the planet, with sales of over three trillion dollars annually; food is a distant second at 1.7 trillion.

Note: U.S. energy industry is valued at one trillion (1/3 of the total)

Kamen, D.M. Spring 2005. "An Energy Policy for the 21st Century," *PolicyMatters*, Vol. 2(2), p14.

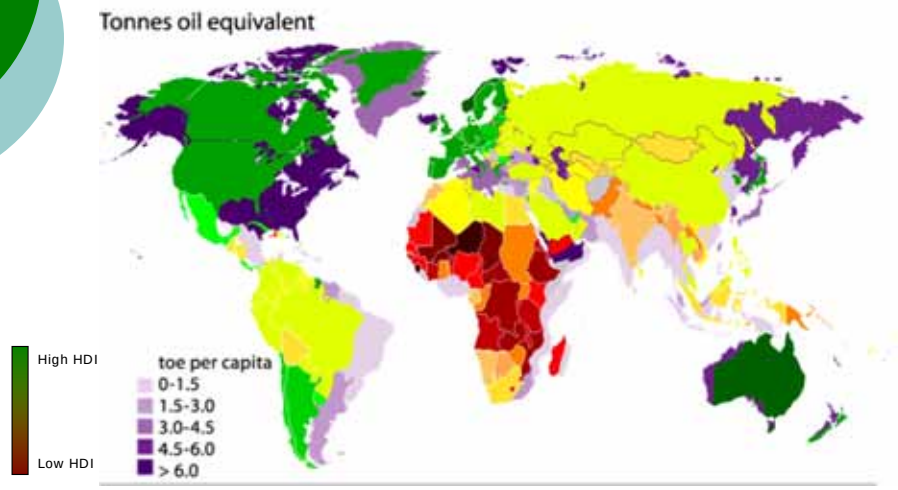
Major Energy Issues

- Affordability
  - Percentage of income?
- Accessibility
  - Do you even have it?
- Security
  - Can you get it when you want it?
- Reliability
  - What is the supply performance?

Primary energy consumption /Human Development Index

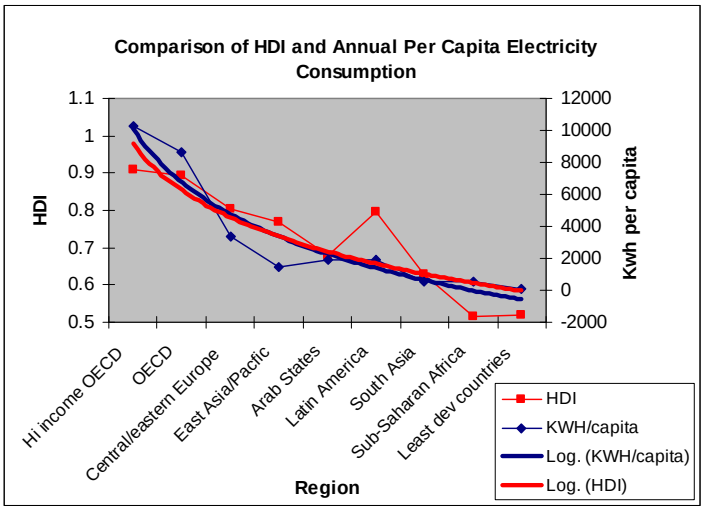
Per capita

BP Statistical Review of World Energy 2005



http://en.wikipedia.org/wiki/List_of_countries_by_Human_Development_Index

Energy & Human Development



Energy Use Patterns

HDI rank	Traditional fuel consumption (% of total energy requirements) 2002	Electricity consumption per capita (kilowatt-hours) 1980	2002
Developing countries	24.5	388	1,155
Arab States	18.0	626	1,946
East Asia and the Pacific	11.0	329	1,439
Latin America and the Caribbean	19.8	1,019	1,927
South Asia	24.5	171	566
Sub-Saharan Africa	70.6	434	536
Central and Eastern Europe and the CIS	4.1	3,284	3,328
OECD	4.1	5,761	8,615
High-income OECD	3.0	6,698	10,262
Medium human development	17.0	368	1,121
Low human development	71.1	135	133
High income	2.9	6,616	10,198
Middle income	9.2	623	1,653
Low income	42.2	174	399
World	7.6[b]	1,573	2,465

Human Development Indicators: 2005 UNDP Report

Table 22: Energy and the environment

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http://hdr.undp.org/reports/global/2005/pdf/HDR05_HDI.pdf

Problems with Fossil Fuels

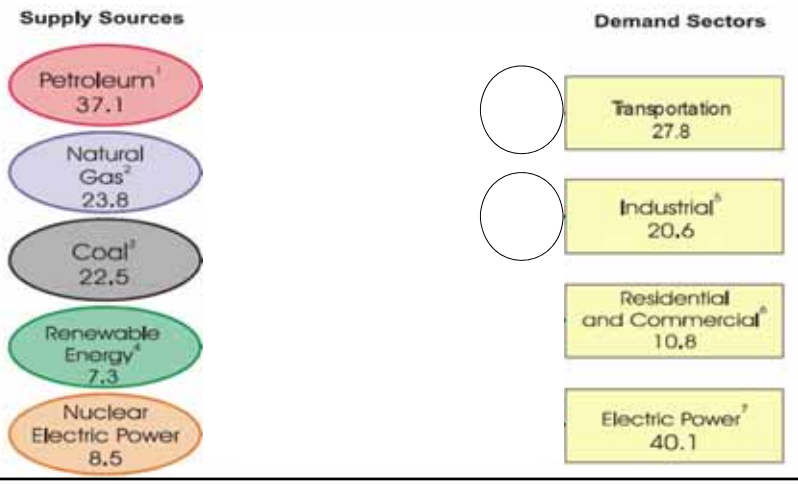
- Fossil fuel resources unevenly distributed around the globe (NWYNI)
- Price volatility (geo-political events as well as natural events)
- Environmental Issues

Advantages of Fossil Fuels

- High energy density per unit
- Perceived cost
- Well developed infrastructure
- Still a lot to go around

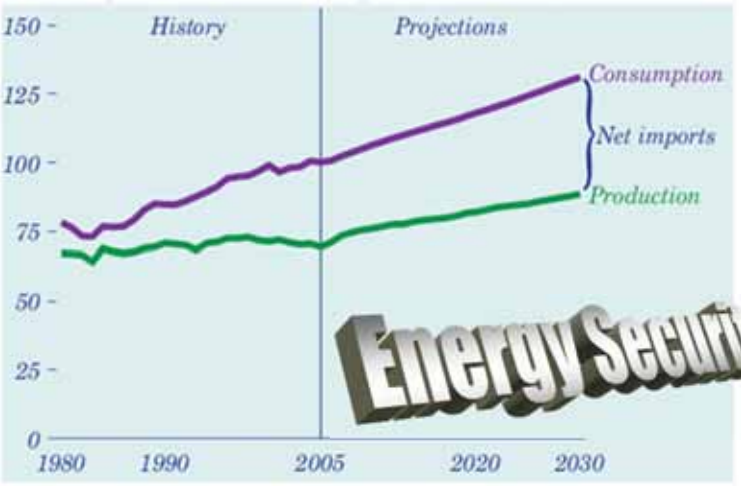
www.eia.gov

U.S. Primary Energy Consumption by Source and Sector, 2008 (Quadrillion Btu)



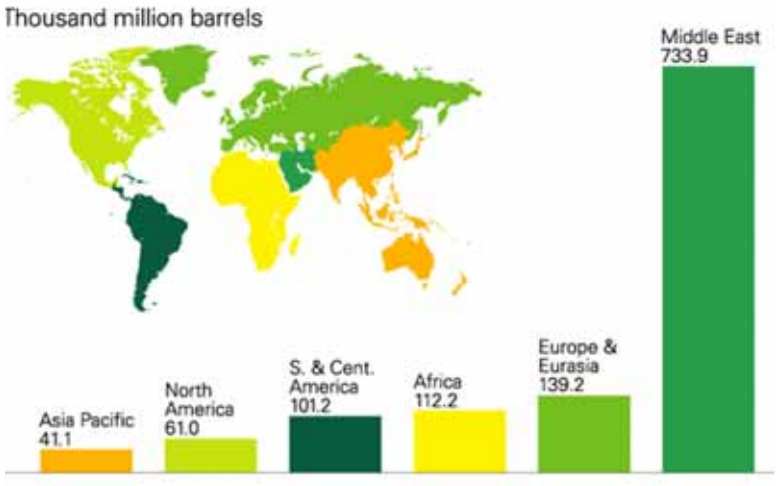
Energy Use Projections

Total Energy Production and Consumption from 1980 – 2030 (quadrillion BTU)



We **import** nearly **60%** of our petroleum needs; predicted to only increase

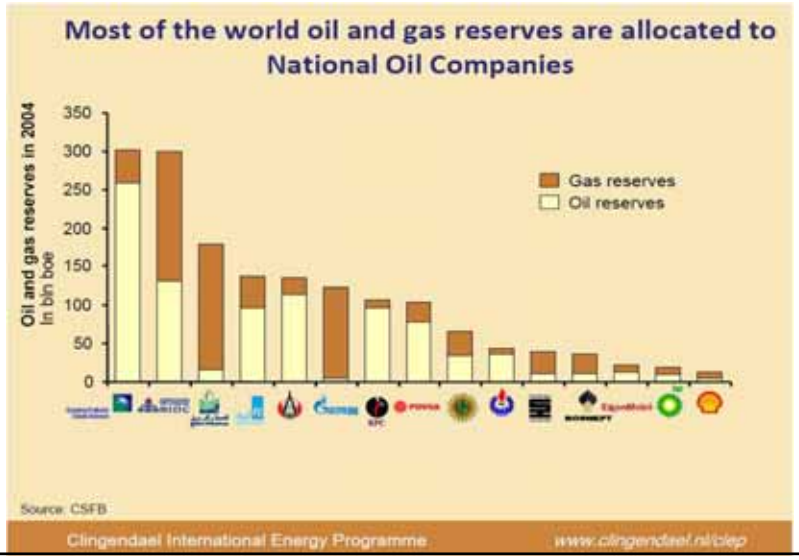
Proved oil reserves



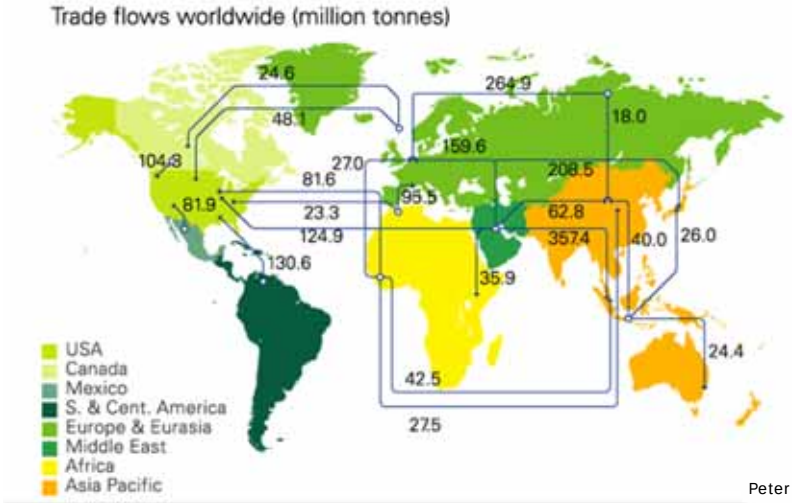
Peter Davies
London, 14 June 2005
BP Statistical Review of World Energy 2005

at 2004 end

Who controls the oil?



Major oil trade movements



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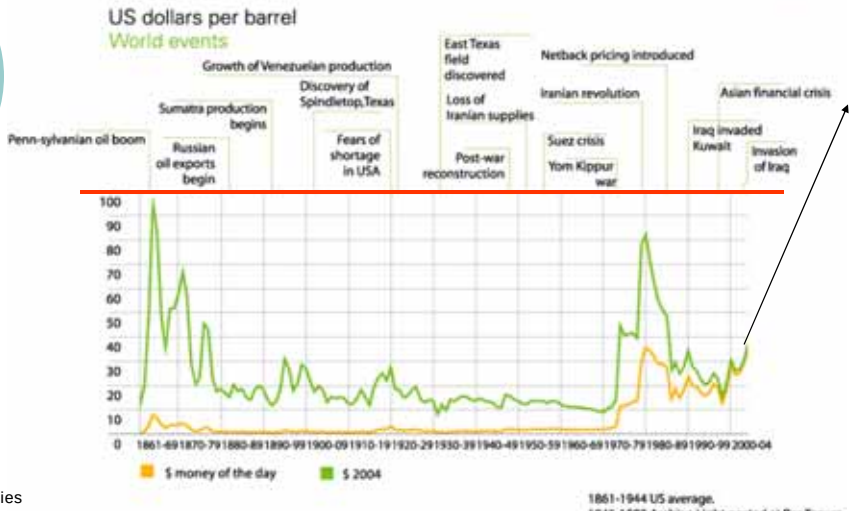
Energy Security Index & Transportation Through the Straits of Hormuz

(%)

	Dependency on Imported Energy	Share of oil in Energy	Dependency on Oil Imports	OPEC Share of Imported Oil	***Transportation through Hormuz***
Japan	81.0	49.4	99.7	88.5	***82.0***
US	27.2	39.3	60.1	47.5	***18.2***
Germany	61.1	37.2	96.7	19.2	***3.7***
Italy	84.6	50.6	93.7	56.7	***22.7***
China	0.6	23.9	30.7	---	***---***

Crude oil prices since 1861



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1861-1944 US average.
1945-1983 Arabian Light posted at Ras Tanura.
1984-2004 Brent dated.

Terrorist Threats

- "We also anticipate a rise in the price of petroleum even before the operations (take place) solely on the account of the statement and the study which are issued. In this there is good media gain since we raise the price of oil by merely issuing a statement, then we raise it again through some of the limited operations against petroleum targets which are poorly protected."

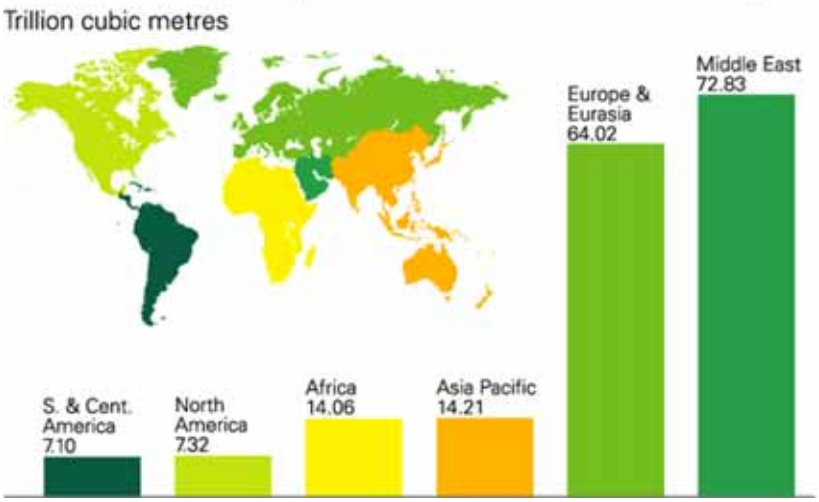
Abu Bakr Naji. (2006). Translated by William McCants. *The Management of Savagery: The most critical stage through which the Umma will pass.* (Funding for this translation was provided by the John M. Olin Institute for Strategic Studies at Harvard University).

Infrastructure Vulnerabilities

- Production facilities, such as petroleum fields, wells, platforms, and rigs;
- Refineries and gas processing plants;
- Transportation facilities, including pipelines and pumping stations, terminals and tank ships;
- Oil and gas depots;
- Administration buildings;
- Distribution centers/petrol stations; and
- All personnel on or employed at these installations.

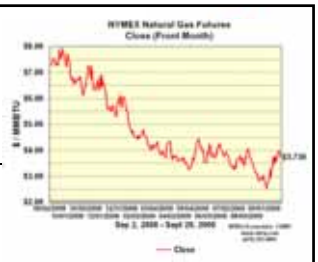
Lia & Kjok, 2004

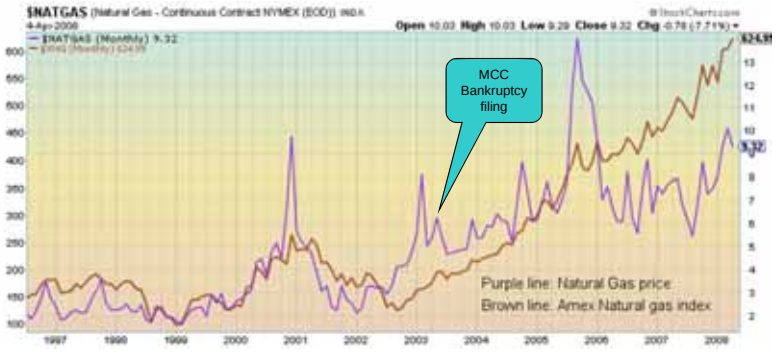
Proved natural gas reserves



At end of (2004) – BP Annual Statistical Summary

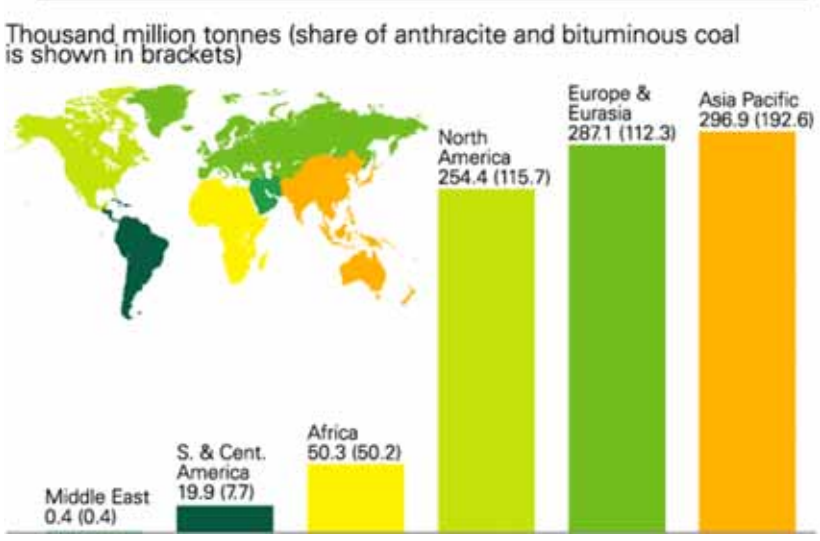
Natural Gas Price Volatility





Source: 321 Energy, http://www.321energy.com/editorials/mckenziebrown/mckenziebrown040808.html

Proved coal reserves (at end 2004)



China's Strategy

Long term target:

2000 – 2020 : quadruple its GDP by 2020 while only doubling its energy use.

Mid term target:

2006 – 2010 : energy consumption of per unit of GDP will reduce 20%.

Dr. Feng Fei
Development Research Center
State Council, PR China

Securing and Improving energy supply

- ***2005, the National People's Congress passed the Renewable Energy Law.***
- ***10% of energy consumption from renewable sources by 2010, 18% by 2020, 30% by 2030 and 50% by 2100.***

Energy Independence?

- ***94% energy supply comes from domestic resource in 2005, and about 80% in 2020. Energy import dependency is much lower than the major countries.***
- ***Ranking 2nd largest consumer after US, but oil consumption is only less 1/3 compared with US.***
- ***Oil demand will be 450 million ton by 2020. Oil import dependency will increase to 60%.***

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Advantages of Renewable Energy

- Abundant and Renewable!
- Environmentally beneficial
- Localized availability
- Positive impact on human development

Problems with Renewable Energy

- Higher cost (although coming down)
- Technology (im)maturation
- Energy density per unit can be low

What is needed?

- The key to energy security has always been diversification.
- requires having oil from multiple sources
- developing a variety of types of energy
- take into account the rapid evolution of
  - the global energy trade
  - supply-chain vulnerabilities
  - Terrorism
  - integration of major new economies into the world market.

Daniel Yergin, 2006

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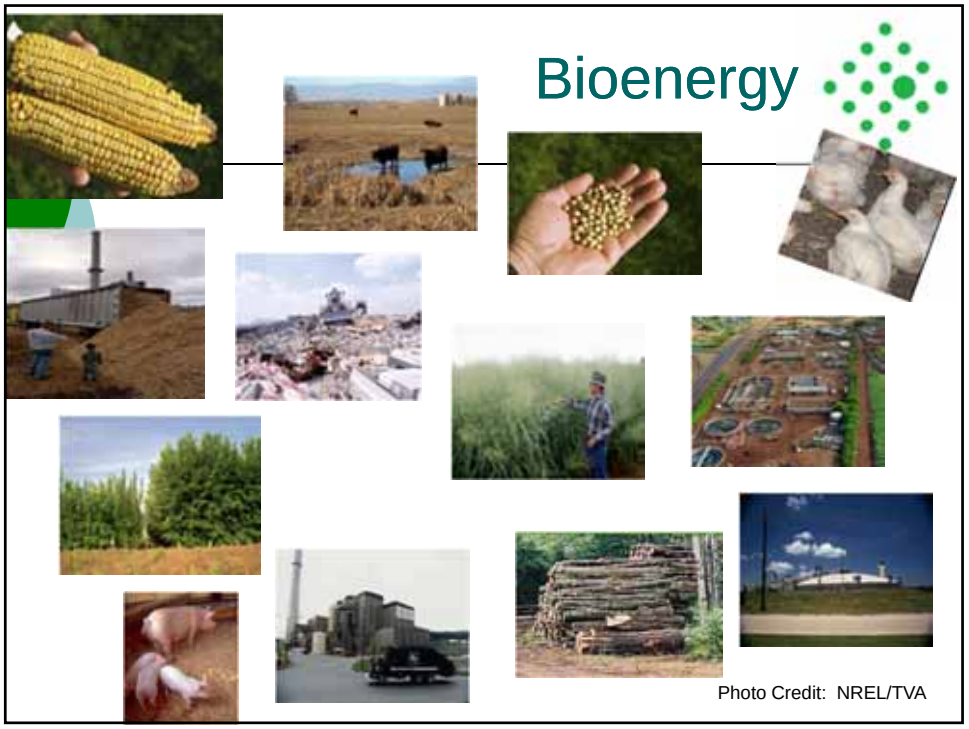


Biomass Potential

- ***The world production of biomass is estimated at 146 billion metric tons a year, mostly wild plant growth.***
- ***Biomass accounts for 35% of primary energy consumption in developing countries, raising the world total to 14% of primary energy consumption.***
- ***In the future, biomass has the potential to provide a cost-effective and sustainable supply of energy, while at the same time aiding countries in meeting their greenhouse gas reduction targets.***
- ***By the year 2050, it is estimated that 90% of the world population will live in developing countries.***

Balat, M., Ayar, G. 2005.

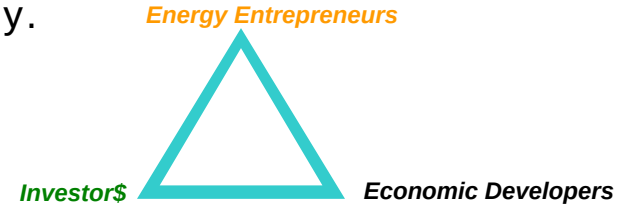
Significance of Energy Development

- Energy and energy technologies have a **central role in social and economic development at all scales:** household and community to regional, national and international.
- Among its welfare effects, energy is closely linked with public health both positively and negatively (due to environmental pollution and degradation)
- **Renewable energy technologies** are used as an example of how an integrated energy-health approach can be used in policy analysis and formulation.

Ezzati, M. et al. 2004.

Strategic Biomass Solutions™

- Help commercialize renewable energy technologies by making them investor ready.



- **SBS is funded in part by the U.S. Department of Energy.**
- Mississippi Technology Alliance is a non-profit organization with the mission to drive innovation and technology-based economic development for the state of Mississippi.

Summary

- Energy development is critical for human development
- Renewable energy development should be an integral part of economic development and the energy mix – *NOT the only energy sources*
- Environmental drivers are important
- Multi-party alliances are essential

Investing in renewable energy is like investing for your retirement…

You must ***diversify*** and you ***can't wait*** till you are about to retire!

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www.mta.ms/biomass

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