Global Energy Management Program
BUSINESS SCHOOL
UNIVERSITY OF COLORADO **DENVER**

Mini-School of Global Affairs

Principles of Global Energy

November, 2016

About GEM – CU Denver Business School

GEM MS Degree

- **Comprehensive graduate business & leadership program**
- **Designed in partnership with the energy industry to develop its succession pipeline**
- **Unique hybrid-online delivery includes both classroom and remote instruction**
  - GEM students can live anywhere in the world
- **Student and Alumni Profile:**
  - Nearing 250 alumni and growing
  - GEM alumni are employed in approximately 175 organizations across the energy spectrum
  - Approximately 60% of GEM alumni are in Colorado

Industry/Public Education

- Lifecycle of Oil & Gas
- MOOC: Fundamentals of Global Energy Business (Coursera)
- MOOC: Public Utilities and Power (Coursera)
- GEM Speaker Series (Ongoing)

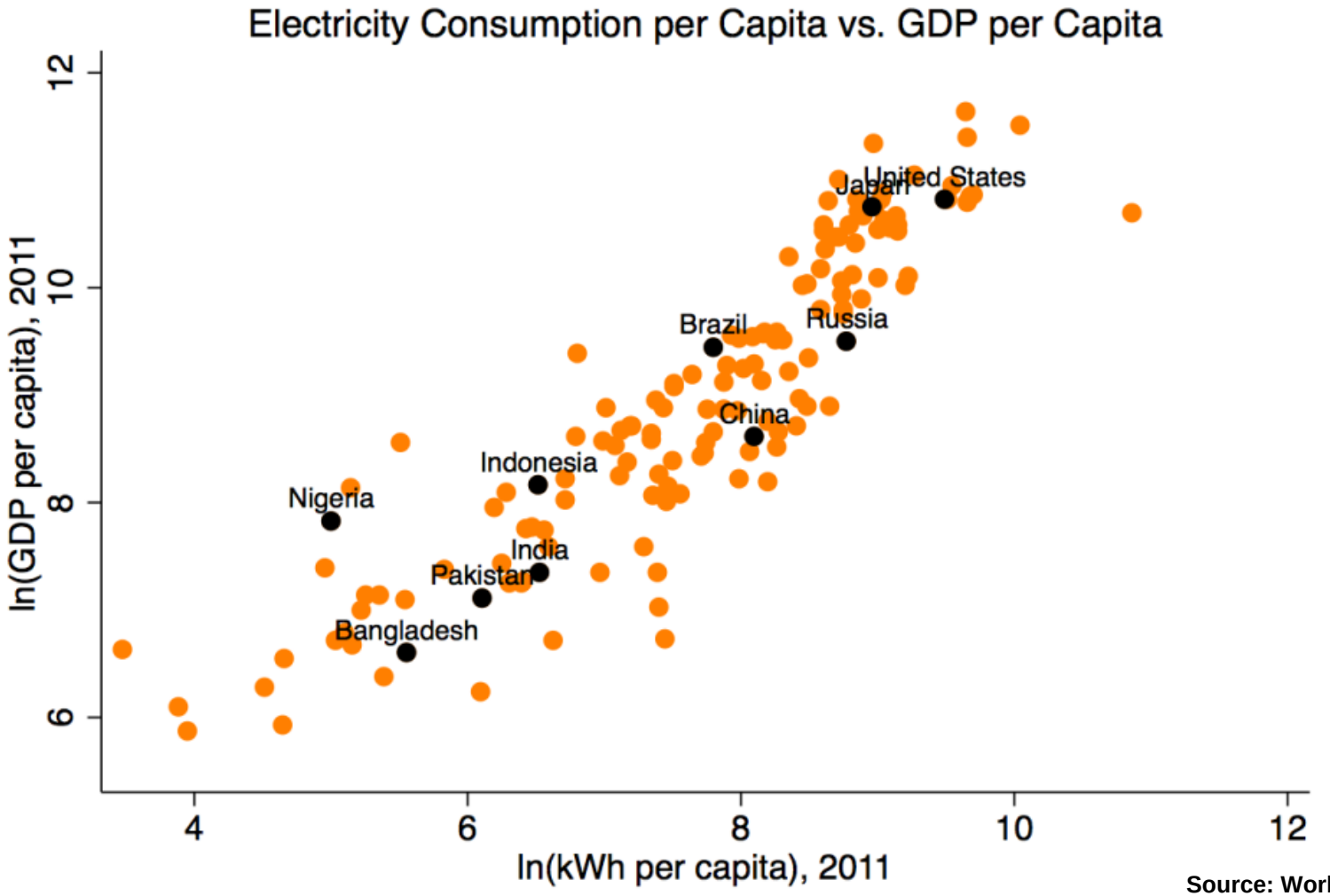
Growth/Outreach Initiatives

- GEM Water Reuse Study
- International Initiatives
- Executive-in-Residence
- GEM Alumni Association

The Principles

1. All human life and well-being depends on energy.
2. Energy technology is always evolving; there is no “end point.”
3. The production and use of energy in any form always have some impact on the environment; this impact must be integral to energy decisions and priorities.
4. Energy has both value and cost, and must be used efficiently, maximizing work performed for energy produced.
5. Alleviation of energy poverty is crucial to global stability and progress.
6. There are multiple stakeholders in the production and use of energy in any form; all will assert their interests.
7. Energy producers and suppliers have a right to a fair profit that takes into account investment, innovation, effort, operational effectiveness, and business and technological risk.
8. Sustainable energy production and use must balance economic, environmental, and social imperatives; this balance evolves over time with innovation and changes in the human condition.
9. Energy security considerations have profound effects on global stability and prosperity; these must be evaluated thoroughly, leading to prudent decisions that maximize the common good.
10. The energy sector, broadly defined, is a force for good in the world and should be seen as such.

1. Energy is Fundamental



Source: World Bank

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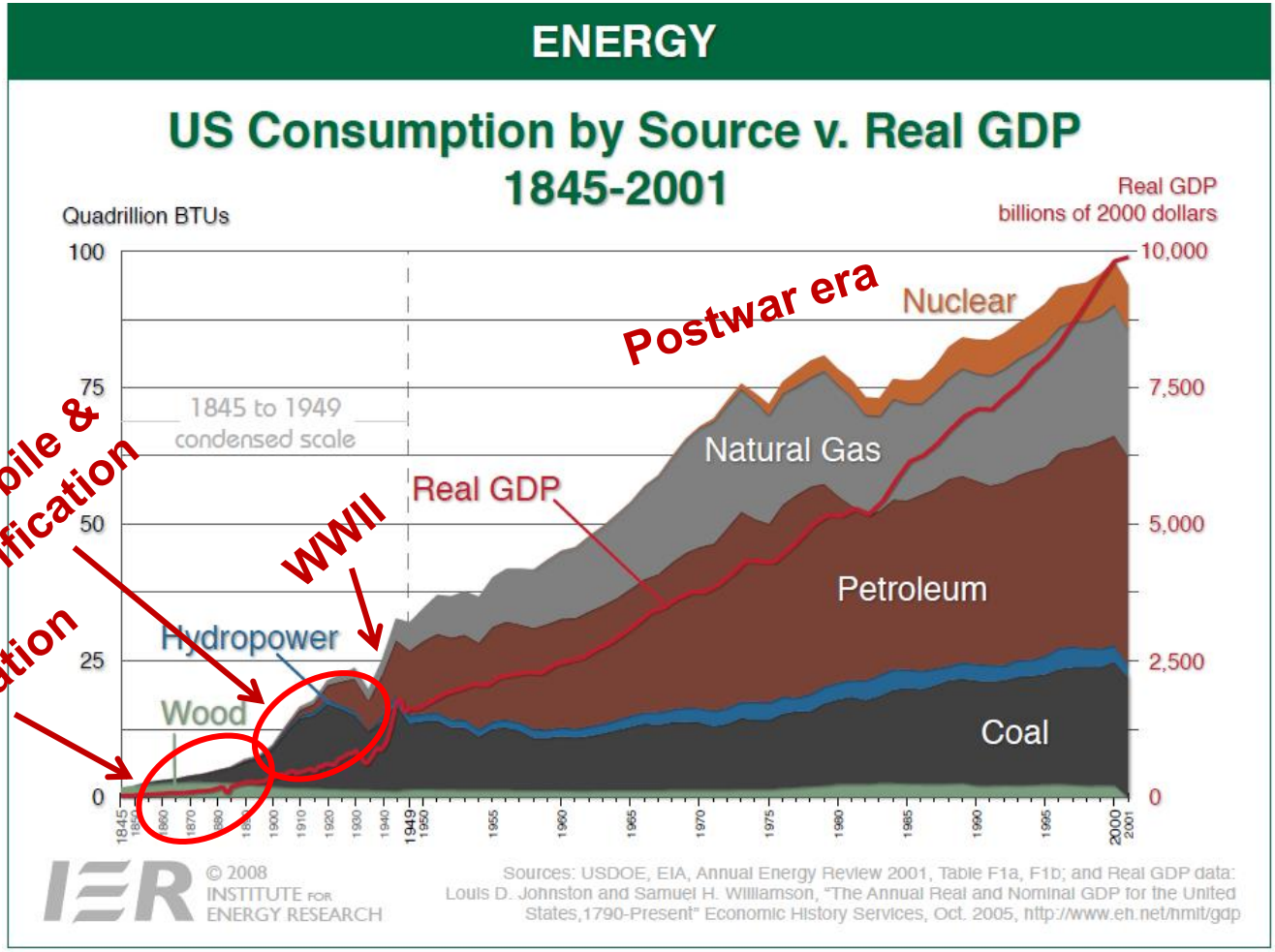

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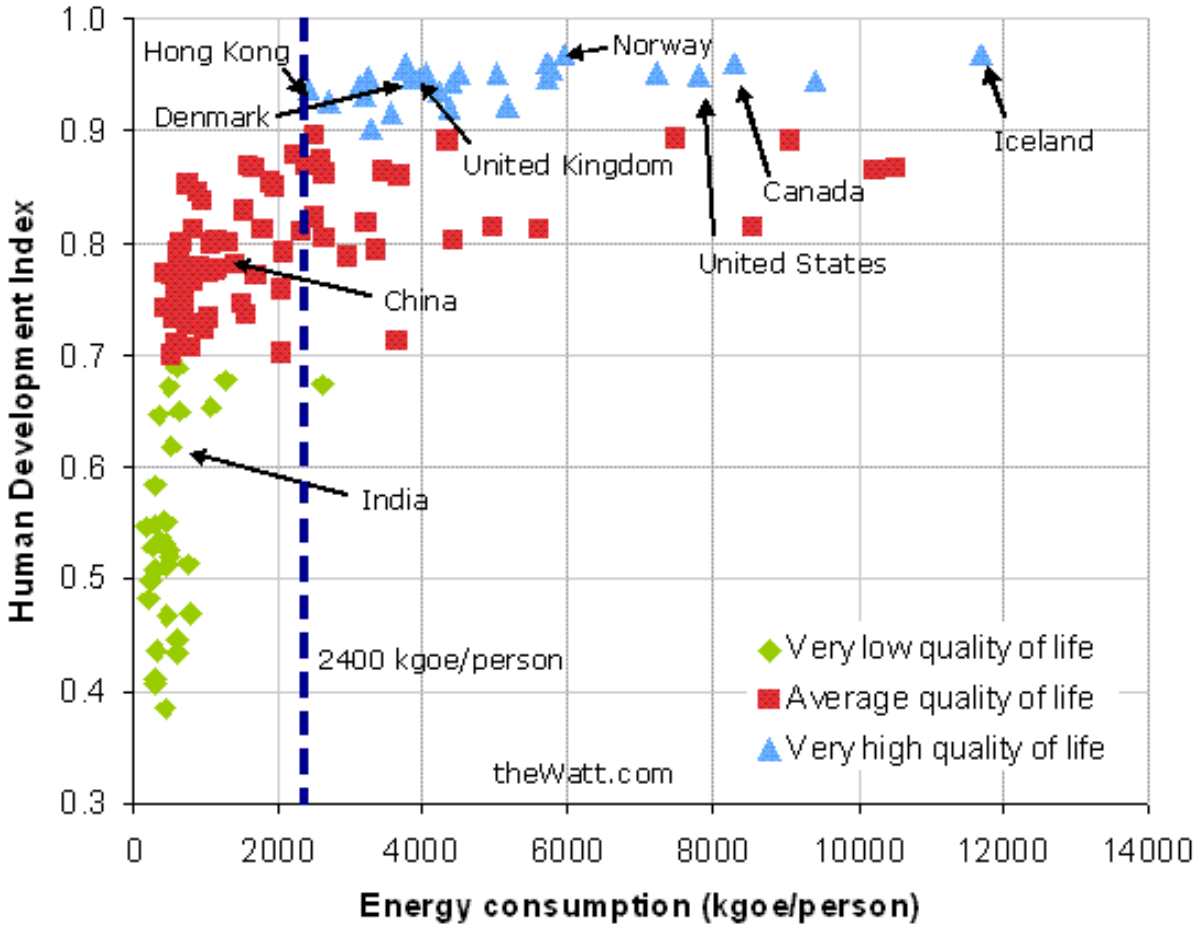
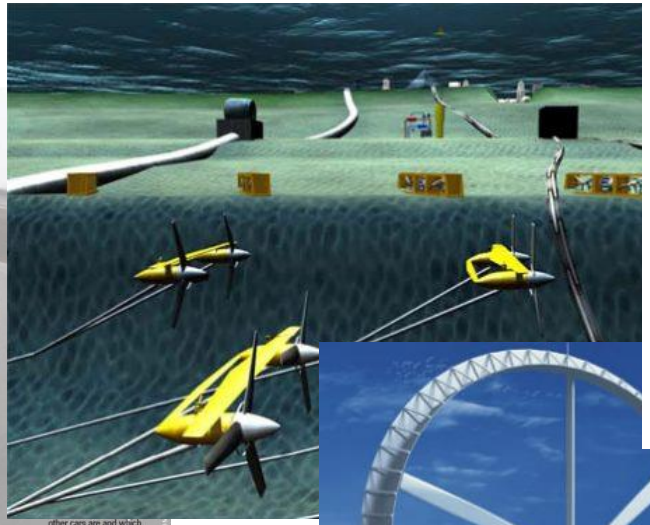
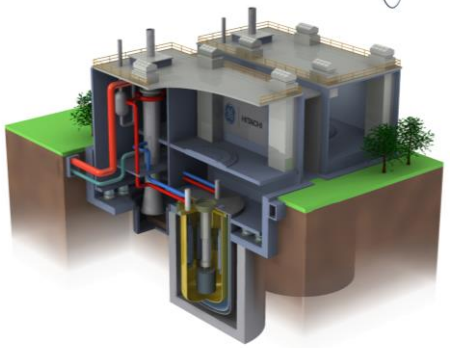
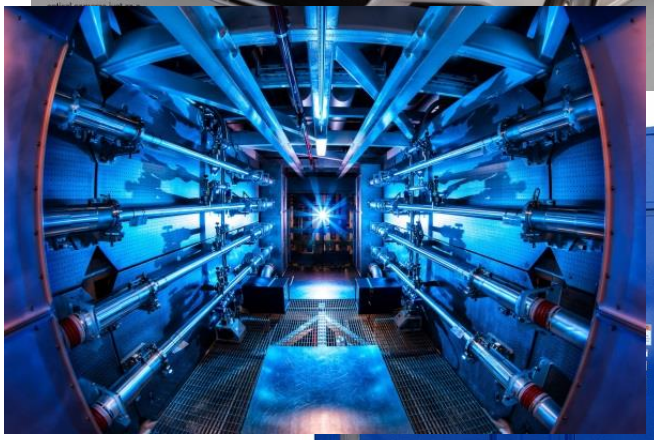


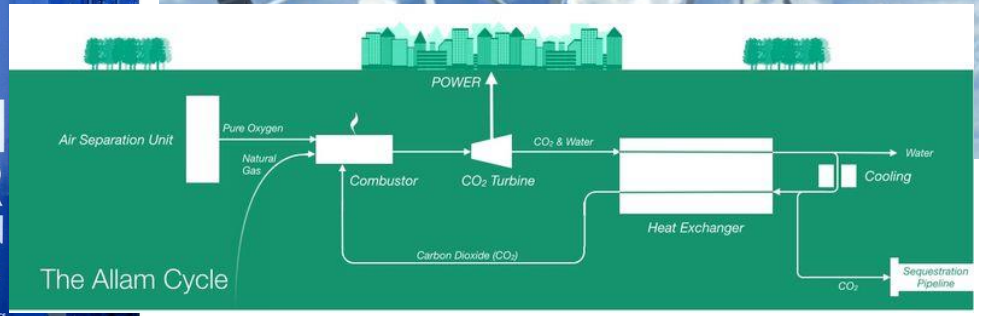
2. Energy Technology



GE Hitachi
Nuclear Energy







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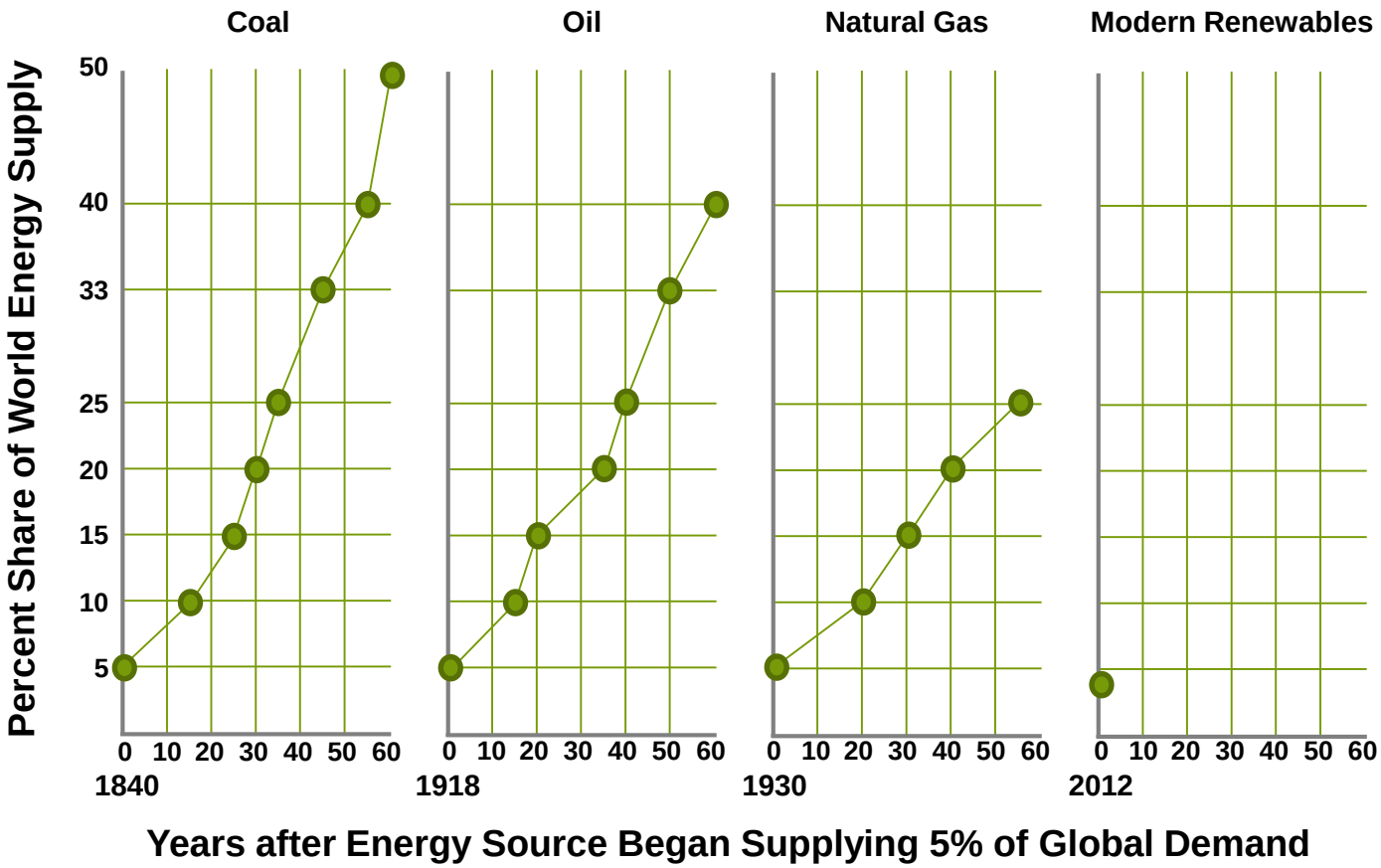

3. Energy and the Environment

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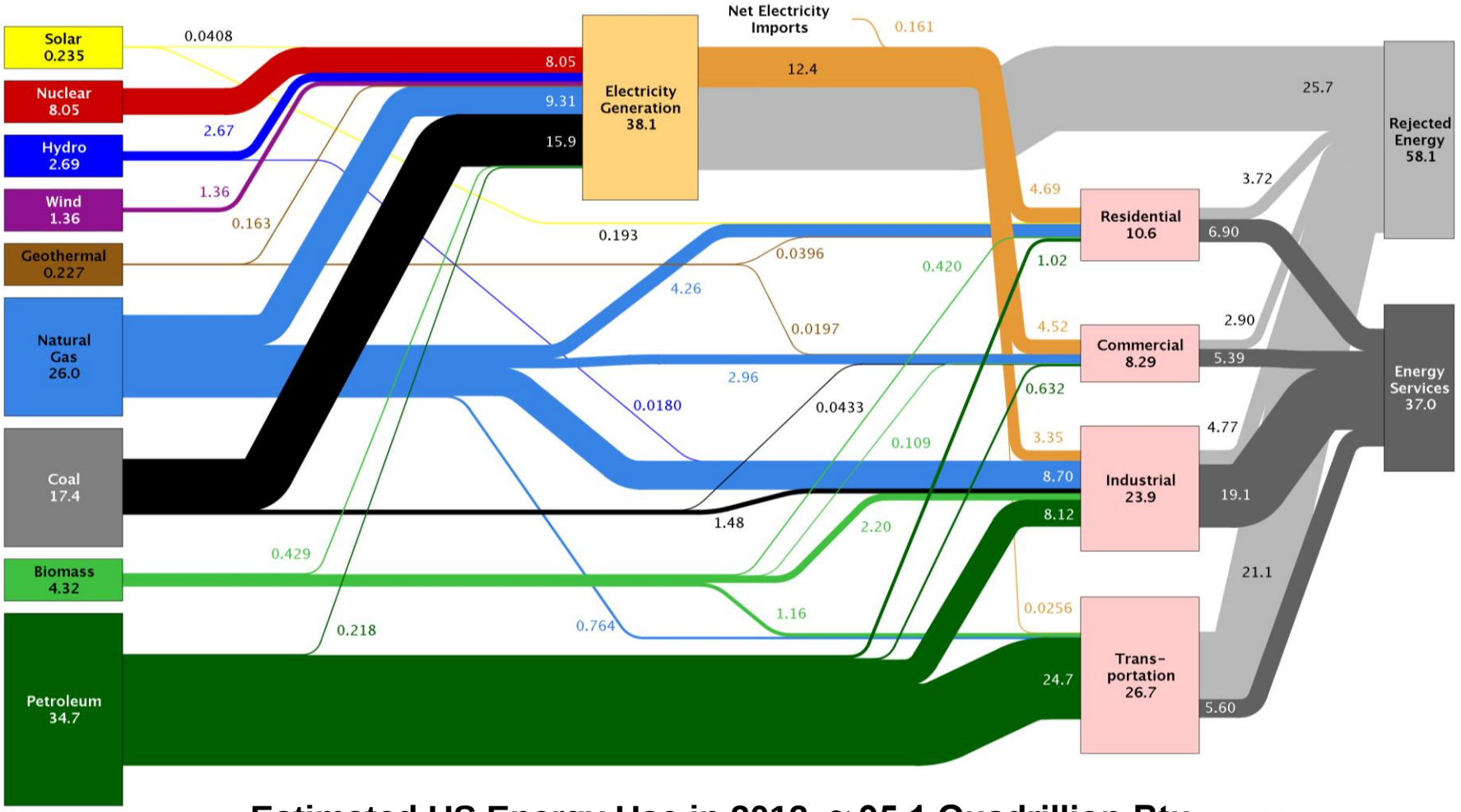
4. Energy Efficiency

Lawrence Livermore National Laboratory



Estimated US Energy Use in 2012: ≈ 95.1 Quadrillion Btu

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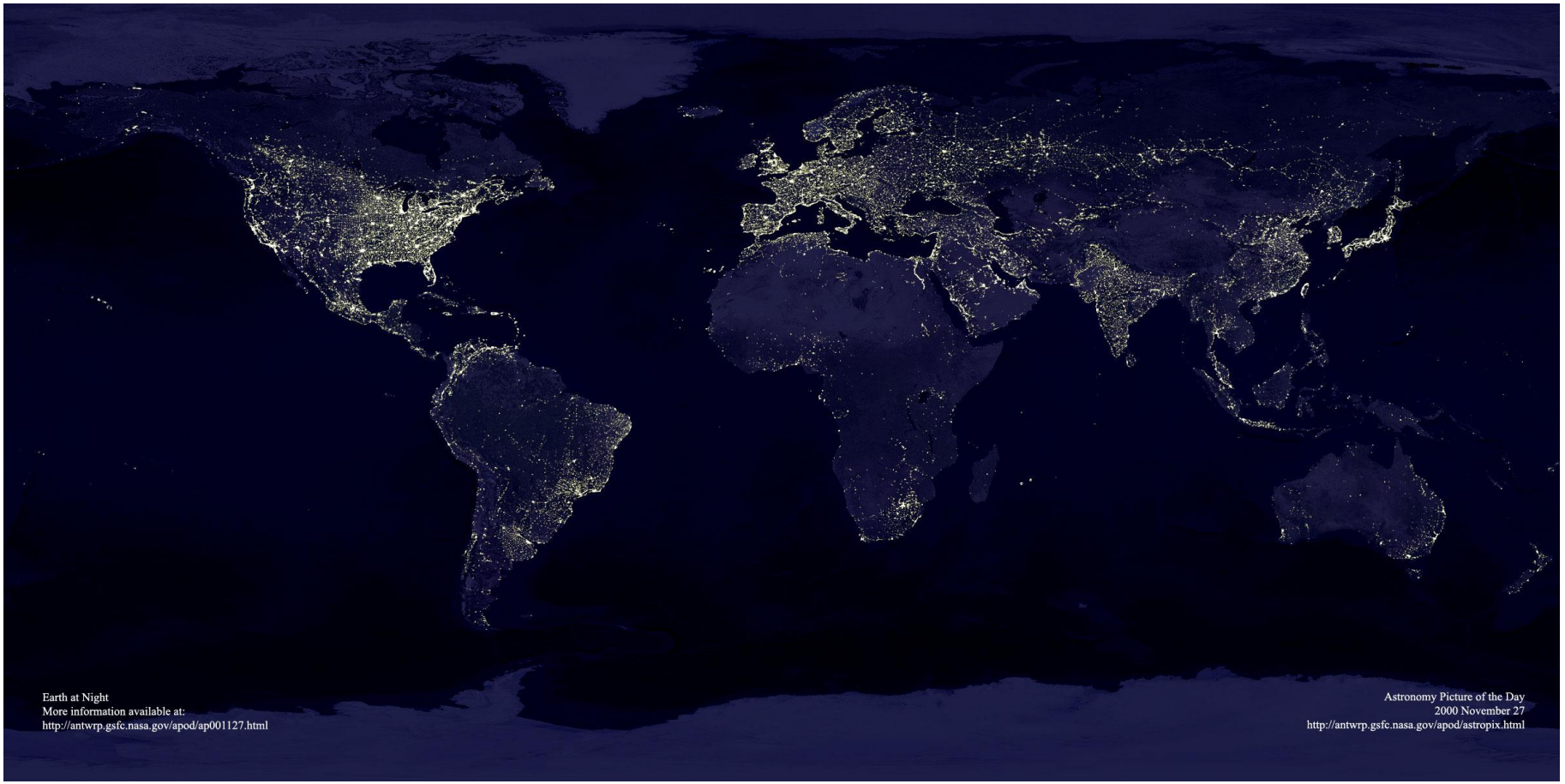
5. Energy Poverty



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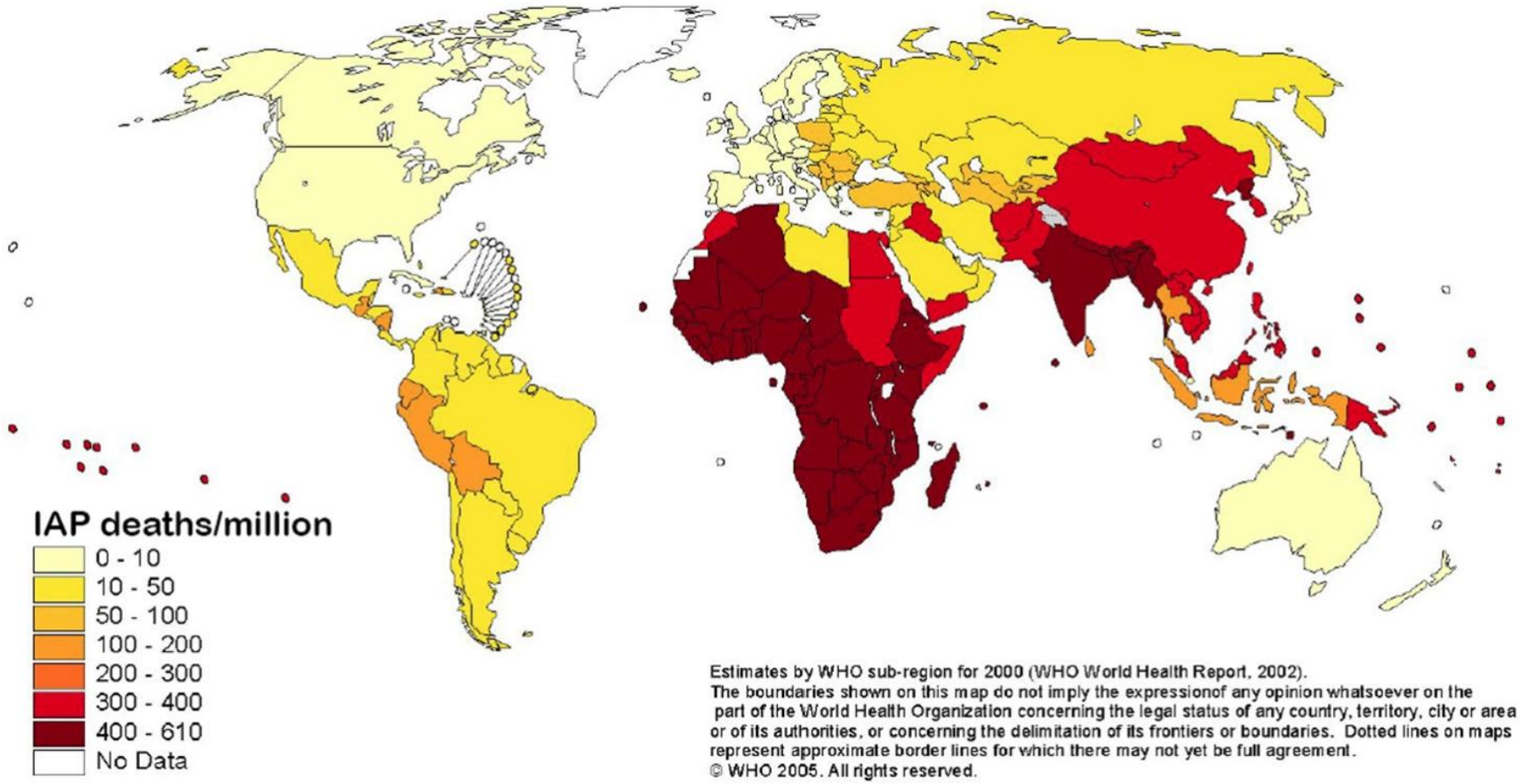

Estimates by WHO sub-region for 2000 (WHO World Health Report, 2002).
The boundaries shown on this map do not imply the expressionof any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

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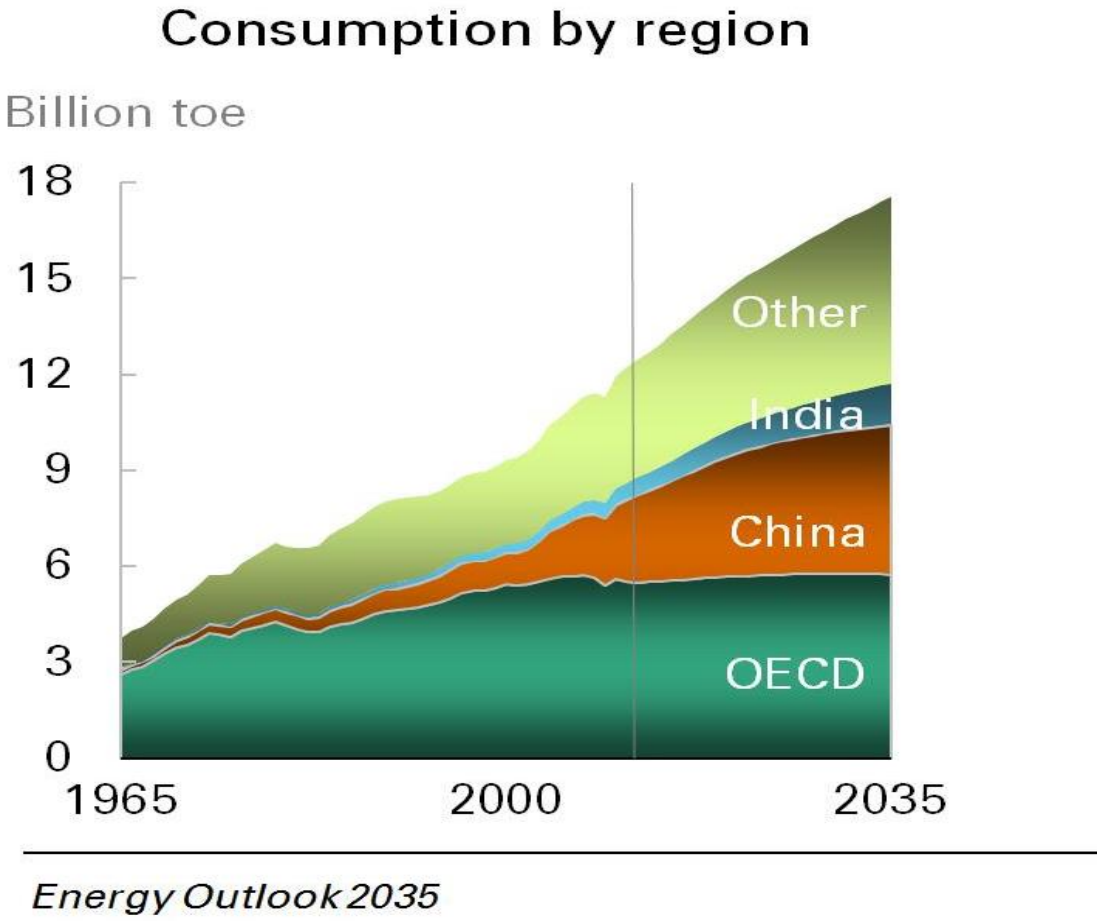
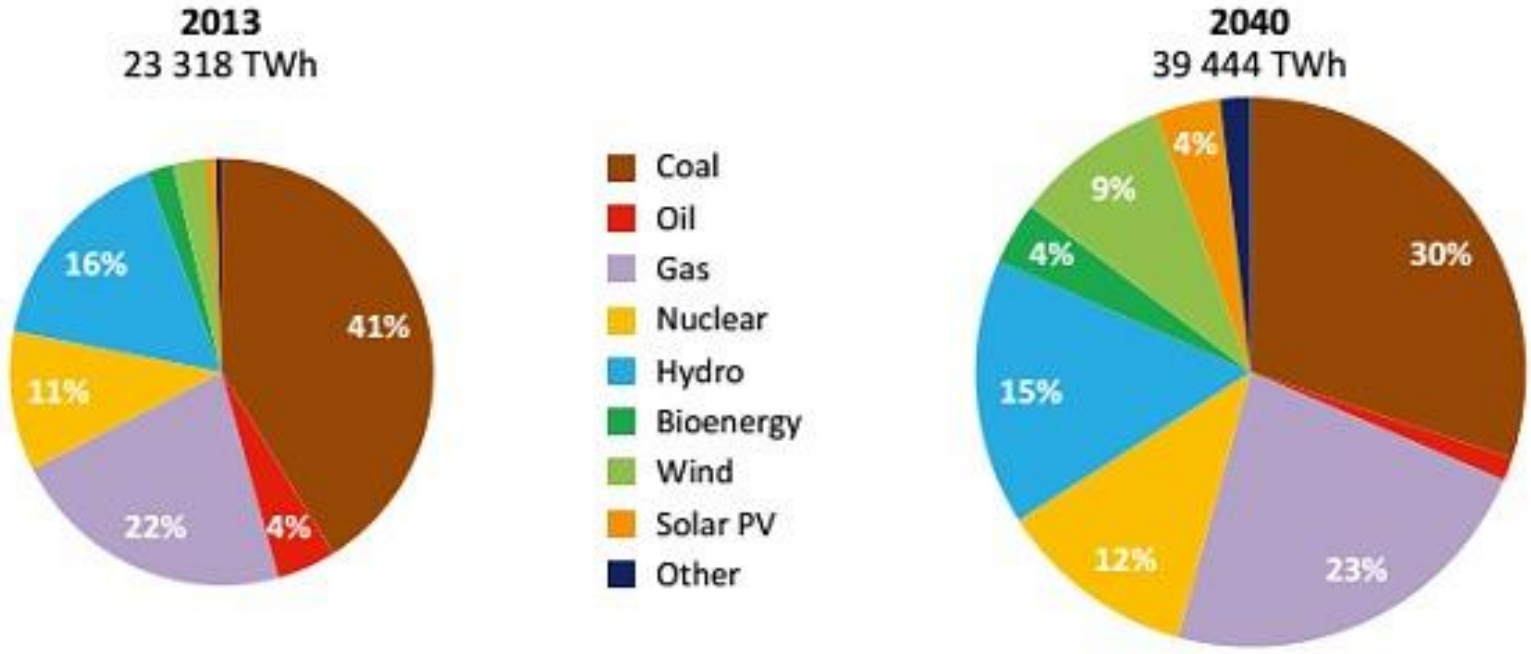


Energy Outlook 2035

5. Energy Poverty

Figure 2.15 ▷ World electricity generation by type in the New Policies Scenario



Note: Other includes geothermal, concentrating solar power and marine.

6. Energy Stakeholders

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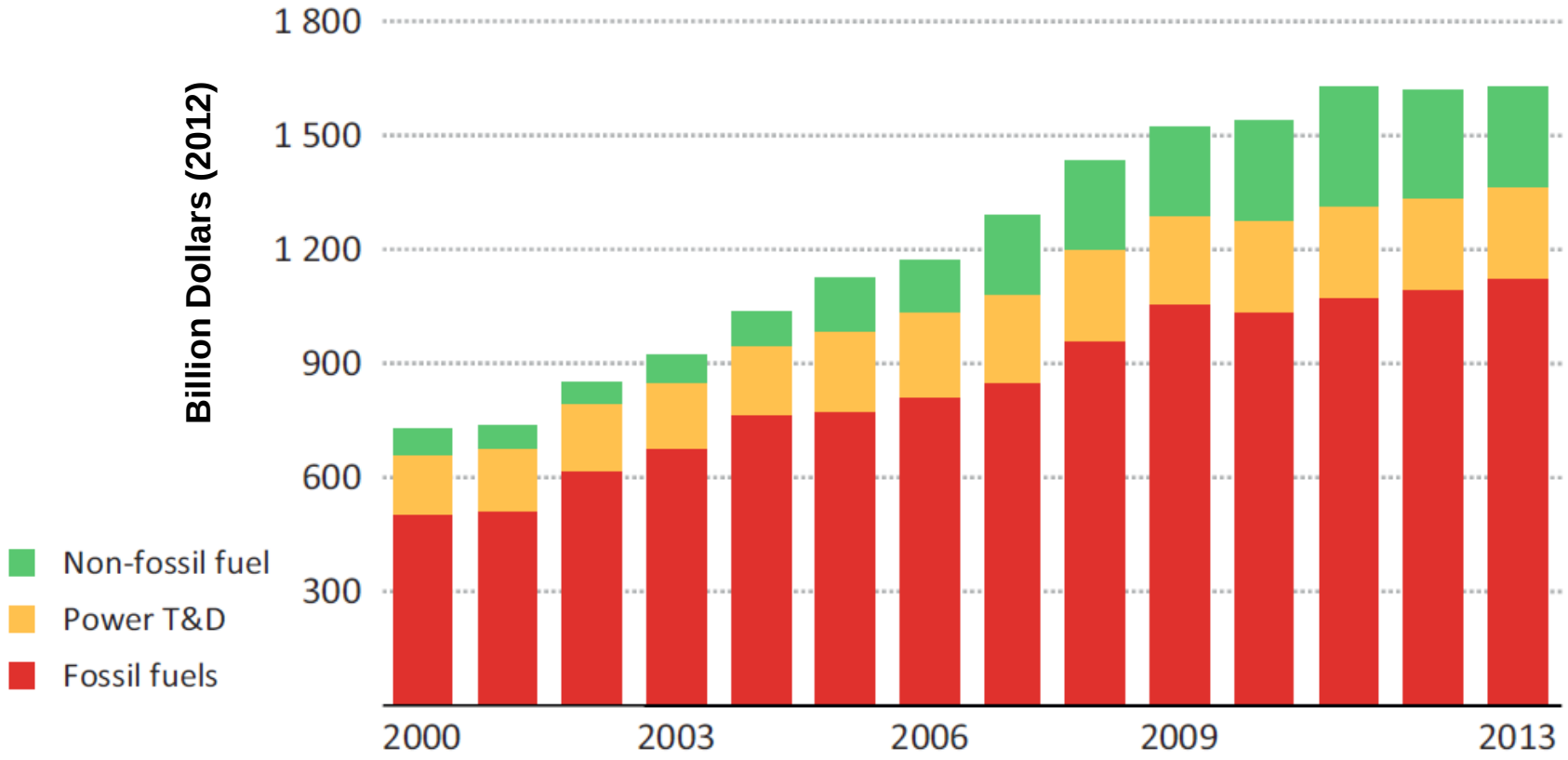
7. Energy Profitability

Investment in global energy supply by fossil fuel, non-fossil fuel and power T&D

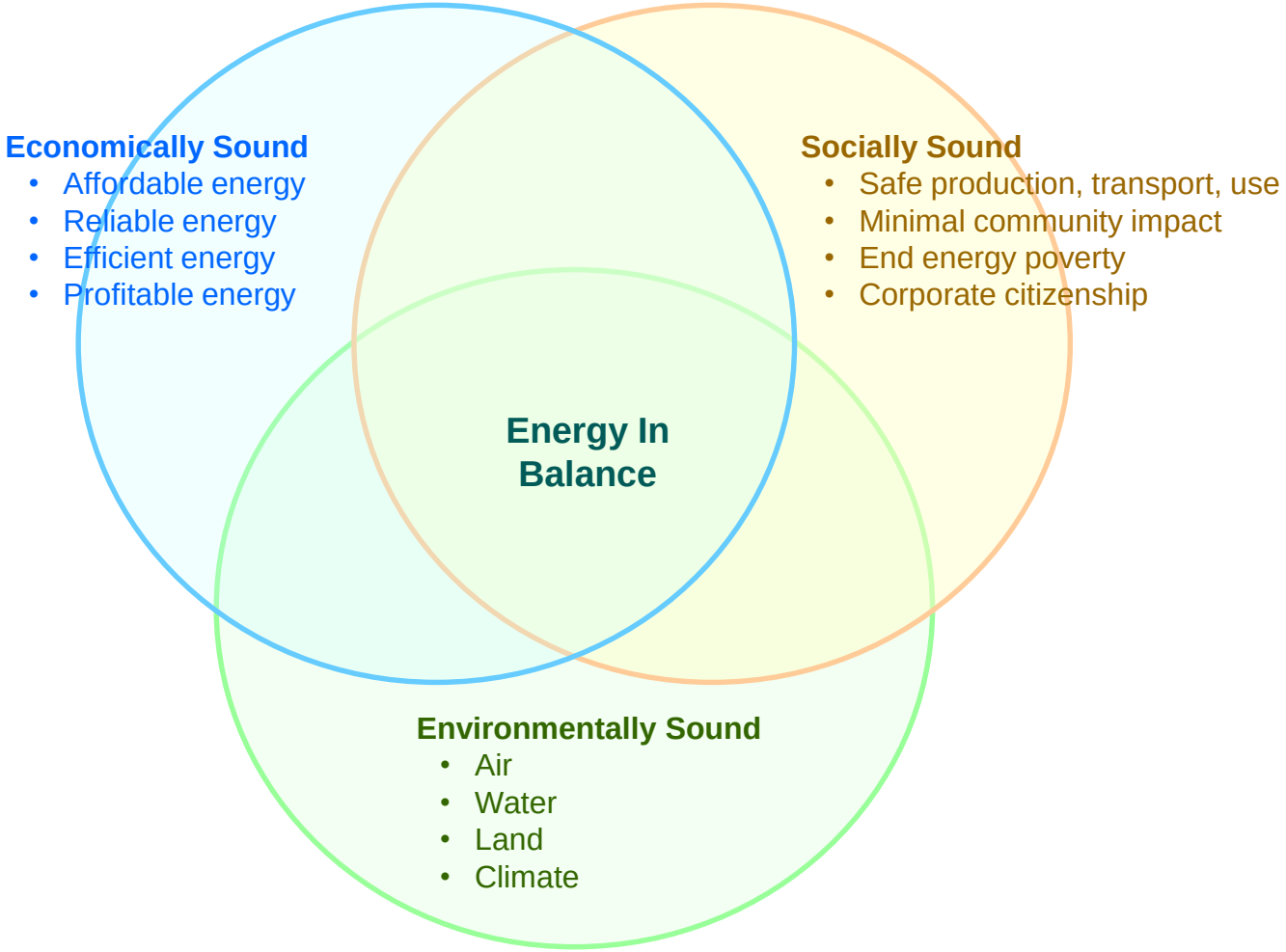


IEA; **World Energy Investment Outlook, 2014; http://www.worldenergyoutlook.org/investment/**

Notes: Non-fossil fuel includes all renewable technologies, nuclear and biofuels. Power T&D is transmission and distribution for the power sector: this cannot be assigned to either fossil-fuel or non-fossil fuel use.

7. Energy Profitability

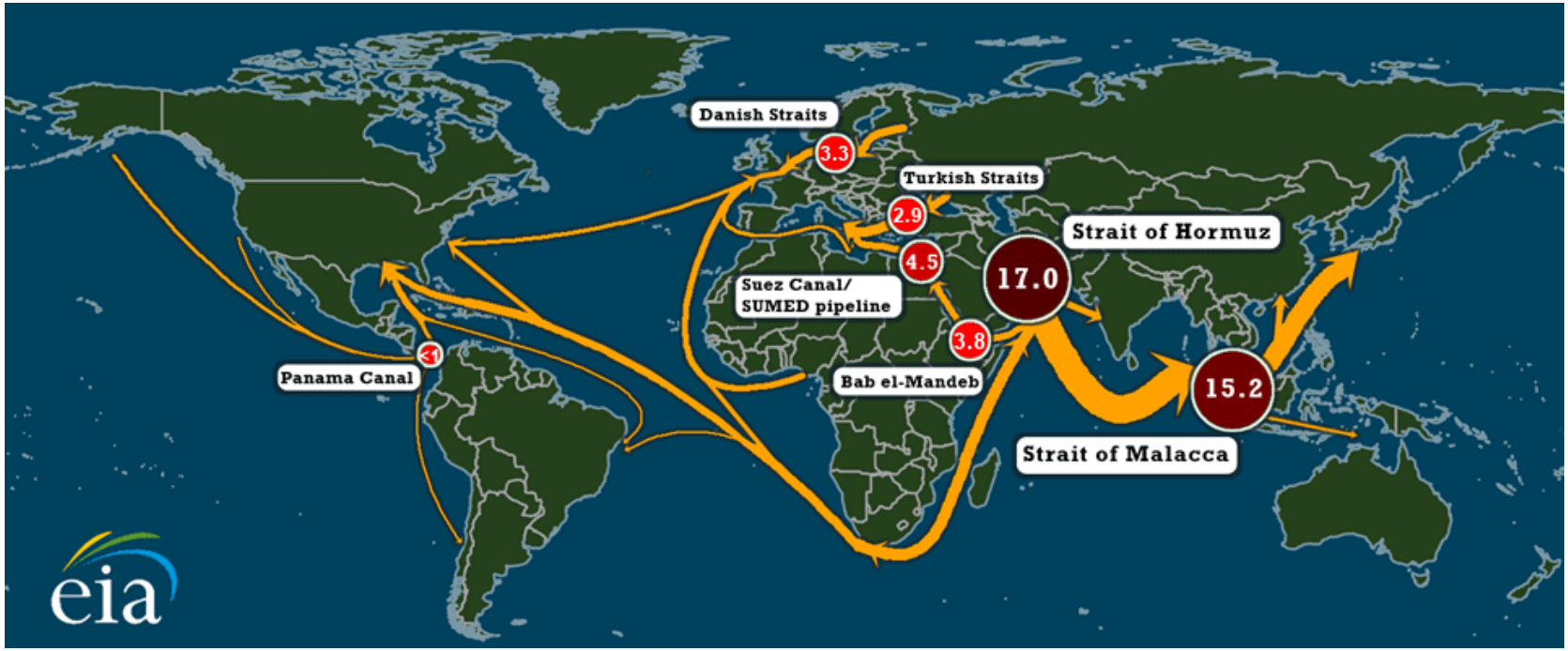
8. Energy Sustainability



9. Energy Security

Oil Choke Points

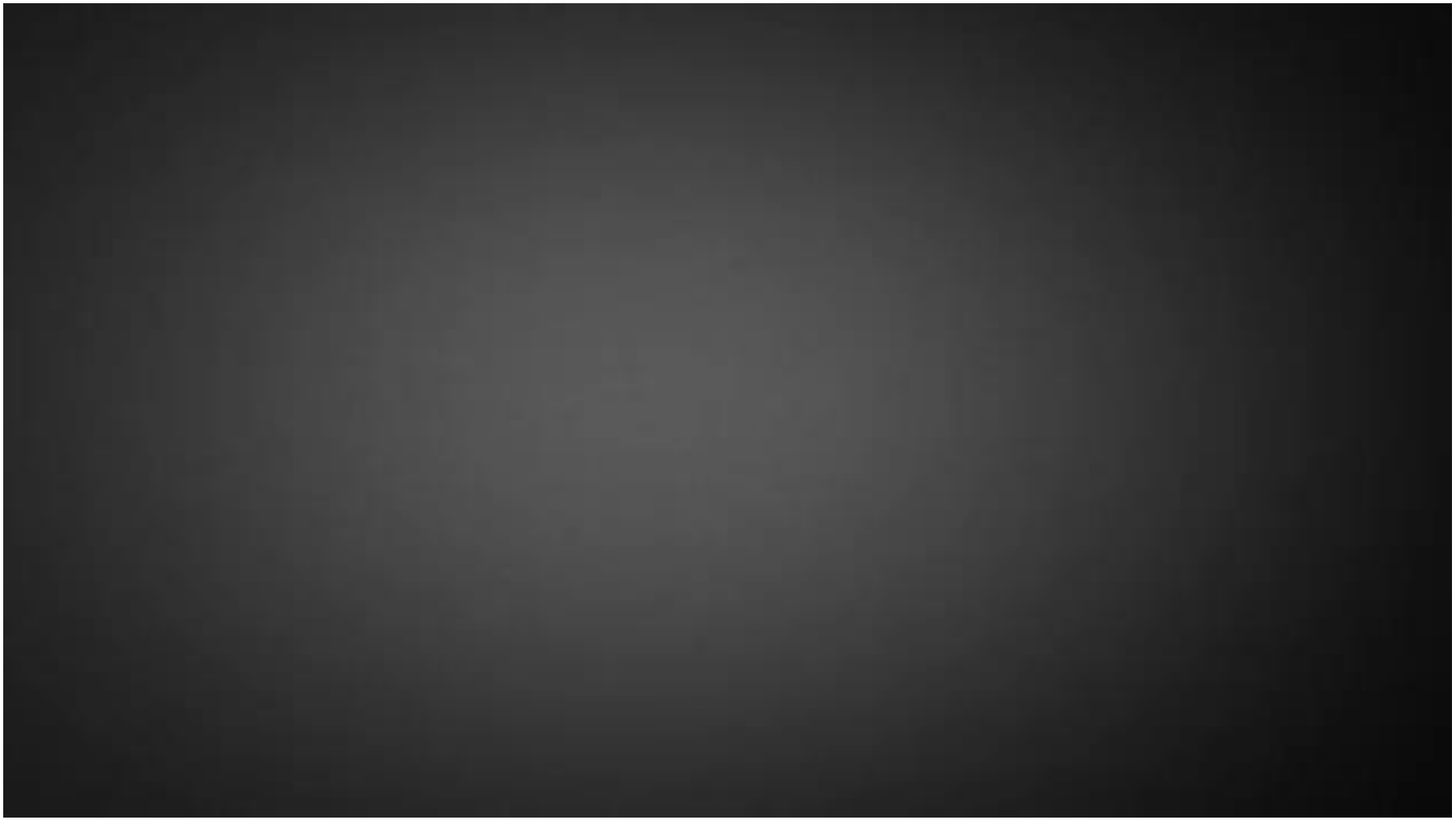
All estimates in million barrels per day. Includes crude oil and petroleum products. Based on 2013 data.



http://www.eia.gov/countries/analysisbriefs/World_Oil_Transit_Chokepoints/wotc.pdf

Sources: U.S. Energy Information Administration analysis based on Lloyd's List Intelligence, Panama Canal Authority, Eastern Bloc Research, Suez Canal Authority, and UNCTAD, using EIA conversion factors.

10. Energy is a Force for Good



Questions/Comments?

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