OVERVIEW OF TODAY’S ENERGY INDUSTRY

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American Association of Port Authorities
Energy Projects Seminar
US Energy Consumption

Figure 8: U.S. primary energy consumption by fuel, 1980-2040

(Quadrillion Btu)

- Petroleum and other liquids: 37%
- Natural gas: 27%
- Coal: 18%
- Nuclear: 8%
- Renewable (excluding biofuels): 10%
- Liquid biofuels: 2%

History | 2012 | Projections
---|---|---

[Graph showing energy consumption trends and projections by fuel type.]
Global Energy Consumption

Figure 2. World energy consumption by fuel type, 1990-2040

quadrillion Btu

history 2010 projections

Liquids
Coal
Natural gas
Renewables
Nuclear

1990 2000 2010 2020 2030 2040
# Energy Imports

<table>
<thead>
<tr>
<th>Energy Product</th>
<th>Amount Exported</th>
<th>Unit of measure</th>
<th>Data Yr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil</td>
<td>8526.653</td>
<td>thousand barrels per day</td>
<td>2012</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>2883</td>
<td>billion cubic feet</td>
<td>2013</td>
</tr>
<tr>
<td>Electrical Power</td>
<td>63.6</td>
<td>billion kilowatthours</td>
<td>2013</td>
</tr>
</tbody>
</table>
## Energy Exports

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<tbody>
<tr>
<td>Natural Gas</td>
<td>1572</td>
<td>billion cubic feet</td>
<td>2013</td>
</tr>
<tr>
<td>Electrical Power</td>
<td>11.284</td>
<td>billion kilowatthours</td>
<td>2013</td>
</tr>
<tr>
<td>Refined Petroleum Products</td>
<td>3137.35</td>
<td>thousand barrels per day</td>
<td>2012</td>
</tr>
<tr>
<td>Coal</td>
<td>126,720</td>
<td>thousand short tons</td>
<td>2012</td>
</tr>
<tr>
<td>LNG</td>
<td>0.03</td>
<td>trillion cubic feet</td>
<td>2012</td>
</tr>
<tr>
<td>Pipeline Gas</td>
<td>1.57</td>
<td>trillion cubic feet</td>
<td>2012</td>
</tr>
<tr>
<td>Petroleum Condensate</td>
<td>650,000</td>
<td>barrels per day</td>
<td>2014</td>
</tr>
</tbody>
</table>
2013 U.S. Coal Trade (million short tons)

U.S. exports are dispersed to various European and Asian countries

Europe: 60.8
- U.K. 14
- Netherl. 13
- Other Eur. 4
- Italy 7
- Germany 5
- Turkey 5
- France 4
- Ukraine 3
- Switz. 1
- Spain 2
- Belgium 2

Asia: 27.2
- China 8
- Japan 5
- S. Korea 8
- Other 4

Other: 2.3
- Mexico: 5.6
- Colombia: 6.6
- Brazil: 8.6
- Others: 5.2

Imports: 8.9
U.S. Production: 984.0
U.S. Consumption: 925.1
Exports: 117.7

Source: EIA, Quarterly Coal Report
Energy Returned on Investment, or EROI, with and without energy storage (buffering or load following). CCGT is combined-cycle natural gas turbine. Nuclear is conventional Pressurized Water Reactors, fast reactors are several times higher. Solar CSP is concentrated solar (à la Ivanpah), solar PV is photovoltaic solar cells like on rooftop solar. Energy sources must exceed the economic threshold of about 7 (blue line) in order to yield the surplus energy required to support a modern society. EROI is similar to Energy Returned on Energy Invested (EROEI). After Weißbach (2013)
Issues Re Expanded Exports

• LNG proposed terminal
• LNG proposed import terminal in 2002
• Crude oil export prohibitions
• Coal
• Refined Products
Gaze into the Future

- Offshore wind
- Robust trade
- Oil and natural gas storage
- Carbon dioxide imports
- Carbon dioxide offshore storage
- Methane Hydrates
Concluding Remarks

- Imports shrink
- Exports expand
- Electrification of ports
- Chaos reigns
- Change has never been more rapid
- Shipping will attract attention of climate change concerns
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