Transportation and Storage of Fossil Fuels

Natural Gas

Natural Gas is not as easily transported as crude oil. The energy needed for its pumping is about three times that of energy required to move crude oil. Tanker transport requires liquefaction by compression (to 1/600th of original volume, an energy intensive process that requires ~29% of its energy content). LNG compression and transport thus negate much of its carbon efficiency advantages over coal. LNG transport is also expensive, further increasing the cost per energy equivalent relative to coal for thermal electricity production.

A five minute burn of a single 25,000m3 LNG tank (most tankers have five) would release the energy of 10 Hiroshima bombs. LNG tanker transport provides very little supply to the US market, pipelines the most. Natural gas is generally more expensive to store than petroleum or coal, and thus its prices vary seasonally on a somewhat predictable basis in some markets. Natural subterranean caverns provide some storage sites, including one near Mist, OR.

Petroleum

Large tankers made crude oil shipping so inexpensive that distance to market became almost irrelevant. Saudi tankers expend just ~1% of all energy in oil transported to bring it to US markets.

Problems with megaships:

-depths of sea routes

-long distances needed to stop

-magnitude of damages from oil spills

-limited number of ports to moor

Pipeline transport is attractive cost wise in regional markets. It is also energy efficient. Energy embodied in steel pipelines is less than 0.1% of the energy in the oil that the pipeline will carry in its 30-40 year service life. Moving crude oil through the TransAlaska pipeline costs just 0.5% of the energy in the pumped crude, and shipping it by tanker from Valdez to Long Beach, CA adds another ~0.5%. These energy COTs are proportionately less than electricity for equivalent distances.

Coal

Coal has lower energy densities than oil and natural gas, reducing its attractiveness relative to oil as a globally traded commodity. However, Australia is a major regional exporter. Coal is easy to store in large piles proximate to shipping terminals or other end-use sites. Demand for internationally shipped coal will continue to rise as newly industrializing regions seek more fuel for electricity.