



Energy, Markets and Their Failures

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1. Two Big Ideas: Markets and Their Failures¹

Historians eschew mono-causal theories of history. Still, energy has profoundly shaped human history, civilization and its institutions. In the rich tapestry of history, energy threads are found everywhere. Empires, from ancient times to the present, have been profoundly shaped by their access to, and use of energy. The historical evolution of energy and energy-related innovations has profoundly affected technological and civilizational progress.

To devise a suitable framework for the inherently interdisciplinary study of energy, it is necessary to develop simple narratives for relevant disciplines based on big ideas found therein. Constructing a narrative of the economics of energy for the non-economist is a daunting task. What are the 'big ideas'? There are many. We will focus on two: markets and their failures.

Markets provide a remarkably responsive and adaptive mechanism for supplying energy. In broadest terms, the historically unprecedented successes of the industrial revolution are testament to the efficacy of markets in general, and energy markets in particular. Why then should governments be involved in markets? Why can't markets solve societal problems on their own? The most commonly cited reasons are externalities and market power, both of which regularly occur in energy markets.

Today, the most prominent example of an adverse energy-related externality is the production of greenhouse gases from hydrocarbon combustion. Various approaches have been proposed including taxing the externality, (e.g., carbon taxes); or, capping the total level of emissions and

allocating tradable quotas (cap-and-trade). The essential difference between these two approaches is that the first seeks to directly influence price while the second limits the quantity. The common feature is that both seek to correct the market externality by internalizing it. Both approaches recognize the efficacy of markets and therefore seek to modify them.

2. The Power of These Big Ideas

The 'Age of Sail'

To appreciate the power of markets in bringing about geopolitical change, consider the 'age of sail' when European empires expanded around the world. This period was propelled by many energy-related innovations that enabled navigation out of sight of land, sails and rigging that enabled sailing against the wind, and weaponry, such as cannon, which would subdue the non-compliant.²

Until the 15th century, trade between Europe and the Far East was mainly overland via the Silk Road, which was especially open to trade during the Han Dynasty (206 BCE to 200 CE) and later during the Yuan Dynasty (1271–1368 CE), the Mongol rulers of China that followed the conquests of Genghis Khan. The Mongol Empire which expanded west into Europe ensured relatively safe passage, to which the legendary travels of Marco Polo bear witness.

But the Yuan Dynasty was short-lived and the expansion of the Ottoman Empire (Constantinople fell in 1453) made passage more difficult and costly. In part, as a result of the desire to *avoid* the Silk Road, European powers sought ocean routes. Columbus sailed west, seeking a shorter route to the Far East, and thinking that he had reached India, called the inhabitants 'Indios' (Indians),

¹This note is based on a presentation at the 4th International Association for Energy Economics Asian Conference, Beijing, September 19–21, 2014. For an expanded version see Yatchew, A. 2014: "Economics of Energy: Big Ideas for the Non-Economist", Energy Research and Social Science, <http://dx.doi.org/10.1016/j.erss.2014.03.004>.

²Many energy-related innovations originated in China, e.g., the stern mounted rudder, early use of coal, oil and natural gas, percussion drilling, gunpowder, coke as a fuel, and the compass, to name a few.

a term that has persisted for centuries. The story of the 'discovery of America' is less one of adventurism (as it is often depicted) than it is one of economic competition for markets and resources among European Powers and the need to avoid the centuries-old overland route.

The 'Age of Capital'

The industrial revolution, driven by coal and the steam engine, had brought about capitalism. But along with capitalism came profound changes in social conditions. Workers had moved from farms to work in city factories, many lived in utter poverty and destitution. Some argued for replacing the market economy with central planning.

During the 1930's, market-based economies were devastated by the Great Depression. Proponents of central planning saw the Great Depression as the ultimate 'market failure'. From the 1930s onward, *the political pendulum in market economies swung to the left*. In an attempt to rectify the problems governments implemented 'stabilization policies' and programs to attend to the public welfare, the 'welfare state'.

And then came the 1970s, a period of stagflation (the combination of a high unemployment, a stagnant economy and inflation), and government policies became ineffectual. This was seen as a major '*government failure*' and *the political pendulum began to swing to the right*, first with the election of Margaret Thatcher and Ronald Reagan. China, Eastern Europe and South-East Asia began to introduce marketization policies. Privatization and liberalization of markets became ever more popular. By the early 21st century, some of these liberalization policies appeared to have gone too far, as evidenced by the financial market meltdown of 2008.

Why is this political, economic and historical narrative useful, even essential, for understanding energy markets? The reason is that energy policies are typically a reflection of broader political and ideological trends. If an increased government role is warranted in managing the macro-economy, why would it not be the case in specific industries, especially those that are literally the driving force in the economy?

Thus, each of these periods has parallels in energy industries. Major government energy-related infrastructure programs were undertaken during the Great Depression. Ever increasing regulation from the 1930s onward culminated in energy price controls during the 1970s. The period of stagflation was exacerbated, perhaps even triggered by the acute rise in oil prices orchestrated by OPEC in 1973.

3. Concluding Comments

The 'age of sail' was brought about by effective use of wind energy along with many other energy-related and navigational innovations. The 'age of capital', marked by a revolution in productivity, was initiated by effective use of the chemical energy embodied in coal.

These two stylized examples are intended to illustrate the value and power of a 'big ideas' framework. No individual can be an expert in all areas of the sciences, social sciences and humanities relevant to energy issues. But the inquiring and persevering mind can gain a much broader perspective by apprehending big energy ideas from other disciplines.

For the economics of energy, a basic understanding of the efficacy and efficiency of markets is the departure point. The next important step is to understand their limitations, and how to devise remedies.