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Any list of history's most influential economists will reveal the usual suspects, names even those who haven't studied the field recognize—Smith, Friedman, Marx, and Keynes...occasionally Krugman. Even Steven D. Levitt and Steven J. Dubner (co-authors of *Freakonomics*), depending on the criteria. We've combed through several and haven't yet run across William Stanley Jevons, whom Keynes, decades his junior, called one of "the minds" of the 19th Century.

Jevons was ahead of his time on many subjects, but perhaps none more than coal, the scourge of today's environmentalists. The Brit was 29 when, in 1865, he wrote *The Coal Question*, in which he argued that the UK's dominance over world affairs was in jeopardy so long as the country was entirely dependant on a singular, finite energy source. He further added, in what would become known as "Jevons' Paradox," that the country's problems could not be controlled by better efficiency. Just the opposite.

By example, he wrote of the iron industry. If iron could be made with less coal, profits would rise, more money would be pumped into the new technology, the price would fall, and demand would increase.

In sum, coal has been a burning issue for a very long time.

Jevons wasn't on our minds back in 2015 when we sold all our investments in coal mining companies. We simply saw environmental and regulatory issues as the reasons the fuel would be an ever-declining source of energy. A year later, the two largest coal companies in North America, one of which we'd previously owned, went bankrupt. After major restructuring, both are back operating, but their stock owners lost everything.

While most of the Western economies have greatly reduced their dependance on coal, China and India have done the exact opposite, offsetting the reductions entirely. Today, coal accounts for the same share of global power generation as it did in 1998—approximately 38%. While that number is destined to go down, there are still huge coal reserves, especially in the US and China.

Another of Jevons concerns was population growth. He'd noted that the U.K. had grown 10% each decade over the previous 70 years, and attributed that to the rise of coal, which had increased 40% in each of those decades. To his mind, the coal spike brought an increase in per capita income and abundance of energy, ideal conditions for family expansion. So, of course, the eventual depletion of coal would cause an inverse effect—a decrease in population and worse living conditions. Parts of Jevons' theory were disputed in some circles, but there's no doubt that population increases continue to have a massive effect on the energy sector, and provide lots of investment opportunities.

And the world's population is exploding. Currently it's at an estimated 7.6 billion. The number of births is double that of deaths. So far in 2018, there's been a net increase of over 42 million people worldwide. By 2030, we'll likely add another billion. With this comes a need for more food, housing, transportation, manufacturing...in short, energy. Why is all this important? To quote our man Jevons, "The theory of economics must begin with a correct theory of consumption."

For a little perspective on global energy demand, let's convert all consumption to oil barrel equivalents. In 2007, the world used 84.9 trillion barrels of oil, which increased to 99.0 trillion by 2017. It's astounding. (Again, we're not talking only about oil, but all sources of energy converted to a common measurement equivalent.) A couple things to note. First, China is now a larger user of energy than the United States, 22.9 trillion-barrel

equivalent to 16.4 trillion-barrel equivalent (BP Statistical Review of World Energy, June 2018). Second, approximately 40% of energy consumption is used to produce electricity, with coal and natural gas generating 60% of what's created, and hydroelectricity generating another 15%.

So we're no longer invested in coal, but clearly there's lots of opportunity in the energy sector. Despite the occasional negative publicity, the multi-source energy companies are where we continue to invest, at least for now. Why? First, oil and gas account for over 57% of all energy consumed and are the primary source of fuel for all transportation. Also, the publicly traded oil and gas companies are some of the largest entities involved in green energy research, continuing to expand their investments in clean alternative sources.

We're always keeping an eye on investment opportunities outside oil and gas, but what's out there is either dying on the vine or not yet ripe. Let's start with dying. Non-fossil forms, hydroelectric and nuclear being the largest, have scads of environmental and regulatory concerns and are declining with no foreseeable prospects for increasing their output. While death is not at their door, it's backing the hearse into the driveway.

However, wind, solar, geothermal, and biomass *are* growing, but make up just 3.6% (combined) of all energy production. When focusing just on electricity, they make up less than 10% of generation capacity. While it is the fastest growing segment of energy production, and should be monitored, the problems with finding suitable investments in this realm lie with the sources of energy themselves. Renewables aren't always available. Often, there's no sun (we see you Prince Rupert, BC). No wind. When, say, utility companies have demand, which is always, with varying peaks, energy must be available to deliver. The backup, of course, is usually fossil fuels, which reduces the benefits and increases the cost of investing in solar or wind power. Add to that the lack of a dominant player, to lead the way, in the segment, and it's hard to commit client's hard-earned money in such a high-risk asset. Keep in mind, to this point, an equal number of wind and solar companies have gone bankrupt as have survived. Hence, not yet ripe.

Like Jevons, some 150 years ago, we're aware of the now, but focused on the future (informed by the then, and now). While we're always keeping a close eye on "breaking" events like trade wars, things like population growth, emerging and dying technologies, and governmental and societal trends are also informing our investment strategies. Three years ago, we divested of coal. But we continue to search for future diamonds.

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