MACKENZIE Investments

CONFIDENCE IN A CHANGING WORLD

The Age of Resource Efficiency

Opportunities for the Environment and Investments

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Executive Summary

In our pursuit of ever better living standards, more goods are moving faster and farther than ever before in human history, putting intense pressure on the environment. We currently see the world slowly but surely moving to an "all-in" cost scheme that includes a fee for our environmental footprint. Concurrently, we also foresee efficient and sustainable goods and services moving to premium pricing. We do not expect that commodities will escape that principle. Rather, we think commodities will take center stage and are set up for a period where price performance is likely to differ materially. We believe that some commodities will trade at a discount and will become the "dirtier" but cheaper alternative for those who can't afford the "cleaner", more sustainable version. Other commodities will enjoy a premium, afforded by those who are willing and able to pay up for the more expensive but more sustainable living standard. Yet again, the invisible hand should push society forward by incentivizing investments in a more sustainable future. In our view, regulatory enforcement will further accelerate this differentiation and support the use of more sustainable alternatives such as natural gas (over coal), lumber (over cement), copper (over iron), and natural fibers (over plastic). We believe that these anticipated changes in the consumption rate and marginal pricing of commodities will offer investment opportunities for natural resource investors in the age of increasing resource efficiency.

The Pursuit of Better Living Standards

During the Industrial Revolution, the air quality in Britain got so bad the peppered moth changed colours. Prior to the coal mines, steel mills and smokestacks, the peppered moth was peppered – black and white markings; post-same, successive generations turned increasingly straight black, an evolutionary adaptation to its changing environment. Today, London is a fine place to live, and air quality is only expected to be further improved by the broad support for, and enforcement of cleaner power generation and electric vehicles.

We don't know if China also has a moth that changed colours, but otherwise the two countries in these respective periods could relate to issues surrounding pollution. Having rapidly elevated a large part of its population from rural poverty into a productively employed middle class, China is investing more in renewable power sources than the rest of the world combined. This seems reminiscent of what happened in telecom. Most of the developing world will never know what a landline was – they skipped this step and went straight to wireless. As economic development continues to take shape across much of the planet, so will proficiencies that limit the environmental impact of increased consumption. History cycles, faster and faster.

Rising Resource Intensity

Consumer needs in emerging markets, currently accounting for some 60% of the planet's population, are starkly different than those found in more developed countries. Regular visits to the doctor, good schooling, a local transportation system that more readily makes available the necessities of life – that's what these four billion people want.

After their basic needs have been met, the emerging middle class will look to increase its mobility. Although inconceivable in most parts of the world not so long ago, today a fast-growing part of the world population thinks nothing of visiting family 100 km away for the weekend or sourcing food from a distance 10 times that. This will be the case in emerging markets, as a development boom in both industrialization and mobility is underway. It is already happening – jet travel in China has grown threefold over the past five years.

This pattern is familiar wherever economies develop and wherever they do, the pattern is associated with a surge in consumption of energy and materials. Look to our own recent past to see the similarities. Between 1950 and 1975, per-capita energy consumption in the United States approximately doubled as the country built out its interstate highway system[1]. There would be similar statistics for basic materials and metals consumption. This same phenomenon is now happening elsewhere, except the starting population base is much bigger. There are few scenarios where demand growth from emerging markets will not outpace the demand growth from developed economies in the coming decade.

We also see trends in the more developed countries that are supportive of resource demand. We've gone from an economy where folks drive to the mall to an economy where, point and click, the mall now drives to us. This has vastly expanded the catchment basin and velocity of goods and their movement. Phrased a little differently, more goods are now coming from farther and farther away and arriving faster than ever before. From Montreal you can order strawberries grown in California and expect them on your front porch the next day. This is highly resource intensive and the trend does not look to stop anytime soon. We have entered the "Everything Now" economy.

Another example of increasing resource demand is the rapid acceptance of ride-hailing services, such as Uber. By making personal transportation more affordable, available and accessible, automotive miles travelled will likely increase – and that is prior to the long-term phase-in of autonomous driving which will make travel even more accessible by lowering the cost and increasing availability. Imagine your teenage child being picked up from home to be delivered at school. More travel, cheaper and faster.

The Need for Resource Efficiency

Standards of living worldwide will likely continue to improve, which in emerging markets should result in strong demand for construction materials to build housing, basic infrastructure, schools and hospitals. Globally, mobility will continue to increase with an associated exponential growth in energy consumption as both distances travelled, and the velocity of travel, increase. Left unbridled, the resource intensity from this growth in transport, electricity and materials poses a challenge similar to 18th century Great Britain. Rather than accepting the projected rise in carbon emissions from this increased resource intensity, populations have acknowledged the necessity for both economic efficiency and environmental protection.

Smaller but similar historical cases show that environmental challenges can be solved by human ingenuity. In our lifetimes, we have seen a dramatic reduction in both nitrous oxide and sulphur dioxide emissions, which were responsible for acid rain. We have also seen the complete ban on the use of DDT—which was responsible for bird deaths—and chlorofluorocarbons, which NASA predicted would have destroyed Earth's ozone layer by 2060[2], had we not regulated their use and forced the development of acceptable substitutes.

[1] Source: U.S. Department of Energy

[2] Source: NASA

More efficient and renewable energy sources are the key opportunity today. The scale of the carbon challenge likely means that mitigation will be tougher, but progress is well underway. More efficient electrical power generation from renewables, natural gas and high-efficiency coal plants, and the conversion of the automotive fleet to battery power are aggressively being pursued – so far without significantly hampering the pace of economic growth. Given the size of the global energy industry and inherent challenges in the large-scale deployment of novel technology, this transition will likely be measured in terms of decades, rather than years.[3]

Resource Efficiency Investment Opportunities

Our mandate remains the same: to seek out superior long-term returns in natural resource sectors. It is our belief that these superior returns are often found in sustainable businesses that both understand and seek to advance and benefit from this trend towards less waste and greater efficiencies by seeking out a better product mix, more favorable geology, superior operational management and disciplined capital allocation.[4]

We think commodities will enter an age where price performance is likely to differ materially. Some commodities will trade at a discount but will become the "dirtier" and cheaper alternative for those who can't afford the cleaner, more sustainable version. Other commodities will enjoy a premium, afforded by those who are willing and able to pay up for the more expensive but more sustainable living standard. We believe regulatory enforcement will further accelerate this differentiation, and will support the use of the more sustainable alternatives. These anticipated changes in the consumption rate and marginal pricing of commodities will offer investment opportunities for natural resource investors.

Natural Gas vs. Coal

Natural gas is abundant. In many instances, it is still flared off as waste. This is when the fuel is produced as a byproduct of petroleum and there is no infrastructure to gather and transport it to market. Of course, most gas is not flared; we bring this up only to underscore that there is a lot of it and in many places, it is quite cheap to extract.

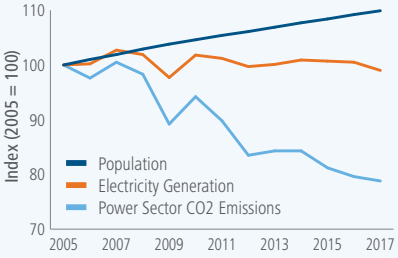
Natural gas is one of the cleanest fossil fuels. When used to generate electricity, natural gas emits only 40% of the carbon as does coal for each unit of energy produced[5]. It also emits fewer particulates and other noxious emissions that the traditional burning of coal produces (See Sidebar #1). You can also turn gas-powered electricity generation on and off more readily than coal. This variable supply capability contributes to grid stability, which is critical as renewables are introduced into the mix. When the sun doesn't shine or the wind doesn't blow, you need some other power source to step up, and quickly. Thanks to its rapid response, the amount of gas-powered electricity generation you have on the grid largely determines how much renewable capacity you can have on the grid. The two go hand in hand.

The opportunities in gas relate substantially to logistics, but this is not to say that they are not sometimes obvious. Gas in Japan sells for a little under $10/MMBtu while in Texas it sells for about $3/MMBtu. Those who can put the pieces together to capture price spreads such as these will do well as demand for this cleaner energy source rises.

SIDEBAR #1

Natural Gas drives reduction in U.S. carbon emissions

Trends in U.S. Electricity Sector Emissions



Carbon emissions from electricity generation in the U.S. declined by roughly 20% over the past decade, despite continued population and GDP growth. This outcome resulted from a relatively flat electricity consumption (due to increased efficiency of use) but, most importantly, an increase in the electricity generation from natural gas from 19% of all power generated, to a current 33%, all the while eliminating emission-intense coal power generation.

Source: U.S. Department of Energy

[3] B. Gervais, O. Rutten, S. Prieur, A. Marrat, E. Glover "From Oil to Lithium" Mackenzie Investments (January 2018)
[4] B. Gervais, O. Rutten, A. Marrat, M. Mathers "Sustainable Free Cash Flow Analysis: A better measure for resource equities." Mackenzie Investments (September 2015)
[5] Source: U.S. Department of Energy

Lumber vs. Cement

When it comes to carbon emissions, the transportation sector has received most of the attention. It may come as a surprise that construction is a similarly bad culprit when it comes to carbon emissions. Cement production is very energy intensive. First, you must cook the limestone in a kiln, then you have to grind it up. In contributing one unit of economic output, making cement consumes ten times its share of energy. Timber, by contrast, sequesters carbon.

Lumber is a sustainable crop, like wheat or barley, when grown and harvested in a certified responsible process. The energy to make it comes from the sun and in this respect the material is inherently renewable. Moreover, forests act as a carbon sink – half of the dry weight of timber is accounted for by carbon that was absorbed from the atmosphere. Innovations in using timber over concrete in construction could help decrease its carbon footprint.

As examples of modern timber construction proliferate, the architectural, psychological and regulatory limitations should recede and this will be good for everyone, including investors (See Sidebar #2). The cost to build a timber structure might converge to about the same as the cost to build a concrete (or steel) structure. Because of the much lower carbon footprint, however, we could see increased demand for this most traditional of resources and expect consumers to be willing to pay a premium.

Copper vs. Iron

Automotive makers are committing tens of billions of dollars towards the development of electric vehicles (EV). In the past there have been false starts but this time it appears, with this sort of broad-based support from industry and a strong regulatory push, that the successor to the internal combustion engine is set to stick. This will have a substantial impact on the mix of metal demand in the coming years.

A 1960's roadster was made from a lot of steel and a little bit of copper. Today's EVs are made from much less high-strength steel and much more copper. They also need large batteries, and large batteries need significant quantities of other metals, metals that few gave much thought to only a few years ago. A typical battery pack may contain some 30 to 40kg of lithium carbonate and some 5 to 10kg of cobalt. While lithium is globally abundant, production ramp-up can take many years as each producer must adapt its process to the form in which the lithium naturally occurs. Cobalt, on the other hand, is geologically rare and concentrated in geographically challenging regions. Or consider neodymium, used in the magnets in the drives of both EVs and wind turbines, or graphite, used in electrodes; these materials all trade in small, volatile markets which require great caution.

But in a world where increasing electrification is emerging as a dominant theme, we believe that copper will be king. In EVs, copper is used in the electric motors, the batteries, inverters and wiring. A conventional vehicle will use about 20kg of copper, whereas an EV might use four times as much. Moreover, copper will be needed for the charging stations, transformers and power grid upgrades that are needed to charge a growing fleet of EVs. In contrast to the other minor metals, copper has a large, established global commodity market that offers long-term investment opportunities. Finally, copper today does not price in a "sustainability" premium.

SIDEBAR #2

Sky is the limit for lumber construction

Most building structures were historically made of wood, but the material went into relative decline in the early 20th century for a variety of reasons, not least of which was susceptibility to fire. Since then, building codes often restricted the use of timber for buildings over three stories in height. However, advances in technology and know-how have recently begun to roll back these restrictions. In 2015, a 14-story timber building was constructed in Bergen, Norway. A "plyscraper" two inches taller was completed in Vancouver in 2017 (shown here). A 24-story wooden building is now being constructed in Vienna and wooden skyscrapers have been proposed for London and Tokyo. Google's urban innovation company, Sidewalk Labs, has planned a community in Toronto which would use wood-composite, modular buildings.

Containerboard vs. Plastic

Amazon wouldn't exist without brown boxes. The brown box industry, or what we call containerboard, has moved from being an ex-growth industry to one growing faster than GDP. Containerboard is recyclable, renewable, and biodegradable at the end of its long lifecycle. Without those properties it would be quickly declassified with plastics as one of the world's greatest environmental challenges: non-degradable plastic waste building up in oceans and landfills. Fortunately, modern containerboard designs can replace plastic packaging, even for liquids, and thereby greatly reduce waste. If made from sustainable forest fiber sources, virgin containerboard is coming from a much more sustainable origin than plastics. More importantly, recycling collection systems for containerboard are well developed globally, and used containerboard can be recycled up to seven times, thus contributing to a more circular, sustainable economy.

Conclusion

The world's population has always aspired to a better lifestyle. But today, most consumers not only aspire to quality goods, delivered faster, at their doorsteps, and at a lower price, but also goods produced in a more sustainable fashion. We believe pressure is now on society to deliver on both aspirations. Hence, we would expect over time, commodities that can deliver on both ambitions to trade at a premium over those that deliver only on one part of the bargain. This offers the opportunity to favour natural gas over coal; lumber over cement, copper over iron, and containerboard over plastics. By targeting businesses that both understand and seek to advance and benefit from these trends, natural resources should enhance investor returns on our way to a cleaner, renewable, and sustainable economy for all.

Talk with your financial advisor to learn more about resource investing opportunities with Mackenzie Investments.

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