CHAPTER

The Four Essentials

Food, Water, Energy, Metals

China has a foreign exchange reserve of $3 trillion and it is not surprising to think $1 trillion will be employed in assets outside of China within the next five to 10 years.

—Nomura China Chairman Yang Zhizhong, at the Boao Resources Forum in Perth, Australia, 12 July 2011

Food, water, energy, and metals: Keep up the supply of those four essentials, throw in some clean air and a peaceful disposition, and—short of a Hollywood-style 2012 cataclysm—the world will run smoothly forever. That’s the theory, anyway, for twenty-first century optimists. The reality is that a secure supply of the first four essentials is far from assured. Big-power rivalry, surging demand for commodities, a rise in living standards for hundreds of millions of people eager to savour the delights of their first car, TV, computer, or mobile phone—or in the case of a billion poorer people, enjoy a second daily meal—means that the pressure on the planet’s finite resources is rising rapidly. There is no easy safety valve to release. The 1.3 billion people in China, another 1.2 billion in India, and hundreds of millions in fast-growing, emerging economies such as Brazil, Russia, Indonesia, Turkey, Mexico, Poland, Nigeria, and
Vietnam do not want to be denied the fruits of their labours. They want what consumers in North America, Europe, and Japan already have. That is why the great battle for control of the world’s resources is well and truly underway.

There are many fronts in this war. One starts deep in the desert country of the West Australian outback, where the sun beats down remorselessly on a forbidding landscape of salt pans, shifting red sand dunes, spinifex, and rocky protrusions. This is the heartland of the Yilgarn Craton, a massive block of weathered rock that takes up a vast swathe of inland Australia, underpinning its claim as the world’s oldest continent. The mineral-rich craton is a crust created 2.7 billion years ago, pushed upward from the ocean floor as the earth began forming into the continents we know today.

A thousand kilometres (600 miles) by road northeast from the state capital of Perth stands one of the Yilgarn Craton’s most significant place names: Mount Weld, the remnant of a volcano that blew up eons ago. At its central core, perhaps three kilometres (2 miles) in diameter, is a rich pipe of carbonatite, the host rock for something much more valuable. Mount Weld is a hot zone, repository of what may be the most important mining deposit outside of China: 24 million tonnes of rare earths resource, resulting in 1.9 million tonnes of rare earths oxide. More importantly, by the middle of 2012, it will offer one of the first new sources of rare earths supply outside China in a decade.

Around Mount Weld, the high-summer temperature regularly tops 38°C (100°F), crisping the sparse vegetation. The dry lakes are thick with salt, a legacy from millions of years of sea spray borne on the winds of the Indian Ocean and deposited hundreds of kilometres inland from the western coast.

On the surface, the land looks unforgiving and potentially fatal for a wayward traveller. But it is the treasure below ground that lures people into this harsh environment. Fortune seekers from Britain, America, and China came in their thousands in the late nineteenth century to search for gold in an area now believed to contain almost a third of the world’s known gold reserves. A hundred years later, prospectors big and small pegged out claims for tenements rich in nickel, iron ore, copper, and zinc.

Now there is a new lure—rare earths: the 17 chemical elements that one day may prove the biggest mining bonanza of them all. Their names—scandium, yttrium, and the 15 lanthanides such
as lanthanum and cerium—are yet to loom large in the public consciousness. But in the ongoing battle for control of the world’s most valuable resources, rare earths and rare metals sit alongside oil, gas, uranium, coal, iron ore, copper, and gold as the materials that countries, companies, and consumers must have. Rare earths are in everything that is technologically hot: batteries for hybrid and electric cars, iPads, iPods, Blackberries and other smartphones, LED televisions, energy-efficient lights, lasers, camera lenses, permanent magnets, highly refractive glass, fluid catalytic cracking catalysts for oil refineries, catalytic converters for motor vehicle exhausts, X-ray machines, phosphors, computer memories, sophisticated military items such as night-vision goggles and missile guidance systems—the list goes on. In December 2010, the U.S. Department of Energy released its *Critical Materials Strategy* report that found five rare earth metals—dysprosium, neodymium, terbium, europium, and yttrium, as well as a processed rare metal, indium—were “most critical” in terms of supply for the United States over the next five years.1 The big demand drivers are permanent magnets and battery alloy; by 2014, when global demand for rare earth oxides reaches 191,000 tonnes, about 55 percent will go to these two applications alone. The British Geological Survey’s own Supply Risk List (see Exhibit 1.1) has rare earth elements as fifth on its list, with niobium behind antimony, mercury, tungsten, and the six platinum group elements (iridium, palladium, platinum, osmium, rhodium, and ruthenium). China is the leading producer of 28 of the 52 elements on the list, including antimony, mercury, tungsten, and rare earths.

Getting a secure supply of rare earths is exercising the minds of politicians, prospectors, and investors around the globe, particularly after China—which accounts for 97 percent of global production—cut back its exports in 2010 and again in 2011 to make it clear that the needs of its domestic users would take priority over exports.

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**Exhibit 1.1  BGS Supply Risk List 2011 (1 = very low risk, 10 = very high risk)**

*Source: British Geological Survey, October 2011*

1. Antimony 8.5  
2. Platinum group elements 8.5  
3. Mercury 8.5  
4. Tungsten 8.5  
5. Rare earth elements 8.0  
6. Niobium 8.0
Japanese electronics and precision equipment makers in particular are heavily reliant on rare earths. Although they are able to recycle some from discarded computers, mobile phones, and other electronic detritus, they get most of their supply from China. In fact, between 50 and 60 percent of China’s rare earth exports go to Japanese buyers. But in September 2010, the buyers suffered something akin to a mini “oil shock.” Their supplies from China slowed to a crawl, tied down by the sort of bureaucratic double-shuffling that the Japanese themselves once employed as a nontariff barrier against unwanted imports. There was no export ban, the Chinese declared, but the result was the same: shipments ground to a halt, and the Japanese electronics industry got very nervous. Japan’s crime was to arrest the skipper of a Chinese fishing boat that collided with two Japanese coast guard vessels near a group of uninhabited islands in the East China Sea. The islands, known to Japan as the Senkaku and to China as the Diaoyu, are claimed by both sides. That there may also be oil and gas riches in the surrounding waters adds another economic dimension to their dispute.

One result from that confrontation was a quick deal by the Japanese trading house Sojitz to form a strategic alliance with the owner of the Mount Weld rare earths, the small Australian mining company Lynas Corp. Lynas, which bought the Mount Weld mining rights from global mining giant Rio Tinto in 2001, struck an agreement to supply its products to Sojitz and to accelerate its project’s expansion with Sojitz’s backing. It also has a joint venture with Germany’s Siemens for future production of neodymium-based rare-earth magnets. According to Executive Chairman Nicholas Curtis, Lynas owns the world’s richest known deposit of rare earths outside China. It claims an advantage in grade and composition over China’s massive 40-million-tonne reserves at the Bayan Obo mines in Baotou, part of Inner Mongolia. According to Lynas, three of the most valuable rare earth elements—dysprosium, europium, and terbium, worth between $1.4 million and $3.8 million a tonne at January 2012 prices—are found at Mount Weld in concentrations at least double that found in the Baotou reserve.

That makes Mount Weld one of the global markers for rare earths. Apart from China, others are in South Africa, the United States, India, Mongolia, Kyrgyzstan, Vietnam, Canada, Brazil, Sweden, and Greenland, meaning that rare earths are not as rare as their name implies. But they are hard to extract economically. Many of
The deposits found so far lack the concentrations that would make them a viable proposition. Others are in difficult or environmentally sensitive locations. Lead times to bring a mine into production can take up to a decade, plus the processing of rare earths ore is a dirty business, one that needs lots of water and leaves a lot of mess to clean up. Pollution is a major problem at Baotou, and few governments are prepared to sanction new projects because of the environmental issues. Lynas says its isolated Mount Weld operation, which began mining ore in mid-2011, meets international safety and environmental standards. It runs the crushed ore through a concentration plant on-site before stockpiling it for shipping to an advanced materials plant being built at Kuantan in the Malaysian state of Pahang, where it will be processed into separated rare earths products. Its first-phase production target of 11,000 tonnes in 2012 is expected to double in phase two to 22,000 tonnes.

China came close to buying Lynas in 2009, but a $500 million bid by the state-owned China Nonferrous Metal Mining (Group) Co., known as CNMC, to take a majority stake collapsed in the face of stringent conditions imposed by Australia's Foreign Investment Review Board. The Australian government insisted the Chinese company keep its stake below 50 percent and take only a minority of board seats—a stance that was unacceptable to CNMC. But why would China want to buy a smaller rival when it already has 97 percent of the market and its Baotou reserve has enough for 200 to 300 years of supply?

**Clean Energy Technologies**

One reason is the future demand for *clean energy* technologies. China, along with India, is fast becoming a global leader in wind and solar power. Large-scale wind turbines rely on permanent magnets, built from critical materials such as dysprosium, neodymium, praseodymium, and samarium. The same holds true for the thin films used in a solar panel’s photovoltaic cells. The critical materials here are indium, gallium, and tellurium.

Lynas is not the only new candidate for a place at the rare earths top table. North American explorer Ucore hopes to have its Bokan Mountain project in Alaska, based on an old uranium mine, producing in 2015. Canada-listed Great Western Minerals has its Steenkampskrall project in South Africa, where an old Anglo-American thorium mine
that closed in 1965 is to be recommissioned for its rare earth resource, with first output likely in 2013. Stans Energy has a similar plan and timetable for its Kutessay II mine in Kyrgyzstan, a past producer of heavy rare earth elements in the Soviet era. Greenland Minerals and Energy, another Australian-listed rare earths hopeful, has a multielement deposit of rare earths, uranium, and zinc at its Kvanefjeld project, on the southwest tip of Greenland. It says the reserve could sustain a large-scale mining operation for decades, with the potential to supply 20 percent of global demand for rare earths at low cost because of the revenue from uranium and zinc. But Greenland is a delicate environment, with more than its share of logistical challenges. Nothing is likely to emerge from Kvanefjeld until 2015 at the earliest.

Well before then, a U.S. contender—Molycorp’s rare earths plant at Mountain Pass, California—will be back in production after being mothballed in 2002 under the weight of cut-price Chinese competition and an increasingly onerous set of environmental regulations. When Molycorp hits its stride at the end of 2012, it expects to be processing 20,000 tonnes a year of oxide, in what it calls its “mines to magnets” strategy. Molycorp also owns a rare-earth processing facility in Estonia, one of only two such plants in Europe. The United States is keen to see a steady supply of strategically critical materials coming from its own mines or from friendly nations. “Diversified global supply chains and multiple sources of materials are required to manage supply risk,” the Department of Energy noted in its December 2010 report. “This means taking steps to facilitate extraction, refining and manufacturing here in the United States, as well as encouraging additional supplies around the world.” Industry expert Jack Lifton of Technology Metals Research says that whatever actions the United States takes, the focus must be on the security of the U.S. supply chain for rare earths, and their availability. “America has all of the technology to transform rare-earth ore concentrates, the first item in the rare-earth end-use product supply chain, into finished magnets and CFLs (compact fluorescent lamps),” he argues. “Yet we have simply abandoned these industrial steps, all of them, actually, for momentary cheaper prices.” Lifton also wants the world to be aware that there is a clear difference between light and heavy rare-earth elements in terms of supply. “The LREEs (light) are not rare . . . just too expensive to produce against the Chinese supply chain. On the other
hand, HREEs (heavy) are scarce even in China . . . ,” he wrote in December 2011.4

For resource seekers, a similarly strategic story is unfolding in South America, where the massive lithium deposits in the salars (salt pans) of the Andean plateau present what some analysts believe is the opportunity of a lifetime. Soft and silvery-white in colour, lithium is the lightest of all metals. It is used in ceramics, glasses, lubricants, pharmaceuticals, and, crucially, in lithium-ion batteries that power everything from watches, smartphones, iPods, and portable computers to hybrids and full electric vehicles (EVs). If the long-range forecasts are right, by 2020, up to 25 percent of the cars on the global auto market will be hybrids or EVs. That should mean a large market for batteries and consequent demand for lithium, though supply competition is likely to be fierce, with a likely over-supply until at least 2013.

Lithium Triangle of the Andes

In truth, there is no great shortage of lithium, but extracting it economically from salt-pan brines or hard rock can be another matter. Suppliers in South America, the United States, Australia, and China are working on a variety of resources and extraction techniques. For now, the cost advantage lies with lithium produced from brines, where the sun’s evaporative power does most of the work. High in the Andes, in a part of the world subject to intense solar radiation and known as the lithium triangle, the flat, white salars that extend across Bolivia, Chile, and Argentina are deemed to be the world’s richest source of lithium brines. Salar de Atacama in Chile, the adjoining Cauchari and Olaroz salars in Argentina and the massive 10,000-sq km Salar de Uyuni in Bolivia are the focus of global attention from investors, miners, and industrial groups keen to ensure they have a handle on lithium supply if—and this is a big if, given the recharging and recycling infrastructure required—demand for electric vehicles (EVs) takes off in the way some forecasters suggest, and if EV makers continue to use lithium in their batteries.

Lithium consumption in 2011 is around 120,000 tonnes of lithium carbonate equivalent (LCE). Only about 6,000 tonnes a year of LCE is for the batteries used in electric vehicles, but that ratio could change dramatically over the next decade if the long-awaited electric car age reaches critical momentum. In the view
of metals consultancy SignumBOX, the consumption figure for the automotive industry could reach 180,000 tonnes of LCE by 2025.\textsuperscript{5} Another analysis by the world’s biggest hard-rock lithium producer, Australia-based Talison Lithium, suggests demand for all applications, including transport, could reach between 350,000 and 500,000 tonnes of LCE by 2020. According to the U.S. Geological Service, global lithium supply in 2015 will be about 250,000 tonnes of LCE. The British Geological Survey’s 2011 supply risk list of 52 valuable metals confirms that lithium supply should not really be an issue. It puts lithium in the middle of the pack, ranked 23, equal to manganese, cobalt, gold, and cadmium, with a supply risk rating of 5.5 out of 10.\textsuperscript{6}

The relatively plentiful supply of lithium has not stopped a cavalcade of contenders for South America’s lithium brine resources. The players are many and varied, covering European, Japanese, Korean, Chinese, North American, Brazilian, and Australian interests. They include Japanese trading houses such as Toyota Tsusho, which has a stake in the Salar de Olaroz project with Australian miner Orocobre in Argentina; the South Korean trio of state-owned Korean Resources Corp. (Kores), trading house LG International and energy company GS Caltex, which are partners with Canadian explorer Lithium One in the Sal de Vida brine project in Argentina; Chilean fertiliser and mining group SQM (Sociedad Química y Minera de Chile), which mines Salar de Atacama in Chile and is the world’s biggest producer of lithium from brine; Frankfurt-based Chemetall, which also operates at Salar de Atacama; and Chinese investment house Citic, which aims to work with state-owned Bolivia Mining Corp. (Comibol) in developing the Uyuni resource. Comibol also has Kores and steel giant Posco as potential partners in taking Uyuni lithium further to processing and eventual manufacture of lithium batteries in Bolivia.

**Bolivia’s Ambitious Pitch**

Bolivia’s President Evo Morales, who upset some of the world’s biggest companies when he nationalized the country’s oil and gas resources after he came to power in 2006, has consistently maintained he is not interested in Bolivia being just the starting point in the global lithium supply chain; he wants to develop a domestic battery industry and potentially a plant to make electric vehicles.
In its ambitious pitch to investors, Comibol says Bolivia holds 70 percent of the world’s lithium reserves, with 100 million tonnes in the Uyuni, Coipasa, and other salt pans. It says that in comparison, Chile has 30 million tonnes, China 3 million tonnes, Argentina 2 million tonnes, and the rest of the world 7 million tonnes. That’s not a view shared by the U.S. Department of Energy, which in its Critical Materials Strategy Report of December 2010 and its update a year later, sees new low-cost lithium coming from Argentina, Chile, and the geothermal brines of the western United States, while noting that “currently and for the foreseeable future, Bolivia’s lithium is only an uneconomic resource.”

The U.S. view tallies with the way Canadian company Lithium Americas sees its low-cost resource in Argentina on the Puna Plateau. There, Lithium Americas, which has EV maker Mitsubishi Motors and auto component supplier Magna International as its strategic partners, says its site straddling the Cauchari-Olaroz salt pans is the world’s third-largest known lithium brine resource. It lies about 200 km east of the front-runner, Chile’s Salar de Atacama, and about 200 km north of second-ranked Salar del Hombre Muerto, where U.S.-listed FMC Lithium operates. For now, SQM, Chemetall and FMC are the big three of brine-based lithium production, while Talison dominates hard-rock production from its Greenbushes plant in Western Australia. Between them, they account for more than 80 percent of all lithium production, though China is looking to exploit its own high-altitude salt pans in the Qaidam Basin, and the United States has its long-running Kings Mountain mine in North Carolina, plus Silver Peak and other deposits in Nevada. A host of junior miners are seeking to make an impression in the lithium marketplace, but the going is tough. In November 2010, Edward R. Anderson, the president of metals consultant TRU Group, warned: “Competition through 2020 will be increasingly fierce, making it virtually impossible for aspiring lithium businesses to ever turn a profit. Millions of dollars invested in these companies will be lost by unsuspecting investors.”

The lithium brine producers have the cost and quality advantage, but not time—the evaporation process can take up to 18 months. Hard-rock producers, who mine spodumene or petalite and then process the ore with heat and acid to extract lithium, can get their product into the market more quickly, but at a higher cost. And just possibly, there is something new in the lithium wings: U.S.
startup Simbol Materials aims to process brine used by geothermal power stations in California’s Salton Sea and extract lithium chloride in just 90 minutes. Simbol’s professed goal is to “fundamentally transform the critical materials supply chain.” Its partner in this ambitious undertaking is the Japanese trading house ITOCHU Corp. TRU’s Anderson is skeptical of the Simbol claim, calling it a “very tall order” that does not change his view of the lithium supply-demand situation. In its 2010 report on electric vehicle batteries, the Boston Consulting Group predicted 14 million of the new cars sold in China, Japan, the United States, and Europe in 2020 would be EVs or hybrids. Of these, 11 million would have lithium-ion batteries. BCG said this battery market would be worth about $25 billion. But lithium is a very small part of a battery’s cost. The 20 kg of lithium likely to be found in an EV battery with a range of 160 km (100 miles) is worth about $100—hardly a critical factor in a vehicle selling for $30,000 plus. So why the rush to bring new supplies to market? The answer is that be it lithium, uranium, rare-earth elements, hydrocarbons, food, or water, everyone with a view longer than the next quarterly report wants to control the supply chain.

Multitude of Factors

Lithium and rare earths represent just a tiny part of the picture emerging in the early twenty-first century of a global struggle for resources between the big advanced economies (United States, Europe, and Japan) and the emerging economies of China, India, Brazil, and Russia. The search is breathtakingly broad in scope and geographic spread as each of the major players seeks control and security of supply over a string of valuable commodities. It reflects a multitude of factors coming together in the last few years to create a fear that someone somewhere is going to miss out. Those factors include the following:

- Very high economic growth rates of 7 to 10 percent a year in the world’s two most populous countries of China and India are pushing up demand for the commodities needed to supply the twin building blocks of their industrial and agricultural economies: power and steel.
- The growth of a middle class is creating a huge demand for motor vehicles in these same two economies and in the “second
wave” of emerging economies such as Mexico, Brazil, Russia, Indonesia, Turkey, Vietnam, the Philippines, Malaysia, and Thailand.

- The global debate on climate change, emissions controls, and carbon taxes is accelerating the search for clean energy technologies such as wave, wind, and solar power, and a commitment by the coal industry and coal-fired power station operators to explore “clean coal” solutions.

- Hundreds of millions of people are being lifted out of poverty in Africa, Asia, and Latin America, allowing them to buy a second meal for the day. These higher living standards across the world mean greater consumption of food and water (and as a consequence, greater use of farming inputs such as fertiliser), raising fears that clean food and water will become scarce.

- Territorial ambitions and border disputes are intensifying as big powers jockey for potential oil and gas reserves in offshore zones of influence.

- Political upheaval in the Middle East and North Africa is changing relationships within the Organization of Petroleum Exporting Countries (OPEC).

- Big energy users such as China, the United States, India, Russia, and Japan are concerned about the security of their maritime supply lines. About 70 percent of the world’s trade moves across the Indian Ocean between the Middle East and the Asia Pacific. A quarter of the world’s crude oil trade passes through the Strait of Malacca, the 800-km (500-mile) stretch of water between the Indonesian island of Sumatra and the Malay peninsula that narrows to just 2.4 km (1.5 miles) wide at the Strait of Singapore, leading to the South China Sea.

- These security concerns are driving a resource diversification scramble. Africa, Indonesia, South America, the Central Asian states of Kazakhstan, Tajikistan, Kyrgyzstan, Uzbekistan, Turkmenistan, and the waters of the Arctic are all the subject of investment interest from global oil companies and miners. China is helping to build ports and rail lines in Africa, investing in Brazil’s gas and power sector, and hoping to tie up more of Australia’s iron ore and coal. India harbours the same ambitions.
To understand China and India’s thinking, it helps to realise that an economy that grows at an average 10 percent a year doubles its size in seven years, and one that grows at 7 percent a year takes 10 years to double its size. China’s average GDP growth for the seven years 2004 to 2010 was 11.0 percent, meaning its economy comfortably doubled in size during that time. For India, the figure was 8.1 percent. Brazil came in at 4.5 percent, even with a small contraction in 2009 because of the global financial crisis. Russia averaged 4.7 percent, after a 7 percent fall in 2009. For the United States and Japan, the comparable five-year figures were 1.6 percent and 0.8 percent, respectively, again with contractions in 2009. The Eurozone contains the big economies of Germany and France, but problems in Italy (and on the periphery in Greece, Ireland, Portugal, and elsewhere) leave the EU looking lacklustre at best. The old twentieth-century world order is giving way to an Asian-led expansion.

As a consequence of its rapid growth over the past two decades, China now consumes more energy, sells more cars, and produces more steel than the United States. It uses more iron ore, copper, lead, zinc, aluminium, chromium, tungsten, titanium, and rare earths than any other nation. By 2020, its high-speed rail network—even with the setbacks of its mid-2011 crash—will have likely grown to 16,000 km (10,000 miles), whisking passengers and high-value cargo at 320 km/h (200 mph) between every major Chinese city. Building this mammoth network and the rolling stock to run on it involves a huge amount of raw materials, including steel.

It is a similar growth story for India, although at a less frenetic pace. Again, steel and power are the sectors where the most activity is bubbling. Even with the push toward cleaner energy, coal will remain the backbone of India’s power generation until at least 2025, meaning that its demand for coal will continue to rise. State-owned Coal India Ltd., already the world’s biggest coal producer with output in 2010 of around 460 million tonnes, is scouring the world for more coal mines in Africa, Indonesia, Australia, and the United States. On the nuclear front, some of India’s ambitions have been delayed because it is not a signatory to the Non-Proliferation Treaty. Despite the Fukushima nuclear crisis in Japan, India wants to build more nuclear power plants. Russia is happy to oblige India with its construction technology and is eager to stay ahead of competition from France and more recently from the United States with the signing of the U.S.–India nuclear agreements. Indeed, Russia
is happy to supply India with energy (and arms) in a multitude of forms. A gas pipeline from Russia through the Central Asian nation of Turkmenistan—which has the world’s fourth-largest reserves of natural gas—is a long-held dream for both parties, but the political realities of a hostile Pakistan and an Afghanistan constantly at war make this hard to achieve. The same obstacles apply for a gas pipeline from Iran to Pakistan and on to India.

According to the U.S. Energy Information Administration (EIA), Russia holds the world’s largest natural gas reserves, the second largest coal reserves, and the eighth largest crude oil reserves. In 2010–2011 it was the world’s largest producer of crude oil, surpassing Saudi Arabia. Most of the oil it exports goes to European customers such as Germany and Holland. There is immense potential for further oil and gas developments in Arctic waters, Siberia, and the Sakhalin region, where China, Japan, and South Korea are natural customers. Japan once held half of Sakhalin, there is a large Korean population, and Chinese influence everywhere in the Russian Far East is growing.

Halfway around the world in South America, the hydrocarbons boom is picking up speed. In 2006, Brazil’s Petrobras and its partners discovered the Tupi oil and gas field in the Santos Basin, an area of the South Atlantic Ocean about 250 km (160 miles) south of Rio de Janeiro. Further recent discoveries mean the area may prove to be the largest find made anywhere in the past 10 years. According to the EIA, these “pre-salt” oil deposits, found in rocks beneath the salt layer at combined water, salt, and rock depths of up to 6,700 metres (22,000 feet), have the potential to transform Brazil into one of the largest oil producers in the world. Venezuela, a founder member of the Organization of Petroleum Exporting Countries (OPEC), has bigger reserves and is the world’s seventh largest oil producer, but since President Hugo Chavez’s nationalization of the oil industry in 2007, output has declined. Colombia, Peru, Bolivia, Argentina, Chile, and Ecuador all produce oil and are the subject of interest from national and global oil companies. Colombia is growing its role as a coal exporter, too, with more supply earmarked for China and India.

**New Products for Old Trading Routes**

In a sense, this scramble for resources is simply a continuation of history—only the players and the products have changed. The Romans
had been trading with India since before the first century, either via the overland caravan route through Persia, or by boat through the Red Sea. Indian trade extended east to China and Southeast Asia, as well as west to Africa and beyond. In 1514, when the first Portuguese explorers sailed up the Pearl River to the port we now know as Guangzhou on the South China coast, adventurers and merchants from Africa, India, Persia, and the Arabian Peninsula had been living and trading there for more than 700 years. Spices, textiles, gems, opium, and timber were to be found in the holds of all manner of sailing craft riding the monsoon winds around the coasts of Southeast Asia and India across the Arabian Sea to Africa, Persia, and Arabia. From the port of Aden at the entrance to the Red Sea, some Asian traders ventured as far as Cairo, Alexandria, the Mediterranean and Venice. From Europe, the intrepid Franciscan monk Giovanni da Pian del Carpine had travelled overland to the Mongol court in 1246, and Marco Polo, his father, and uncle (probably) had been as far as the Chinese imperial capital of Beijing by the late thirteenth century. In the other direction, the Ming dynasty emperor Yongle had sent massive fleets from China west to India and beyond, beginning in 1405 with a 62-ship convoy that reached Calicut on the southwest coast of India. At least seven fleets under the overall command of Admiral Zheng He sailed out from the China coast in search of treasure, tribute, and geographic knowledge, reaching as far west as the coast of Africa, into the Red Sea, the Arabian Peninsula, and the Persian Gulf. The last voyage set out in 1432 and returned to Nanjing in 1434 after reaching Hormuz at the entrance to the Persian Gulf. Zheng He died in 1433 on the return leg. China clearly had the technology to mount massive voyages of discovery, but there was no religious or commercial imperative to do so. It was simply a question of prestige: to impress on other civilizations that the Middle Kingdom truly was the centre of the world and tribute was expected.

For resource-hungry Europe, it was a different matter altogether. Opening up a sea route around the southern tip of Africa to Asia at the end of the fifteenth century offered the prospect of a rich trade in spices, silks, and porcelain, and the opportunity to control new lands. The Portuguese were in the vanguard, but by 1521, seafarers from the other great European maritime power of the day, Spain, landed in the Philippines, and within 50 years had set up a Spanish capital at Manila. Under two treaties of 1494 and 1529, the
Portuguese and the Spanish had already decided how they would carve up the “new worlds” they believed they were discovering in South America and in the Asia Pacific. The Portuguese and the Spanish were just the first wave of European colonizers. By the early 1600s, the Dutch were in Java, seeking to tie up the spice trade through the Dutch East India Company. Although the Portuguese had reached Calicut and Goa in 1498, it was the British and French, along with the Dutch and the Danes, who vied to establish trading posts along the coast of India in the early seventeenth century. By the end of the eighteenth century, Britain was the dominant colonial power in India and had also been able to establish a solid foothold at Guangzhou, which was rapidly becoming one of the world’s busiest trading hubs.

When British demand for tea from China rocketed in the early 1800s, there was no item the Chinese wanted from the West that would balance the trade position—until Indian raw cotton and then Indian opium took on this role. The opium trade, with its deleterious effect on Chinese users and its attraction for criminal elements, sparked trouble between Britain and China, leading to what became known as the Opium Wars of 1839 and 1856. As a consequence, China was forced to open more of its ports. Merchants, missionaries, administrators, and assorted soldiers of fortune from Europe, America, Japan, and Russia poured into these enclaves up and down the China coast, eager to make their mark. It would be more than a century before China could free itself from their advances and another 70 years on top of that before it would approach its fifteenth-century position as the centre of the world.

The World in 2050

In January 2011, the global bank HSBC—which traces its history to the formation of two bank branches in Hong Kong and Shanghai in 1865—issued a report titled “The World in 2050.” It concluded that by 2050, the emerging world—including China and India—will have increased its output fivefold and will be larger than the developed world. Nineteen of the top 30 economies by gross domestic product (GDP) will be countries that it currently labels as emerging. China and India will be the largest and third-largest economies, with the United States as No. 2. Japan will be fourth, followed by Germany, United Kingdom, Brazil, Mexico, France, and Canada.
in the top 10. Russia would rank fifteenth. HSBC predicted that “substantial progress” would be made by a host of other emerging economies, including Turkey, Indonesia, Egypt, Malaysia, Thailand, Colombia, and Venezuela, all of which would rank in the top 30. China, with its massive pile of foreign reserves ($3.2 trillion at October 2011), has the money to buy virtually whatever it wants—assuming it can keep its society together. With $320 billion, India has only a tenth of China’s reserves, but it is pursuing the same determined scramble for resource security. The United States, Europe, and Japan are not likely to give up easily in their own pursuit of ever-higher living standards through investments in technology and productive growth.

And what of the food, energy, water, and other natural resource constraints that might apply in 2050? HSBC says that the world is already in a period of “ecological deficit” where it is depleting natural resources faster than they can be replenished. Short of a major change in the way the world operates, the depletion rate is destined to grow. This is the fundamental challenge for the biggest users, given that the impact of their decisions flows well beyond their own borders. The global resources war has a long way to run yet.

Notes

2. Ibid.
4. Ibid.
15. Ibid.
16. Ibid.