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Linking Japan

Summer 2013

QUARTERLY INVESTMENT INSIGHTS



Changing Japan's Future

Government Touts Alternative Energy and Storage
Devices as Route to Stronger Tomorrow

Abenomics: Trajectory True?

Years of Political Deadlock
Have Ended – Now Comes
the Difficult Part

Shin-Etsu Chemical

Building a Foundation for
Sustained Growth through
New Inventions and
Reinforcement of Existing
Strengths

Can Renewable Energy Re-energize Japan?

Comprehensive Review
of Japanese Energy Policy
Brings the Most Organic
Solution to the Forefront

The Storage Battery Business

A Traditional Japanese
Stronghold Enters a New
Phase

Publisher's Note

Sweltering Heat

The only word that can be used to describe this summer is sweltering. All-time high temperatures – in some cases surpassed on consecutive days – have been recorded across the country. Combine this with our wonderful humidity, flash floods from “guerilla rains” and lightning storms and there are definitely better places to be in the summer. However, Tokyo and Japan have kept us uniquely captive this summer.

The economy also seems to be keeping us uniquely captive. Summer bonuses on average were much better. Fifteen-dollar parfaits are selling out and people are dining out more. So the consumer appears to be doing better, but the initial Abenomics measures appear to be sputtering with the stock market presently highly volatile, the yen settling back to the 96 yen to the dollar level and sentiment being positive but not quite bullish.

Another supplementary budget is expected in the fall. Prime Minister Abe has emphasized alternative renewable energies and thus that is the focus in this summer edition. This is seen domestically as a significant opportunity and there has recently been a spate of new energy-related technological development. Whether developmental and implementation costs can be suppressed to where clean energy incentives retain their value remains to be seen, but the importance of rapid advancement in this area is undeniable. In this issue, we provide an overview of opportunities, developments, obstacles, and glimpses into Japan's energy future.

J. Michael Owen
Chairman
Transpacific Enterprises

Linking Japan

Summer 2013 Volume 7

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Abenomics: Trajectory True?

Years of Political Deadlock Have Ended – Now Comes the Difficult Part

Japan's Prime Minister Shinzo Abe passed the sternest test of his second tenure in office when he won a majority for his coalition government in a July 21 upper house election. The lower house and upper house are now controlled by the governing coalition, ending years of political deadlock. Now the real challenge begins.

Resuscitating the economy will require walking a political tightrope in which the prime minister will need to contain disaffection within his party, satisfy various vested interest groups and convince a voting population tired of excuses from lawmakers that his measures – no matter the short-term pain – hold the key to returning Japan to vibrancy.

To do so, businesses will have to become more competitive internationally, new industries will be required and the nation's numerous troubled companies will need to be resuscitated.

All of this will have to be done alongside a program of fiscal consolidation to prevent the nation's national debt from

tumbling into a crisis that always looms but never seems to come. Abe has a maximum of three years before Japan's next national election to prove his political nous.

Reading the Vote

Many media outlets described the July 21 upper house election victory for Shinzo Abe's Liberal Democratic Party (LDP)-led coalition as a landslide. Not so fast. Voter turnout declined to 52.61% in that election, down from 57.92% in 2010. The 22.68 million votes the LDP won represented a gain of a little more than 3 million. The main opposition Democratic Party of Japan (DPJ) won around 8.65 million votes, compared to 22.75 million in the 2010 upper house election, at a time when the party was in power and beginning to anger a population demanding results. In other words, the opposition lost the election far more than the LDP won it.

The LDP will also need to rely on New Komeito, a religious party, in the upper house. Abe's party controls 115 of the 240 seats in that chamber. Councillors in Japan serve terms of up to six years, with half of the seats in the upper house up for grabs every three years.

The loss of the DPJ as a realistic opposition for the LDP has not necessarily helped Japan. With few to answer to, the temptation is for leaders to follow their own whims rather than those of the electorate. "I'm not optimistic (a cogent opposition will emerge) because I'm not sure where the policy expertise and leadership will come from," said Tobias Harris, a political analyst who has worked in the Diet. "I don't expect that the Japan Communist Party will move to broaden its appeal, and the DPJ appears mired in infighting and is hopelessly adrift when it comes to economic policy. It is not enough to be able to poke holes in Abenomics. They need to be able to answer the question 'what would you do differently?'"

The prime minister could face opposition to numerous reforms from within his party. An LDP implosion in light of the lack of an opposition is not out of the question. Many in the party have opposing views on issues ranging from tax to trade to history.

Issues to be Tackled

Away from parliament and in the real economy, things are further complicated. Installing a Bank of Japan board that has the ambition to carry out bold easing was a first victory for Abe. Unraveling the knot that left politics crippled, a second. Straightening out the web of complications that have hampered the economy since the early 1990s will take more gumption.

An inexhaustive list of economic ailments, often interconnected, demonstrates the size of the task:

- Employment laws need to be reformed to bring liquidity to the job market.
- A post-Fukushima energy policy needs to be formulated that takes into account trade issues, utility woes and public opinion.
- Sectors of industry need to be reformed to bring close-to-zombie corporations back to profitability.
- Efficiency in the agricultural sector needs to be improved.
- A means of paying for a fast-growing elderly population must be found.
- New industries that can contribute to future growth must be nurtured to global success.
- "Mr. & Mrs. Watanabe," as well as Japan's business leaders, must be encouraged to spend.

These problems – and more – have left Japan in a deflationary spiral for years. Tackling them through the "third arrow" of Abenomics is a priority. A first set of structural reforms, including the introduction of special economic zones, a loosening of rules on public-private partnerships and an easing of visa controls for skilled foreign workers that wish to enter Japan in fields such as medicine and education, were announced in June. The market response was tepid at best. The Nikkei 225 fell to a two-month low and analysts questioned the government's ability to carry out the daring reforms.

"For any properly educated economist, it is in fact quite straightforward how you can promote growth. If you increase the labor force, or production capital, or technological efficiency, you get growth," said Takuji Okubo, chief economist at Tokyo-based Japan Macro Advisors. "Then you need to think about how you can increase Japan's labor force, increase capital spending or improve efficiency. Promoting the participation of females in the labor force, cutting corporate tax to increase incentives for companies to invest, or spending on education,

promoting study in Japan to overseas students and enabling them to stay in Japan to work all leads to growth...I do not see how he can achieve anything material without a clear focus and willingness to spend political capital.”

A second set of reforms is set to be announced in the autumn. Stability in government and the prospect of three years under the same coalition have raised hopes that these will be more daring. Agriculture and the job market have been marked out as key to a comeback. Autumn will also see a decision from the government on hiking consumption tax from 5% to 8% in April 2014 and a more active role for Japan in the U.S.-led Trans-Pacific Partnership (TPP) trade negotiations.

Handling multiple key decisions at once will prove tough. “There is a need to monitor the emergence of ‘opposition parties within the ruling camp,’” Kyohei Morita, chief economist of Japan at Barclay’s Capital Research, wrote in a recent analysis piece. “In relation to the consumption tax, for example, some LDP lawmakers have already taken an explicitly cautious stance, which could lead to internal splits.”

Local media reports suggest that the government is reconsidering the details of the hike. Some in the business sphere have argued it should. “If you raise the taxes too early, you are going to have a negative impact on the economy,” Yoji Otani, senior analyst at Deutsche Securities Inc., said at a July conference in Tokyo. “The tax should not be raised from 5% to 8%, but up to 10% once the economy is stable.”

Morita warns any backtracking on tax could have repercussions. “A setback related to the consumption tax hike could do more than create stress in the bond market. It could also cause the international political community...to turn against (yen) depreciation,” he wrote.

Investors and politicians will also be watching the way Japan handles the TPP talks. Any agreement is likely to open up Japan’s markets to goods considered sacred, notably in agriculture. According to government estimates, participation in the trade agreement will lead to a 3.2 trillion yen boost to the economy, 0.66% of GDP. “I do think Abe’s in a harder position on TPP than he’s letting on,” Harris said. “He desperately needs his negotiating partners to accommodate the desired opt-outs, because I think Abe’s rhetoric on TPP will make it hard for him to say no regardless of what the deal looks like.”

That tells half the story. Farming, for example, will have to become more competitive.

Japan’s agriculture laws are notorious. Imported rice faces a 777.7% tariff, butter 360%, sugar 328% and wheat 252%. The government has proposed doubling agricultural income over the next decade by increasing the number of corporate farms to counter the negative effects of increased imports. It argues that such measures could double exports of agricultural goods to 1 trillion yen by 2020, compensating for worsening domestic

conditions caused by TPP. That will mean getting the 400,000 hectares of abandoned farms back up and running, many of which have been left dormant because of tax benefits. Pushing through such a dramatic change will be politically costly.

Energy

Powering the nation offers another set of problems. Since the meltdowns at the Fukushima Daiichi nuclear facility, a cogent energy policy has failed to emerge. The LDP’s vow to restart “safe” reactors will go some way toward getting utilities’ bottom lines and the national trade balance back on track. Paying the expenses for reactor decommissioning, the Fukushima cleanup and compensation associated with the disaster remain issues needing to be dealt with.

Renewables offer a way to compensate for the diminishing use of nuclear energy. Clearing up the regulatory minefield ought to be a government priority. “We would like to make use of abandoned land, so we would like to see the simplification of agricultural laws,” said Yuichi Nishigori, head of investment at ORIX Corporation, during a panel discussion in July. His company, looking to expand its presence in solar energy, is being hindered by regulatory hurdles.

Costs since the nuclear disaster have been footed by the taxpayer. Household bills are also rising. These increased costs have yet to be met with a wage boost – perhaps Abe’s biggest challenge.

Japan’s nonfinancial corporations and households in fiscal 2012 held 25.8 trillion yen and 22.1 trillion yen in assets respectively. The graying of the population poses a problem for household assets. Corporations, however, should be boosting wages and capital spending, according to the government. By getting corporations to part with their money and invest in new equipment and research while improving wages, the government believes it can create a virtuous cycle of consumer spending that creates jobs and revenue, keeping the economy on an upward trajectory.

Annual wage negotiations in April failed to bring about the government’s desired wage rises. Summer bonuses, a one-time risk, rose 1.64% compared to the same period in 2012. Electric utilities cut bonuses by 45.5%, dragging down the average. Without a rise in base wages, which would come next April after negotiations, it is difficult to see Abenomics succeeding.

Wage rises will come with demands from Japan’s captains of industry. A cut to the corporate tax, which stands at 35.6%, would be welcome by executives. Changes to the employee-friendly labor laws more so. Prime Minister Abe backtracked on a pledge to look at reforming the nation’s employment laws in the buildup to the July election. These laws have underpinned Japan’s “jobs for life” ethos through the years of the

economic miracle, the end of the bubble and deflation. Opponents argue it has hobbled the economy by draining efficiency, favoring older employees as times have worsened and hampered innovation. According to the IMD business school’s 2013 World Competitiveness Ranking, Japan ranks 39th in the labor market.

Big Spenders Necessary

Any changes to the law are likely to hurt employees in Japan’s most troubled sectors. The weak yen has helped electronics makers such as Sony Corporation and Toshiba Corporation return to profitability. A return to strength for the currency will mean a return to weakness for those companies. Restructuring has to take place alongside capital investment to create goods that meet consumer’ needs and new markets. Sony’s new focus on medical equipment as a growth business offers hope for growth in an aging nation.

“Japan leads in the shrinking and aging population,” William Saito, a venture capitalist, said in Tokyo last month. “At no time in human history has this dynamic occurred. It effects macroeconomics, democracy and capitalism. In 10 to 14 years many countries will be in the same position.”

Reforms in many areas of the economy are going to be inevitable moving forward. The clock is ticking. “Japan may indeed stumble along without facing a crisis for some years,” Okubo of Japan Macro Advisers said. “But it will come sooner or later. In our view, Japan could enter a crisis period as early as in 2015.”

Satisfying all on the path forward will be impossible. Turbulent times lie ahead. Abe, however, appears to be maintaining his focus. “We will press on with our growth strategy – we must roll up our sleeves and live up to the mandate that has been given to us,” he said after winning the election in July. He has a mountain to climb.

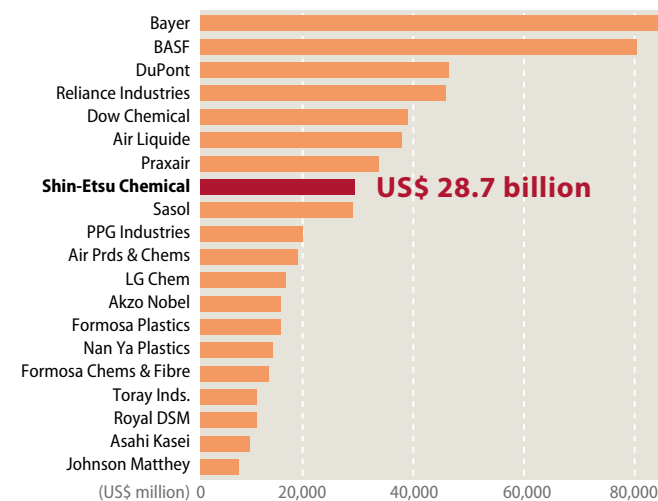


Shin-Etsu Chemical

Building a Foundation for Sustained Growth through New Inventions and Reinforcement of Existing Strengths

A number of chemical manufacturers in Japan are expending R&D resources on the development of technology to enhance the performance of lithium-ion batteries (LiBs) used in motor vehicles and smartphones. Shin-Etsu Chemical Co., Ltd. is one of those firms, and it recently announced the development of a new material that will improve the performance of LiBs tenfold.

Market Cap. Ranking of Global Chemical Companies as of March 29, 2013



Source: Datastream, Bloomberg

Moody's Rating of Global Chemical Companies as of April 19, 2013

Company (Country)	Long Term Rating
Shin-Etsu Chemical (Japan)	Aa3
BASF (Germany)	A1
Monsanto (U.S.A.)	A1
Air Products (U.S.A.)	A2
Asahi Kasei (Japan)	A2
DuPont (U.S.A.)	A2
Praxair (U.S.A.)	A2
Sigma-Aldrich (U.S.A.)	A2
Syngenta (Switzerland)	A2

Source: Shin-Etsu Chemical, based on Moody's data

Shin-Etsu Chemical is a well-established firm, founded in 1926 in Nagano City, Nagano Prefecture and boasting a history of robust performance under the leadership of Chairman Chihiro Kanagawa. Shin-Etsu Chemical's PVC (polyvinyl chloride) Division, Organic Chemicals Division, Semiconductor Materials Division and Electronics Materials Division all boast products with strong market share and the chemical manufacturer also has overseas operations in the U.S., Europe, Asia and Oceania. As of May 2013 Shin-Etsu Chemical is #450 on the Forbes Global 2000.

Kanagawa, who became chairman in June 2010, tapped Shunzo Mori as his replacement as president. Shin-Etsu Chemical is listed on the first tier of the Tokyo Stock Exchange and is also a member of the TOPIX Core30 index.

One of the new business areas in which the firm has invested R&D resources is the realm of energy, with one particular focus being the development of a superior-capacity LiB, for which the company has recently notched a groundbreaking achievement.

Shin-Etsu Chemical has successfully developed a new material that will increase the amount of electricity that can be stored in LiBs tenfold for smartphones and EVs. With an increase in battery capacity comes extended usage time for smartphones and further reduction in battery sizes.

The new material is formed as a sheet and placed inside the battery. Employing processing techniques acquired through the company's experience in developing and manufacturing semiconductor wafers along with silicone, Shin-Etsu Chemical created a material capable of storing electricity with silicone. Compared to common carbon-based materials, silicone is far more expensive, but has about 10 times the storage capacity. If applied to a smartphone, usage time will be extended, and greatly reduce the frequency of recharging.

The company has begun shipping a prototype to battery manufacturers in Japan and abroad, and intends to commence mass production in three to four years and to supply the mate-

rial to major battery manufacturers around the globe.

By 2017, the global LiB market is projected to grow fivefold compared to 2012 for an estimated size of 1.7 trillion yen. Samsung SDI Co., Ltd. and Panasonic Corporation are currently driving the market. Additionally, Japanese manufacturers collectively hold nearly 50% of the global market share for battery materials. In addition to augmenting battery capacity, Japan also assumes a leading position globally in terms of technology that reduces the risk of inflaming. This invention by Shin-Etsu Chemical is vital for it and Japanese firms to continue having a lead in technology where the Chinese and South Korean firms had been beginning to catch up. This new discovery may be the launch of a new global no-holds-barred battle for manufacturing supremacy between major material manufacturers and information device manufacturers.

By the Numbers

In the year ended March 31, 2013, Shin-Etsu Chemical posted a year-on-year decline in net sales of 2.1% to 1,025,409 million yen, but growth in consolidated operating income of 5% to 157,043 million. The profit growth was bolstered by significantly increased profits reported by Shintech in the U.S. This is the third consecutive year the company has recorded increased profits. Furthermore, its capital-to-asset ratio remains high, at 82%.

An analysis by division shows the PVC Division recording strong growth in both net sales and ordinary income due to robust global demand. The Semiconductor Materials Division held up with smartphone and tablet-related demand nearly offsetting struggles related to PCs, flat-screen TVs and related goods. The Silicone Division was dragged down by sluggish markets in China and Asia. The Electronics Materials Division was a strong performer across its product lines from rare-earth magnets to optical fiber preform.

Capital Investment the Key to Growth

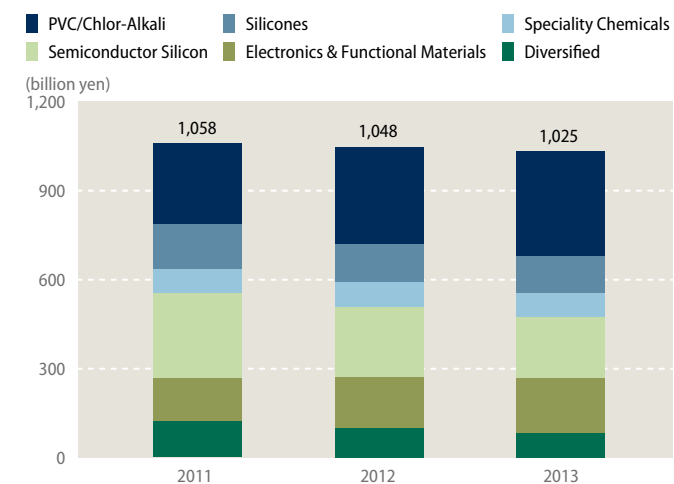
Shin-Etsu Chemical is convinced that improved and robust performance across the firm is only possible with a commitment to capital investment. The company plans to particularly make active capital investments in the U.S. through Shintech, which has a 40-year business foundation. The historically strong base will be further accentuated by the investments made through it. In 2012, the Shin-Etsu Group began building a new plant in Louisiana for hydroxyethyl cellulose production and the plant is scheduled for completion in 2014. This factory, along with other bases in the U.S., Germany and Asia, are key to Shin-Etsu Chemical diversifying its manufacturing bases and capturing anticipated future demand.

R&D Also Extends to Healthcare

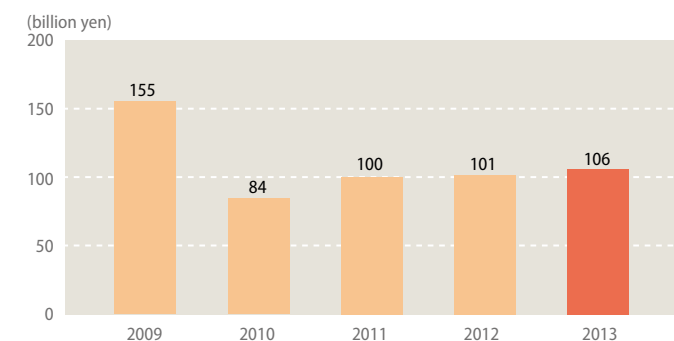
Shin-Etsu Chemical has also invested in drug discovery venture NanoCarrier Co., Ltd. to help strengthen its position in healthcare. The company is working with NanoCarrier to co-develop a material that aids in more efficiently treating areas afflicted by illness. NanoCarrier, founded in 1996, listed on the Mothers index of the Tokyo Stock Exchange in March 2008. The venture has been at work developing drug-encapsulating micellar nanoparticles – submicron-sized particles that serve as vehicles for effective, targeted drug delivery – as well as new drugs. NanoCarrier's technology requires advanced polymer technology, for which Shin-Etsu Chemical is known. Shin-Etsu Chemical invested more than a billion yen in the venture and the two are now collaborating on research into the delivery of drugs to targeted areas of the body.

This dedication to existing businesses, R&D and continued reinforcement of production capacity and abilities combined with robust corporate leadership are all keys to keeping Shin-Etsu Chemical at the top and building a foundation for sustained growth.

Net Sales by Business Segment



Net Income



Source: Shin-Etsu Chemical Co., Ltd. 2013 Annual Report

Floating offshore wind power generator measuring over 100 meters in height docked at Otsurugi Wharf, Onahama Port (taken on July 1, 2013 at Shimogawa, Izumi-machi, Iwaki City). Photo provided by The Mainichi Newspapers Co., Ltd.

COVER STORY

Can Renewable Energy Re-energize Japan?

Comprehensive Review of Japanese Energy Policy Brings the Most Organic Solution to the Forefront

The government's recently announced growth strategy indicated four themes within the plan for creating strategic markets, including the "realization of supply and demand for clean economic energy." Specifically, energy areas covered in the plan included "high efficiency thermal," "renewable energy," "methane hydrate," "reforms to the electric power system" and "storage batteries."

A few years ago, Japan implemented a system for purchasing extra energy from houses equipped with solar power generators. In July 2013, Japan extended the system for purchasing power at fixed prices to incorporate electricity produced by small and medium hydro power, geothermal power, and biomass facilities. The alternative power purchasing system was conceived to oblige power companies to acquire power created through renewable energy generation.

Under this system, the cost of acquiring the alternative power is borne by the customer. This policy was systematized in the August 2012 Special Renewable Energy Measures Law and the specified purchase prices are being finalized in preparation for implementation of the Law.

This report focuses on the current state of offshore wind power and geothermal power generation and looks at companies aiming to capitalize on these potentially lucrative opportunities.

Offshore Wind Power Generation

Attention in the field of wind power generation has recently drifted from traditional onshore generation toward offshore wind power generating platforms. The interest shown in this field by major ship builders, power companies and even small- and medium-sized enterprises illustrates the strong potential for profit here.

In Japan, the public impression is that wind power is a form of power generated on land, but Europe already widely operates offshore wind power generation facilities. The benefits of the offshore generators are believed to include the following:

- In contrast to on-land generation, locating a facility offshore offers a greater selection of locations for erecting windmills.
- More favorable wind conditions generally allow for more stable power generation.

There are also some disadvantages, however:

- The time and cost required to erect an offshore large-scale windmill can be prohibitive.
- The cost incurred to lay the undersea cabling necessary to transfer the power generated to land would be considerable.

Additionally, there is a dearth of data available on wind conditions in marine areas around Japan, and it is uncertain

whether the offshore-onshore argument is supported by saying that wind conditions in marine areas near Europe are favorable for wind power operations.

Offshore wind power generation is popular in Europe. Most of the facilities are installed on fixed platforms and tend to be larger than those built on land facilities. The larger these facilities, the greater the opportunity for Japanese firms to demonstrate advantages they have in power generation facilities.

Offshore wind power generation is rapidly catching on in Europe with new facilities being developed in England, Denmark, the Netherlands, Germany and Belgium. One reason is that European geographic conditions are exceptionally favorable in that the westerly wind patterns are more stable than elsewhere and the North Sea, which encloses England and Denmark, is relatively shallow.

Development of offshore wind power generation began in coastal areas and has since progressed to areas further offshore. Planned developments are now proceeding in offshore areas where ocean depths reach 30 to 40 meters. In deeper waters, there is a trend toward larger windmills and generating units in order to keep unit construction and maintenance costs down to make the projects more economically viable.

If the European facilities continue to grow in size and scale, there will be numerous commercial opportunities for Japanese manufacturers planning to enter the wind power generation field.

The windmill uses rotation to transfer torque to the power generator using a drivetrain system, which increases the rotation effect by almost 100%. Until now Samsung Heavy Industries Co., Ltd. and Vestas Wind Systems A/S have led the market in development of gear-driven systems. Drawbacks to this method include the need for a power inverter, and the fact that the strength of the inverter declines as the facility becomes larger. Siemens is working on developing a direct drive turbine, but presently the generator for the system is prohibitively large for offshore installations.

Mitsubishi Heavy Industries (MHI) is also currently developing a unique hydraulic drivetrain. The company has had some experience and success in the wind power generation field, having delivered more than 400 gear-driven drivetrains, but with the expansion of offshore wind power generation facilities, MHI trusted the unparalleled reliability of "classic" hydraulic technology that's long been in use worldwide.

MHI has staked out a position in this area with a hydraulic cylinder that serves to suppress rotation speed errors and one merit of the hydraulic method is that since the generator system can be controlled hydraulically, the generator doesn't require any additional mechanisms. Another benefit is that a large hydraulic pump can be combined with a hydraulic motor to accommodate larger facilities. MHI is now performing

Japanese Firms Involved in Wind Power Generation

Large windmill manufacturers	Mitsubishi Heavy Industries, Japan Steel Works, Fuji Heavy Industries / Hitachi, Komaihaltec
Small windmill manufacturers	Sinfonia Technology, Zephyr, Daiwa Energy, Kikukawa Kogyo, NKC, Nasu Denki-Tekko, MECARO, Toho Tenax, Loop Wing
Blades	Japan Steel Works, Toho Tenax
Fiber-reinforced plastic (FRP)	Japan U-Pica, Showa Highpolymer, Dainippon Ink, Nippon Reinetsu, Asahi Glass, Nippon Electric Glass, Toray Industries
Carbon fiber	Toray Industries, Mitsubishi Rayon, Toho Tenax (Teijin)
Electrical equipment	Hitachi, Fuji Electric, TMEIC Corporation, Yaskawa Electric Corporation, Meidensha, Fujikura
Generators	Hitachi, Meidensha, Yaskawa Electric Corporation, TMEIC Corporation (Mitsubishi Electric, Toshiba)
Transformers	Fuji Electric, Risho Kogyo
Amplifiers (gears)	Ishibashi Gihann, Osaka Chain & Machinery (Sumitomo Heavy Industries), Komatsu, Onex Corporation, Neturen
Bearings	JTEKT, NSK, NTN, Komatsu, Nippon Roballo
Hydraulics	Kawasaki Precision Machinery, Moog
Equipment	Nabtesco, Sumitomo Heavy Industries, Toyooki Kogyo, Akebono Brake Industry
Steel / cast metal	Japan Steel Works, Nippon Chuzo

Source: Japan Natural Energy White Paper (Wind Power), Japan Wind Power Association, 2013.

verification testing in Scotland, and even in Japan, the hydraulic systems are being used in the testing of floating wind turbines off Fukushima Prefecture.

J-Power and NEDO begin Verification Test of Off-shore Wind Power Generators

In Japan, J-Power (Electric Power Development Co., Ltd.), in cooperation with the New Energy and Industrial Technology Development Organization (NEDO), constructed an offshore wind power generation facility off Kitakyushu City and launched its verification testing program in June 2013. J-Power is the only power company in Japan that both serves as an electricity wholesaler providing power to multiple regions from a single power plant and operates its own intraregional power grid. In terms of coal-fired thermal power generation, J-Power has the largest share of the domestic market at 21%, and is number two domestically in market share in both hydraulic and wind power generation facilities.

Japan’s First Floating Offshore Wind Power Generation Plant

Construction for the Fukushima Recovery Experimental Off-shore Floating Wind Farm Project began in July 2013, and operational testing is expected to start in October. Japan’s inaugural floating offshore wind power generator is located 20km off Fukushima Prefecture’s Onahama Port, and features a large windmill with a diameter of 80 meters. A floating substation has also been constructed, which will supply power to Fukushima Prefecture via undersea cables.

Corporations are increasingly active as the increasing sizes of offshore wind power stations and the realization of floating generation facilities makes returns from these projects more attractive.

Global development of wind power systems incorporating extra-large windmills (80m in diameter) is proceeding quickly, and Japanese manufacturers are making their presence known in no uncertain terms. Japan’s wind power manufacturers are highly advanced with regard to peripheral parts and components and the financial industry is watching this segment closely.

A total of eleven Japanese corporations and institutions are participating in the Fukushima Recovery Experimental Off-shore Floating Wind Farm Project, including Marubeni (project integrator); the University of Tokyo (technical advisor); Mitsubishi Corporation; MHI; and Nippon Steel & Sumitomo Metal Corporation.

Japanese firms involved in the project have been active in supplying ancillary equipment and structures – the floating steel structure supporting the windmill was created by Mitsui Shipbuilding & Engineering in conjunction with MODEC, Hitachi made the extra-large floating windmill, and the floating substation was developed by Japan Marine United Corporation.

Geothermal Power Generation

The Ministry of Economy, Trade and Industry (METI) incorporated a detailed article on geothermal power generation in its 2013 Energy White Paper. Furthermore, 33 Japanese industrial companies joined to form the Japan Geothermal Association in December 2012, including manufacturers, general contractors, trading companies and energy firms. The Geothermal

Association will tackle a broad range of geothermal power generation issues.

Japan: Feeling the Positives of Volcanoes

The use of geothermal power began drawing interest in Japan soon after World War II due to the country’s location in the midst of a volcanic zone. The first full-scale geothermal power station began operation in 1966, and presently there are nearly 20 such stations operating primarily in the Tohoku and Kyushu regions. While the actual power outputs from these facilities are relatively small, the fact that the stations are extremely stable makes geothermal power a key focal point in Japan’s future.

Geothermal power has a multitude of unique characteristics including the ability to recycle hot steam and water used in power generation and apply it to the heating of agricultural greenhouses as well as to fish farming and district heating, and the fact that it is a sustainable, near limitless power source that is stable and available around the clock.

Issues

Geothermal power sources are typically located in close proximity to public facilities such as parks and hot springs. As such, the power company must negotiate issues and gain the understanding of local residents during the siting and permit phases of the project. Power distribution systems and determining customer bases are further hurdles in developing local geothermal power grids.

In theory, geothermal power generation takes more than 10 years and involves 5 stages of development. We are seeing an acceleration of environmental assessments in growth strategies. The Wasabizawa geothermal power plant project in Yuzawa City, Akita Prefecture, which involves J-Power and other organizations, is presently in stage 3 (environmental assessment). Through a shortening by nearly half of the assessment period, it is said that the project will actually be able to begin generating power in about 5 years.

Additionally, investigations are underway in 13 other locations, including Appi Kogen (Hachimantai City, Iwate Prefecture), Oyasu (Yuzawa City, Akita Prefecture), Musadake (Shibetsu, Hokkaido), Amemasudake (Akaigawa, Hokkaido), and Matsuo-Hachimantai (Hachimantai City, Iwate Prefecture).

Geothermal Power Generation Studies Launched at 7 Hot Springs

Geothermal power generation studies are being conducted at hot springs nationwide. The studies are being funded by METI. The key benefit of such areas is the ability to apply binary

power generation, which uses bubbling spring water without the need for a deep well to be dug. Some of the locations conducting the studies are the Ashoro District (Hokkaido), Higashi Izu Atagawa Onsen District (Shizuoka Prefecture), Arifukuonsencho (Shimane Prefecture), Houreinoyu District (Kumamoto Prefecture), and Ishimatsu Nouen (Kumamoto Prefecture).

The Firmament’s the Limit

Geothermal energy has already been in use for thousands of years in some parts of the world in applications including cooking and heating spaces, but it wasn’t until the early 1900s in Italy that it was first successfully used to produce electricity.

Today there are more than 20 nations producing geothermal energy, led by the U.S. It is said that most geothermal power plants going forward will employ binary generation, which means a significant reduction in CO2 emissions compared to power plants fueled by natural gas. It’s always available, unlike energy generated from the sun or wind, and is markedly less expensive for users than power generated using fossil fuels. If environmental issues such as the release of certain natural gases and the safe, proper disposition of geothermal fluids can be resolved, there’s apparently no ceiling in terms of the growth of this field. Combined with advances in wind and solar power generation, it’s clear that there is most definitely an alternative route to fossil fuels. The question is, who will pave the way?



FEATURE

The Storage Battery Business

A Traditional Japanese Stronghold Enters a New Phase



The storage battery industry is a traditional stronghold of Japan where Japanese companies have maintained a formidable presence in the global market. Technological innovation has progressed - particularly with regard to the lithium-ion battery (LiB) - and the achievement of a low-price large-capacity battery that was impossible even only a few years ago has become not only realistic but imminent. Consequently, just as the hybrid car market is already firmly established, so also we can anticipate the formation and expansion of a new stationary battery market. Foreign battery makers from the West, Korea and China are following Japan's lead and entering the market. The following report looks at companies affiliated with storage batteries and movement in this industry that is soon to deliver a viable and vital new energy device.

Central Government Expectations for Storage Battery Industry

The age of the hybrid car was launched when Toyota's first Prius – the world's first mass-produced hybrid vehicle – went on sale in Japan in 1997. Honda followed with the Insight in 1999. The second-generation Prius debuted in 2003 and Honda released its new Insight in 2009 at a low price of just 1.89 million yen, bestowing further acceleration of the hybrid car market.

In April 2010, the Next Generation Automobile Strategy Working Group of the Ministry of Economy, Trade and Industry (METI) released the 2010 Next Generation Automobile Strategy. In reference to automobile storage batteries, the report stated, "An action plan will be formed to secure globally leading battery research and technology so that the performance of lithium-ion batteries (LiBs) can be improved, post LiB batteries developed, mass production benefits generated through the spread of electronic automobiles and the environment prepared for secondary uses of batteries." At the time the report was released, it was already possible to foresee growth in non-automobile uses from a cost perspective, and the preparation of an environment for secondary usage.

Furthermore, the Resource Energy Agency's Work Shop on Storage Battery System Industry Strategies pointed out in its publication on "Forming the Storage Battery System Industry" (May 2010) that, "(In the next-generation energy and social system of Japan) storage battery systems will play a vital role as we anticipate expanded acceptance of reproducible energies such as solar power generation and next-generation automobiles." Further, the document specified the expectations for the batteries as a new export industry in saying, "Next-generation automobiles, reproducible energy and storage batteries will become monumentally important on a global scale."

In Japan, the hybrid car spread like wildfire, sparked by the enactment of preferential measures such as the eco-car tax reduction and by a societal convergence on environmental and

HV, PHV and EV Sales (Global Market)

	Expected 2012	Compared to 2011	2030 Forecast	Compared to 2012
HV	1.6 mn units	175.8%	8.63 mn units	5.4x
PHV	60,000 units	6.0X	1.94 mn units	32.3x
EV	70,000 units	175.0%	3.07 mn units	43.9x
Total	1.73 mn units	180.2%	13.64 mn units	7.9x

energy issues. The role of storage batteries as a key device in these cars is serving to increase their importance.

Hybrid Cars Soon to be Integral Part of Everyday Life

In 2012, hybrid vehicles (HV), plug-in hybrids (PHV) and electric vehicles (EV) were all available on the market, and the release of fuel cell vehicles (FCV) is just around the corner. The global market today has not yet reached 2 million cars, yet some reports expect this number to soar to 13 million by 2030. Hybrid cars are no longer a next-generation vehicle, they are soon to be woven into the tapestry of our everyday lives (Fuji Economics Institute, "2030 Global Market Forecast for HVs, PHVs and EVs").

HV Market to be 8.63 Million Units in 2030

HV sales are forecast to expand from 1.6 million units in 2012 to 8.63 million units in 2030. The Prius and Aqua (known as the "Prius c" abroad) models will drive sales for Toyota but they will face growing competition from U.S. manufacturers in that market. Given that its roads are well suited to the hybrid and its people demand the newest and best in all things, Japan is expected to remain the world's largest HV market through 2018 despite Japanese manufacturers aggressively launching many HV models in the U.S.

The Japanese market for HVs is expected to mature by the year 2020, with HV sales comprising 31.1% of all automobile sales, and after that sales will gradually level off. In the West, the market share of HVs is expected to reach 17.8% in Europe by 2025 and 12.2% in North America, with these figures climbing to 20.1% and 18.2% respectively in 2030.

PHV Market to Reach 1.94 Million Units in 2030

In the U.S., various measures have been implemented to aid in the permeation of PHVs, including federal development support for U.S. manufacturers, preferential measures and regulations like the Zero Emission Vehicle (ZEV) regulation passed in California. U.S. manufacturers will try to stage a rally with PHVs to offset their lack of success in the HV market, but Toyota, Honda and other Japanese manufacturers are expected to go into battle armed to the teeth with cutting-edge technologies.

In the Japanese market, the Prius PHV is struggling. When examining the factors contributing to poor sales, the lack of a supporting infrastructure and the price of the vehicles are regularly the first factors cited, but users seem to actually have a healthy disdain for the separate ports for gasoline and electricity. If the infrastructure for electricity recharging can be established, the PHV may fulfill its original objective of serving as a bridge to the EV, but Japan lags in terms of both the development of an EV market and the formulation and implementation of an infrastructure for it, leading many to believe that a large market will not emerge to supplant the HV market.

Furthermore, EVs will have established a tangible presence in the global markets by 2025 and 2030. Therefore, by the year 2020 the PHV is expected to be positioned as a vehicle in conformity with environmental regulations which should then lead to reasonable demand for and sales of medium to large PHVs.

EV Market to be 3.07 Million Units in 2030

The market scale in 2012 was 70,000 units. With the exception of the Nissan LEAF, the market was comprised primarily of commercial-use and trial EVs. Furthermore, the prime motivation of companies and local governments that have incorporated them in their vehicle fleets is to broadcast their environmental soundness to the public.

Manufacturers active in the commercial-use arena are Mitsubishi, Renault and PSA while Daimler, BMW, Ford and GM are only conducting trial sales. Volkswagen is focused primarily on the European markets and achieving sales on the order of a few thousand units.

Between 2016 and 2020, models will increase and ZEV regulations are expected to bolster sales in a broader range of markets. This will primarily be the case in Europe. Furthermore, EVs for the general consumer are anticipated to spread progressively.

German manufacturers, finding themselves far behind Japan in HV development, have been forced to focus on EVs. However, the image of an EV traveling extended distances on the Autobahn is not a terribly realistic one, and as such use will probably be limited to that of a second vehicle for getting around town.

Non-passenger Car Batteries

Following passenger cars, battery use is expected to spread among busses, trucks, motorcycles, trains, forklifts and beyond. Japanese manufacturers are already at work on HV busses and trucks and in 2015 they’re expected to account for 1.2% of all HV and EHV vehicles including passenger cars. Both Yamaha and Honda sell e-motorcycles that use LiBs. Power-assisted bicycles also fall into this domain. The e-motorcycle market is forecast to grow to 160 billion yen by 2015, and power-assisted bicycles to nearly 40 billion yen.

A unique likely future application for LiBs is the light rail

Primary Uses for Vehicle Batteries Other than Passenger Cars

	Market Size	Technology Development Potential	Relative Competitiveness of Japanese Firms
Bus/truck	< Passenger car market	System different from that of passenger EVs/HEVs but technology can be transferred	Established Japanese manufacturers are strong
Motorcycle	200 bn yen market in 2015	Market expected to grow using passenger EV/HEV technology	Established Japanese manufacturers are strong
Train	LRV and other markets are small	Performance must exceed existing batteries	Leading established manufacturers are foreign, which may make entry difficult
Forklift	7 bn yen market	Further cost reductions are needed for LiB to spread as an alternative storage device	Established Japanese manufacturers are strong

Source: Analysis of various published materials and company interviews by Arthur D. Little

Forecast of Trends by Country/Region for 2030

	HV	PHV	EV
Japan	1.48mn	110,000	340,000
North America	3.73mn	730,000	810,000
Europe	2.55mn	770,000	1.30mn
China	270,000	150,000	570,000

Japan

The combined market share of HV, PHV and EV combined is expected to grow to 44.6% of all domestic automobile sales. In 2020, the HV market will enter its mature phase with a full range of models and by 2025 latent growth will enlarge the shares for PHVs and EVs. Pricing, perceived inconvenience and insufficient infrastructure will serve to stunt PHV market growth with respect to HVs, and so demand will stagnate from around 2025 with achievement of a certain level. Once EVs hit their stride around 2025, the ability of owners to recharge them at home is expected to propel the market, but not before a variety of obstacles have been successfully negotiated.

North America

EVs will grow to comprise 4.4% of the market and combined with HVs and PHVs will hold a 28.4% share. Measures to increase PHV sales will succeed through ZEV regulations and help the EV and PHV markets to grow to a certain level. However, there will not be substantial growth until around 2025, after which the market is expected to settle into a structure under which HVs are prominent among medium and large cars, and EVs are recognized as compact cars.

Europe

The share of HVs (including diesel hybrids) in the entire automobile market of Europe will grow to 18.25% and HVs, PHVs and EVs

combined will boast a 33% share. The share of EVs will climb to 9.3% with use expected to be concentrated in urban areas. In the European market, a certain level of HV and EV sales are expected as a means to enable Europe to meet the EU’s 2020 CO₂ emissions target of 95g/km and these vehicles will be actively utilized as a means to satisfy the regulations until the age of the EV arrives around 2030. Diesel cars account for roughly 50% of automobile sales in the European market. This is because diesel gets preferential tax treatment, in Europe (as in the U.S.) only ultra-low-sulfur diesel is in use, the environmental consciousness of Europeans is high and there is a fully developed diesel infrastructure. Furthermore, diesel technology in Europe is highly advanced. The 95g/km regulation will not force them to move out of their diesel technology field skillset into gasoline HVs.

China

The Chinese government’s efforts to promote EV sales have not yet borne fruit. The government is indicating it will provide grants for HVs since an increase in demand for EVs could result in a shortage in electric power. Despite this fact, the government is being forced to promote EVs because of inadequate control technology among Chinese manufacturers. The growth in demand for e-motorcycles is illustrative of the expected growth in market categories with low entry barriers like EVs and micro EVs from around 2015.

vehicle market known as LRV. Practical application of this system already exists with the low-floor articulation LRV Green Mover Max – the first ever to be entirely built in Japan and operated by Hiroshima Railway. West Japan Railway Company has also installed a stationary large power storage facility.

E-forklifts are also showing signs of growth. Both Nissan and Mitsubishi Heavy Industries have launched models and the market is expected to reach 70 billion yen in 2015.

Stationary Batteries - A Market with Explosive Potential

The development of LiBs with greater storage capacity and at lower costs to accommodate compact general uses like mobile phones and laptops has led to market growth for the former in line with the latter. Further expansion is seen for the LiB market now due to greater in-car use and new stationary applications.

The stationary market (industrial use) is a sector of the LiB market that is expected to skyrocket to annual sales of just under 1 trillion yen in 2020. Market scale is still small compared to in-car uses, but the growth rate should surpass the in-car use market – it is already growing faster than initially expected due to the impact of the Great East Japan Earthquake.

Storage Batteries for Corporate Facilities

Power generation and battery facilities provide emergency power at data centers and wireless bases to sustain operations during disasters. There is demand for LiBs in data centers due to their compactness and because they do not emit gas. TDK Lamda is using LiBs as an uninterruptible power supply (UPS) for data centers. In the case of wireless base stations, the need for LiBs is great where there are limitations on the space and weight and when placed in the vicinity of vital communications

infrastructure equipment. Hospitals are also taking a close look at LiBs as they can serve as a UPS; power generators are only activated after an outage that may range from dozens of seconds to several minutes. There are many cases of hospitals procuring batteries. The Tokushima Prefectural Police were the first to employ LiBs to power traffic signals, and this application is being adopted on a gradually broadening scale as well. Power generation facilities that incorporate storage batteries and use recyclable energies are also expected to become more common depending on adoption by factories. Panasonic, Hitachi and Toshiba have announced the utilization and testing of various lifestyle-related systems that employ LiBs.

Home-use Batteries

Home-use demand for storage batteries as a source of backup power has also taken off due to the earthquake, with companies like Yamaha, Elly Power and BYD developing batteries for home use. Demand for storage batteries is also very strong in emerging countries, which need the backup power to overcome frequent power outages. In the U.S., governmental support measures are driving demand to stabilize power systems. These markets are expected to grow with further reductions in LiB costs and size.

There are also emerging expectations for vehicle-to-home and vehicle-to-grid applications where EV and PHV batteries are used to supply both home power and grid power. Before this can really gain traction, however, there is a need to overcome various technological issues such as battery life, safety and control.

Large-scale Power Storage

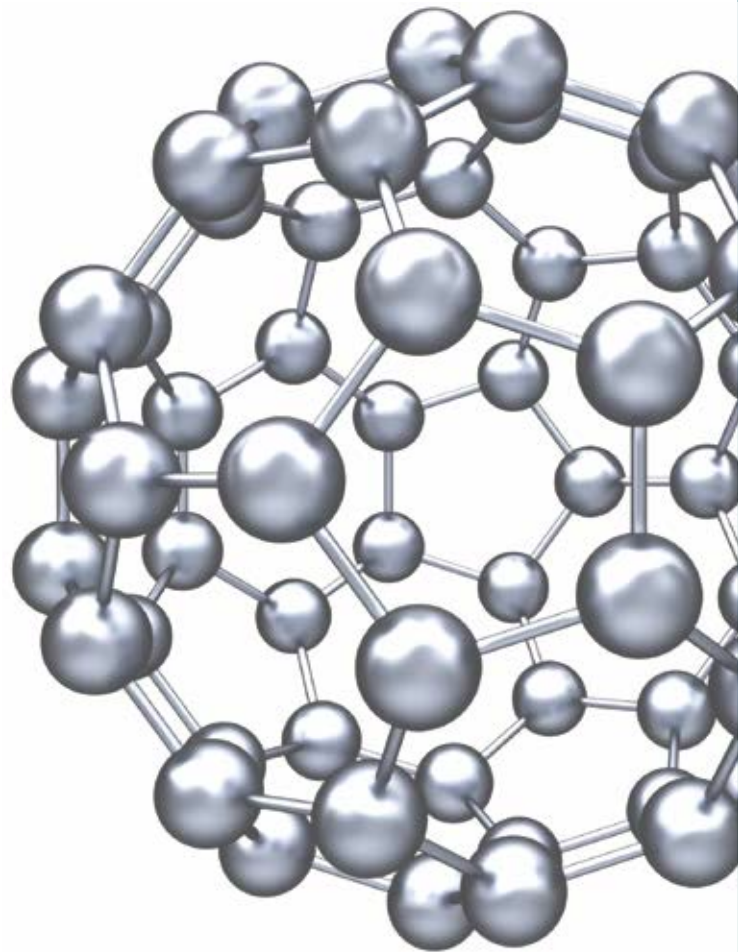
The need for LiBs as a large power storage facility to replace power generation facilities for ancillary services in order to overcome fluctuations in supply and demand is also growing rapidly. As the cost of the batteries decreases, they are expected to be more widely used to supply ancillary power to offset expensive power sources, as well as in alternative energy facilities as a stable energy source to complement the unstable sources of wind and solar power generation.

Time and Tide Wait for No One

There is yet another exciting breakthrough in the continuing growth and evolution of this field – the supercapacitor. Until now it has been regarded as impractical due to a low energy-storage-to-volume ratio – the supercapacitor would have had to be far too large to be viable in most applications. Researchers at Monash University in Melbourne, Australia, however,

have just succeeded in creating a supercapacitor using graphene – a layer of carbon atoms one atom thick in a honeycomb lattice arrangement (graphite is comprised of many layers of graphene) – that is extremely strong and has a high energy density similar to that of lead-acid batteries, and reportedly about 12 times that of supercapacitors that are currently available commercially. According to an online article in Green Building Elements published on August 3, Professor Dan Li of the university’s Department of Materials Engineering, the head researcher on the project, believes commercial application is not that far in the future. “We have created a macroscopic graphene material that is a step beyond what has been achieved previously. It is almost at the stage of moving from the lab to commercial development.” The possibilities generated by this small, light, powerful material are sure to spark further shock waves of excitement and anticipation.

With the momentum bolstered by this and other developments that seem to take place between blinks of the eye, the vehicular battery market is fully charged and, despite technological and infrastructural challenges that at times seemingly threaten to short-circuit its progress, it is a market that going forward is sure to amp up Japan’s battery market and macroeconomy.



Investing in Japan:
The Story Within the Story



JAPAN FUND (CNJFX)



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Taking the time to become intimately familiar with the characteristics, circumstances and needs of clients; taking the time to understand the causes of growth and decline in the communities and regions in which we do business; and taking the time to carefully unearth the underlying potential in targets for investment – these are the essence of the modus operandi of FCA Corp., based in Houston, Texas. They are also the foundation for its success – and that of its clients – since 1975. FCA operates the Commonwealth International Series Trust – a grouping of five mutual funds, including one Japan-specific fund.

At the helm is Founder, President and CEO Robert W. Scharar, whose unique background has given him an equally unique – and valuable – perspective.

“As both a CPA and a taxation attorney, I have a comprehensive understanding of accounting and business legal issues, and while this background certainly supports the mathematical and financial aspects of analysis, the numbers are never our only criteria. We are constantly searching for the underlying potential – the story within the story – and that requires more of a personal approach.”

FCA’s strengths lie in the rich, varied experience of its team members, its ability to source accurate, timely information locally in the areas in which it does business, and dedication to its “leave no stone unturned” approach to knowing its clients and investment targets.

“It’s important to us to not only get to know our clients well – we do extensive interviews with each client – but also to use real intelligence gleaned on the ground in the countries where we manage funds. In Japan, for instance, through our network of contacts who are knowledgeable about the customs, economy and demographics, we’ve learned that it’s a country with a host of interesting stories, and that within some of those stories – one being Fukuoka, with its proximity to Asia and energetic local leadership – are fascinating opportunities.”

As the investment advisor to the Commonwealth funds, FCA goes beyond the story told by the figures, communicating regularly with the people in its network. By identifying specific strengths of certain countries and then “drilling down” where the greatest depth of knowledge exists, it can leverage its many years of international investing experience.

“Numbers really only tell one side of the story. Obviously there’s a great deal of information to be obtained from a conversation with corporate management that is not necessarily listed in the company’s financials, such as how passionate they are about the company’s strategy or their apparent skills and experience. As for targets, we like to invest in companies we think meet the “three R” test – Real Companies, Real Products, and Real Financials. Because we are an external fund investing in Japan, we want to invest in companies in a way that doesn’t mirror the index, thus providing a diversified exposure to Japanese stocks not easily acquired by many foreign investors.”