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Saft international

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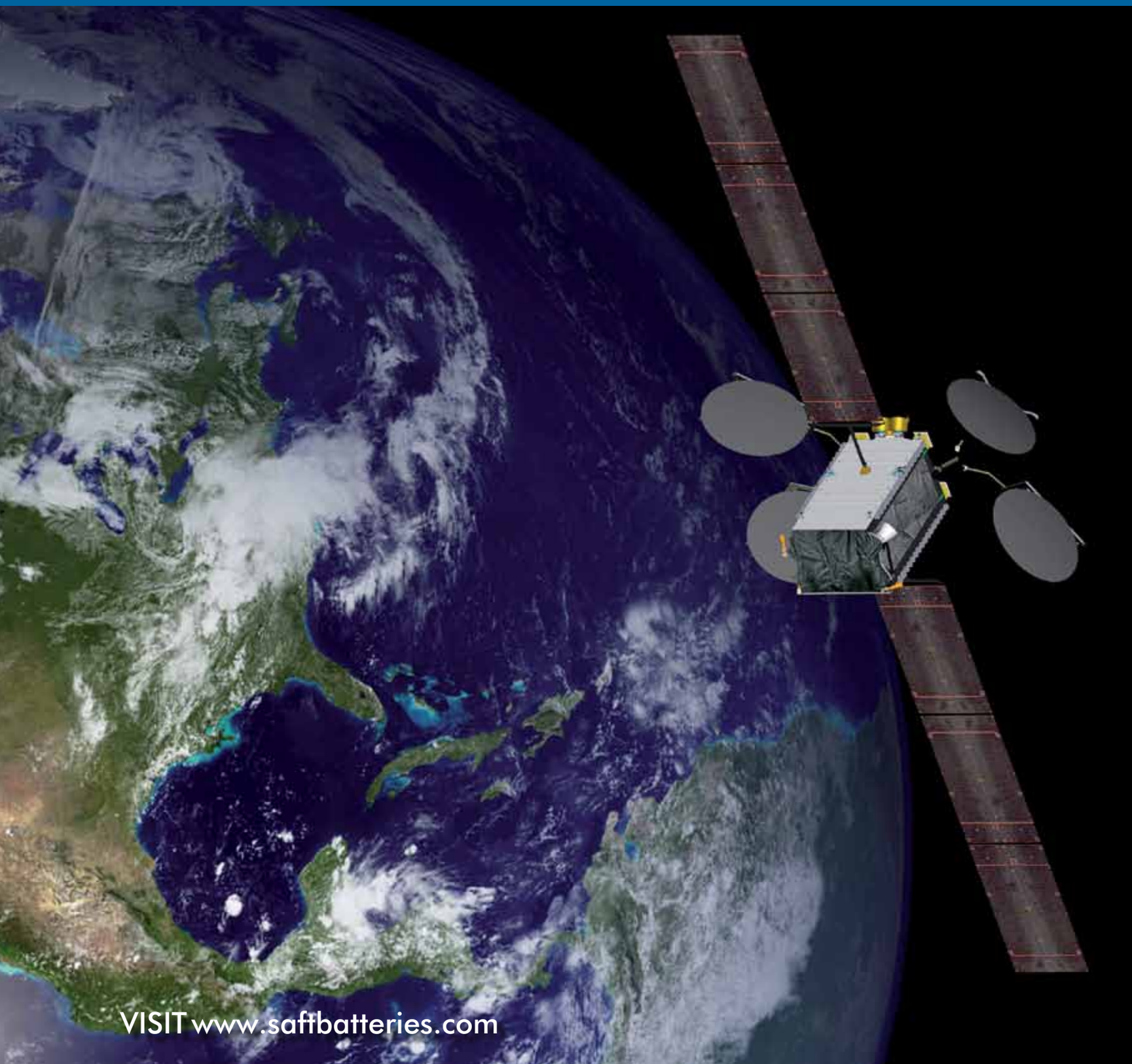
SAFT NEWS
Li-ion batteries for GEO satellites



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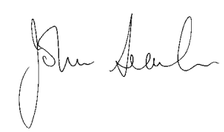
I invite you to read the 2012 edition of Saft International, Saft's magazine for our customers and partners.

As you will see, 2012 was the year when deliveries began from our new Li-ion facility in Jacksonville, Florida.
Our strategy is now in place for serving the markets which require the benefits that Li-ion brings, whilst continuing to develop our nickel battery business around the world, in particular where challenging climatic conditions or critical processes demand long-life reliable technology.
We have successfully penetrated the energy storage market and have already positioned ourselves as a major player in this field. We have re-entered the vehicle market too, addressing the motive power and hybrid and electric truck and bus segments as a priority, recording some important initial successes.
Major contracts were also obtained for Li-ion telecom batteries, particularly in India, but also in the marine and rail industries. Saft continued to strengthen its position in the Space and Defence market too.
On 1st January 2013 we bought back the Li-ion facility in Nersac, France, which has been building Li-ion batteries for the vehicle market since 2009.
With our R&D leadership and our new manufacturing footprint, Saft continues to brings its customers cutting-edge technology and the reliability and reputation of a market leader for the years ahead.



John Searle
Chairman of the Management Board
Saft Groupe SA

IN THIS ISSUE

Saft International – A magazine for Saft's customers and business partners. **Editor-in-chief:** Jill Ledger. **Managing Editor:** Catherine Jouatel. **Texts:** Graham Lord. **Graphic design:** D Parquet and ML Lanceau. **Photo credits** ©: Saft - FranckJuery - Schüco - Fotolia/Smileus - Sensile Technologies SA - Shanghai Electric Group - Fotolia/DeWe - Boeing - Wayne Powell - ERDF - Fotolia/Zauberhut - Franck Camusat - Bernard Bakalian - Communauté Urbaine de Bordeaux - SNCF - Saft/2007/ Steven James Pepple/Fotolia - Fotolia/Tovovan - SNTF - Ferrari

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Saft inaugurates **a new world-class factory in Bangalore, India**

On January 23, 2013, Saft opened a new factory incorporating the latest manufacturing technology in Bibadi, Bangalore. The 75,000 sq.ft factory will produce state-of-the-art, nickel-based rechargeable batteries.

This investment has effectively doubled Saft's local production capacity for industrial battery systems, opening up new business opportunities in one of the world's fastest developing battery markets. Indian demand for stand-by pocket-plate batteries is growing by 20-30% per year.

The new plant will be operated by AMCO-Saft India Limited, a joint venture set up in 2006 between Saft and its long-standing Indian partner Amalgamations. Bangalore will put Saft on track to benefit from increased opportunities in sectors such as railways, telecom and aviation, among others.

Railways, telecom and aviation

The Bangalore plant has all the resources required to support the Indian operations of major railway OEMs, from design to manufacturing and commissioning of battery solutions. It positions Saft to benefit from the large investments in the Indian railway market anticipated for at least the next five years. Investment is focusing on urban transport (metro) systems in cities with over three million inhabitants, as well on as high-speed train projects. The local metro system in Bangalore already features Saft batteries and they are found in metros throughout India including Delhi, Chennai, Jaipur and Mumbai. Saft has also delivered batteries for a number of locomotive projects.

The new Saft factory will provide local support for telecom battery business by providing maintenance, training and commissioning to meet strong demand for energy back-up linked to the deployment of mobile telecom networks. In much of India, as in Africa, mobile telecoms are 'leap-frogging' feebly-deployed fixed-line telephony.

The plant will also be qualified to manufacture aviation batteries for the Indian Air Force, the world's fifth-largest, complementing Saft's position as a major supplier to Hindustan Aeronautics.

The additional manufacturing capacity will also enable Saft to satisfy growing demand for energy storage to support power plants and photovoltaic (PV) renewable-energy projects, as well as meeting the back-up power needs of India's defence forces and the oil and gas industry.

Cutting-edge technology

Saft's Bangalore plant is equipped with the latest manufacturing technology. Some 80% of the equipment is new, including the aviation line, and a small amount has been transferred from the existing AMCO-Saft factory on the other side of Bangalore, which will soon be closed. The old plant was deemed too small and otherwise unsuitable for expansion

On inauguration two lines were ready to roll, and four lines should be operational by the end of March 2013. Soon after inauguration the plant was producing at 20% of capacity, and this was ramped up to 50% in March. By the end of April the plant was producing at 100% of capacity.

The new factory is equipped to produce 40 million Ah per year, compared to 18 million Ah per year at the old plant. It also has room for a capacity upgrade to 60 million Ah if demand is there.

A TECHNOLOGY HUB

Known as the Silicon Valley of India, Bangalore is home to numerous aerospace, telecom and other high-tech companies, and is regarded as one of the world's top 10 entrepreneurial locations, making it an ideal location for Saft in the fast-growth market of the Indian subcontinent.

A strategic investment in the future

"This new Bangalore factory is Saft's latest investment in emerging economies where there is high growth. This is a key thrust of the company's strategy," says CEO John Searle. "This very significant increase in manufacturing capacity in India will play a crucial role in expanding our business in the sub-continent." In addition to the Indian market, AMCO-Saft is in a position to supply customers in Bangladesh, Sri Lanka and Nepal.

The inauguration of this new plant concentrating on nickel-based battery systems follows closely on the start-up of Saft's sophisticated Li-ion battery plant in Jacksonville, Florida, which began delivering products at the end of 2011.

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An auspicious occasion

The new Bangalore plant was inaugurated with appropriate festivity, on a date regarded by Indians as particularly auspicious, in the presence of AMCO-Saft employees, customers and suppliers as well as the financial community. Following the inauguration, which included Hindu ceremonies to ensure continuing prosperity, guests were invited to tour the plant and watch a manufacturing demonstration, and then they visited an exhibition of the various batteries manufactured by Saft in India and elsewhere.

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Smart Li-ion battery storage for **Schüco's smart Energy Manager**

Saft is providing a Li-ion-based smart storage solution for the innovative Energy Manager in-building photovoltaic (PV) energy-management solution developed by Schüco, the German specialist in energy-efficient buildings.

The new system, which provides intelligent control of a building's energy (including PV input, in-building use and sale to the grid) will be highlighted for the second time at the 2013 Intersolar fair in Munich. The Energy Manager is generating strong interest from building and home owners and PV installers who want to optimize on-site generation and self-use of solar electricity.

Smart management

Together with its worldwide network of partners, architects, specifiers and investors, Schüco creates sustainable building envelopes which focus on people and their needs in harmony with nature and technology. The highest demands for design, comfort and security can be met, whilst simultaneously reducing CO_2 emissions through energy efficiency, thereby conserving natural resources.

For some time Schüco has offered grid-connected systems, and the Energy Manager is a step change up to full electronic management, as it intelligently determines if photovoltaïc energy should be stored, consumed or sold back to the grid. The system's control unit detects how much self-generated electricity is available and combines this information with data from external sources. Electricity is only exported when production exceeds storage capacity.

… and smart storage

"Smart energy management solutions demand smart energy storage," says Dr. Thomas Schlenker, head of the New Energies technical department at Schüco International KG. "Saft's leading Li-ion technology, engineering competence and industrial capability make a vital contribution to the efficiency and reliability of this leading-edge solution."

Saft's Li-ion battery system for the Energy Manager comes with a Battery Management System that manages balance, SOC, etc. and also communicates in 2-way mode with the control system. Saft engineers worked with Schüco to size the batteries and to design and qualify the specific interfaces required. They also helped with integration (ventilation, fixations, cables, etc.) and assisted with testing and validation at Schüco's Bielefeld plant.

The Energy Manager is designed for PV systems of up to 5.5 kWp and comes with a battery of 4 kWh or 8 kWh, depending on building size and PV input. The battery systems have been developed to offer extremely efficient and flexible energy storage all year round to support the highly dynamic charge and discharge cycling profiles found in renewable applications, with the added advantage of a 20-year service life.

The system has now been certified by German authorities as complying with stringent safety rules and is currently being installed on the premises of the first customers.

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Long-lasting primary lithium power for Swiss-made smart-telemetry level monitoring systems for oil and gas tanks

Saft is supplying more than 20,000 specialized Li-$SOCl_2$ batteries for Sensile Technologies' high-tech SENTS™ sensor+GSM telemetry devices for remote monitoring of levels in oil and gas storage units.

Machine-to-machine (M2M) specialist Sensile Technologies supplies smart monitoring devices for tanks installed in remote locations by customers such as oil and gas distribution companies. The company, based in Morges, Switzerland, is European market leader in remote monitoring solutions for the oil and gas industry, all Swiss made and ATEX (anti explosion) certified.

With its SENTS™ technology, the Sensile device measures the liquid or gas level, records the data and transfers it via a wireless module to a central monitoring system. The distribution company can then know exactly how much liquid or gas is stored in each of its tanks at any moment. This allows distributors to reduce logistics costs and transport-related CO_2 and to optimize stocks of fuel, gasoline, LPG, lubricants and other stored fluids, while letting them offer improved service to their own customers (no need to check levels themselves, detailed consumption record, optimum delivery intervals and the assurance that a tank will never run dry).

Reliability and long life

The 7.2V 3.6Ah batteries, based on Saft LS17500 lithium-thionyl chloride (Li-$SOCl_2$) cells, offer a service life of 7 to 10 years. Saft's LS series cells, designed for metering applications, have an extremely wide operating temperature range of -60°C to +85°C, are leak-proof at up to +130°C and housed in corrosion-proof containers. The cells are stable and reliable with low self-discharge, giving the Sensile devices a very long operating life. "The long life, safety and reliability of the Saft batteries means that maintenance and replacement costs are kept to a minimum, while also benefiting the environment", says Jean-Marc Uehlinger, Sensile's Operational Director.
The company's solutions are currently installed on more than 40,000 tanks and meters, in over 42 countries on all continents.

Expertise and service

Sensile used Saft batteries for several years via a distributor. They were happy with the batteries, but they needed better technical advice than distributors can usually give. Sensile is constantly developing new models for specific applications. "A couple of years ago I stopped at Saft's stand at a metering fair and talked to one of their engineers," says Jean-Marc Uehlinger. "I quickly realized that easy access to people who know about batteries would make a big difference. Sensile is in a high-tech market. So we started dealing directly."

The company is currently developing a new generation of products. "Saft is working very closely with us upstream to integrate just the right batteries. They have come to Switzerland and our engineers have been made very welcome at Saft's Poitiers plant. Another thing we appreciate is Saft's flexibility. In 2012 we posted strong sales growth and needed more batteries than anticipated. And we needed them fast, because our production team has a 'just-in-time' approach. We placed a couple of last-minute orders but Saft still delivered on time. A supplier like that is very valuable."

"We can put commoditized batteries in Sensile products, and they'll be cheaper. But we'll probably get lower performance and we'll certainly not get the same level of customer service."

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Reliable nickel-based back-up for Shanghai Electric's Vinh Tan 2 power station project in Vietnam

Saft is supplying SBM pocket-plate battery systems for the first tranche of a power-generation complex that will help meet fast-growing demand for power for this emerging country's on-going socio-economic development.

The Saft batteries will provide back-up power for critical safety and control functions at the power plant in the event of an interruption to the main power supply.

The coal-fired Vinh Tan complex, located in the south-central province of Binh Thuan, is being developed in three phases and will have a total capacity of 4,400 MW. The second phase, with a capacity of 1,200 MW, is currently being constructed as an EPC (Engineering, Procurement and Construction) contract by Shanghai Electric Power Generation Group (SEPGG), part of the huge Shanghai Electric Group . Construction began in mid-2010 and Vinh Tan 2 (in fact, the first tranche to be constructed) is scheduled to be commissioned in 2014.

SEPGG is one of China's top three power-station EPC firms, offering turnkey construction and service of power plants both inside China and internationally. The group, which has 12,000 employees, is also a major power-industry OEM, and the world's leading manufacturer of steam turbines. This is a breakthrough order for Saft, the first for a big power-station project by a Chinese EPC player.

3 hours back-up in case of incident

Under this $1.8-million contract, Saft will supply a total of 20 batteries, comprising thousands of SBM and Uptimax blocks. They will provide 220 V DC back-up power supply for generator units, coal desulphurization and handling systems, utilities, and emergency lighting, and etc. The batteries, with nominal capacities from 65 to 1390 Ah, are required to provide the plant with between 1 and 3 hours of autonomy.

Saft SBM pocket-plate block batteries have been specially developed for stationary industrial applications and offer high performance, ease of installation, minimal maintenance and an optimized TCO (Total Cost of Ownership). They have an anticipated service life of more than 20 years.

"Our customer, the end-user utility Electricity Vietnam, specified nickel-based batteries instead of the more usual lead-acid, and they recommended Saft," says Ms. Yingli Zhao, Senior Engineer in SEPGG's EPC Division Procurement Department. "We were impressed by the large capacity of Saft's SBM range, and they put together a competitive technical and commercial offer, with a commitment to on-site service in Vietnam. And it certainly helped that Saft had a team based right here in Shanghai! I am sure that for future projects using nickel-based batteries, Saft will be the N°1 choice for SEPGG."

Powering Vietnam's socio-economic development

The Vinh Tan complex, southern Vietnam's first thermal power plant, is being built under the government's energy-security National Electric Development Plan 2006-2015, which provides for construction of a large number of hydro and coal-fired power stations. Vinh Tan will be the key power-supply centre for the southern region in 2013-2020. Its planned output of 7.2 billion kWh annually will help meet increasing demand in the southern region and ease pressure on the north-south transmission line, as well as improving the efficiency of the national grid. Binh Thuan province, where the complex is located, posted double-digit average annual economic growth (industrial growth was about 20%) through the first decade of this century.

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SAFT, A GROWING PRESENCE IN ASIA

In recent years Saft has been posting strong growth in Asian markets, particularly China, and the company now has a solid presence in railways, aviation, metering, telecoms and energy storage. Saft is also winning significant business from Chinese-based construction firms and OEMs expanding their business throughout the rest of Asia.
Among Saft's key assets in its drive for growth in the region are the company's Shanghai and Hong Kong offices and above all its Zhuhai factory, which gives Saft the ability to manufacture, assemble and test battery systems locally. This sales and manufacturing presence is much appreciated by Chinese customers.

Megawatt-level Li-ion battery storage for Endesa's STORE project in the Canary Islands

Saft has provided an Intensium® Max battery system for one of Europe's first large-scale energy storage projects, designed to optimize operation of an island grid that has increasing input from renewables.

In the first half of 2013, a fully-integrated Saft ESS capable of delivering 1 MW of power for up to 3 hours will be commissioned on the Spanish Island of Gran Canaria as part of the pioneering STORE (Storage Technologies Of Reliable Energy) project to demonstrate how energy storage can maximize the integration of renewable energy – wind and solar photovoltaic (PV) – within utility networks and optimize the grid infrastructure.

The €11-million project, partially funded by the Spanish Ministry of Economy and Competitiveness CDTI unit (Centre for the Development of Industrial Technology), is led by Endesa, Spain's largest electric utility and the largest private electricity multinational in Latin America.

Helping tomorrow's grids integrate renewables

The aim of STORE is to demonstrate the technical and economic viability of large-scale energy storage as a way to reduce the need for grid infrastructure upgrades and to lower system operation costs, and to further increase the penetration of intermittent renewable generation within power networks.

This project should also contribute to the penetration of electric vehicles on the Canary Islands. After all, environment-friendly electric cars make more sense if the power they use comes from renewable sources.

"Energy storage is one of the new paradigms that will determine the direction of the electricity business in the medium term," says Pablo Fontela Martinez, Project Manager STORE, Endesa. "The constant growth in renewable energy generation on the Canary Islands places a much greater load on their transmission infrastructures and electrical distribution, while the nature of the local geography makes it extremely difficult to carry out traditional upgrading projects. Installing Saft's ESS on Gran Canaria is an ideal opportunity to evaluate the technical and economic viability of this innovative solution by making reserves of energy available in isolated locations, distribution substations and even for energy arbitrage."

A fully-integrated ESS

Saft was selected against strong competition, following a visit to the Bordeaux plant by Endesa engineers. Saft had the demonstrated ability to provide this sort of system, and followed this up with a good technical offer at a competitive price.

Saft has delivered a fully integrated turn-key ESS based on Intensium® Max 20 containerized systems manufactured at Saft's Li-ion plant in Bordeaux. Saft provides the complete energy storage system as a turnkey solution, comprising the Li-ion battery, a power conversion system supplied by its Spanish partner Ingeteam, as well as installation and commissioning services. The ESS comprises Li-ion battery modules, power management and control interfaces, air conditioning and safety devices. The overall system will deliver 3 MWh of energy to help smooth the peak demand on a substation and compensate for the intermittent production of wind farms and solar photovoltaic (PV) installations, as well as delivering ancillary services such as network frequency regulation and voltage control.

The island context

Li-ion technology is an excellent solution to support increasing penetration of renewable energy while improving island grids and enhancing power-supply quality.

By definition, islands have power grids with limited or non-existent outside support, so they have power-autonomy risks. So they tend to rely more on renewable generation – particularly environment-conscious islands that depend heavily on tourism. Other factors in favour of renewables may be the topographical difficulties and cost (eg. transport) of building and fuelling fossil-fuel plants. The Canary archipelago is an ideal setting to demonstrate the benefits of electricity storage, because of the high local penetration of renewables. Spain is one of the leading European countries as regards renewable energies, and Canaries are at the forefront, with well-developed solar PV and wind generation and potential for much more. They have the highest solar irradiation in Europe in terms of kWh/m2, and the coastal areas experience long periods of high wind speed.

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EL HIERRO - NO MORE FOSSIL FUELS

One of the Spanish government's goals is to make El Hierro, another of the Canary Islands, 100% reliant on wind- and hydro-power. That would make El Hierro the first island in the world to halt fossil-fuel power generation.

Lightweight high-energy Li-ion batteries for Boeing's new small- platform GEO satellites

Saft has been awarded a multi-million dollar contract to supply Li-ion battery packs for four technology-rich 702SP communications satellites. This is the sixth order under Boeing's long-term development partnership with Saft signed in 2009.

The high-tech small-platform (SP) satellites, designed to operate in the 3- to 8-kilowatt power range, are being developed by Boeing for Asia Broadcast Satellite (ABS) and Satélites Mexicanos (Satmex). The first two geosynchronous earth orbit (GEO) satellites, ABS-3A and Satmex 7, are scheduled to be completed by Boeing in early 2015 and will be launched together on a SpaceX Falcon 9 rocket.

Light, high-energy batteries

The Boeing 702SP is engineered to be affordable and adaptable, equipped with next-generation technology and avionics designed to enhance performance, simplify operations and streamline access to critical data. Each satellite will weigh between 1,900 and 2,100 kg yet will carry the payload of a much larger platform. Saft's lightweight batteries contribute to the weight savings, allowing for two of these small satellites to be launched on a single rocket. This in turn means a cost saving for Boeing's customers.

Saft will deliver batteries comprising multiple high-energy Li-ion cells designed to supply 8kW of on-board power during its 15-year life. This power is delivered primarily during the two 45-day eclipse periods each year when the satellite receives no sunlight. The batteries are mission-critical, and that's where Saft reliability comes in. Saft will deliver the batteries in 2013-2014. This is the first order for Boeing's 702SP satellite program.

Long-term partnership

Boeing Space and Intelligence Systems (S&IS) is the world's leading manufacturer of geostationary satellites. At its Satellite Development Center in California, the largest dedicated satellite factory in the world, Boeing manufactures satellites for commercial and military communications, weather forecasting and global positioning.

"Boeing has been working with Saft since 2006", says Thomas W. Thrailkill, Director Supplier Management at Boeing Space and Intelligence Systems. "As a primary supplier, Saft supports Boeing in delivering satellites that serve critical needs."

This is the sixth order from Boeing for Li-ion satellite batteries since signing a long-term agreement with Saft in 2009. The agreement solidifies a mutually beneficial partnership between the two companies and also validates Saft's expertise and ability to support such a major satellite-builder's programs for five years.

This new order increases Saft's current GEO satellite programs to more than 60 and will further establish the space heritage of Saft's high-energy Li-ion battery packs.

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SAFT, WINNING THE SPACE RACE

Saft was among the pioneers in space, sending its first satellite battery into orbit 47 years ago. Over 550 space programs flew with Ni-Cd batteries before Saft developed Ni-H_2 technology in the 1980s and embraced the Li-ion revolution in the 1990s. The company is now in a dominant position, with cutting-edge manufacturing sites in both France and the US working with satellite builders in 19 countries. Saft's Li-ion technology has long been used in space applications such as launchers, satellites, ATVs, probes, power tools and planetary rovers.

Li-ion battery storage helps Canada's First Nations harness wind power

Saft has been selected by Cowessess First Nation to supply and install a Li-ion battery Energy Storage System (ESS) comprising two Intensium® Max 20E containers for the High Wind and Storage Project near the city of Regina, Saskatchewan.

The Cowessess First Nation (CFN) demonstration project, Saft's first wind-power order in North America, involves an 800kW utility-scale wind turbine backed by a 400kW/740kWh battery system. Each Intensium® Max container, manufactured at Saft's Jacksonville plant in Florida, includes a state-of-the-art, 200kW Power Conditioning System.

Leveraging the wind

Southern Saskatchewan has one of the most extensive wind-energy resources in Canada. However, the wind is strong but intermittent and cannot be relied upon without back-up or battery storage. The CFN system is designed to provide a more continuous and predictable output. The grid-connected ESS will help optimize wind power generation by increasing reliability and decreasing volatility by as much as 70% over the 15-year lifespan of the system.

In helping to design the installation, Saft demonstrated that this base system can perform wind smoothing and achieve a maximum ramp rate of ten percent per minute of the rated power output of the 800-kW wind turbine while also providing up to 740 kWh at peak times. The flexibility and scalability of Saft's solution also allows the energy content to be increased in 124-kWh increments up to 992 kWh if additional peaking capability is desired. The demonstrator began operation in May 2013.

Promoting sustainable development

"This is an extremely important project that will increase the amount of renewable generation we can deploy on the grid," says Cowessess Chief Grady Lerat. "It's critical to have Saft providing state-of-the-art technology to make the High Wind and Storage Project successful."

The project was initiated by the Saskatchewan Research Council (SRC) who approached Cowessess with a concept in 2009, following a wind study performed on the site in 2006. Funding has been provided by the Treaty Land Entitlement of Cowessess First Nation, Natural Resources Canada through its Clean Energy Fund, the Government of Saskatchewan through its Go Green Fund, Aboriginal Affairs and Northern Development Canada and SRC.

Saskatchewan-based project consultants McNair Business Development worked closely with the SRC on managing the project on behalf of CFN. "We supported Cowessess and SRC with procurement and financing, among other things," says McNair Senior Business Consultant John Waller. "By spring 2012 we had a short list of three battery suppliers. We were concerned with company history, technical reputation, wind-power experience and financial solidity. Cowessess had little appetite for risk since it was the First Nation's first project of this nature. We had several interviews and Saft came out on top."

A model for other First Nations

This is a traditional collective-ownership project that incorporates new technology, capacity development and wealth creation (Cowessess will be selling power to the provincial utility). Ancillary benefits are intellectual property and construction contracts for local firms as well as increased business related to tourism and educational visits (the site is very close to Regina).

According to National Resources Canada, a successful demonstration of the CFN system would prove it as a model for other First Nation communities across Canada.

"First Nations like Cowessess have traditionally lived close to Nature and we were conscious of sustainability long before it became fashionable," smiles Chief Grady Lerat. "And we are delighted when high-technology like wind turbines and Li-ion battery storage can help us continue with this tradition".

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CANADA'S FIRST NATIONS

The Cowessess First Nation has 3,692 members, of whom 712 live on-reserve. Canada has about 300,000 First Nations people living on 615 different reserves (and represented by an Assembly of First Nations), as well as 400,000 living off-reserve. The country's other aboriginal groups are the Métis and the Arctic Inuit.

Nice Grid and Venteea, exploring power-grid technologies for the future

Saft is a partner in two projects in France, one involving solar PV and the other wind power, designed to gain deeper knowledge of the techniques and technologies required by tomorrow's smart power grids integrating significant amounts of renewable generation as well as energy storage.

The two projects, Venteea on the windy plains of France's north-eastern Aube region, and Nice Grid on the sunny Riviera, are being carried out by ERDF, which manages France's public electricity distribution network. They have financial backing from the French government Energy Agency as part of its "Investing in the Future" initiative. Both projects, which are exploring new solutions under real grid conditions, involve numerous specialist partners from the public and private sectors. Saft is supplying and managing various Li-ion energy storage systems (ESS).

Wind power

The three-year Venteea project is exploring innovative technologies for better integration of wind energy into a medium-voltage electricity grid, while also improving network efficiency and optimizing connection costs. The project is located near the city of Troyes in the Aube region, which is strong in wind-power generation. Venteea is based on a 6MW section of an existing wind farm. Saft is providing a 2MW containerized Intensium Max® energy storage system of 1.3 MWh storage capacity.

The project will demonstrate new tools (sensors, circuit-breakers, transformers, fault-detectors, etc.) to increase the 'observable' and 'controllable' character of a power grid into which wind power is integrated, particularly where the grid was not designed to accommodate fluctuating generation and reverse power flows. The solutions used must allow disruptions to the 20-kV grid to be limited and fluctuations in power generation to be smoothed out. They will enable voltage plans to be adapted and any incidents on the network to be more quickly detected and located. Venteea will also explore supply-side energy-storage solutions intended to contribute to stabilization of the network and increase its capacity to receive new decentralized energy sources.

Partners in Venteea include ERDF, Saft, EDF R&D, Enel Green Power, GE Energy and Schneider Electric, MADE-SA, RTE, Troyes University of Technology and Lille Laboratory of Electrical Engineering and Power Electronics.

"ERDF is a pioneer in future grids, and we have a dozen demonstrator projects under way, all in partnership with key players in different areas of network operation," says Didier Colin, Smart Grid Project Manager at ERDF. "As a leading world energy-storage specialist, Saft was the obvious choice as our energy-storage partner."

Solar power

The other smart grid pilot, playfully called Nice Grid because it is located on the outskirts of Nice, is demonstrating a PV-linked microgrid. The project is based in Carros on the Plaine du Var, within the Nice Côte d'Azur Urban Community, by far the sunniest region of France.

The 3-year project, due to run until 2015, is the first smart solar district demonstration to be conducted in France. Nice Grid is a full-scale demonstration involving 1,500 customers (residential, professional and public/collective). The project is setting up a smart grid that harmoniously integrates a high proportion of solar PV generation, energy storage batteries and intelligent power meters installed in the homes of volunteer participants. The zone has installed PV capacity of 2-3 MWp and Saft is providing a containerized 1MW ESS, several medium-size ESS from 100 to 200 kW and one hundred residential Li-ion batteries.

Nice Grid is using innovative technologies to study all issues involved in the smart grids of the future:

- optimisation and operation of a medium- and low-voltage network open to large amounts of decentralised and intermittent renewable energy (mainly photovoltaic),
- the functioning of an autonomous consumption zone isolated from the national grid and equipped with its own PV generation and energy storage facilities,
- the behaviour of customers who become players in the production, consumption and storage of electricity,
- appropriate business models for all players and services involved.

"The key innovations here are that we are studying a network with massive input of renewable, and that we are encouraging energy users to manage their own power consumption and budget, changing from passive consumers into producer-consumers or 'pro-sumers'. This is the way ahead for power grids", says Christophe Arnoult, head of ERDF's Large Projects & International department.

The Nice Grid partners are ERDF, Saft, Alstom Grid, EDF R&D, Armines, RTE, Daikin, Watteco, NetSeeenergy and Socomec.

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NICE GRID and VENTEEA have financial support from France's Environment and Energy Management Agency, ADEME. The Agency, which is under the joint authority of the Ministry for Ecology, Sustainable Development and Energy and the Ministry for Higher Education and Research, is tasked with encouraging, supervising, coordinating, facilitating and undertaking initiatives aimed at protecting the environment and managing energy.

Saft fine-tunes its strategy in the clean-vehicle market

Saft is pursuing a new strategy designed to consolidate its position in today's growing market for clean vehicles, with the emphasis on Li-ion battery systems for both electric and hybrid vehicles.

Implementing this strategy is the responsibility of the new Vehicles Business Unit within Saft's Industrial Batteries Group. "The hybrid and electric vehicle market is a key vector for Saft's future growth. Our aim is to excel in selected niche markets," says Olivier Amiel, head of the Vehicles Business Units (VBU). "Our strategy has three main thrusts: commercial and industrial vehicles; low-voltage hybrid systems for passenger vehicles; and motor sports and limited-edition luxury vehicles." These strategic development focuses were highlighted at the Paris Motor Show in autumn 2012, where Saft presented advanced Li-ion battery solutions for all these applications.

Focusing on three niche markets

Commercial and industrial vehicles

On the commercial vehicles side, Saft is concentrating on buses, trucks and vans, including both electric and hybrid vehicles. And on the industrial vehicles side, Saft is targeting a wide variety of vehicles such as tractors and heavy-duty mine trucks, as well as airport push-back and towing vehicles. Saft is developing scalable batteries of up to 200 kWh for these applications.
Saft has now been selected by one of the major producers of commercial vehicles to develop advanced Li-ion batteries for its new generation of plug-in hybrid and electric vehicles.

Affordable hybrids

Saft is focusing on low-voltage (48V) Li-ion energy-storage solutions for "affordable hybrid" or "eco-hybrid" systems equipping passenger vehicles. These systems are designed to achieve significant reductions in CO_2 emissions and fuel consumption due to their stop-start, regenerative braking and boost functions.

Competition and sports cars

Since 2009 the world's first electric racers, equipped with custom-developed Saft Li-ion batteries, have competed for the Andros Electric Trophy, a series of races run on ice tracks at French ski resorts. And for several years Saft has worked with the major Formula One teams to develop high-performance Li-ion cells for their Kinetic Energy Recovery Systems. Lastly, the Furtive-eGT electric sports car featured at the Paris Motor Show is also equipped with a Saft Li-ion battery system.

Leveraging Saft's strong assets

In pursuing this clean-vehicle strategy Saft has a number of core assets. "First of all, our strategy is strongly underpinned by the experience and expertise in Li-ion traction batteries gained during Saft's five-year joint venture with Johnson Controls," says Olivier Amiel. "Today there are 1.5 million Li-ion cells produced in the Nersac factory in series cars on the world's roads, including hybrids such as the Mercedes S400, the BMW Active Hybrid 7 and the Azure Dynamics delivery van and EVs such as the Ford Transit Connect.

Saft also has a comprehensive industrial and development organization devoted to Li-ion batteries, based in France (Nersac for production and Bordeaux for development) and the U.S. (Jacksonville, FL for production and Cockeysville, MD for development). This organisation also includes personnel from Saft's specialized Systems Development Unit at both sites. "This dual organization is particularly effective to support business on both sides of the Atlantic," comments Jim Hess, VBU Business Development Manager in the U.S.

Last but certainly not least, Saft already has a product offer. Our new 48 V Li-ion module, developed in cooperation with Valeo's Propulsion Systems Division, uses specific technology which renders it suitable for use in very high-power applications, such as 'affordable hybrid' systems. Electric and hybrid vehicles, including buses and trucks, can now reap the benefit of the unique performance of the SuperPhosphate™ technology developed by Saft and superior to the standard lithium-iron phosphate technology currently available in the market. Saft's battery systems comprise standard modules that can be rolled out in different versions, allowing energy and power adjustment to cover a broad range of vehicle applications.

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The Exagon Furtive-eGT

« The Saft Li-ion battery equipping the Furtive-eGT meets Supercar electric performance requirements while providing the best compromise between autonomy, top speed and longevity « , says Saft VBU Technical Manager Mathieu Belle. "The car has two electric motors delivering a total of 296 kW, and its 53 kWh battery pack gives the car a range of 310 km in mixed urban+extra-urban cycle (NEDC) before recharging."
The Furtive-eGT, the first 100% electric Supercar, is the product of European technological excellence and French "haute couture automobile". It brings together four major players: Siemens for its motor, Saft for its batteries, Michelin for its tyres and HP composites for its carbon chassis. Series cars will be assembled by hand by Exagon Motors manufacture starting at the end of 2013.

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Sport as an **Innovation Driver**

The 12 purpose-designed Andros Cars built by Exagon Motors are equipped with a 90 kW asynchronous motor delivering torque of 300 Nm between 0 and 5,000 rpm. The cars weigh 800 kg, including a 277 kg battery system, and have a top speed of 140 kph. The batteries, with a power/energy ratio specially designed for this application, deliver 24 kWh, which is enough for the car to do 17 laps of a 2.5-km circuit. Recharging for the next race takes only 25 minutes.
The batteries have to deliver very high power in a very cold environment (around 0°C and lower) and also withstand vibrations and mechanical shocks. The batteries have performed extremely well and the Andros Cars still use the same battery that was supplied four winters ago. Saft obviously got it right!
"Innovation lies at the heart of Saft's strategy, and what better laboratory for proving innovation than motor sport, such as the world's only 100% electric motor-racing event, says Béatrice Lacout, Saft's VBU Business Development Manager Europe. "Our long association with Andros has allowed us to test our latest Li-ion batteries in a real context and under extreme conditions, and this has been a great help in improving their reliability and performance. The lessons we've learned in demanding competition are already being used in solutions we've developed for other electric and hybrid applications."

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SAFT ENTERS A RACER IN THE ANDROS ELECTRIC TROPHY

Saft has partnered the Andros Electric Trophy event for the last four years, supplying specially-developed batteries for the innovative Andros Cars that take part. But Saft wanted to become more involved in this successful event. So for the first time this winter one of the cars - which are all identical, so winning depends only on the skill of the driver - raced in Saft colours. Saft's entry was driven by a promising young driver, Matthieu Vaxivière, who won the French F4 championship in 2012. "The Andros Car is really terrific and I'm proud to drive for the company that makes the batteries 'under the hood'. But I took a while to master ice racing and I was up against some real pros", says Matthieu. "I came home eighth in my first race but after that I got better and better. Despite my lack of ice experience and the challenging weather conditions, by the end of the series I had mounted the podium three times, putting Saft in fifth place overall. We'll do even better next winter!"

Lightweight, long-lasting lithium batteries for the U.S. military's scouting and surveillance missions

The U.S. Defense Logistics Agency has awarded Saft a one-year, $1.2-million contract for ongoing development of the ALPS compact lithium battery with integrated charger to serve as a portable energy source in the field.

The aim of this development funding is to advance the technical and manufacturing readiness of the Advanced Lithium Power Source (ALPS) battery, intended for use in a variety of applications, including the Long-Range Advanced Scout Surveillance System (LRAS3). This is a multi-sensor system that detects, identifies and pinpoints targets at long range and in virtually any conditions. The improved ALPS battery will provide a lower cost, lightweight power source with a longer lifecycle and shorter recharging.

Saft is to provide 10 ALPS batteries to the U.S. Army Communications-Electronics Research, Development and Engineering Center (CERDEC). Some units will also be supplied to the U.S. Army Product Manager, Ground Sensors, for field testing.

Lighter, longer life, faster charging

The new ALPS battery will adapt components of Saft's highly successful Lithium Battery Box (LBB) used by the Improved Target Acquisition System (ITAS) developed for the TOW missile system. In a fine example of *kaizen*, Saft's experience in developing the LBB has also been leveraged in other specific-application batteries designed and manufactured using the same principles.

The ALPS will offer 24 to 28V and consist of a 100Ah energy storage unit with a built-in charging function compatible with 28V vehicle batteries and AC generators. Compared to the current LRAS3 power sources, the ALPS system will be lighter by 187 pounds, provide a 200% increase in silent watch time and reduce recharging time by 300%. The system will serve as a remote energy source, able to power critical sighting and communications equipment and recharge from tactical vehicles.

"The ALPS battery should provide greater power capacity, speed and efficiencies in the field, advances that are crucial to mission success for our military personnel" says Michael T. Brundage, Chief of the Power Sources Branch, Power Division (CP&ID, CERDEC) of the US. Army. "This contract is Saft's latest step involving development and supply of high-performance batteries for a wide range of applications, including military radios and portable soldier equipment."

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MULTI-MILLION DOLLAR DLA ORDER FOR LI-SO_2 BATTERIES

The DLA has also awarded Saft a long-term contract to supply advanced-technology BA 5590 lithium sulfur dioxide (Li-SO_2) batteries to the U.S Army, Navy, Air Force and Marine Corps. The BA 5590 batteries, whose reliability has been demonstrated for 20 years, provide a long-lasting, lightweight power source for portable military equipment such as radios and surveillance equipment. Saft will be supplying 100% of the U.S. military's needs for this type of battery. The contract covers demand-based quantities up to a maximum of $98 million over five years. The first orders are expected in mid-2013.

Mission-critical back-up power for French Railways control centre

France's national railway operator SNCF now relies on Saft nickel-based batteries for mission-critical backup at its centralized substation control centre in Bordeaux.

The new-generation nickel-based Tel.X batteries were installed a year ago in the control centre housed in the Bordeaux railway station. They ensure the continuous operation of systems that control the delivery of high-voltage trackside power to SNCF's entire network in south-west France.

The Saft Tel.X batteries specified by SNCF feature a specialized, high recombination maintenance-free design that made it possible for them to be installed in the historic Belle Époque station building, with no need for modification to the walls or roof structure for ventilation purposes. There is no certainty that the architectural authorities would have allowed this.

Compact, reliable, maintenance-free

The Tel.X batteries have been developed as the ideal direct replacement for VRLA (valve regulated lead-acid) batteries in this type of application. Their compact, modular format, which weighs some 30 percent less than an equivalent conventional battery, made them fast and simple to install.

The Bordeaux control centre plays a key role in the smooth running of France's south-west region rail network. It controls the operation of 58 main substations and 66 auxiliary substations that provide power to around 1,800 kilometers of track. This vital strategic role requires that the control centre remains in operation at all times, so it is provided with an emergency power supply that takes up the load automatically if the mains power supply is interrupted and ensures up to 8 hours of autonomy.

"The battery backup system at the Bordeaux control centre is rarely called into action. But when it is needed we must have total confidence that it will provide the autonomy we require. That's why we specified the Saft batteries," says Hervé Dupuy, SNCF UP MRE technical manager responsible for maintenance and electrical services. "We have had a very good experience with Saft's nickel-based technology and we were keen to use this new generation design that offered an increased capacity as well as being totally maintenance free. Within only a few months of its installation in early 2012, the Tel.X battery system was en called into action during a maintenance exercise when both the main power supplies (we have a second 'fail-safe' supply) had to be taken offline. It worked perfectly and has been doing to ever since."

So the Saft batteries play a truly mission-critical role. If the mains power was interrupted and the back-up system failed to take over, trains in a quarter of France would stop running and trigger a truly major crisis for SNCF.

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New Saft solutions for **a dynamic railway market**

The world railway market is forecast to grow steadily over the next five years, and Saft continues to develop new battery solutions – for emergency back-up, engine starting and regenerative hybrid traction – to meet the evolving needs of OEMs.

The world railway market is expected to grow by 2.6% per year until at least 2017. All regions should contribute to this dynamic, with particularly strong growth forecast for Latin America and Africa/ Middle East. These are the key conclusions of the recent World Rail Market Study published by the European Rail Industry Association (UNIFE).

The rail supply industry has proved stable despite the volatility in world economic activity, and the indications are that railways will be increasingly important as a mode of transport. The main factors here are: a preference for rail as emerging economies modernise their transport infrastructure; ongoing urbanization (metros and commuter rail); and a politico-economic need to reduce dependence on fossil fuels.

At the 2012 Innotrans trade fair in Berlin, Saft launched the latest additions to its portfolio of railway batteries to serve this dynamic market, leveraging both Ni-Cd and Li-ion technologies.

2012 Innotrans trade fair in Berlin, Saft launched its latest railway products

Ni-based batteries for back-up and engine starting

Saft's new SRA LT/HT extreme-temperature Ni-Cd batteries ensure the continuity of auxiliary systems for passenger safety and reliable train start-up. They come in two versions: SRA LT, delivering greater available capacity than standard Ni-Cd batteries at very low temperatures (- 50°C to + 40°C), thus enabling operators to use a smaller capacity to support the required load profile; and SRA HT, offering superior charge efficiency at high temperatures (- 20°C to + 65°C), thereby resulting in a smaller and more compact battery.

With their optimized electrical performance, extremely compact cells and very high energy density, SRA LT/HT batteries are a light and space-saving solution for today's urban transit (metros, tramways, tram-trains, airport shuttles), regional services (EMUs, DMUs) and intercity transport (high-speed trains, electric locomotives, passenger coaches).

Reliable engine starting is a vital factor for the increasing number of diesel operators who demand multiple start capability to enable engines to be stopped during daily breaks in operation, thus saving fuel while reducing noise and emissions. Saft has risen to this challenge with advanced asymmetric nickel supercapacitor (SNC) and battery technologies (MSX and SRX) that provide the high cranking power essential for reliable starting of large diesel engines on locomotives and DMUs.

Li-ion for regenerative hybrid traction

Li-ion batteries dedicated for rolling stock can optimize the reliability and energy efficiency of rail networks by supporting autonomous and hybrid traction for catenary-free operation and regenerative braking. Saft has developed a modular Li-ion on-board solution with high power Super-Phosphate™ technology – in a railway-grade format – that can provide sufficient autonomous traction power for a rail vehicle. The modules are designed for ease of mechanical assembly to offer the scalability and flexibility to suit all power needs, and can be configured into battery systems up to 750V. As a result battery-powered traction is possible especially in locations where catenaries cannot be installed for cost, safety or aesthetic reasons – such as historic city centres.

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Nickel-based battery back-up for **Bombardier's Electrostar inter-city trainsets**

Saft has won a contract worth about €1 million from Bombardier Transportation to supply MRX on-board battery systems for 26 new Class 377 Electrostar electric multiple unit (EMU) trainsets

The five-car trainsets have been ordered by Southern Railways, which serves the south of England. This is the third time Bombardier has asked Saft to supply MRX specialized railway batteries for its Electrostar projects

The compact and powerful MRX battery systems will support the reliable operation of the new Southern Railway trains by supplying back-up power to ensure the continuity of critical safety and auxiliary systems in the event of an interruption to the main power supply. The use of Saft's nickel-based MRX cells has enabled the battery systems to meet Bombardier's key requirement for an uprated capacity within the existing space envelope, and to meet the additional demands of new back-up power loads for passenger comfort services such as Wi-Fi and power sockets for charging cell phones and laptops. The Southern Railways battery systems are based on cells that offer a capacity increase of around 30% compared with previous Electrostar projects. Two of the 110 V systems will be installed below the floor of each trainset.

Top priority: reliability

"We have chosen Saft's MRX specialized railway batteries for a number of rail projects over the past few years," says Keith Price, Procurement Director at Bombardier Transportation UK. "These include South Africa's Gautrain high-speed link between Johannesburg and Pretoria, as well as the express service between Stansted airport and London, and a London-to-Cambridge service. All these routes are operated with Electrostar EMU trainsets, and our customers are very satisfied with the reliable performance of the batteries. Saft has also supplied MRX batteries for Bombardier ALP-45DP dual-power locomotives made in Germany for North American customers."

Saft will deliver the battery systems to Bombardier as turnkey, installation-ready packages, assembled in rafts complete with control equipment and interfaces to communicate with the EMU's systems. The 26 Southern Railways trainsets are currently being built at Bombardier Transportation's Derby facility.

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Algeria modernizes its railways, with solid back up from Saft.

Algeria is making significant investments to modernize and extend its railway infrastructure, with a strong focus on urban and suburban transport in Algiers. Saft is a key player in this upgrade.

Over the past five years, Saft has delivered battery systems to most of the railway OEMs doing business in Algeria. Today, 90% of the existing electric and diesel rolling stock is equipped with Saft batteries, mainly nickel-based MRX and SRX back-up and/or engine-starting batteries. Recent projects have included the first metro and tram lines in Algiers, suburban trains, diesel railcars for regional services, and diesel-electric locomotives for national services.

Algiers trams

A big breakthrough in urban transport came two years ago with the first tram service, operated by the Algiers Urban and Suburban Transport Corporation (ETUSA). Saft started delivering MRX back-up batteries for the trams in 2009 and ETUSA inaugurated its first 7.2-km service in May 2011. When the infrastructure is completed, Algiers will have a 33-km tram network with 38 stops.

Algiers metro

The first 10-km stretch of Line 1, operated by the Algiers Metro Corporation (EMA), was inaugurated in November 2011. The 14 six-car trains all have Saft MRX batteries on-board. Soon after the inauguration, EMA called for tenders for three more sections of Line 1, all of which are now under construction. Two other lines are planned by 2020.

Suburban electric trains

Saft started delivering MRX batteries for the capital's new suburban electric trains about six years ago. The first of the four-car trainsets went into service in May 2009 and by 2011 all suburban trains were electric. Today, the network boasts nearly 100 trains per day from Algiers to either Thenia or Afroun, operated by Algerian Railways (SNTF).

Intercity diesel railcars

SNTF's 17 new intercity diesel railcars, equipped with MRX batteries for engine starting and service back-up, began operating between Algiers and Oran in January 2008. The 200-seat railcars, which can travel at 160 kph, are extremely quiet and fully air-conditioned.

New diesel-electric locomotives

Saft started delivering SRX engine-starting batteries for Algeria's 30 new high-power diesel locomotives in 2008 and the locos began hauling SNTF mainline passenger and freight trains to the country's main cities the same year.

"Algeria has undertaken an ambitious programme to upgrade its rail services. Our main concern at SNTF is passenger safety and comfort and on-time services for both passengers and freight customers," says Rolling Stock Manager Ali Kessaci. "Reliable back-up and engine-starting batteries are crucial to this mission. All the rolling stock purchased for the upgrade programme between 2006 and 2010 is equipped with Saft batteries, and those batteries continue to give us complete satisfaction."

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Metros and trams: **quality of life**

Algeria's capital, El-Djazaïr to the locals, is a city of 3 million people. Traffic congestion started to be a problem three decades ago, when the first plans for a metro system were put forward. Today, the city boasts 1.36 million motor vehicles, and there are traffic jams from dawn to dusk, so the new metro and tram services have brought a considerable improvement in quality of life. Algiers also has four cable-car lines and a fleet of 3,454 buses.

AN AMBITIOUS FIVE-YEAR PLAN

Early this century, Algeria launched a wide-ranging programme to modernize its overall infrastructure. The current Five-Year Plan (2010-2014) provides for investment of $286 billion, with $35 billion devoted to urban/suburban transport and the national rail network. The Plan covers metro and tram networks in several cities as well as the purchase and rehabilitation of locomotives and rolling stock and the construction of additional track. Today SNTF operates a rail network of 3,854 km and by 2015 the network will cover 10,000 km.

Saft receives Ferrari award for innovation

INNOVATION
AWARD
2012

Saft has received the 2012 Innovation Award from the famous Scuderia Ferrari.

The prize recognizes that Saft has made the highest overall contribution to innovation during the past year within Ferrari's Gestione Sportiva, thereby helping to maximize the team's results in the Formula One Championship. This distinction is the result of five years of close cooperation and technical innovation with Scuderia Ferrari. The criteria for the award were innovation, performance, reliability, process and cost control.

Saft continues to work with Ferrari. The new engine regulations planned for 2014 will see the Kinetic Energy Recovery System (KERS) output increase with the introduction of a new power unit and the use of a hybrid ERS with an integrated electric motor that will improve the vehicle's hybridization. Saft will be providing high-performance Li-ion cell technology for the new ERS in 2014.

saft