saft international

#30 SPRING 2014

A350 XWB takes off with Saft batteries › page 6

Success on track in Asia › page 12

Sunny outlook for energy storage › page 22

John Searle
Chairman of the
Management Board
Saft Groupe SA

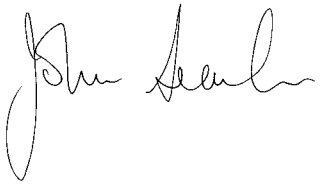
Saft's strategy is to secure growth for our company through continued deployment of our wide range of technologies in multiple applications and markets worldwide.

We went some way towards that in 2013 with significant commercial successes and major breakthroughs in markets for both nickel-based and lithium-ion batteries. Among the most significant successes were in the Li-ion telecoms market in India and the nickel telecoms market in the US. The transportation markets, batteries for the rail and aviation industries, also registered strong growth, with numerous contracts won in China in particular.

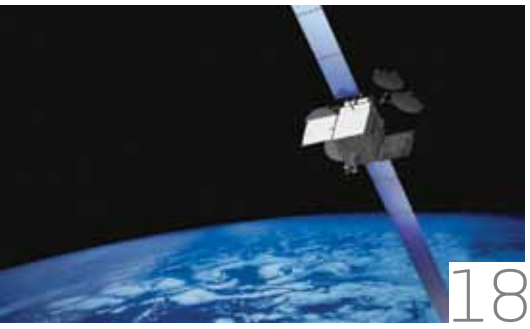
Saft is constantly serving new markets and finding new applications throughout the world, see the new e-call requirements in Europe for example, a new market which Saft is well-positioned to benefit from.

We are also progressively putting in place enhanced services for our customers and business partners, which will considerably extend the support they can receive from Saft and bring them even greater value from the investment they make when they choose our batteries for their equipment. Apart from our ability to customise battery solutions for all our customers' needs, in many markets Saft is now proposing a range of services to optimise the total cost of ownership of the customer installation, such as maintenance, refurbishment, training and support in the field.

Our international footprint and portfolio of advanced technology batteries, together with our track-record of decades of market experience and industrial excellence, mean that Saft is on track to achieve its ambition of being one of the most successful advanced battery manufacturers in the world and to continue to support its customers' in their development for the years to come.



IN THIS ISSUE



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Building for growth in China

A press conference in Beijing in November 2013 saw Saft announce plans to expand activities in China. Attracted by the rapid growth of the world's second largest economy, Saft has been working with Chinese customers in the aerospace, rail, utility metering, electronic toll collection and back-up power markets for a number of years. Production capacity at the existing Zhuhai plant is already being increased to meet growing demand.

John Searle, President of Saft's management board said: *"Saft's strategy in China has always been to support Chinese industry with high quality, reliable battery solutions, wherever possible manufactured close to our customers. Saft is bringing its 100-year experience to meet the needs of the Chinese market and Saft's entire range of rechargeable and primary battery systems is now available in China"*

Chinese highlights

- Zhuhai manufacturing facility established in 2006 with Saft sales subsidiaries in Hong Kong and Shanghai
- Primary lithium cells power smart gas and water meter projects
- Integrated battery systems provide back-up power for Beijing Metro

New Moscow subsidiary

Saft said Добро пожаловать в Москву (welcome to Moscow) in October 2013 with the opening of a new subsidiary to meet the growing demand for advanced technology batteries in Russia and the CIS countries.

Called ООО Saft, the subsidiary is now in business offering enhanced sales, product delivery and technical support. It is initially focused on the transportation, energy storage, infrastructure and telecom sectors and also supports customers in the aerospace and oil & gas sectors.

In its current form, the Moscow base acts as a sales and support office but there is potential to introduce production facilities for state-of-the-art nickel-based battery systems.

General Manager of ООО Saft, David Masgrangeas, said: *"Saft's advanced battery technology is well suited to meeting the particular challenges of our customers here as it provides the required high performance, long life and optimized total cost of ownership, with low maintenance, even in extreme temperatures that can fall as low as minus 50°C."*

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Siemens' Desiro RUS trains used during the Sochi Winter Olympic Games relied on Saft batteries

A smarter online presence

There are three new websites where Saft customers and partners can access technical and commercial information. The main corporate site, saftbatteries.com has a fresh new look and feel. Two local sites have also gone online: amcosaft.com specifically for customers in India and saftbaterias.es dedicated to customers in Spain and Latin America.

- **Saftbatteries.com** the corporate site
- **Amcosaft.com** India
- **Saftbaterias.es** Spain and Latin America

The SLFP 6T delivers improved performance at a competitive price

Super-Phosphate Li-ion forces weight saving

Specialists at Saft's Cockeysville manufacturing facility in Maryland, USA, are driving down the cost of the e6T military truck battery. The Li-ion solution provides improved performance in the same sized package as traditional lead-acid batteries, delivering the same duty with less weight.

As well as being lighter in weight and higher in energy density, the e6T has lower total cost of ownership and greater cycle life than a traditional lead-acid battery. While the e6T is currently being evaluated on Lockheed Martin's engineering and manufacturing development (EMD) Joint Light Tactical Vehicle (JLTV) trucks, Saft is working to make the battery more cost competitive.

By replacing the current Li-ion cells with VL 30P Fe Super-Phosphate (SLFP) cells, the battery will reap the benefits of high production capabilities, delivering a substantially lower price while still giving superior performance. The new "SLFP 6T" can deliver up to 1,100 cold cranking Amps at -18°C and will be backwards compatible with existing e6T installations.

High-tech battlefield power

Saft is supplying tens of thousands of primary and rechargeable lithium cells and batteries to the French army under a five year contract with INEO Support Global, a leader in electrical installation, information and communication systems and related services. The GDF Suez subsidiary has selected Saft to supply some 70 types of battery to provide reliable, lightweight and long duration power for high-tech field equipment.

Addressing portable renewable energy

A new portable power source for the US Army will help the military make the most of renewable energy. Funded by the Communications-Electronics Development and Engineering Center (CERDEC), Saft has developed the Advanced Deployable Renewable Energy System (ADRES).

ADRES will power mission-critical equipment at forward operating bases, enabling them to reduce fuel consumption by storing energy produced by solar panels and wind turbines. The 28 V Li-ion battery system includes a built in charger that accepts both AC and DC power. As with the e6T battery, Saft is exploring the potential of SLFP chemistry to improve manufacturability and reduce unit costs.

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'Shaping efficiency' for Airbus A350 XWB

By supplying its advanced technology battery systems, Saft embodies Airbus' tagline 'shaping efficiency' for the world's most technologically advanced commercial aircraft – the A350 XWB.

For the A350 XWB, Airbus brings together the very latest in aerodynamics, design and advanced technologies to provide a 25 percent step-change in fuel efficiency and an equivalent reduction in CO2 emissions, compared to its current long-range competitor. Over 70 percent of the A350 XWB's weight-efficient airframe is made from advanced materials, combining composite structures with titanium and advanced aluminum alloys.

The emphasis on advanced technology on the A350 XWB is evident in the focus on the on-board battery systems that provide starting and emergency back-up power. The initial production aircraft will be fitted with the latest in Saft's long line of flight-proven nickel-based batteries. However, with a view to future developments, the flight testing programme is providing the opportunity for Airbus to evaluate state-of-the-art lightweight Li-ion batteries. These could eventually reduce weight by a significant amount.

Maiden flight success

The A350 XWB made its successful maiden flight in June 2013, with John Searle, Saft Group's Chairman of the Management board commenting:

"This is a further demonstration of the excellent technical partnership between Saft and Airbus which goes back for over 40 years. Saft congratulates Airbus on this successful first flight and looks forward to contributing to the success of the next testing phases and the A350 XWB's entry into service."

Li-ion flight tests

Following the maiden flight, the A350 XWB flight test programme is now in full swing. This is enabling Airbus to conduct in depth studies of the maturity, safety, reliability and flight-readiness of the 450VH1 Li-ion battery architecture it has been developing and qualifying with Saft. The programme has seen 4 flight-test A350 XWB aircraft fitted with Li-ion main batteries. One aircraft will also be fitted with nickel-based main batteries during the later stages of the flight

programme to carry out specific tests required for aircraft certification.

Over 800 aircraft ordered

The cornerstone of the new A350 XWB family is the A350-900, capable of carrying 315 passengers, while offering unbeatable economics in high-density seating and true long-haul capability with a range of up to 7,500 nautical miles. Firm orders for well over 800 A350 XWB aircraft have been placed to date, with the first due to enter service for Qatar Airways later this year.

Flight record

The A350 XWB continues Saft's distinguished flight record, with around two-thirds of the world's fleet of civil and military aircraft currently equipped with Saft nickel-based on-board batteries, including all of the jetliners delivered by Airbus going back to the 1970s.

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Ground handling efficiency

Li-ion batteries don't just promote aviation efficiency in the air. Effective energy storage is now being used by Kalmar Motor to power the world's first hybrid tractor for wide body aircraft (such as the Airbus 380) – the TBL 800 hybrid-electric aircraft pusher.

The ground support equipment sector is both fast growing, with the world's airports serving more than 5.7 billion passengers in 2012 – up by 4.4 percent on 2011 – and is also facing new challenges in providing energy efficient and low emission operations.

The new generation TBL 800 developed by Kalmar Motor, aircraft tractor specialist, is designed to enable airports to cut their use of diesel-driven tractors to address growing demands for reduced environmental emissions. It is fully powered by a 180 kWh Saft high energy Li-ion battery system throughout its shift, from early morning to late at night. This extended duty is made possible by the Li-ion battery's fast-recharging capability, facilitating regenerative braking as well as charging during break periods when not in use. For total security, a diesel unit cuts in to recharge the battery before it is fully discharged, ensuring that the vehicle can never be stranded.

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Thousands of civil and military aircraft worldwide are equipped with Saft batteries to provide high peak power for engine starting as well as emergency back-up power. They include all of the Airbus fleet and 80 percent of Boeing's airliners.

Saft's world of aviation

Saft is advancing the role of Li-ion in state-of-the-art aircraft

Saft's ULM® batteries offer high performance at low weight

Pioneering Li-ion on the new F-35

A $6.5 million order placed with Saft by GE Aviation will see Lockheed Martin's latest generation F-35 fighter jet pioneering unprecedented Li-ion technology in the form of high power JSF (joint strike fighter) batteries. As part of the contract, Saft will meet More Electric Aircraft (MEA) industry objectives that aim to optimize aircraft performance and reduce gas emissions.

Three distinct variants of the F-35 will replace the A-10 and F-16 for the U.S. Air Force, the F/A-18 for the U.S. Navy, the F/A-18 and AV-8B Harrier for the U.S. Marine Corps, and a variety of fighters for at least 10 other countries.

The state-of-the-art JSF batteries will provide in-flight backup for critical systems such as electro-mechanical actuation for the flight control surfaces. Each ship set consists of one JSF 270V and one JSF 28V battery per aircraft.

Saft has been supplying batteries to GE Aviation since 2006 and also has a 60-plus year history with the U.S. Naval Air Force for nickel-based batteries. To date, the F-35 battery development program has logged more than 6,000 flight test hours.

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Wildcat is mission ready

Saft batteries will ensure total reliability in demanding battlefield conditions for 62 new AW159 Lynx Wildcat helicopters being manufactured for the UK's Ministry of Defence by AgustaWestland.

AgustaWestland identified Saft's nickel-based ULM design as offering the ideal combination of high performance, low weight, ultra-low maintenance requirements and long life essential for helicopter operations. The AW159 batteries have been developed and tested by Saft to withstand high vibration levels and extreme temperatures. They will deliver emergency back-up and starting power for the two Lynx Wildcat's two turboshaft engines.

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Life saving power on the road

Lithium batteries power the ACU-II for over 10 years

European car drivers and passengers will benefit from reliable power provided by Saft batteries should they have a serious accident. Actia, the major player in automotive electronics, has ordered Saft lithium batteries for its ACU-II (second generation Automotive Communications Unit).

The device meets the eCall standard, which will be built into all new European vehicles from 2015. eCall is an Europe wide emergency service that sends an automatic signal to alert the emergency services about serious car accidents. It will cut the annual number of fatalities on Europe's roads by 2,500 by halving the time it takes for emergency services to respond. Knock-on benefits will be that injuries will be treated more quickly and authorities will be able to clear accident sites more quickly.

eCall will cut fatalities on Europe's roads by 2,500

In normal operation, the ACU-II and its advanced battery remains dormant but an accident will prompt the device to send a minimum set of data (MSD) detailing the car's exact location, direction of travel and number of passengers while also allowing a voice connection to the nearest Public Safety Answering Point (PSAP). This calls for a battery that can deliver pulse loads of up to 2.5 A and background currents of 1.3A for up to 15 minutes.

In addition, the battery will need to operate reliably following a long period of sleep mode of up to 10 years or more, having survived extreme temperatures from -40 to 90 °C and significant shock and vibration on the road and during the accident. The sizing is also critical – coming in a very compact package, as small as AA, to keep the ACU-II's overall size to a minimum.

High-end car manufacturers already install the ACU-II into their top marques and Actia is building other functions into the unit, such as stolen vehicle tracking and other connectivity-related services. But with 11.2 million new cars driving off European forecourts every year, it's an application that could provide a lot of market traction.

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ECO-H partners a lithium-ion battery system with a diesel generator

Hybrid power rigged for fuel efficiency

The search for new energy resources is itself an energy-hungry business. Drilling rigs, for example, are typically powered by diesel generators that consume up to 30,000 litres of fuel a day. To meet this challenge, ECO-H Technologies, Inc has developed its innovative hybrid power management system that helps oil and gas operators reduce fuel consumption, emissions and operating costs. And providing the power and energy storage at the heart of this first to market hybrid genset and battery system is Saft's Intensium® Flex Li-ion battery system.

Effective energy storage creates a more efficient power supply system

The ECO-H system has been developed to support immediate power demands on drilling and production rigs and to help level peaks in power usage. In addition, it is equipped with a power management control system to regulate gensets and optimize efficiency. The effective energy storage provided by the integrated battery facilitates peak shaving and genset load levelling. This creates a more efficient power supply system that requires one less generator and decreases daily fuel costs, improves the rig's carbon footprint and provides the opportunity for operators to earn government carbon credits.

Li-ion technology is perfect for this application thanks to its high cycling capabilities and long service life. Light weight and high energy density are added advantages when it comes to deploying the ECO-H in remote installations. The pilot system was built around an Intensium® Flex battery with a nominal capacity of 696 V DC at 500 kW for 525 kWh of energy.

The ECO-H system is being distributed by Tesco Corporation, a global leader in the design, manufacture and service of technology-based solutions for the upstream energy industry.

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Dancing over the waves

Ballerina's new electric ferry boat powered by Saft Li-ion battery systems will enter service this year in the Swedish capital city, Stockholm. The new ferry will carry foot passengers and cyclists over a 50-minute circuit of the waterways in the city.

Ferry operator Ballerina, acting on behalf of Stockholm Public Transportation, is launching the ferry in a bid to save fuel and improve the environmental credentials of the city's water transport network.

Ten of Saft's Li-ion marine battery systems with a nominal 650 V and 500 kWh combined energy storage, will supply all of the ferryboat's propulsion and auxiliary power.

The efficiency of the marine battery systems means that a long overnight charge and two partial charging periods during the day will be sufficient to power the ferry for eight round-trips every day, throughout the year. Although the boat will be equipped with a diesel generator, it will purely act as a source of emergency back-up power.

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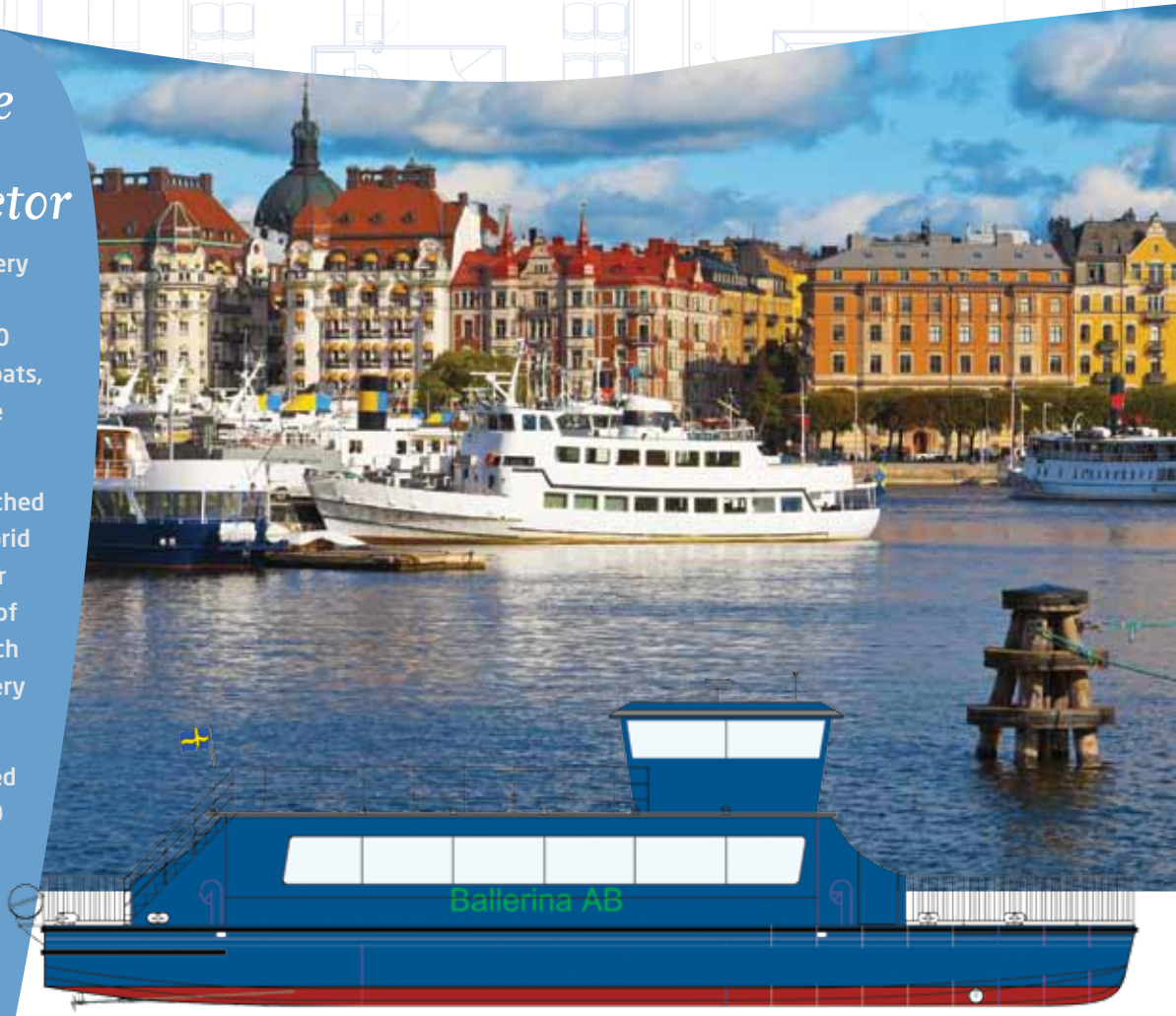
Li-ion marine propulsion: a growing sector

- Saft launched Li-ion battery technologies for marine propulsion at the SMM 2010 exhibition to power workboats, passenger ships and leisure boats.
- **In 2012,** Keolis launched two new electric-diesel hybrid ferryboats that ply the river Garonne in the French city of Bordeaux. Saft supplied each with a 140 kWh Li-ion battery system.
- **In 2013,** Saft supplied the 140 kWh cells for a 100 percent battery-powered passenger vessel that acts as a shuttle link between the Parisian Icade business district and the city's Metro network.



Stockholm's ferry network will gain a battery powered boat in 2014

Success on track

Return journey for Eurotunnel

The entire Eurotunnel Shuttle fleet of passenger and freight vehicles is being re-equipped with Saft's new generation of advanced technology nickel-based rail batteries. They replace batteries originally supplied by Saft 20 years ago, which have demonstrated outstanding reliability and long life.

The Eurotunnel Shuttle system carries 2.5 million cars (Le Shuttle) and 1.5 million trucks every year, between Calais and Folkestone making it by far the world leader in piggyback transport. Since the opening of the lorry Shuttle service in July 1994, Eurotunnel has carried almost 19 million Lorries, 244 million tonnes of freight goods and 172 million passengers.

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in China

Saft Zhuhai plant manufactures state-of-the-art batteries

On-board batteries play an essential role in the operation of the Chinese rail network, which is now the third largest in the world, covering 98,000 km as well as 10,000 km of high-speed railway as of December 2012 and set to grow fast. But Chinese rail OEMs are now very active in export markets, winning contracts to supply trainsets the world over. Saft is making strong progress in the fast growing Chinese railways market, with a number of contract wins for high-technology battery systems building a solid presence.

One contract saw Saft supply nickel-based SRM batteries to CNR Changchun Railway Vehicles Co., Ltd, China's leading train manufacturer. The onboard batteries worth multi-millions of Euros are being installed on trainsets bound for the new Line 6 on the Beijing subway. In operation, the SRM batteries will provide up to 45 minutes of back-up power for vital control, communication and passenger safety systems.

Saft is also been supporting China's rail export market, with one recent example being a contract to supply nickel-based MRX batteries to Alstom in China. Alstom is fabricating 42 of its Metropolis driverless trains for Singapore's metro, where they will increase the capacity of the transport system.

"We are delighted to win this major contract for the Singapore Metro, especially as it provides further momentum for Saft in the Asian mass transit sector, where we are already working on high profile projects including the new metro system in Hyderabad, India, Hong Kong's West Island Line, ten lines of Shanghai's Metro, Beijing's, Nanjing's and Wuxi metros as well as the Singapore metro, and Klang Valley line in Kuala Lumpur" says Xavier Delacroix, General Manager of Saft's IBG Division.

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China's rail sector — key facts

$100 billion:
China's 2014 budget for investment in new railway lines

272,000 km:
Anticipated growth of the network by 2050, including proposed connections to Macau, Russia, Europe, South East Asia and India

Saft's MSX batteries will supply reliable back-up power for the new Hitachi Class 800

Hitachi emphasizes exceptional reliability

Hitachi Rail Europe has awarded Saft a multi-million Euro, five-year, framework contract to supply turnkey, fully integrated MSX battery systems for the new Class 800 series trains destined for the UK's Great Western Main Line and East Coast main Line. The contract, one of Saft's largest agreements in the UK rail industry, covers the supply of battery systems to provide vital backup power for passenger safety and comfort services on up to 122 Hitachi Class 800 and Class 801 train sets.

As part of the Intercity Express Programme, Hitachi is replacing the UK's 40-year-old InterCity 125 high speed diesel-powered fleets with new electric and bi-mode trains that represent an important step-change in train travel in the UK. The Class 800 series, the majority to be built in Hitachi's new Newton Aycliffe factory in northeast England, offer greater capacity and reduced environmental impact while placing a key focus on exceptional reliability. Jamie Foster, Procurement Director of Hitachi Rail Europe said: *"For the Intercity Express Programme, Hitachi places the highest priority on quality and reliability and we require this from our suppliers as well. Saft were able to provide us with a commercially competitive offer, while meeting our customer's demanding technical requirements regarding temperature conditions and lifecycle. When visiting Saft's manufacturing facility and observing their processes, Hitachi's quality team was very impressed."*

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Smooth operations in India

Teams at Amco Saft's new state of the art manufacturing plant in Bangalore, opened in 2013, are working hard to support the development of rail infrastructure in India, one of the world's largest railway markets.

8 billion:
annual number of rail passengers in India

$32 billion:
India's planned rail investment by 2019

7,000 m²:
the size of Saft Amco India's state-of-the-art manufacturing facility in Bangalore

Chennai metro

A brand new metro system in Chennai is due to carry its first passengers within the next year. Its two first The system will relieve traffic congestion in the city of eight million people and will be able to transport up to 500,000 passengers per day.

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Hyderabad

Saft is also supplying the on-board back-up batteries for another brand new metro system in Hyderabad. Korean trainset manufacturer Hyundai Rotem has ordered Saft's MRX nickel-based batteries for 57 train sets that will start operation in 2015.

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'Game-changer' in Macau

35 casinos in Macau attract some **22 million** tourists every year

7 Macau earns seven times more than Las Vegas

50% of Macau's revenues come from casinos

Macau, the world's biggest centre of gaming and gambling, is a hot spot for tourism. Together with Hong Kong, the city is one of China's two special administrative regions that enjoy more autonomy than other parts of the country.

In the world's top gaming city, it is essential that casinos operate flawlessly, which is why Saft batteries were installed at one of the city's major casinos. The Uptimax New Generation nickel-based batteries are installed throughout the major casino complex where they guarantee two hours of autonomous operation in the event of a loss of the main power supply.

"Gaming, banking and IT services are significant elements within the Asian economy. And they all rely on continuous power to maintain their revenue flow, since even short disruptions to normal operation can result in huge losses. So the proven reliability of Saft's nickel-based technology is fast becoming regarded as a 'game-changer' in this region", says Xavier Delacroix, General Manager of Saft's IBG Division.

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Uptimax New Generation batteries deliver two hours of operation

Hospital care

Continuity of power is essential for patient care in the operating theatres and intensive care unit of the Klinikum Bayreuth in Germany. In 2013, the hospital installed two Saft battery systems as part of an installation by Kaufel GmbH & CO KG, the leading manufacturer of emergency lighting and safety power supply systems.

Each of the two nickel-based battery systems store enough energy to provide 30 minutes of power at 15 kVA for intensive care systems plus emergency lighting rated at 5 kVA.

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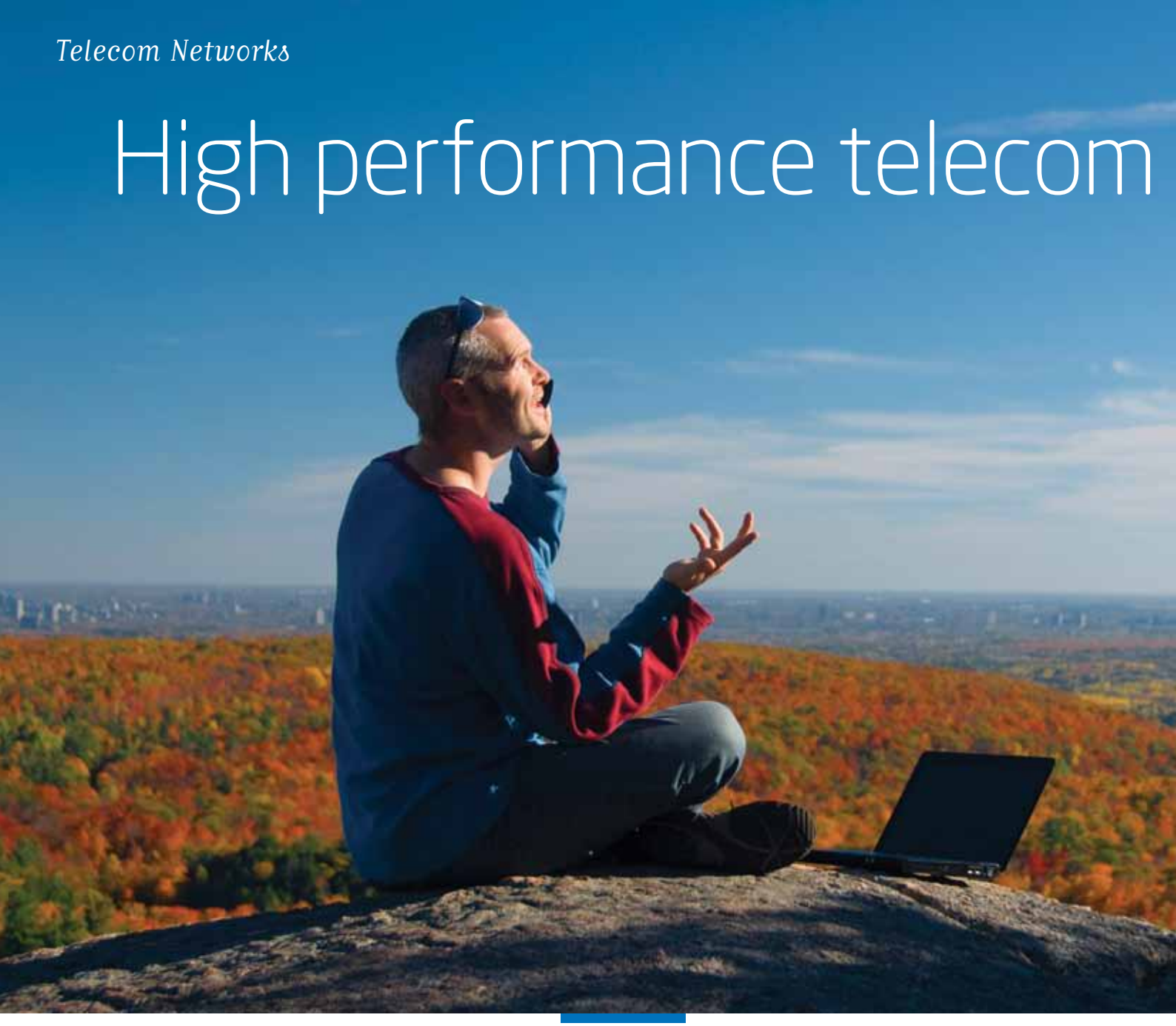
High performance telecom



Saft's lithium-ion and nickel-based technologies serve the telecoms market

Global demand for mobile phones is at a record high level and continues to grow fast. 14 countries already have more than 100 million mobile phone subscribers each and an estimated 1,300 million smartphones will be shipped worldwide in 2016, fuelled by the shift to 4G networks.

And as subscribers' expectations grow, operators need to ensure the reliability and availability of networks in locations where reliable power networks are not always a given.

This adds up to a growing demand for high performance batteries that offer reliable back-up power for remote and hard to access BTS (Base Transceiver Station) sites. As a specialist in Li-ion and nickel-based battery technology, Saft has developed two innovative telecom battery systems that deliver exceptional performance throughout the life of the equipment they power.

Tel.X is a nickel-based battery that provides 4-8 hours of back-up power over a long life in a compact and scalable form. Resistant to extremes of temperature,

batteries

the Tel.X is designed for remote but grid-connected cabinets, BTS and BSC (Basic Station Controller) sites.

The Li-ion Evolion module will also provide several hours for on-grid and up to 1-2 days for off-grid of back-up power and is suited to charging either from a stable mains supply or an off-grid location, operating as part of a hybrid scheme with a diesel genset and/or renewable energy sources.

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Evolion rolls out for India's 4G network

18,000 BTS sites across India will integrate Saft Li-ion batteries

3.2 million: the size of India in square kilometres

3.9 kWh: maximum energy storage capacity at each site

Saft received its largest ever order for Li-ion telecom batteries in July 2013 when Reliance Jio Infocomm Limited (RJIL) selected Evolion™ batteries modules to support more than 18,000 sites in India.The project is executed on a global basis, with Evolion™ systems manufactured in Saft's specialized US Li-ion facility in Jacksonville, Florida, and supported by Amco-Saft's India factory in Bangalore.

Evolion™ 48 V modules are specifically designed for remote telecoms installations and ensure exceptional service and long life while operating over a wide range of temperatures from -40°C to +75°C. They offer high energy density, can accept fast charging and requires no maintenance.

Each Li-ion battery system will provide up to 3.9 kWh energy storage for back-up power at BTS sites spread across all 22 of India's telecoms service areas. The network will provide the only national 4G network in India, spanning a country of 3.2 million square kilometres that includes not only densely populated urban areas and rural farming communities but also environmental conditions of the mountains, deserts, highlands and swampy lowlands.

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A space pioneer

Saft has been a pioneer in the space industry since 1966 when it supplied a battery to power the Diapason D1A satellite. Since then, Saft has supplied in the region of 30,000 batteries to power GEO, MEO and LEO (geosynchronous, mid and low earth orbit) satellites, launchers, probes and landers.

Today, Saft is a trusted and reliable partner to the space industry and is the only manufacturer of all the battery technologies that are used in space, being primary lithium (Li-SO2, Li-SOC2 and Li-MnO2), lithium-ion (Li-ion), nickel-cadmium (Ni-Cd) and nickel-hydrogen (Ni-H_2).

1966:
Saft's first space battery was launched into orbit

Over 600:
satellites equipped with Saft batteries

22.5 years:
the life achieved to date from Nickel batteries on GEO missions

103: satellites equipped with Saft Li-ion batteries

275 million:
the number of cumulative hours without failure or deviation logged by Saft's 9,000 Li-ion cells in space

One hundred up for Li-ion

In December 2013, the 100th satellite powered by Saft's Li-ion batteries was launched into orbit with the successful launch of Inmarsat 5 F-1 by a Proton M rocket from Kazakhstan. The launch was a major milestone for Saft's pioneering Li-ion battery technology as it also marks the 75th GEO satellite in orbit using Saft batteries.

Saft first supplied Li-ion batteries for space in 2002 and since then its customers have launched Li-ion batteries worth Ð120 million into space. A main benefit of Li-ion cell chemistry is its light weight and high energy density, which helps reduce the overall mass of satellites and makes more payload weight and space available for revenue earning equipment. Li-ion is also exceptionally efficient and reliable while its low self-discharge ensures a long shelf-life – vital when launch schedules are delayed.

Saft is a trusted and reliable partner to the space industry

Designed for space

For the 100 Li-ion launches, Saft provided long-life, high energy batteries including VES 140, VES 180, VL 48E and MPS cells. These supply voltages ranging from 4 V to 100 V with capacities of up to 625 Ah.

"Saft has a diverse offering of space-qualified cells that are designed to meet all the stringent requirements vital to successful performance in space, including the abilities to operate in extreme temperatures and to withstand thousands of cycles for the life of the spacecraft," said Thomas Alcide, General Manager of Saft's Specialty Battery Group. "The 100th launch demonstrates our leadership position in the satellite industry, especially in the GEO market. Saft is proud of the success and leadership we have been able to establish within the worldwide space community over the past decade."

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Inmarsat 5 F-1 lauch was a major milestone for Saft's Li-ion technology

In brief

Saft has supplied the batteries **for Argentina's GEO satellites Arsat-1 and Arsat-2.** Saft won the order thanks to its heritage and performance and compatibility with on-board equipment.

Saft will be supplying the battery sets **for the next 18 Ariane-5 ECA launch vehicles under a contract with Airbus.** The contract builds on Saft's experience of supplying the battery systems for a total of 65 launchers from its facility in Poitiers, France.

Boeing placed two major satellite orders in 2013

Booming with Boeing

Boeing, a major customer for Saft, builds satellites and advanced systems for space flight as well as offering commercial space services.

In 2013, several existing Boeing/Saft satellite projects were continued in addition to Boeing awarding Saft five new satellite contracts for Intelsat-29, Inmarsat4, Viasat2, US Government and Intelsat EPIC series 31-34. These represent over $20M in new satellite battery business for Saft America Inc. in Cockeysville, MD, USA, where the large GEO batteries are built.

The Li-ion batteries intended for geosynchronous orbiting satellites deliver power (kW) to the satellite during its two annual 45-day eclipse seasons when its solar panels are not in direct sunlight. The satellites are generally for broadcasting and deliver bandwidth to specific geographic regions that the end users provide to commercial customers, but also to militaries needing communication bandwidth availability.

Saft and Boeing have had a Long Term Agreement for such GEO Li-ion batteries and this partnership continues to strengthen with the reliability of Saft's deliveries and performance.

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A first for mankind

Saft is supplying the battery system for the MASCOT space lander mission that is due to land on an earth-like asteroid in 2018 as part of Japan's Hayabusa-2 mission. The MASCOT lander is in development by the German and French space agencies and its soft-landing mission represents a first for mankind.

The MASCOT lander's primary batteries will remain on standby during the four-year voyage from earth before powering the 10 kg lander's mission-critical activities. The batteries will then deliver 39 Ah of stored energy, which will provide power at 11 V for up to 12 hours for the vehicle's landing, sampling of the asteroid's surface and the return to the host spacecraft, which will bring the samples back to Earth for scientific analysis.

The battery's extreme light weight, high electrical capabilities and low rate of self-discharge were all important factors in its selection by French space agency CNES.

On the Ball

A new customer in the US space industry, Ball Aerospace & Technologies Corp, has selected a Saft Li-ion battery system for its LEO satellite programme. Under the $1.2 million contract, Saft is due to supply a 32.8 V, 240 Ah battery system in 2014.

Power for 20 Russian Satellites

A memorandum of understanding signed in June 2013 with two leaders in space systems and components will see Saft develop power supply systems for around 20 Russian LEO satellites. Saft is working with VNIIEM Corporation and with JSC Radioexport to develop the systems for science and commercial satellites over the next five years.

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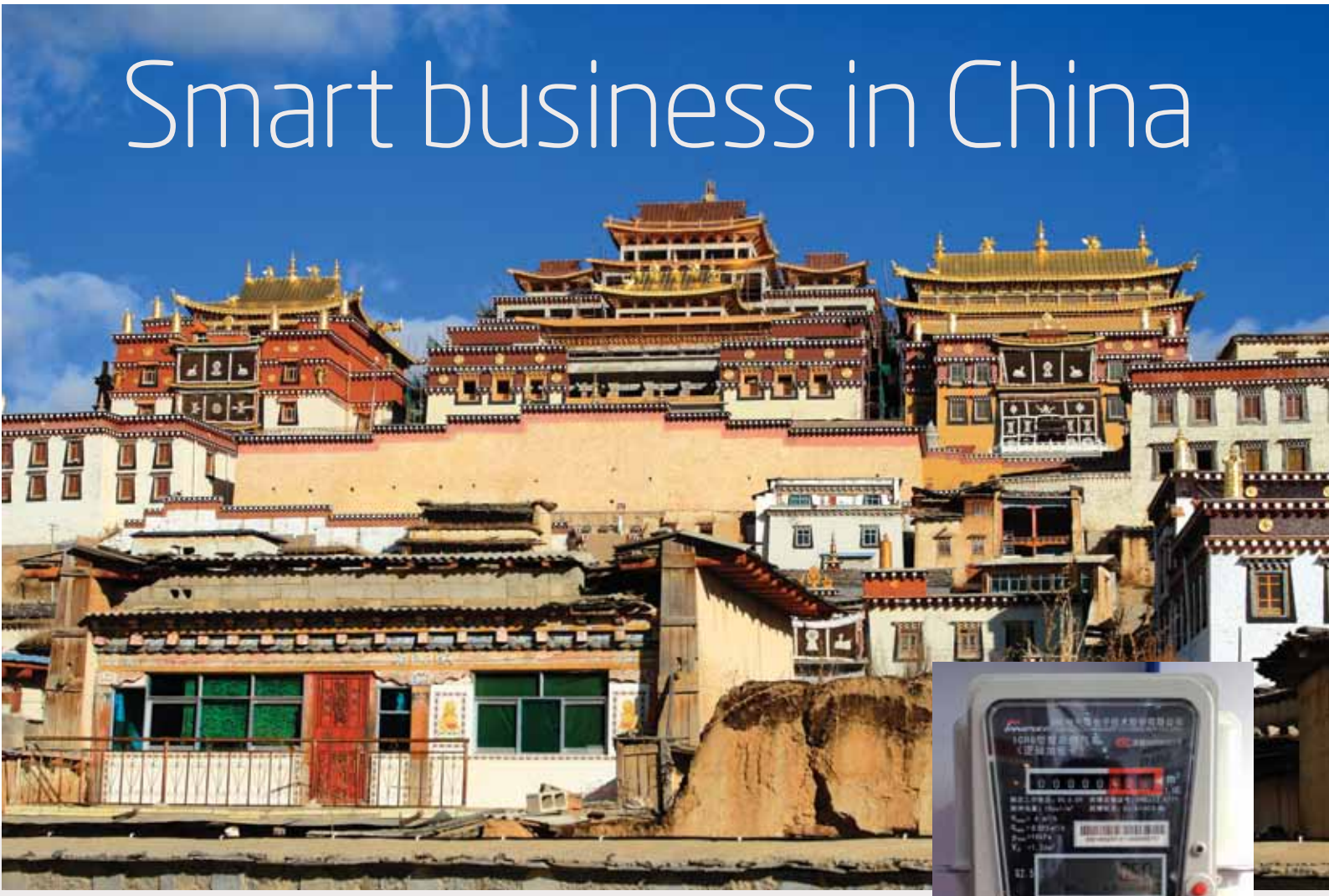
Smart business in China



Saft's primary lithium batteries ensure a long service life for smart meters

Three major smart metering roll-out projects will make use of Saft's primary lithium batteries in China, the world's largest metering market, where demands for smart gas and water meters is estimated at 50 million and 10 million respectively by 2015.

Motivated by recent reforms, Chinese utilities are introducing automated meter reading and smart meters. Saft is well placed to support Chinese meter OEMs from its manufacturing facility in Zhuhai by supplying primary lithium batteries that power metering and telemetry over a long and predictable life.

In its first ever smart gas meter contract in China, Saft is supplying around 500,000 Li-SOCl2 cells to one of the country's top five smart gas meter OEMs. Over four years, the A and C-size cells will be installed in gas meters destined for projects in Hangzhou and Shenzhen.

Under another contract, Saft is supplying 500,000 AA-size Li-SOCl2 cells to the leading water meter OEM.

Saft has extended its market share in China's smart metering market

Most recently, in late 2013 Saft won a new contract to supply A-size primary lithium cells to one of the top five smart gas meter OEMs, with the meters bound for the main gas suppliers in Zhejiang Province. The new contract has extended Saft's market share in China's domestic metering market and positions Saft as a premium supplier of specialist batteries for metering.

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Island in the sun

The Bardzour solar PV plant will incorporate 9 MWh energy storage

Saft is leading a consortium to build the Bardzour 9 MWp photovoltaic (PV) power plant on the French island of La Réunion in the Indian Ocean. The plant, due for completion by mid 2014, will incorporate a megawatt-scale Li-ion energy storage system that will store energy and stabilize the power delivered to the grid to a continuous 40 percent of the plant's rated power into the grid.

Predictable and reliable

The turnkey project for Akuo Energy is the largest project announced in the group of 16 solar farm projects awarded in 2012 under the French CRE tender (CRE: Commission de Régulation de l'Energie) for a total of 50 MW of solar PV production capacity coupled with storage in Corsica and French overseas departments. The goal is to establish solar PV as a predictable and reliable part of the islands' energy mix and support grid stability.

'The announcement of this contract in this CRE global tender reinforces our vision that energy storage will play an important role in the NIZ (Non Interconnected Zones) and confirms our leadership position in this developing future market', said François Bouchon, Director of Energy Storage at Saft

During the project, Saft will supply, install and commission a 9 MWh battery system along with training and a full service contract to support performance and availability. The system will comprise nine Intensium® Max+ 20E containers, each of which will house 17 racks of Saft's Synerion® energy storage modules, battery management, thermal management and safety systems.

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9 MWh: the largest Li-ion energy storage facility built by Saft

50: the number of 20 foot containers already shipped by Saft or on order

200 – 400 MW: the potential market for energy storage in French overseas territories

Driving domestic self-consumption

Li-ion batteries help make the most of solar PV

Germany's Energiewende (or "energy transition") has led to the country shifting towards distributed renewable energy generation. Solar PV is playing its role in the mix and, according to Germany's Institute of the Renewable Energy Industry (IWR), in 2012 supplied 50% of the nation's midday electricity demand. But there is a limit on how much solar PV the grid can accept, which is why Germany is incentivizing domestic producers of solar PV to make the most of their own energy.

In response, Saft has worked with a number of OEMs to develop systems that support self-consumption by combining batteries, solar inverters and energy management systems.

For domestic customers, these make use of Saft Synerion® maintenance-free Li-ion battery modules that can be either integrated within OEM power management systems or deployed in the standalone Intensium® Home storage system.

Two major OEMs are integrating Saft's Synerion® in their systems designed to help domestic PV producers minimise the cost of buying electricity and maximise self-consumption. Schüco's Energiemanager was launched in 2012 while Bosch has developed its BPT-S 5 Hybrid system. After introduction in Germany and the training of 450 installers Bosch is now launching it in the Italian, Australian and French markets.

Saft partners with distributors in Germany to Market its Intensium Home versions compatible with SMA Sunny Island or with Nedap Powerrouter.

For industrial and commercial customers, Saft has worked with Schneider Electric to develop Intensium® Smart that, together with Schneider Electric's electrical energy storage system (EESS), will store and manage power to help businesses make the most of their renewable energy, optimise energy bills and ride through grid power outages.

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2014 events

Saft will be present at over 70 exhibitions, conferences and trade shows in 2014. Here's a flavour of the events we're attending in the next few months.

Find a full list in the News/Events section of saftbatteries.com.

1 AABC Kyoto
19-23 May; Kyoto, Japan

2 Intersolar
4-6 June; Munich, Germany

3 Power Sources
9-12 June; Orlando, FL, USA

4 Smart Grid
11-13 June; Paris, France

5 Electric & Hybrid Marine World Expo
24-26 June; Amsterdam, the Netherlands

6 Sensors Expo
24-26 June; Rosemont, IL, USA

7 Battery Show
16-18 September; Novi, MI, USA

8 Innotrans
23-26 September; Berlin, Germany

9 OSP
1-2 October; Baltimore, MD, USA

10 MRO Europe
7-9 October; Madrid, Spain

11 APTA Expo
13-15 October; Houston, TX, USA

12 NBAA
21-23 October; Orlando, FL, USA

13 Electronica
11-14 November; Munich, Germany

14 Airshow China
11-16 November; Zhuhai, China

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