



WWF Climate Savers innovation cases: Nokia Siemens Networks in China

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Nokia Siemens Networks in China: innovating for sustainability in product, process and paradigm

Nokia Siemens Networks (NSN) China has been facing three major challenges since its establishment in 2007. First, the Chinese government and NSN's biggest customer China Mobile Communication Corporation (CMCC) established very high green standards for suppliers. Second, NSN's telecom base stations needed an overhaul. These base stations are vital for connecting mobile phone users beyond reach of the state grid, but their diesel generators were far from clean and were expensive to maintain and refuel across the vast distances of rural China. And third, the Chinese government's policy of 'independent innovation' which provided assistance for innovation projects to domestic players such as Huawei and ZTE was putting multinationals such as NSN at a distinct disadvantage.

This case examines how NSN has responded to those three challenges. It has done so in three ways. First, in line with the company's own environmentally sustainable business model, it has developed a customised end-to-end solution for energy-saving in China. Second, it has begun to collaborate with some of its key accounts such as CMCC in order to get more directly involved in the greening of the telecommunications industry. Third, the company has established a Green Pioneer Club for its employees (and this has now been extended from China to other countries). Between them, these three measures are intended to help NSN retain its market position and make a contribution towards meeting China's own increasingly ambitious environmental goals.

Company profile

NSN was established as a joint venture between Nokia and Siemens in 2007. It is a leading global enabler of telecommunications services operating in 150 countries and serving more than 600 million customers. The company provides a portfolio of mobile, fixed and converged network technology, as well as professional services including consultancy and systems integration, deployment, maintenance and managed services.

NSN has a policy of fostering sustainable business practices which also increases profitability. One such initiative is the participation in the WWF Climate Savers programme, with the aim of reducing annual CO₂ emissions by approximately 2 million tons compared to the baseline level of 2007. One of the key commitments is to improve the energy efficiency of GSM/EDGE and WCDMA/HSPA¹ base station products by up to 40 percent by 2012. According to Rajeev Suri, Chief Executive Officer of NSN:

Responsible business is also good for business. Fair, safe and healthy working conditions lead to improved worker morale and productivity. Better environmental management and efficiency

¹ GSM: Global System for Mobile Communications; EDGE: Enhanced Data rates for Global Evolution; WCDMA: Wideband Code Division Multiple Access; HSPA: High Speed Packet Access.

reduces waste and cuts costs. I am confident that corporate responsibility and ethical business conduct will continue to make Nokia Siemens Networks – and each of our suppliers – a stronger and better company.

A number of other steps have also been taken. NSN' Flexi Base Station has the lowest energy consumption in the market, and was recognized as the world's most progressive mobile network technology at GSMA Global Mobile Awards 2009. Currently NSN has more than 390 sites across 25 countries which run on renewable energy. By 2011, renewable energy will be a preferred source of power supply for every remote base station site that the company installs. Overall, NSN aims to reduce CO₂ emissions from its offices and facilities by 30 per cent by 2012, from the 2007 baseline.² Means of doing this include:

- increasing the use of renewable energy to 50 per cent of total electricity use by 2010 (from 10 per cent in 2007);
- improving the energy efficiency of buildings to reduce associated energy use by 6 per cent by 2012 (from the 2007 baseline).

These targets have been agreed with WWF as part of NSN participation in the Climate Savers program.

² For more details: <http://www.nokiasiemensnetworks.com/about-us/corporate-responsibility/corporate-responsibility-report-2009/environmentally-sustainable-12>

Total greenhouse gas emissions	2009	2008	2007 (April to December)
Total emissions (tonnes CO2 equivalent)	206,000	217,000	188,000
Indirect emissions (tonnes CO2 equivalent)	203,000	209,000	182,000
Direct emissions (tonnes CO2 equivalent)*	3,000	7,600	6,000
Ozone depletion substances (kg) – Finland and China only (34 percent of our building portfolio)	20	0.12	
Hydro fluorocarbon (HFC) from refrigerants (tonnes) – Finland and China only (36 percent of our building portfolio)	997	283**	

*Direct emissions (scope 1) include CO2 from gas and oil use in our facilities, methane and nitrous oxide emissions from heating our facilities. CO2 emissions are calculated based on the conversion factors in the Greenhouse Gas Protocol.

**2008 figures only included data from Finland

Nokia

Siemens Networks CO₂ emission (2007-2009) (Source: NSN Corporate Responsibility report 2009)

Each NSN operating region has an energy saving plan, and in 2009 NSN carried out 23 energy audits at facilities in Belgium, Brazil, China, Finland, Germany, Hungary, India and Portugal to identify potential energy savings.

Telecoms growth and the energy challenge

Many emerging markets – in particular India and China – are now rolling out mobile phone networks to literally millions of new customers a month, and both are very much in the spotlight regarding rapidly rising carbon emissions. As mobile networks expand in developing markets, an estimated 75,000 mobile base stations are built each year. Telecommunications infrastructure accounts for approximately 80 per cent of the total energy consumed by communications service providers (CSPs). Based on key CSP benchmarks, across the globe in mature markets an average of 10 per cent of network operational cost is energy. In developing markets, it can be anywhere from 15 to 30 per cent.

In mature markets, the most common way to provide power to a base station site is by connecting it to the existing electricity grid. However, in many emerging markets, particularly where mobile networks are expanding into rural areas, an electricity grid may not be available. Also even in some urban areas electricity supply is often unreliable, going off sometimes for many hours a day. Thus base stations need their own power source, at present usually a diesel generator. Reducing fuel consumption and CO₂ emissions is now a priority for companies like NSN around the world. Solutions include solar and wind power, low energy base station technology – which is becoming increasingly efficient – and battery and fuel cell banks. Where grid electricity is available, a range of other measures can be used to cut energy

consumption, such as better cooling systems, eliminating air conditioning and heat exchangers. Juniper Research estimates that by transforming base stations with equipment that takes less power and migrating from diesel to renewable energy to power off-grid generators, worldwide electricity costs will peak in 2011 and then drop to 10% below current levels by 2014.

NSN in China: environmental and market challenges

NSN China is headquartered in Shanghai, with branches in most provincial capitals and major cities. It has 7000 employees, six research centers and three large factories. NSN is a big customer for locally produced parts. ‘We purchase 120 billion Yuan a year which almost matches our annual sales revenue in China. You can see what a huge contribution we make to the country’, says Yuhong Chen, head of PR, marketing and communications in Greater China.

Fuelled by improved consumer confidence in the Chinese mobile communication industry, NSN’s net sales in the Greater China region reached €1.45 billion in 2010, a year-on-year increase of 3.9 per cent. Sales in China rose by 20 per cent in the fourth quarter of 2010, according to China Tech News.

However, several threats to growth have emerged. The Chinese governments, both central and provincial ones, and big state-owned telecommunications corporations like CMCC and China Unicom are setting high standards for environmental performance. As Ma Kai, who was Minister of National Development and Reform Commission³ (NDRC) underlined in China’s recent (the 11th) Five-Year Plan (2006-2010), ‘with regard to the relationship between man and the environment’, the Guidelines for building energy saving and environment friendly society include two of the basic national policies, namely energy-saving and environmental protection.

A notable feature of China's 12th Five-Year Plan and the Government Work Report⁴ of 2009 is the prominent position of both climate change and environmental issues, in addition to energy saving. In fact, not only is this the first Five-Year Plan that mentions climate change, but the subject is mentioned at the top of the environmental section of the Plan. The Plan includes details of China's commitment to international cooperation and the UN-led climate negotiation process, including concerns over climate finance and technology transfer. It discusses the need to implement more climate adaptation-related policies, such as greater preparedness for extreme weather events. There is a clear recognition in these plans of the importance of environmental sustainability.

The Plan also sets separate targets for energy saving (16 per cent reduction by 2015) and reduction of CO₂ emissions per unit GDP (17 per cent reduction by 2015). The use of non-fossil fuels in primary energy consumption is also set to rise to 11.4 per cent of total by 2015. Premier Wen has stated that China would put in place ‘well-equipped statistical and monitoring systems for greenhouse gas emissions, energy conservation and emissions reductions’ to ensure these policies are tracked and properly implemented. Carbon reduction standards are indeed set to become a standard part of the audit process for Chinese SMEs wanting to supply major retailers.

³ NDRC is a macroeconomic management agency under the Chinese State Council, which has broad administrative and planning control over the Chinese economy.

⁴ A government work report in China is an official and public document delivered by the Chinese Premier at the opening meeting of the annual full session of the National People's Congress (NPC) of China reporting on the work carried out in the previous year and plan for the next year.

This means that companies such as NSN are under pressure to reduce emissions generally. Specifically, this means even more pressure to find alternative energy sources for its base stations, especially in remote rural areas where there is no reliable access to the state electricity grid.

Finally, the Chinese government has started encouraging ‘independent innovation’. China is focusing much effort and resources on improving its innovation capabilities. The State Council's Medium and Long-term Plan on S&T Development (2006-2020) calls for the government to foster domestically-produced innovative technologies and reduce dependence on foreign technologies. The government is now actively supporting Chinese companies such as Huawei and ZTE⁵. This means that foreign companies like NSN are losing their technological advantage over domestic rivals. It seems likely that NSN and other foreign providers will be forced to compete for a dwindling market share as domestic providers establish themselves more fully. NSN needs to find other advantages beside just technology.

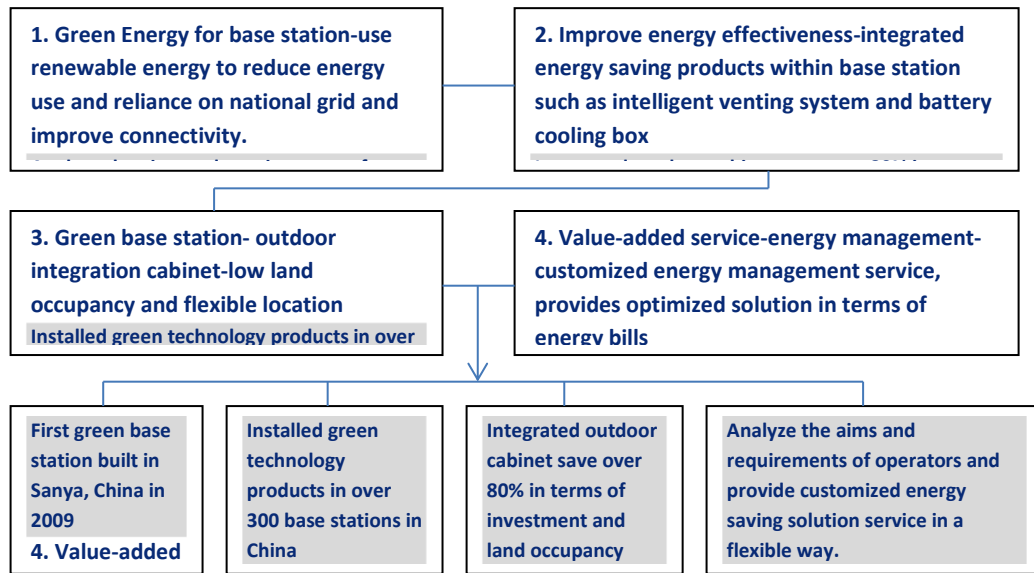
As noted above, Nokia has adopted a threefold response to these threats. First, it has addressed the need for energy saving in several innovative ways. Second, it is collaborating with big accounts such as CMCC in order to be actively involved in implementing environmental policies throughout the telecommunications industry. Third, the Green Pioneers Club has been established to encourage employee involvement.

Innovation one: a customized end to end solution business model focusing on energy saving

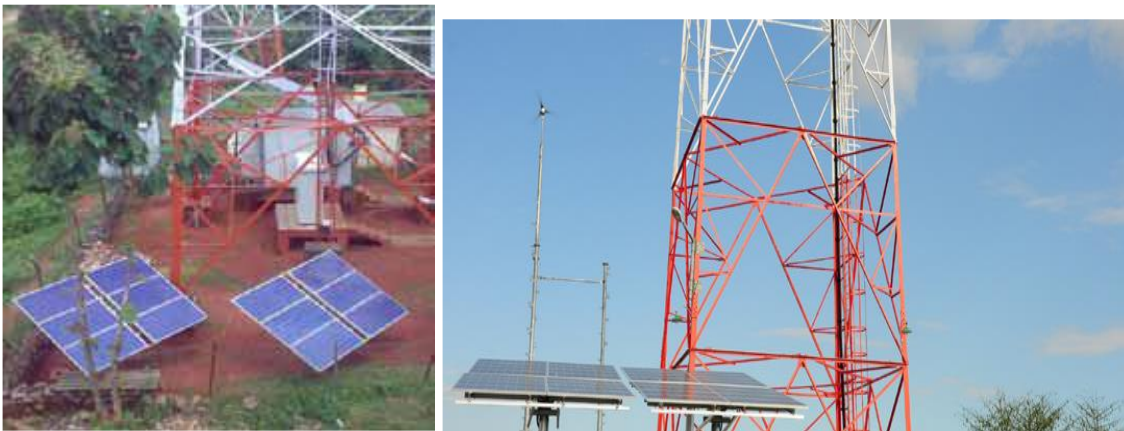
NSN has been contracted to supply CMCC with network capability, and has now extended its offer to a full service-defined solution (although CMCC has not yet agreed to accept the full-service package). There are three steps to this: consulting, delivering and maintaining. The diagram below describes how

⁵ The leading international suppliers of network equipment - [Alcatel-Lucent](#), [Cisco](#), [Ericsson](#), [Nortel](#) and [Siemens](#) - as well as the major international suppliers of portable phone sets - [Ericsson](#), [Motorola](#), [Nokia](#), [Samsung](#), and also Siemens - are well known in China. A large number of Chinese companies compete now with foreign corporations not only in the Chinese market but also in other countries. [Datang](#) is the main [TD-SCDMA](#) manufacturer, and [UTStarcom](#), the main PAS/PHS manufacturer. [Huawei](#) leads the SMS market and Great Wall stands out in the broadband sector. Other recognized Chinese equipment suppliers are [Shanghai Bell](#) and [Zhongxing Telecommunications Equipment](#) (ZTE). Furthermore, [Amoi](#), [Konka](#), [Ningbo Bird](#) and [Kejan](#) are the most representative Chinese mobile phone manufacturers.

NSN plans to implement its innovative solutions for saving energy for customers like CMCC.



Let us look at each of the four elements of this new relationship. Formerly, if CMCC needed power to supply one of its base stations it had to either install a diesel generator or negotiate with the National Grid to dig a cable trench – a substantial expense. NSN has now developed a solar power generator that could supply electricity independently of the Grid, which it provides as part of its service to CMCC.



NSN solar solution for base stations

Second, minimizing energy use is integral to performance and profitability. Intelligent venting systems consist of a window, a ventilation fan and a filter blocking alarm. When the temperature of the green base station is higher than that outdoors, the window opens automatically and the fan circulates the air in the room. If the outdoor temperature is higher than indoors, the window will be closed automatically and air conditioning starts working. Battery cooling cabinets or boxes can replace expensive shelters and power-hungry air conditioners – which are often needed only for battery cooling – and increase battery life by up to three times.

In the past few years, the power consumption of our master equipment has reduced by 70 per cent. This is what the whole industry is doing. Previously, if you went to the engine

room, there were 18 big cabinets piled up together. Now, very small blades are integrated, intensified and everything is developed towards IT...and the environment.

Min Fu, Head of Site Solutions & Network Implementation, NSN in China.

Another challenge facing CMCC was ‘how to get the system outdoors, to avoid renting a room and air-conditioning’. So-called ‘green base stations’ occupy less space use less energy, but they have to be able to withstand severe weather. As Min Fu says, ‘The biggest problem we have met is it is too “dirty” outside. If you put this ventilation system in Lanzhou or Shanxi (where there are a lot of sand storms), you have to maintain the filter at least every month.’ This too has its costs.

Finally, NSN combined these three technical solutions into an integrated offering, incorporating product design, hardware installation and energy management. According to Min Fu, ‘What NSN provides is the end-to-end total solution. Why do we propose this concept? If it is a solar energy company, it will only focus on producing solar energy. If it is a fan manufacturer, it is only able to produce fans. Nokia Siemens Networks doesn’t manufacture solar energy or fans. Then what do we do? We are an integrator and end-to-end solution provider.’

‘Our solution provides a comprehensive approach to reduce energy consumption in mobile operators’ networks’, added Xue Rui, head of NSN’s global services business in Greater China. ‘Not only do we help operators meet their green targets but also help them do so in a cost efficient way.’⁶

Innovation two: Collaborating with customers

CMCC is the largest network operator in China, with the world’s largest mobile network and a customer base of over 900 million customers. CMCC has clear strategic KPIs on sustainability. It is also NSN China’s largest and most important customer.

In 2009 CMCC developed an integrated environmental management mechanism combining systemic planning, scientific management, root cause analysis and integrated incentive schemes, all aiming to sharpen the focus on long-term environmental performance.

CMCC manages its own targets, and those of its suppliers, through its ‘Green Office’ within the planning department. In 2009 CMCC worked more closely to ‘green’ its supply chain partners in areas such as product design, production processes, component and device selection, and raw material supply in order to reduce unnecessary resource consumption. By the end of 2009 53 of its key suppliers across the world had signed a strategic memorandum of understanding with CMCC, making them partners in implementing the ‘Green Action Plan’. NSN was among the first to sign up, in 2008, and has a detailed agreement regarding operational and business-unit level collaboration throughout China.

One example of collaboration is an initiative to save energy in air-conditioned equipment rooms. For example, the use of air conditioning hoses developed according to specific temperature requirements can

⁶ For more details: <http://www.nokiasiemensnetworks.com/news-events/press-room/press-releases/china-unicom-nokia-siemens-networks-set-ambitious-energy-saving-targets>

result in air conditioner efficiency increase of 45 per cent. Such technology has been applied in 25 provincial subsidiaries. A total of 373 air conditioning systems using glycol additives have been installed to take advantage of cooler temperatures during winter months. A further 1,929 air conditioning systems have been upgraded with a spraying technology that increases cooling efficiency during summer months, again reducing energy use. Fourth, CMCC and NSN have promoted energy-efficient water cooling techniques in equipment rooms.

Also in collaboration with NSN, CMCC implemented intelligent ventilation and heat exchange systems in Hebei province. The use of natural cooling sources for regulating temperature has enabled CMCC to reduce air conditioning electricity use by at least 20 per cent, and as much as 80 per cent in some areas.

NSN has also researched the problem of blocked filters, and in 2010 developed an alarm to remotely signal the need for maintenance, avoiding the need for fortnightly checks. This is especially valuable in remote areas.

In some provinces, collaboration is built even further into the business model in the form of an energy contract management, under which NSN provides the hardware to customers for free and shares the savings on electricity bills.

Behaviourial change / Employee empowerment : Green Pioneer Club (GPC)

The Green Pioneer Club is a voluntary environment protection organization initiated by NSN China's employees in July 2008. It focuses on improving NSN employees' environmental awareness, takes concrete action in environmental protection (energy-saving and emission reducing), and leverages the company's technology and other resources to drive green projects. As Yi Wang, Manager of Corporate Affairs, Greater China Region, explains, 'the Green Pioneer Club was developed from the green office and then became an official mission. We have our declaration, website and members.' There are now more than 200 members taking part in green knowledge-sharing activities across 14 Chinese cities.

In September 2009 the GPC joined the 'green office initiative', which was cascaded down from corporate headquarters, and made significant progress in reducing NSN's operational footprint: for example, less paper cup usage, less paper consumption, collective waste disposal for batteries and a green box for recycled mobile phones and accessories. With a 'green quiz' and more tips for green offices, the GPC is attempting to change people's daily behaviour.

In Shenzhen, 35 NSN employees took an afternoon to clean the DaMeiSha beach. In Beijing another 35 NSN employees, including Zhiqiang Zhang, the CEO of NSN Greater China, and five representatives from the Dongcheng District government, cycled to 5 Hu Tong in Dongsu Area to donate battery recycling bins and environment protection knowledge brochures to residents in the communities.

Yi Wang describes a growing culture of green practices rooted in the employee community:

The environment is regarded as a stakeholder, and this is the main object of the Green Pioneer Club. Since the beginning colleagues tried to look for economical practices at work, such as duplex printing, using fewer paper cups, or more efficient hand driers in washrooms. If printing paper is stored in reception, people will think twice before going to fetch more. Used paper is selected by cleaners and stapled into notebooks that people could help themselves from the print areas. We also placed some display board in public areas, such as

routes to the canteens of Guo Hua office or Haidian Park to attract public attention. Many people living around Haidian Park have learnt green awareness from us in this way.

Support of innovation

A number of factors are helping NSN to carry forward these innovations, and it seems clear that momentum for change is building. One important factor is support from NSN's top management at headquarters in Finland. Symbolic of this was the decision in 2007 to hold NSN's first global Environmental Sustainable Business launch ceremony in Beijing, with participation by the leaders of NDRC (National Development and Reform Council), China Mobile Communication Corporation (CMCC), the Telecommunications Research Institute, and the Ministry of Information Industry. NSN went on to organize the first Green Energy Saving Forum in 2008, hosted by government departments including the Office of the Telecommunications Research Institute, and held in CPPCC Auditorium. As Yuhong Chen explained. 'We organized this conference because we wanted to enlarge the influence of our environmental sustainable business. For example, we had an event with WWF called "earth hour" which encouraged people to switch off their lights for one hour.'

The willingness of key customers such as CMCC has also been a key factor. This can be seen as part of a more general interest by Chinese businesses in environmental sustainability. The Chinese government has started to encourage sustainability through tax incentives and investment, and this top-down approach is very important in China according to Dongmei Chen, former Director of Climate Change & Energy Programme of WWF China. Yuhong Chen of NSN commented: 'First, the Chinese government is paying more and more attention to sustainability issues and it is on their agenda to promote energy saving. Second, the environmental requirements of government, the industry and the network operators are becoming more aligned, so we can cooperate more closely.'

NSN faces intense competitive pressure from Chinese competitors who are copying their energy-saving solutions. But this is seen as good for the environment overall and Rui Bai commented that 'we move relatively fast in comparison to our competitors in sustainability... It is a big market, and we hope to differentiate by developing our solutions more closely aligned requirements of operators and government. It is a good thing that there are more people coming into this business, because it benefits the environment and our customers.'

Barriers to implantation

Despite these favourable conditions, NSN also has a number of barriers to overcome. One is the lack of common standards across the country. Each province has its own standards and its own requirements. As Min Fu commented,

CMCC and ChinaUnicom are different from one provincial branch to another. When I did a presentation in Germany, I pointed out that CMCC is huge in the sense that the number of subscribers equals that of a number of countries in Europe; and the Beijing branch of CMCC equals that of a small country. So your solution has to conform to provincial requirements. Products must be customized to each province's requirements. Otherwise it will be difficult for us to win business.

Rui Bai points out that these differences within CMCC create obstacles to an integrated service with consistent environmental standards: 'Maybe the CMCC business in one province has met its KPIs and

has no motivation to do more. Other provinces may be more active because they haven't met their KPIs, and will be willing to do more. Negotiating across provinces can be difficult.'

Selling an end-to-end service contract into a customer with a purchasing system standardised for buying products and components is challenging. This is even more pronounced where the 'price' of the service is measured in unpredictable cost-savings shared between customer and supplier. NSN's new model, including energy contract management, has never been implemented before, and has given rise to many procedural and policy issues. Rui Bai described resistance to change during the implementation of innovative solutions: 'The difficulties are that the predictable results are very easy to buy, while during real operations, such cooperation may involve a lot of internal changes and adaptation, including processes and cooperation models.'

Conclusion

Yuhong Chen explains how he understands today's environmentally sustainable business:

ESB means that we need to think more about ourselves. The communication technology we use could have positive impact on both ours and other industries. We could all do better on environmental protection and energy saving. Documents which were printed using a lot of paper in the past could be transferred to electronic versions through ICT technology. We are now using E-tax, E-banking and a lot of other things in an electronic way. We have influenced the environmental protection of the whole telecommunication industry through our phone base station and our equipment and the impacts we have had on other industries. The telecommunication industry is not one of the worst offenders in carbon emission reduction. Other industries normally can get more attention. However, we do have great impact on other industries. So it is a matter of long-term development. If you do good just for the sake of doing good without having a close connection with your business, your behavior would have no long-term force. Our ESB strategy connects our business with environmental protection.

....and the final word....

'In our corporate responsibility activities, we essentially seek to "do the right thing" by three key stakeholders: our employees, our customers, and the planet. We want to maintain an active and open dialogue with many more entities to improve our performance and find new and better ways to serve our key stakeholders.'

Source: NSN Corporate responsibility approach.