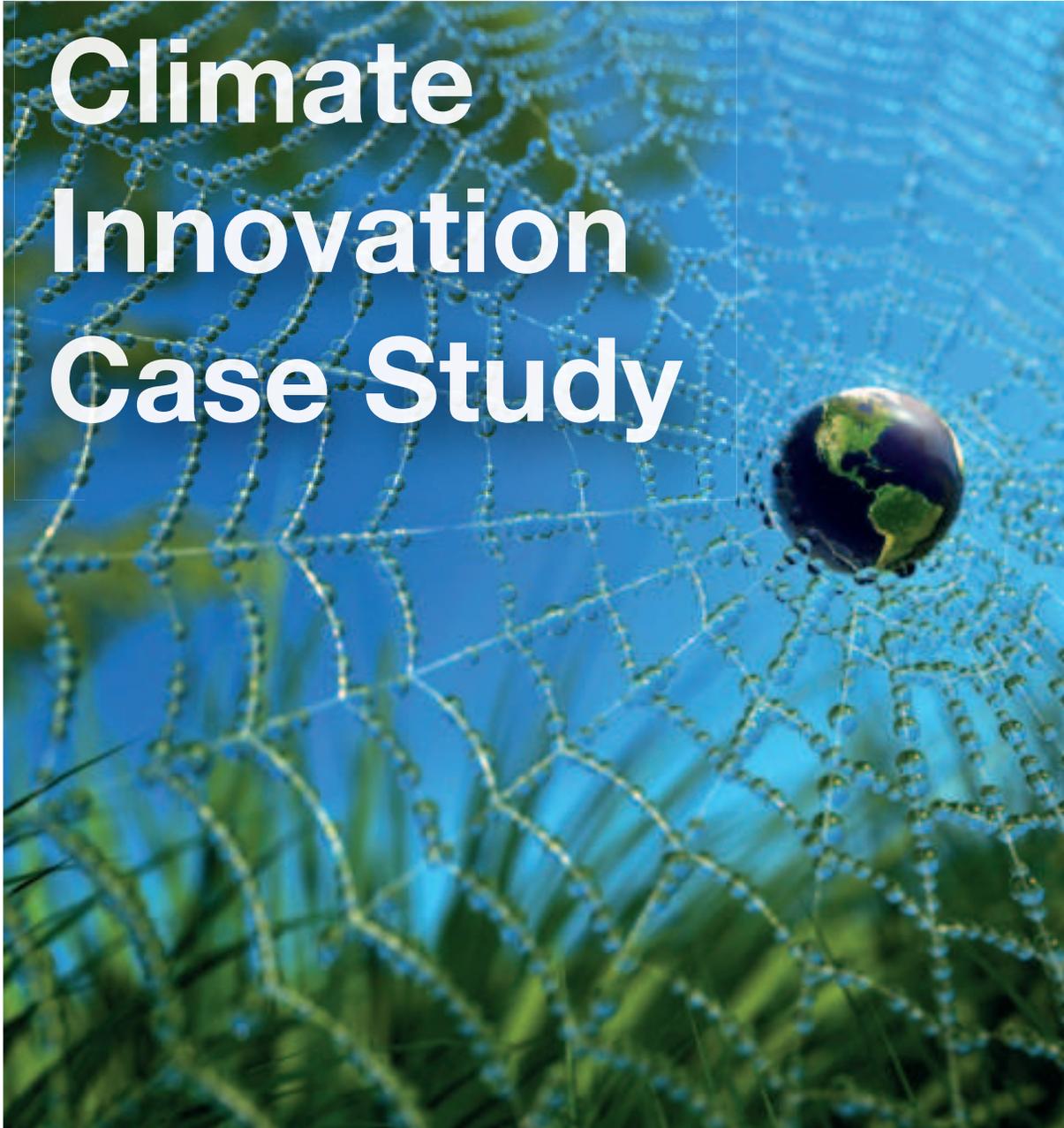




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With a portfolio of projects Nokia Siemens Networks committed to a plan to reduce its CO₂ footprint by an estimated 2 million tons per year compared to 2007. These projects included decreased energy consumption in its buildings and increased purchasing of renewable energy, as well as increased energy efficiency of its base stations, which would also deliver social benefits – greater access to communications, energy and economic development.



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Nokia Siemens Networks: Connecting Business growth and emissions reductions.



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This case was commissioned by the WWF Climate Savers Program

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ESPOO, FINLAND. OCTOBER 2005. The R&D team at Nokia Siemens Networks had done it. A year before, they had received an assignment to transform base station technology to make it smaller, lighter and more convenient. Today, the team was celebrating the product's launch. They were proud of how well they had exceeded their energy efficiency goals. Their work would create savings of €30 million in energy costs and 145,000 tons in CO₂ footprint for its customers per year. The technology was made 90% from recyclable materials and it was 80% smaller.

Background

Nokia Siemens Networks is a 50-50 joint venture between Nokia's Network Business Group and Siemens Communications. It provides wireless and fixed network infrastructure and communications and network service platforms, as well as professional services to operators and service providers. Established in April 2007, Nokia Siemens Networks is one of the top three telecommunications equipment suppliers in the world. It made €15.3 billion in sales in 2008 with more than 600 operator customers in 150 countries, and systems serving over 1.5 billion subscribers. It has around 60,000 employees

In January 2008 the company partnered with WWF International to work on training workshops, global web campaigns and other environmental awareness activities. A few months later, WWF invited the company to join WWF Climate Savers.

WWF Climate Savers was founded in 1998 by WWF as a platform to enable companies to join forces in committing to more ambitious reductions in their greenhouse gas emissions and to transform the industry's more customary incremental and/or passive approach toward climate change action.

Nokia Siemens Networks was attracted by the value proposition of Climate Savers – approaching climate change as a driver of business activity and as an opportunity to create new business for a low-carbon economy – and joined the initiative in June 2008.

Setting Targets for CO₂ Reduction

Nokia Siemens Networks' CO₂ footprint came mainly from the consumption of electricity required to run its mobile infrastructure products. Mobile infrastructure had experienced ever-increasing energy demands since 2003, as the internet and mobile phones spread rapidly to developing countries.

The company has been recognized as being active in addressing climate change issues.¹ In this regard, it is working on its products, in addition to building energy efficiency into its buildings by improving lighting, heating and energy sources. It is also implementing various staff programs like its "greenest car policy in Finland" (refer to Exhibit 1) and promoting virtual

¹ Fitchard, Kevin. "Nokia Siemens Greens up Its Radio Gear."Penton Insight, November 21, 2007

conferencing. Its total greenhouse gas (GHG) emissions from facilities in 2008 amounted to 216,936 tonnes of CO₂-equivalent (*refer to Exhibit 2*). This is equivalent to about 331,000 business class return flights from Helsinki to London. Obviously the amount of GHG emissions is much higher when the use of the company's products is factored in.

The way Nokia Siemens Networks approached the WWF Climate Savers partnership was to set specific targets for the products with the biggest CO₂ footprints and for internal business operations instead of establishing a single emissions reduction target. Its ambition was to have specific and integrated targets, which were therefore more meaningful to the business, using 2007 CO₂ emissions as the baseline. Three major targets were set:

- Improve the energy efficiency of its GSM/EDGE and WCDMA/HSPA base station products by up to 40% by 2012.²
- Decrease the energy consumption of office buildings by 6% by 2012.
- Increase the use of renewable energy in company operations to 50% of total energy use by the end of 2010.

It was anticipated that meeting these targets would result in an annual decrease in the company's CO₂ footprint of 2 million tons.

Focusing on Energy Efficient Base Stations

A base station is a wireless communications unit installed at a fixed location to enable the functioning of mobile phones, wireless internet and other gadgets using communications technologies like GSM, WCDMA and WiFi. The base station receives and decrypts signals, and also encrypts and transmits signals to facilitate communication. It is managed by another piece of equipment, a controller which allocates the channels, receives measurements and other functions.

Base stations are placed high on buildings, towers or hills to ensure good coverage. They are also large, heavy and difficult to maneuver. Despite their durability, they are often upgraded or replaced to keep pace with fast-improving technology. For mobile operators they are expensive to run, since they are energy intensive. Anne Larilahti, Nokia Siemens Networks' head of environmentally sustainable business, pointed out:

For a typical mobile operator in developed markets you are looking at up to 10% of the network's operational expenditure going on energy. And if we go to developing markets it is 15% to 30%.

Developing the Flexi Base Station

In late 2004 a team of engineers in R&D were challenged to transform the typical base station into a smaller, lighter and more convenient unit.

The four main aims of the new technology were to:

- Minimize the number of base station sites
- Minimize the need for air-conditioning to cool the sites
- Use the latest base station technology
- Deploy software features that optimize the use of radio access for wireless communications.

² GSM is a popular mobile telecommunications standard and EDGE is an enhanced version of GSM. WCDMA is an interface found in mobile telecommunications networks and HSPA is a mobile telephony protocol that enhances WCDMA.



環境優先
Defensores do Clima
クライメートセイバーズ
Climate Savers



The R&D team in charge of the project developed a solution that completely changed the form of the base station, making it portable and hence more manageable. Along with this change in form, a number of other benefits had come, including energy efficiency.

Nokia Siemens Networks applied the Design for Environment process (DfE) to generate and track environmental product requirements. The aim of DfE is to ensure that environmental items are taken into consideration through a product's entire life cycle: from raw materials to end of life. For the Flexi base station, R&D looked closely at the use, remarking and reuse of the materials, and the energy efficiency of the product. At the product review process, these requirements were measured against the prototype design and the final product.

The product was launched in October 2005, with a new model following in 2006 and a third one, the Flexi Multiradio base station, released in February 2009. Nokia Siemens Networks wanted to keep itself and its product as innovative as possible.

The New Base Station: Smaller, Durable, Energy Efficient and Cost Effective

The Flexi base station's key benefit for customers was its size: 80% smaller than the norm. It was redesigned from being a bulky cabinet to the size of carry-on airline baggage (*refer to Exhibit 3 for images of base stations*). This meant 80% less material and 80% less resource consumption and CO₂ footprint. Over 90% of the materials used were recyclable.

The reduced size was a substantial factor in facilitating the deployment of the station. Now that it could be hand-carried, cranes and other heavy building equipment were no longer necessary for installation, thus further reducing the overall energy burden. In addition, a technician no longer had to travel to the site to install new features and functionalities – this was arranged centrally at the press of a button. Car journeys to locations for maintenance became minimal. Mobile operators no longer had to purchase new base stations when the existing technology was outdated; base stations now had a longer life cycle, further reducing resource consumption and CO₂ footprint.

The new Flexi Multiradio base station consumes only 790 watts, the equivalent of a coffee maker. The typical 2005 base station consumed 4,100 watts. This was an extremely interesting proposition for mobile operators, which in the last few years had been forced to shift priorities from growing revenues per user and increasing the number of subscribers to managing a rising energy cost. For a typical Western European operator with 10 to 15 million subscribers, running its base stations requires 290 gigawatt hours of electricity a year, at a cost of €30 million (US\$45 million). If such an operator used the Flexi Multiradio base station, the annual energy saving would be the equivalent of 145,000 tons of CO₂ footprint.

The Challenge of Marketing the Flexi Base Station

The new base station fulfilled all of the objectives put to R&D and gained recognition as a technological breakthrough. In 2009 the CTIA E-Tech Awards hailed it as the Greenest Network Innovation.³ At the Global Mobile Awards, it was rewarded with the Best Network Technology Advance, and Nokia was commended for its Outstanding Environmental Contribution.⁴ The

³ "International CTIA WIRELESS 2009@ Announces E-Tech Award Winners." CTIA, April 2, 2009. <<http://www.ctia.org/media/press/body.cfm/prid/1815>>(accessed November 24, 2009).

⁴ "Global Mobile Awards 2009 – Winners." GSMA Global Mobile Awards 2009. <http://www.globalmobileawards.com/awards/winners_archive.shtml> (accessed November 24, 2009).



Sustainable Energy Europe Awards saw the Flexi Multiradio base station nominated for the Market Transformation award.

Yet even though the Flexi base station was a breakthrough technology, marketers found that mobile operators were initially reluctant to pursue it. New sales were limited by the normal life cycle of products already installed since companies waited until existing assets were no longer effective before installing new technologies. Thus, from an environmental perspective, the full impact of energy efficiencies from Nokia Siemens Networks' new product would not be felt worldwide until after at least one life cycle with older products, estimated to be 10 years. Larilahti commented:

The fact is that operators already have operational equipment at their sites. There is no business case to change equipment they bought only two or three years ago. The environmental perspective is not strong enough to go against that.

This was not the case for developing markets and remote areas of developed countries, so the company focused marketing efforts in those areas. A focus on remote areas of developed countries, such as the mountains in Italy, and on developing markets where new infrastructure was being developed, meant that Nokia Siemens Networks was providing new locations with access to communications technologies for the first time.

Going for Developing Markets

The Flexi base station is Nokia Siemens Networks' first major offering for developing markets. Its low energy consumption means it does not depend on the electricity grid, since it can run on diesel or renewable energy generators. This facilitates the deployment of mobile networks in rural areas, thus having a positive impact on the economic development of those communities. Further social benefits arise when base stations built close to villages also allow the villagers to charge their mobile phones and car batteries that store the energy they use in their homes. The company has also set up partnerships with major solar and wind power companies to provide a turnkey solution to mobile operators.

For Telenor Pakistan this was an ideal solution, as chief technology officer Khalid Shahzad explained:

Expanding into rural areas is a challenge, as there is no access to the electricity grid to supply power to base stations. Traditional alternatives, such as diesel generators are neither environmentally friendly nor cost-efficient. Nokia Siemens Networks not only offers a clean substitute, but will also reduce the cost of running these sites – allowing us to offer affordable communications to users in rural Pakistan.⁵

GSMA (an industry association representing the interests of the worldwide mobile communications industry) forecast that some 118,000 renewable off-grid base stations would be built in developing markets by 2012. If the operators choose renewable energy instead of diesel energy for power generation, this would result in a saving of up to 2.5 billion liters of diesel.

⁵ "Telenor Pakistan Opts for Solar Power to Extend Services to Rural Customers." Nokia Siemens Networks Press Release, November 4, 2009. < <http://www.nokiasiemensnetworks.com/press/press-releases/telenor-pakistan-opts-solar-power-extend-services-rural-customers> > (accessed November 24, 2009).

However, Nokia Siemens Networks recognizes that there are challenges in meeting this goal, since many operators still adopt a short-term financial perspective for their infrastructure, preferring diesel generators to run the base station because they are cheaper to buy than renewable energy generators. But this does not take into account the complicated logistics for

delivering the diesel to the sites or the cost of the fuel itself. As an example, Nigerian operator Zain estimates that it burns 350 liters of diesel every minute to run its network. Theft of fuel is also a problem.

In response, the company points out that the renewable option becomes a financially better solution within two to four years. This is because there is almost no operational expenditure – solar and wind technologies are virtually maintenance free after installation.

One example is a small base station in India that was put up three years ago. Nokia Siemens Networks established it to run on renewable energy but with diesel back-up just in case. Since operations began, the diesel back-up has been used only 5% of the time, and this would be even less except the engine needs to run periodically to keep it in working order.

So far Nokia Siemens Networks has deployed more than 400 base stations running on renewable energy in 25 countries in Asia-Pacific, China, Europe, the Middle East, Africa and Latin America. This relatively small number is believed to be due to a lack of trust in renewable energy and inefficient old base stations. But the company has recently seen a changing mindset, as Larilahti explained:

When operators were sending us requests and asking us to bid, we were lucky if we got a dozen. Now, some of the deals are in thousands.

Major Lessons and Next Steps

Reflecting on the journey, Larilahti extracted two major lessons. Her first and most important lesson:

It is not only about incremental change, sometimes it pays to blow out the whole thing and look for completely new ways of doing things. It's very easy to get stuck on incremental change, the easy and safe way of approaching things.

Nokia Siemens Networks has learned and seen the benefits of transformational innovation and change. Being bold and staying committed to the new Flexi base station has led to the opening of new markets, a market position as an innovator, and huge advantages in terms of energy efficiency – the linchpin in the company's response to climate change. Energy efficiency was the route it took to respond to the climate change issue. Larilahti outlined her second lesson:

Also, the whole energy and climate change discussion, as depressing as it can be, is inspiring because it is opening up so many opportunities for corporations, completely new industries will be formed. We need to take it from that perspective, rather than only looking at how much more difficult it is going to make things.



環境優先
Defensores do Clima
クライメートセイバーズ
Climate Savers



Exhibit 1

About Nokia Siemens Networks' "Greenest Car Policy in Finland"

Nokia Siemens Networks has what it calls 'the greenest car policy in Finland', which encourages employees to choose cars with lower emissions: the policy includes monetary incentives that encourage employees to choose more environmentally friendly vehicles. The maximum emission limit is 240g/ km, and below emissions of 170g/ km the company portion of the leasing fee starts increasing. For example, when an employee chooses a car with very low emissions (130g/km or below) the company share of the leasing fee doubles. The company service fleet is part of the green car policy: the target is to reduce the emission level of new cars in the service fleet to 120g/km in 2010.

Source: WWF Climate Savers partner fact sheet on Nokia Siemens Networks

Exhibit 2

Summary Results on Energy and Emissions Indicators, 2007 and 2008

Energy consumption	2008	2007
Total energy consumption (GWh)	609	402
Renewable energy (GWh)	90	48
Renewable energy (percent of electrical energy use)	17	9

Total greenhouse gas emissions	2008	2007
Total emissions (Scope 1 & 2, equivalent t)	215,938	173,054
Indirect emissions (Scope 2, equivalent t)	209,099	174,499
Direct emissions (Scope 1, equivalent t)	7,839	3,555
Ozone-depleting substances (kg) - Finland only (24 percent of our building portfolio)	0.12	
Hydrofluorocarbon (HFC) from refrigerants (kilograms) - Finland only (24 percent of our building portfolio)	253	

*Direct emissions (Scope 1) include CO2 emissions from gas and oil usage in our facilities and methane and nitrous oxide emissions from heating our facilities.

Source: Nokia Siemens Networks Corporate Responsibility Report 2008