whitepaper

GETTING TO GREEN ABUNDANCE

logica

be brilliant together

Shape a sustainable future together

ABOUT THE AUTHOR: BART DE RIJK

Bart de Rijk – lead sustainability consultant at Logica Netherlands – is passionate about helping our customers to improve their sustainability performance. He has been instrumental in delivering corporate responsibility and carbon emission reporting for the company.

Bart is strong in analytical skills and quick to add new fields of interest to the experience he has accumulated. He practices what he preaches, too: he cycles to work and has reduced his personal gas heating consumption by 40 per cent. Bart initiated and co-ordinated a Logica community project to improve an open source software system for Kenyan microfinance institutions. Before focusing on sustainability, he led a research project on change management in online communities.

In his first 12 years with Logica, Bart was a project leader and business consultant working with major Dutch banks and providing advice in marketing, control, risk and cash management and core banking.

Bart holds a Masters in Finance Business Administration from the Vrije Universiteit, Amsterdam.

With thanks to Logica colleagues:

Willem Altena, Chris Bannink, Michel Bayings, Victor Beverloo, Arlette Broex, Edward Bouwman, Sander van Dam, Frans Glazener, Erik Grandiek, Philippa Green, Wim Groenendaal, Marianne Herbert, Michiel Homan, Gerben Mak, Hans Moonen, Marcel Mourits, Marcel van Nederpelt, Jan Cornelis den Ouden, Tony Rooke, Sudhir Sharma, Hans Volkers, Hilke de Wit

CONTENTS

MANAGEMENT SUMMARY

Green abundance is our vision of optimal performance, in which an economy's environmental impact has decreased to a level that no longer threatens the ability of future generations to meet their needs.

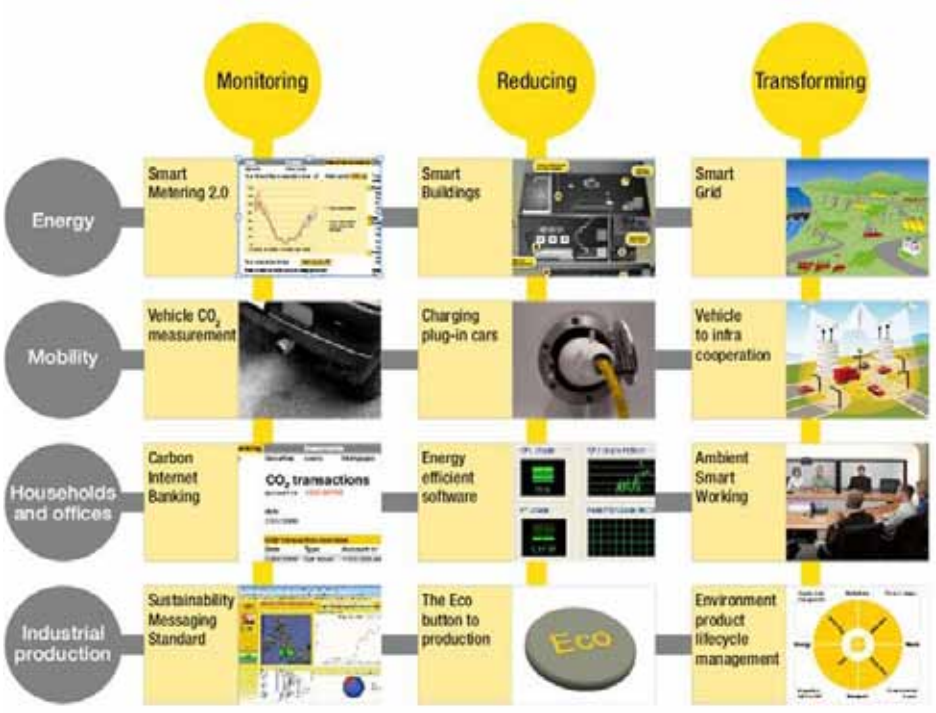
Every major sector of the economy contributes to the consumption of fossil fuels, and to the associated release of carbon dioxide and other greenhouse gases (GHGs). Historically, these fossil fuels have been relatively cheap and so have not necessarily stimulated a restrictive approach to energy use. But, pricing conditions have recently changed, especially as a result of concerns over security of supply, alongside increasing demand. As a result, there is an opportunity for each sector can improve its environmental performance and reap the cost benefits that ensue.

Innovation is central to reaching this goal and getting the very best out of the opportunities sustainability has to offer. It is – and always has been – the source of progress.

An ICT-based innovation agenda is an essential part of the work needed to get closer to making the vision of green abundance a reality. By monitoring, reducing and eventually fundamentally transforming their environmental footprints, the main sectors can progress and decouple economic success from environmental impacts.

The energy sector will move towards a decentralised, renewable energy-based smart grid. Mobility will be based on electric vehicles and optimised through intelligent transport. Households will both drive and adopt environmental progress in other sectors, in part through smart working. Industrial producers will optimise the environmental performance of products throughout their lifecycles and the supply chain. Co-operation is key.

Our innovation agenda comprises 12 sustainability topics, illustrated in this diagram.



INTRODUCTION - PEOPLE - PROFIT - PLANET
OUR FOCUS ON ENVIRONMENT

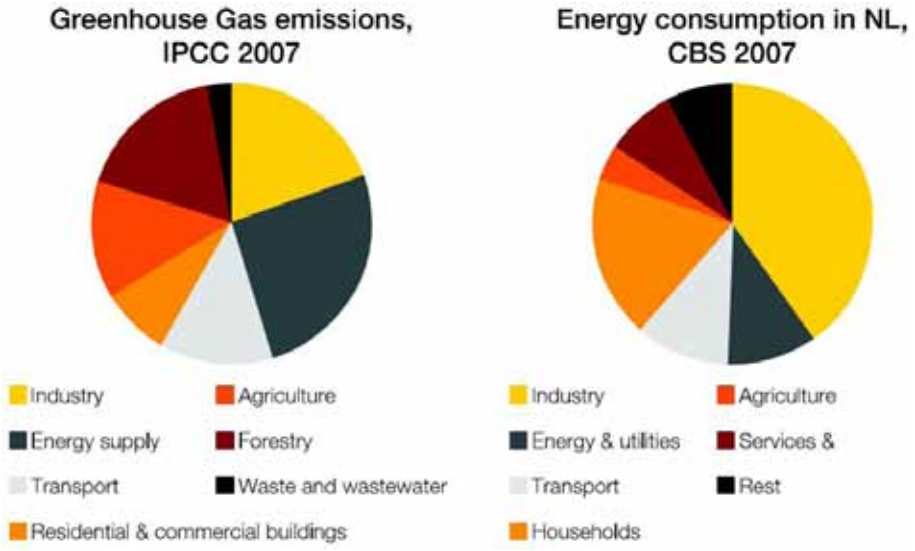
Many environmentally aware individuals, businesses, researchers, governments and international bodies are fostering the sustainability that comes from cutting fossil energy consumption and reducing our carbon footprint. ICT can help them to monitor their progress and operate smarter, as they move towards a sustainable economy– known here as green abundance.

The aim of this white paper – written chiefly for managers and specialists with an interest in sustainability, innovation and ICT – is to present a vision of a sustainable economy and to propose an ICT-related innovation agenda. We hope that an understanding of developments in other sectors may inspire them to take part in sustainability efforts that cross sector boundaries

The concept of sustainability is rather broad. Elkington's "people – planet – profit"[1] – a popular motto for sustainability within corporations – gives a high-level understanding of the concept. It is not only about making profit, nor solely about benefiting people or our planet. These efforts should complement each other.

This paper focuses on the planet while recognising the crucial role played by profit and people. Innovations in environmental sustainability will be successful only when organisations can be assured that they will make a profit – and when people believe that their wellbeing will be improved.

One of the most pressing environmental issues are greenhouse gas emissions, particularly CO_2[2], and consumption of largely non-renewable energy. As the charts [3], [4] below show, all sectors of the economy make an environmental impact.



In the Netherlands, energy and emissions reduction measures have had some measurable effect. Since 2000, consumption and emissions have risen substantially less than economic growth – but they have still grown. Industry and agriculture have been especially successful in curbing their environmental impact but the transport sector has lagged behind in reducing both emissions and energy consumption.

Innovation will be pivotal in turning increases in energy demand into rapid decline. This white paper looks at the sectors most strongly related to ICT: energy, mobility, households and services and industrial production. It explains first the vision of green abundance. Examples of innovations show how each sector can use these to monitor and reduce its environmental impact and become truly sustainable. Finally, we highlight two integrating themes that bring the innovation topics together.

OUR VISION: GREEN ABUNDANCE

Green abundance is our vision for a green world, a world in which the environmental impact of our society has reduced to a level that does not jeopardise the ability of future generations to meet their needs.

A key element of green abundance is low-carbon energy at lower prices than today's fossil fuel-based energy. Solar energy, both de-centralised and in large installations, will become the backbone of renewable energy supply. Offshore wind farms, hydropower, biomass and geothermal energy are other renewable sources that will complement solar power in satisfying energy demand.

In this green world, electric vehicles powered by renewable energy are commonplace. They are designed according to Cradle2Cradle[5] concepts, which take the environmental aspects of full product lifecycles into account, shrinking their footprints in natural resources and waste.

As emissions and engine noise are eliminated, the environmental impact of transport is limited to the space that vehicles need. Offices become meeting places, catering for the needs of staff to meet face-to-face every now and then, complementing their virtual collaboration from home. Effective smart working systems enable workers to interact in a natural way, both at meetings and at desks – and reducing the need for travel.

Production has shifted towards either re-usability and re-cycling – cutting down the production of environmentally unfriendly, chemically based products – or to biodegradable products. Producing locally for local demand reduces transport throughout the value chain. Products require less volume, last longer and their production consumes less energy and produces less waste. They are designed for optimal environmental performance throughout their lifecycle.

When will all this happen? The timing, of course, is subject to debate: 2020, 2030, 2050, never? Even more progressive concepts may overtake parts of this vision. But the vision of green abundance serves as the ultimate challenge, towards which innovations of the next decade should progress.

ENERGY IN OUR CHANGING WORLD

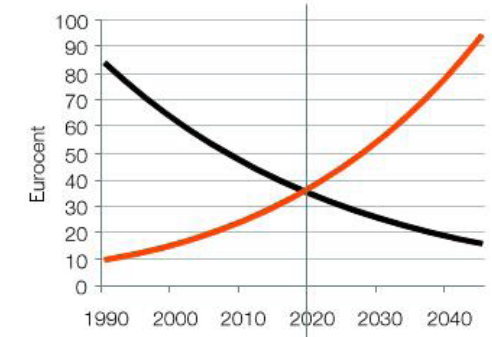
The energy sector will see profound changes in the coming decades, brought about by environmental impact and energy transition. Power production will shift towards higher levels of decentralised renewable resources, adding to the needs of effective energy storage and flexible grid power management[6]. Customers will become co-producers, requiring the grid to provide them with energy continuity at low financial and environmental cost. Carbon capture and storage (CCS) systems will evolve to reduce the environmental impact of fossil energy production for as long as renewable energy can't meet all of the world's energy demands. In distribution, the need to power electric vehicles will create technical and financial opportunities for electricity distribution companies, as the fossil fuel market declines.

Solar energy is the most promising renewable resource. A solar power coverage of six per cent of the Sahara could meet the entire world's energy demand. Of all renewables, it has the fewest environmental side-effects.

But it is technically and financially the most challenging resource.

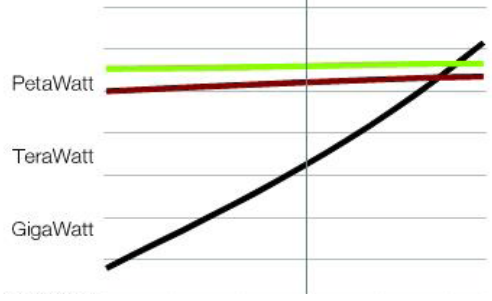
The two graphs [7], [8], [9] (below) show the developments needed to achieve green abundance through solar energy alone. Developments such as efficient thin film solar cell systems[10] need at least to continue at the current annual three per cent growth in price efficiency, reaching grid parity[11] by 2020. At present, capacity is growing at an annual rate of 40 per cent. Only when this growth doubles after grid parity – and storage solutions for the energy that is generated scale up – can solar power close the current million-fold gap between solar and fossil energy production by 2040.

In the meantime, energy monitoring and reduction efforts are key to slowing the other trend shown here: the continuing growth in global energy demand



Green Abundance scenario:
Solar Grid Parity in 2020

- Solar power - eurocent/kWh: -3%
- Grid power in NI - eurocent/kWh: – 4%



Green Abundance scenario:
Solar capacity meets demand in 2042

- Solar capacity: +40% until Grid Parity; – 80% after Grid Parity
- World electricity demand: +3%
- World primary energy demand: –1,2%

MONITORING: SMART METERING 2.0

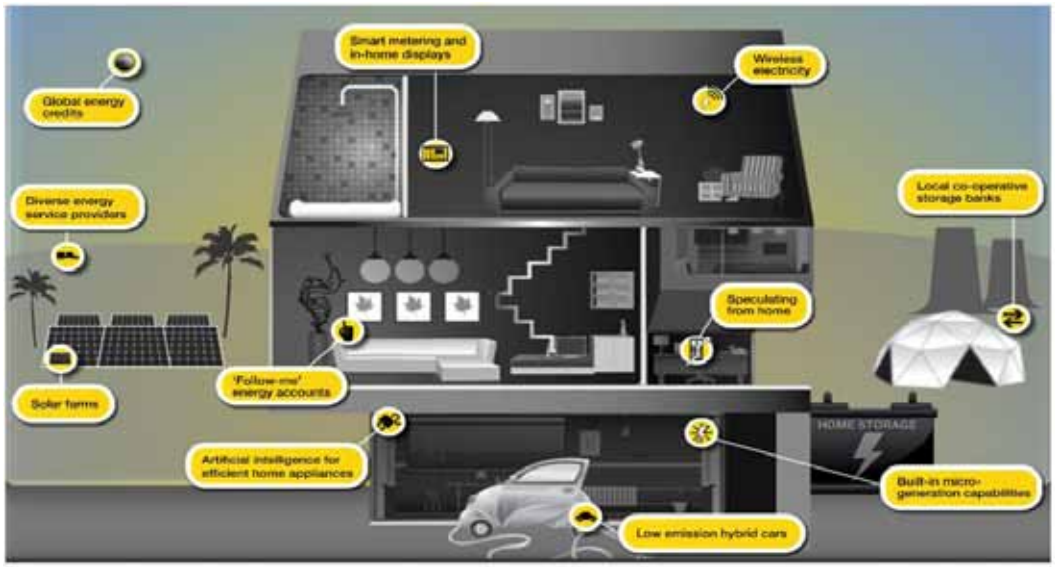
When trying to cut their home heating bills, Western Europeans have a hard time deciding what investment or behavioural change is likely to be most effective. Smart metering 2.0 gives them a tailor-made benchmark for energy saving opportunities. In Växjö[12], Sweden, we have already demonstrated the success of a portal-based competition for reducing consumption, in which smart meters enabled private householders to monitor their energy use. With Smart Metering 2.0, they voluntarily send relevant information such as house size, insulation and thermostat settings to the portal[13].

Joining this information with near-real time smart metering data, anonymous benchmarks are instantly created for similar types of homes. What-if analysis features allow owners to make realistic calculations about the environmental and financial impact of the various efficiency measures they can take. Web 2.0 techniques can enable householders to learn from each other's approaches and join forces

REDUCING: THE SMART BUILDING

The idea that won a children's contest set up by the Dutch Ministry of Environment in 2008 was simple: one button to switch off all lighting and appliances when you leave the house[14]. And it's possible. A home area network – HAN – provides all appliances with an IP address and uses Internet communication via electricity cabling to connect them to a central controller. The controller is smart enough to leave the fridge and security system power on when the Leaving house button is hit.

That's only the start of the HAN's energy-reducing possibilities, which apply just as much to offices. A HAN allows smart metering down to the most detailed level, giving an oversight of which appliances have used the most energy. Capable of dimming lights, it can also use ambient sensors to increase lighting gradually when it's needed. It can flatten energy consumption peaks by deferring activity of time-flexible appliances such as fridges and washing machines to quieter and cheaper timeslots. The HAN communicates energy load balancing information to the household's own solar energy system and the smart grid (see below). Of course, it will communicate only the external aggregate household energy demand with the smart grid, keeping the private details where they belong – within the house.



TRANSFORMING: THE SMART GRID

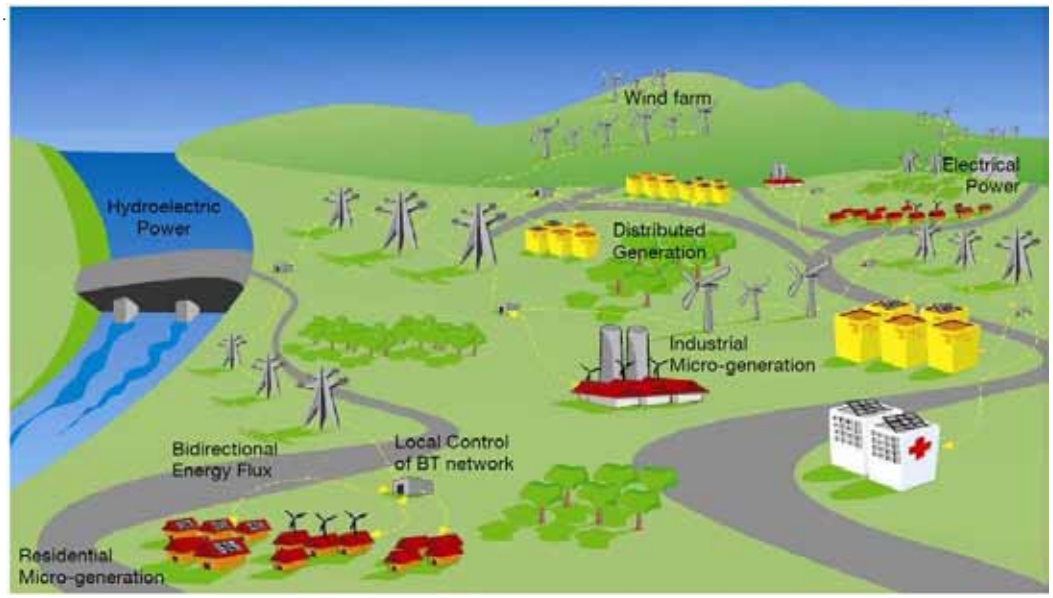
Just as the Internet turned one-way media consumers into interactive media producers, so the energy grid will become a smart grid of inter-dependent energy consumers and producers.

First, energy production will no longer be under full central control. Micro-generated renewable energy production will turn every building into a co-creating energy producer without a guarantee as to when and how much power will be supplied. Joining vast numbers of these producers will be smaller numbers of large wind and solar parks. The smart grid[15] will need to anticipate weather conditions and decide whether to charge or discharge energy storage facilities, and which central power stations to bring on line.

Second, new and dynamic business models will emerge. Through continuous two-way communication with smart meters and intelligent HANs, the smart grid will aim to flatten peaks in demand and supply. Dynamic variations in pricing for energy consumption and micro-generating will promote energy consumption in off-peak hours and production in peak hours and cut the need for environmentally and financially undesirable energy peak production.

Third, a shift from fossil fuel-based cars to electric vehicles might lead to a tenfold increase in highly distributed energy demand[16]. The smart grid will have to decide on the timing and pricing for the overnight charging of electric vehicles, to prevent most cars being charged when drivers arrive home at six pm. Cars needing an instant charge will pay a higher price.

Logica is piloting the smart grid through the InovGrid project[17], led by the Portuguese energy distributor, EDP. This project aims to bring Portugal into a leading position in smart grid implementation.



INTRODUCTION

ON THE MOVE - SMARTLY

Reducing both the environmental impact and the need for travel continues to be a major topic, alongside the desire to reduce traffic jams. Car makers are making huge investments in next generation hybrid and plug-in cars to ensure that they will meet the pending emissions limit of 130 gram CO_2/km by 2015[18]. Online services reduce the need to travel to local shops, banks and municipal offices. Local and national governments are fostering a switch from cars to public transport, supported by dynamic trip planners.

Sustainable logistics[19] aims to reduce the environmental impact of freight transport. Improved supply chain-wide interaction fosters locally clustered supply chains, optimises return loads and monitors CO_2 emissions throughout the chain. Dynamic traffic management supports transport flow and switches to environmentally best-performing modes, such as canal transport. Sustainable logistics may also arrange a sustainable last mile into city centers. Deliveries from various suppliers to multiple closely related shops are collected in a hub outside town. From this hub, low-carbon transport can be highly efficient in bringing these goods to their final destination in crowded city centers.

We have launched a wide range of intelligent transport systems, all of which contribute to CO_2 reductions. These are some of them:

- The MESSAGE[20] project showcases dynamic CO_2 monitoring to identify roads with CO_2 hotspots
- Road pricing systems provide financial triggers for switching car travel to other means of travel
- Our multi-modal mobile trip planner supports travel mode change, a showcase of the EU i-Travel research project[21]
- The Connekt[22] programme optimises the supply chain, reducing the need for environmentally unfriendly express deliveries

As these innovations reach maturity, new innovations in monitoring, reducing and transforming mobility are needed.

MONITORING: THE VEHICLE MEASUREMENT THAT MATTERS

Significant fuel economies and carbon reductions can be realized through efficient driving. Given the differences in fuel consumption during city trips and highway travelling, it is hard for car drivers to understand how well they are doing when watching their traditional on-board fuel economy meters. For fleet owners it is even harder to judge which driver is driving efficiently and which isn't, as they have insights in average fuel consumptions only.

More helpful guidance would come from context-aware monitoring and feedback systems. Logica's EMO[23] innovation sets an important step in this direction. It collects actual data about acceleration, deceleration, fuel consumption and carbon emissions and sends this data to a central system. Such data is used in multiple ways through the eCoMove research project. First, black spots can be identified : in which sections or crossings of roads are fuel[24] consumption and carbon emissions above average? This may trigger road side actions to improve this situation, such as adaptation of traffic lights, recommendations towards drivers regarding optimal speed and distance between vehicles Secondly, car drivers can be profiled, providing them with personal advice regarding opportunities to improve their driving style.

These concepts of measuring and feedback loops can be extended into freight logistics. As the need for measuring and reducing real carbon emission throughout the supply chain increases, combining data on actual fuel consumption and freight loads provide freight operators with all the information they need to calculate carbon emissions per delivery. They can also use this information, enriched with data on traffic condition to run fair fuel efficiency contests amongst their drivers to spur further improvement.

REDUCING: PLUG IN CARS GET THE CHARGE

As from 2011, plug-in hybrids and electric cars will start appearing in car showrooms. To make it onto the main roads as well, a good infrastructure is needed. Car charging poles will be required to provide electric car drivers with easy and reliable access to power their vehicles. Residential areas, office parking lots, parking garages and shopping malls are key locations for these poles.

Equally important is international standardization of the complete charging process. Drivers seek real-time guidance by their navigation system to direct them towards available poles. Once arrived, they identify themselves through a card. Drivers connect their car to the charging pole. As the navigation system has learned about timing and length of upcoming trips, car-to-pole communication settle speed and timing of charging. As the charging pole and Smart Grid exchange information about cost, demand and supply of energy, all relevant aspects are known to arrive at an optimal charging program.

Once charging is finished, the proper billing process is settled. Various options will be possible, including credit card payments, personal charging accounts, fleet owners accounts or through specific arrangements like loyalty programmes of the nearby retailer whose parking space is being used.

Together with partners, Logica Netherlands has delivered a nation wide end-to-end charging pole infrastructure, including software for charging poles, authentication and infra monitoring systems, enabling success of the first wave of mainstream electric vehicles[43]. Participation in international standardization efforts will ensure this progress won't stop at national borders.

TRANSFORMING: ANY VEHICLE SHALL SPEAK UNTO VEHICLE

For many years, science fiction writers and futurists have predicted fully automated highways as the ideal solution to traffic congestion and safety. The environment would also benefit from the optimal use of space and the fuel economies of fluid travel. Each decade is bringing us closer to this ideal. In the 1990s, trials in Europe and the United States provided proof of concept for restricted lanes. Now, essential building blocks such as sat nav have rapidly covered the market, while up-market car-makers offer intelligent cruise control systems that maintain a minimum distance from other vehicles.

Vehicle-to-vehicle and vehicle-to-infrastructure communication are key elements of current thinking. Highly specific data from these communication systems will enable urban dynamic traffic management. Route guidance will provide personalised information, including speed advice, so that cars can benefit from green traffic lights. At the same time, traffic lights will be influenced so that they handle anticipated traffic optimally. Road access systems might penalise or even block access for through traffic in residential areas, or restrict vehicle access to city centres, based on their emissions. The EU's Co-operative Vehicle-Infrastructure Systems (CVIS)[25] research project, which involves Logica, is developing just such systems. This project has been extended upon through the Dutch government funded SPITS research project. SPITS will [26]create an open infrastructure for cooperative systems between cars and infrastructure, amongst others to improve sustainable and safe mobility.

The coming decades will see new systems from which traffic gets more automated guidance. In combination with electric vehicles, the ideal of automated highways would solve most of the environmental problems created by traffic.

But technology alone will not change fiction into reality. Legal, financial and security issues will have to be dealt with, alongside international standardisation. Most importantly, people need to accept losing control over their driving in exchange for efficient, green and safe transport. Putting the building blocks into place in an evolutionary way will support this transformation

SMART HOMES... AND OFFICES

Households consume most goods and services, so they have a vital role in reducing the carbon footprint. They can decide to turn to more environmentally friendly products, to invest in energy-efficient appliances and to change their behaviour. Many of the sustainability innovations in energy, mobility and industrial production rely, therefore, on acceptance by households. That's why we emphasise the need for households to have an accurate picture of their carbon impact – and of the alternatives.

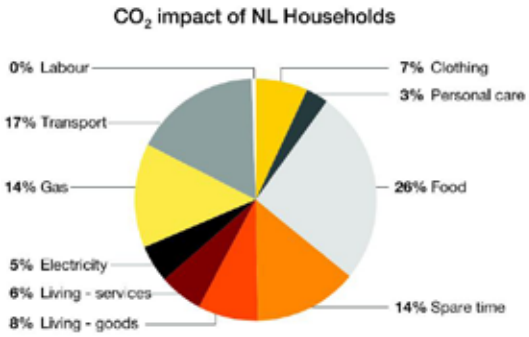
Though different in scale, offices have a carbon impact similar to that of households, although theirs derives mainly from energy consumption and travel. This means that offices can take a more professional and innovative approach to CO_2 abatement, paving the way for households. In the end, offices may turn into meeting points for staff who want to have personal contact with colleagues they normally work with at a distance, using home computers.

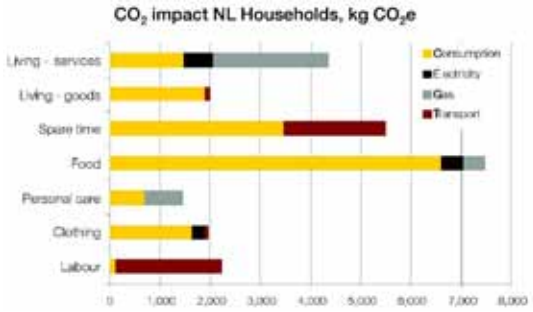
MONITORING: A CARBON-CUTTING COMPETITION

Households that want to reduce their CO_2 footprint should be given the tools to monitor their performance dynamically. As with managing a financial budget, they may take up the challenge to meet their own CO_2 targets, even getting family members and friends to join in carbon-cutting competitions. Carbon Internet banking enables automated carbon household books. Every product can have its carbon tag. For example:

1 litre milk	1,4 kg CO_2 [27]
1 kg beef	36,4 kg CO_2 [28]
100 KWh electricity	34 kg CO_2 [29]
100 km car travel	20 kg CO_2 [30]

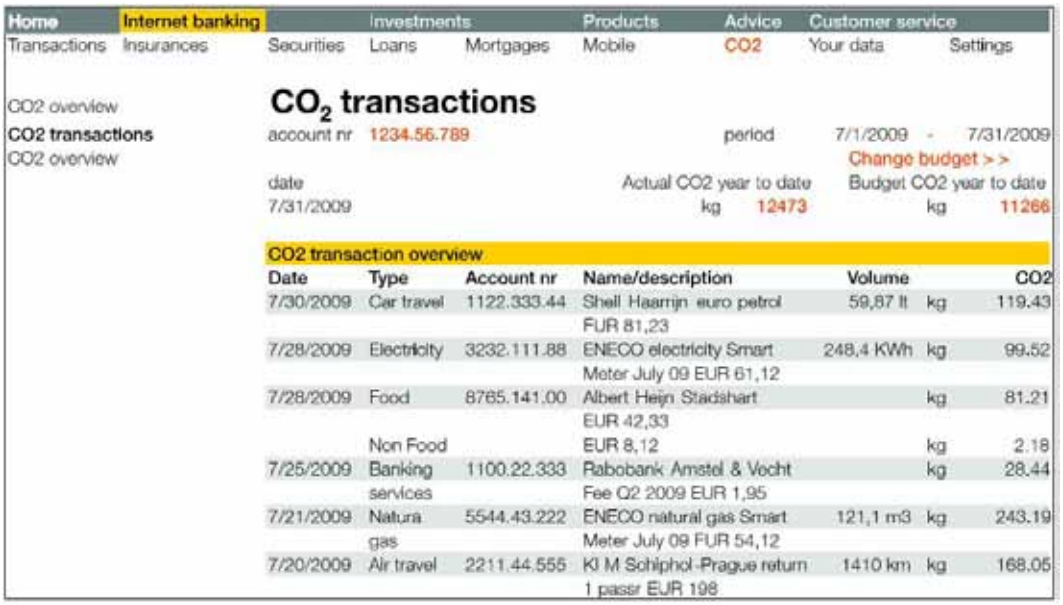
Current Internet-based carbon calculators typically show a household's direct carbon impact, caused by energy consumption and travel. On average, this amounts to 9,000 kg CO_2e. However, the indirect impact of consumption amounts to 16,000 kg CO_2e. Food consumption has a substantial impact, as these charts[31] show:





The British Standards Institution has developed a carbon labelling standard: PAS 2050[31]. Logica's EMERALD system supports retail companies in managing, calculating and presenting the carbon labels[33].

With carbon Internet banking, a message attached to each payment transaction would show the total carbon impact of the goods or services you have bought. The bank, which already gathers payment transaction information, would collect the carbon impact information. Appearing next to the financial overview in Internet banking, a carbon overview would list the individual impact of the goods and services purchased and show year-to-date accounts of actual and budgeted emissions. It will spur competition not only among households but also among retailers to lower their CO_2 impact.



Home | Internet banking | Investments | Products | Advice | Customer service

Transactions | Insurances | Securities | Loans | Mortgages | Mobile | CO2 | Your data | Settings

CO2 overview

CO2 transactions

CO2 overview

CO_2 transactions

account nr 1234.56.789 period 7/1/2009 - 7/31/2009

Change budget > >

date	Actual CO2 year to date		Budget CO2 year to date	
7/31/2009	kg 12473		kg 11266	

CO2 transaction overview

Date	Type	Account nr	Name/description	Volume		CO2
7/30/2009	Car travel	1122.333.44	Shell Haarrijn euro petrol EUR 81,23	59,87 lt	kg	119.43
7/28/2009	Electricity	3232.111.88	ENECO electricity Smart Meter July 09 EUR 61,12	248,4 KWh	kg	99.52
7/28/2009	Food	8765.141.00	Albert Heijn Stadshart EUR 42,33		kg	81.21
	Non Food		EUR 8,12		kg	2.18
7/25/2009	Banking services	1100.22.333	Rabobank Amstel & Vecht Fee Q2 2009 EUR 1,95		kg	28.44
7/21/2009	Natura gas	5544.43.222	ENECO natural gas Smart Meter July 09 EUR 54,12	121,1 m3	kg	243.19
7/20/2009	Air travel	2211.44.555	KI M Schiphol-Prague return 1 passr EUR 198	1410 km	kg	168.05

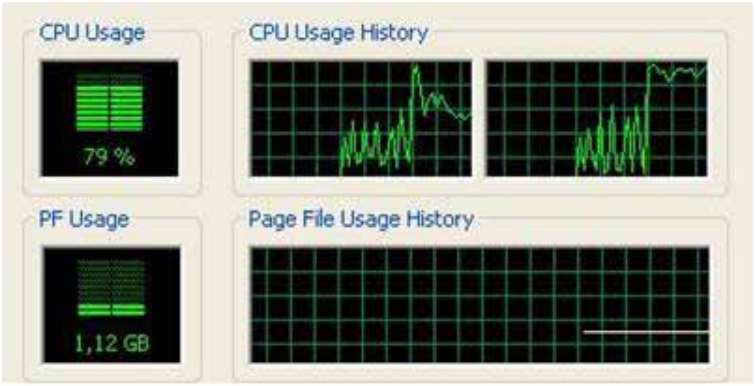
REDUCING: COOL SOFTWARE

ICT may be responsible for more than 20 per cent of a financial services company's carbon footprint. Until now, desktop hardware and data centres have received most attention in meeting green IT requirements to cut energy consumption and carbon emissions. Measures such as smart cooling, virtualisation and smart power management provide reductions of up to 40 per cent. More radical approaches include providing heat for neighbouring buildings and off-shoring data centres to territories – such as the Nordic countries – with low CO_2 emissions per kWh, low energy prices and low temperatures.

Now it's time to focus on software. You can compare energy-efficient hardware with a hybrid vehicle but it's still not going to be efficient if it's driven like a racing car. In the same way, software affects hardware energy efficiency.

We already know some of the first elements for software energy efficiency. For example, software should be designed for operating on virtualised hardware and utilize possibilities of parallel computing. Animations and multi-platform-based software require substantial computing power. But which measures result in what levels of energy saving?

We need a joint research project to develop best practices and standards, re-using knowledge from areas in which software energy efficiency is an established topic, such mobile telephony. This should result in a dynamic, energy-efficient software standard – a performance label that will be one of the procurement requirements. It will allow software suppliers to compete on environmental impact alongside price and quality.



TRANSFORMING: OUR SMART WAY TO WORK

Smart workers cut travel by turning their homes into offices. They work with colleagues virtually. Ease of use and the quality of technical solutions are improving all the time – but they are different from face-to-face meetings and group work, generating resistance to smart working from managers and staff. High-end video conferencing, which shows other participants around you in real world images, is already close to technical perfection[34] but high costs are hindering availability below the level of senior management. The breakthrough should come when we achieve high-end functionality with low-end prices, alongside training in how to use the equipment.

The ultimate goal is an ambient smart working system that allows for virtual collaboration throughout the working day. It will cater for formal meetings as well as informal gatherings around the coffee-machine or water-cooler. People will be able to share any documentation, whether it's being presented or needs to be created on the spot.

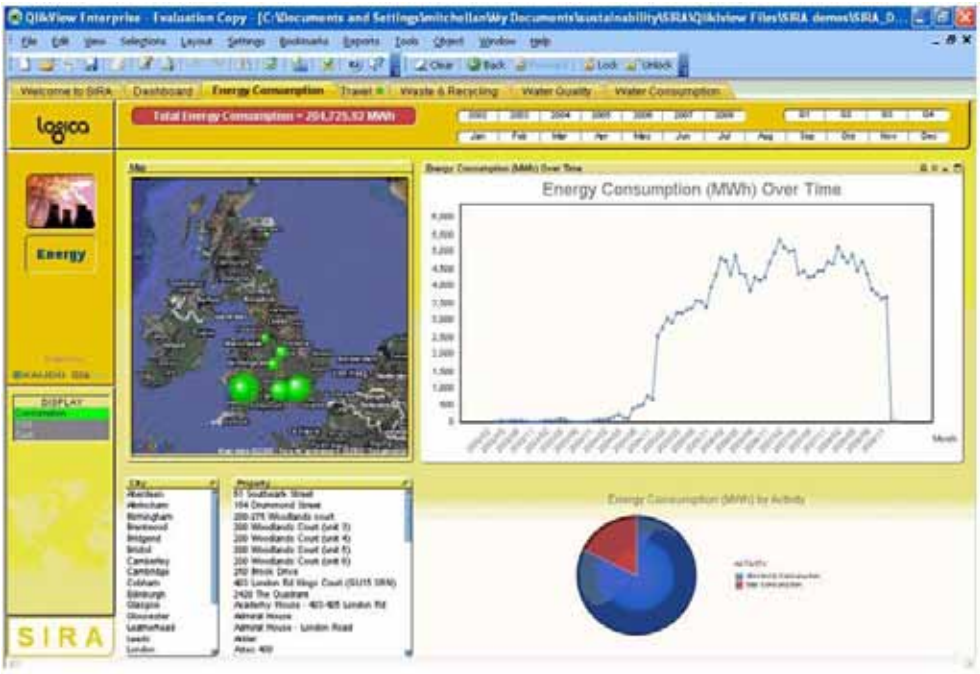
The system ought to give an automated visual impression of what colleagues are doing. Are they actually there? Are they engaged in an informal conversation? Are they concentrating? It should foster spontaneous contacts, such as when someone sees an interesting document on a colleague's desk. The innovation challenge for ambient smart working is how to make this happen in a way that is effective, low cost and natural – but still preserves people's privacy.

INTRODUCTION

INDUSTRY IN THE LEAD

The environmental impact of industrial production, especially that of the base chemical sector, is larger than its contribution to the economy. Many industrial companies are aware of this, not least because of the growing financial impact of emission rights, and are striving to be leaders in environmental performance. This has brought them to the forefront of emissions management – but a number of important innovations would support their next steps towards CO_2 reduction.

MONITORING: SUSTAINABILITY MESSAGING STANDARD



Companies need to tell their stakeholders about their sustainability impact, and to put impact labels on their products and services. Logica is helping in this area with the introduction of SIRA, a sustainability reporting dashboard, based on the Global Reporting Initiative (GRI)[35] and the Greenhouse Gas Protocol[36]. To provide comprehensive reports to stakeholders and consumers, organisations need to gather environment impact information about all the products and services they have purchased from suppliers. Some suppliers, such as energy companies, have started to provide this data. But in the absence of a standardised message format, very few organisations are able to use the input effectively and have to process data manually or use a multitude of dedicated interfaces. We need an international sustainability messaging standard to solve this problem.

This messaging standard may start by covering data for carbon impact, expanding later to other aspects of sustainability, such as raw material volumes, waste and water consumption. These information exchanges will be the backbone of international carbon and sustainability accounting.

At first, the information supplied might be of a static nature, based on calculating an average impact of production. Over time, it should move towards a more dynamic approach, taking into account consumption, transport and waste figures. This shift will motivate each participant in the supply chain to optimise its sustainability performance. Logica's EMERALD dashboard for managing carbon embedded in products and services is one innovation in this area.

REDUCING: INDUSTRY NEEDS THE ECO BUTTON

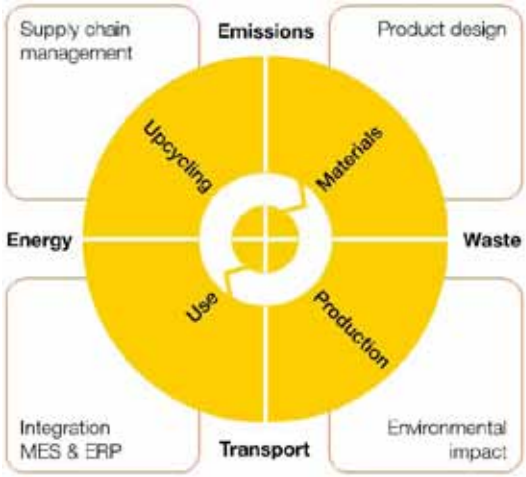
Your washing machine may already have an eco-button to run in economy mode but many industrial plants can switch only between full power and full stop. And moving between extremes can be costly. Enabling plants to run in eco-modes geared towards maximum efficiency instead of maximum output will solve this problem and make them more agile.

Taking this route, factories will need to create new methods for each part of the production process. This eco-mode, along with other systems for product lifecycle and enterprise resource management, will be challenging technically – but it is feasible. Changing management structures and the mindset of plant managers is likely to be more difficult, since managers are typically rewarded for delivering maximum output levels.

TRANSFORMING: ENVIRONMENT PRODUCT LIFE CYCLE MANAGEMENT

The interdependency of the ways of reducing environmental impact at each stage of a product's lifecycle means that an integrated management approach is the only way to optimise lifecycles. At the design stage, companies must take account not only of the environmental impact of extracting raw materials at specific sites but also of the impacts of transport alternatives throughout the chain and of energy consumption at point of use. Design for recycling and upcycling should be crucial parts of decision-making and monitoring.

Environment Product Lifecycle Management (EPLM) is upgrading current manufacturing execution systems[37] from site-specific to enterprise levels. It will integrate with supply chain management logistics. Interfacing with the EPLM systems of companies throughout the production chain will maximise optimisation. Eventually, highly reliable audit trails on lifecycles may enable new carbon emission rights policies that reward companies for making energy-saving consumables, instead of punishing them for the carbon emissions generated in their part of the production chain.



INTEGRATING THEMES

The 12 topics on this paper's innovation agenda are closely inter-related. Each of them is an important building block for green abundance but they also require integration across different sectors of the economy. Two integrating themes, in particular, stand out: carbon reporting and co-operative decision-making.

CARBON REPORTING

Energy consumption, the carbon impact of travel, food and other products and services add up to the total carbon impact of households. Smart Metering 2.0, vehicle CO_2 monitoring and carbon Internet banking are the innovations that enable consumers to monitor their carbon impacts in detail. This scrutiny will enhance their awareness, guide them towards the most effective ways to reduce their carbon footprint and increase the pressure they put on companies to improve their own carbon performance. The innovations are valuable on their own but true effectiveness will only come from synergy.

Carbon reporting systems and standards for organisations are more readily available, serving both internal and external reporting. The Greenhouse Gas Protocol defines corporate carbon reporting, supported by Logica's SIRA reporting suite; PAS 2050 defines carbon labelling per product, which is supported by our EMERALD system. IT-based innovation focuses on sustainability messaging standards, allowing every organisation in the production chain to inform every other organisation about their contribution to carbon impact

COOPERATIVE DECISION MAKING

Enabling decisions based on shared information throughout and across sectors is the second emerging sustainability innovation theme. Smart grids can balance supply and demand only when working with households' smart meters and smart buildings. Co-operation between vehicles and infrastructure is key to getting optimal traffic flow. Industrial producers need to co-operate across their supply chains to optimise environmental product lifecycle management. Co-operation within and across sectors is the key challenge.

OUR ROUTE TO SUSTAINABILITY - AND YOURS

We help clients and their customers to achieve sustainability – and we practise what we preach. We aim to cut our organisation's 2020 carbon footprint by 50 per cent from our 2008 baseline[38]. According to Gartner, ICT is responsible for two per cent of the world's carbon emissions[39]. Logica's sustainability offering is about reducing the remaining 98 per cent.

Your organisation needs to manage the impact of regulations, minimise risks and costs. But, imagine how powerful it would be if you could co-create services with your consumers and business ecosystems. Then you'd drive sustainability through their lifestyles and network, not just in your own business.

Our consumer focused sustainability services range from energy management for Swedish consumers, to managing the carbon impact of how we drive and what we buy. And we're also turning insight from our own internal sustainability programme into further client services.

We'll work with you to build the business capability essential to achieve sustainability. Turning this into valuable business and consumer services, that create sustainable homes, communities, and workplaces.

Our innovation agenda offers you the opportunity to join the next steps in sustainable progress. Four of the systems discussed in this paper are ready for implementation, since they are based upon proven technologies. Four are suitable for implementation projects, supported by our research and experience in pilots. Finally, open innovation projects for four of them are ready for your organisation to join us in a collaborative effort.

OUR PROGRAMMES FOR CHANGE

These are some of our proven sustainability programmes[40] that can help your organisation meet both environmental and financial targets.

- Smart metering 2.0 is an extension of our energy competition portal implementation at Växjö in Sweden
- Home automated networks (HANs) build on Logica's remote asset management technology
- Charging plug-in cars through the solution of Logica and its partners is already live as part of a programme to implement 10,000 charging poles in three years[41].
- Sustainability Messaging Standard builds upon implementation of our SIRA sustainability reporting service at the British Ministry of Defence and other carbon management services[43]
- Eco-button and production and environmental product lifecycle management are based on our manufacturing systems technologies

PILOTS AND RESEARCH

Four innovations explored in this paper are based on continuing pilots and research projects throughout our operations. We can implement these systems for your organisation, based on our experience from these projects:

- Smart grid concepts have been turned into reality with the Portuguese InovGrid project, in which we support EDP (formerly Energias de Portugal) and others
- Vehicle CO_2 measurement can be provided through our EMO emission monitoring system, which unites on-board measurement with messaging technologies
- Vehicle-to-infrastructure co-operation is the goal of the EU-funded CVIS (Co-operative Vehicle-Infrastructure Systems) research project, providing a re-usable architecture
- Ambient smart working builds on our smart working systems and interactive television research

JOIN US IN OPEN INNOVATION

The essence of two of the innovation methods looked at in this paper is collaboration throughout the production chain. Open innovation projects are the best way to get you and the companies you work with to co-operate on achieving a shared goal. Given our track record in existing technologies and thought leadership on innovation, we are well placed to make such projects work.

We invite you to join open innovation projects in:

- Carbon Internet banking – bringing together producers, utility and transport companies, retailers and banks. We can supply the IT knowledge, including our Emerald carbon labelling system and strong payments and messaging experience.

- Energy-efficient software – an area of interest to IT-intensive organisations, IT providers, research and standardisation bodies. Our contribution is state-of-the-art knowledge on software architectures and experience in mobile phone applications, where energy efficiency already plays a key role.

REFERENCES

1. Elkington, J. (1994) "Towards the sustainable corporation: Win-win-win business strategies for sustainable development." California Management Review 36, no. 2: 90-100

2. Greenhouse gas impact of other gases is usually converted into CO_2 equivalents, enabling aggregation of their impact into one common denominator: CO_2e. Under IPCC rules, CO_2e amounts represent greenhouse gas impact over a period of 100 years.

3. IPCC data on Greenhouse Gas emissions: http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf

4. CBS (Dutch Statistical Bureau) data on energy consumption: http://www.cbs.nl/nl-NL/menu/themas/natuur-milieu/publicaties/publicaties/archief/2008/2007-c167-pub.htm

5. Cradle2Cradle aims to design, create, use and recycle products in such a way that new product cycles are based upon materials of prior cycles. This eliminates both waste and the need for new raw materials. More information at http://www.epea.com/english/cradle/principle.htm

6. Read more on Logica's vision regarding the Energy market in the Logica Energy Vision White Paper at http://www.logica.com/we-are-logica/media-centre/thought-pieces/sustainability-energy-in-2020/

7. Trends in USD/Watt ratio for solar power and solar capacity growth: IEA International Energy Agency,2008 Trends in Photovoltaic Applications, survey report of selected IEA countries between 1992 and 2007, Report IEA-PVPS T1 – 17, Paris August 2008. Downloadable at http://www.iea-pvps.org/tasks/task1.htm

8. Dutch grid price trend: CBS Statline Energy, 300KWh double tariff 2003- 2008, households and small business consumers: http://statline.cbs.nl/StatWeb/publication/?DM=SLNL&PA=37359&D1=19&D2=a,!0-30&VW=T

9. Trends in World Energy demand and supply: IEA International Energy Agency 2008, Key World Energy Statistics 2008, Paris 2008. Downloadable at http://www.iea.org/textbase/nppdf/free/2008/key_stats_2008.pdf

10. Thin film solar cells require much less material to produce than conventional solar wafer cells, but also provide less Watt per square meter. Third generation cells strive to increase efficiency of thin film solar cells, including applying multiple layers of solar cells. More details at: http://en.wikipedia.org/wiki/Third_generation_photovoltaic_cell

11. Grid parity is the point in time at which solar electricity is cheaper or equal than power grid electricity, see http://en.wikipedia.org/wiki/Grid_parity

12. Logica press release, May 13th 2008: http://www.logica.com/we-are-logica/media-centre/news/2008/växjö-energi-and-logica-launch-energy-saving-web-service-for-consumers/

13. Find more information about Logica Smart Metering: visit http://www.logica.co.uk/we-work-in/utilities/smart-metering/ and get the free Logica eBook: Smart Metering for Dummies,

REFERENCES

14. Dutch Minister of Environment on December 2nd, 2008: http://www.vrom.nl/pagina.html?id=38149

15. Find more information on Smart Grids at http://www.logica.com/we-are-logica/media-centre/thought-pieces/sustainability-energy-in-2020/ and at http://www.smartgrids.eu/

16. IEA shows world energy consumption of fuel to be ten times world electricity consumption, http://www.iea.org/textbase/nppdf/free/2008/key_stats_2008.pdf

17. Find more information about the InovGrid project at http://www2.inescporto.pt/use-en/news-events/the-press-us/a-era-da-energia-inteligente/

18. European Union, memo 08/0799 on December 17th, 2008: http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/08/799&format=PDF&aged=0&language=EN&guiLanguage=en. Currently, the average CO_2 emission per new car is 190gr CO_2/km.

19. See Logica white paper 'Moving towards sustainable transport' for more background information, downloadable at http://www.logica.com/we-are-logica/media-centre/thought-pieces/intelligent-transport-systems---sustainable-mobility/

20. Logica participates in this UK research project. More information at http://bioinf.ncl.ac.uk/message/. Project brief downloadable at http://bioinf.ncl.ac.uk/message/files/MESSAGE_Flyer_Feb2009.pdf

21. Find more information on i-Travel at http://www.i-travelproject.com/en/i-travel_concept/

22. Logica participates in the Sustainable Logistics project of the Connekt programme. More info on slowing down the value chain (in Dutch) at http://www.duurzamelogistiek.nl/www/scripts/project.php?pageID=4&projectid=31

23. More information on EMO at http://www.logica.com/we-are-logica/media-centre/brochures/innovation-emo/

24. An introduction to eCoMove research project, in which Logica participates, is available at http://www.internationaltransportforum.org/Proceedings/Lisbon2009/1-Jeftic.pdf

25. More information on CVIS at http://www.cvisproject.org/en/about_cooperative_systems/introduction/

26. See http://www.cvisproject.org/en/news/spits_the_strategic_platform_for_intelligent_traffic_systems.htm for more information about SPITS

27. Statement by Dutch Ministry of Agriculture on June 2nd, 2008 http://www.minlnv.nl/cdlpub/servlet/CDLServlet?p_file_id=28708

28. Japanese research on carbon impact of beef at http://www.newscientist.com/article/mg19526134.500

29. Greenhouse Gas Protocol reports carbon emission factors for electricity for each country at http://www.ghgprotocol.org/downloads/calcs/ElectricityPurchase_ServiceSector_v3.0.xls

REFERENCES

30. Average car emission factors, see http://www.ghgprotocol.org/downloads/calcs/co2-mobile.xls

31. Carbon impact of household graphs based upon data from RIVM, 2003: Milieudruk consumptie in beeld, downloadable at http://www.rivm.nl/bibliotheek/rapporten/771404004.html (in Dutch)

32. BSi's PAS 2050 standard downloadable at http://www.bsi-global.com/templates/FormPage.aspx?id=143647&epslanguage=EN

33. Find more information about Logica EMERALD at http://www.logica.com/we-are-logica/media-centre/videos/interview-with-the-propostion-manager-for-emerald/

34. See example of high-end video conferencing at http://www.cisco.com/web/strategy/docs/trec/Cisco_Green_IT_whitepaper.pdf

35. GRI is the global standard for corporate responsibility reporting. Guidelines can be downloaded at http://www.globalreporting.org/Home

36. Greenhouse Gas Protocol is the global reporting standard for carbon emissions. Downloadable at http://www.ghgprotocol.org/corporate-standard

37. See http://www.logica.com/we-work-in/manufacturing/ for more information about Logica's Manufacturing Execution System offerings

38. More information about Logica's carbon footprint and reduction targets can be found at http://www.logica.com/we-are-logica/investors/reports-and-accounts/

39. Gartner, April 2007. See: http://www.gartner.com/it/page.jsp?id=503867

40. A full overview of Logica's sustainability solutions is available at http://www.logica.com/we-do/sustainability/

41 Watch the video on Logica's solution for electric cars at http://www.logica.com/we-are-logica/media-centre/videos/charging-electric-car/

42. More information about cities piloting the car charging solution of Logica and partners at http://www.logica.com/we-are-logica/media-centre/videos/charging-electric-car/

43. Logica is implementing Sustainability Reporting at thousands of sites of the UK Ministry of Defence: http://www.logica.co.uk/we-are-logica/media-centre/news/2009/logica-to-deliver-ministry-of-defence-carbon-monitoring-system/

Logica is a business and technology service company, employing 39,000 people. It provides business consulting, systems integration and outsourcing to clients around the world, including many of Europe's largest businesses.

Logica creates value for clients by successfully integrating people, business and technology. It is committed to long term collaboration, applying insight to create innovative answers to clients' business needs.

Logica is listed on both the London Stock Exchange and Euronext (Amsterdam) (LSE: LOG; Euronext: LOG).

More information is available at www.logica.com

This document is for general information purposes only and is subject to change without notice.

Logica
Tel: +44 (0) 207 637 9111
sustainability.uk@logica.com

www.logica.co.uk

CODE 027 0210

AUSTRALIA / BELGIUM / BRAZIL / CANADA / CZECH REPUBLIC / DENMARK / EGYPT / ESTONIA / FINLAND / FRANCE
GERMANY / HONG KONG / HUNGARY / INDIA / INDONESIA / KUWAIT / LUXEMBOURG / MALAYSIA / MOROCCO
NETHERLANDS / NORWAY / PHILIPPINES / POLAND / PORTUGAL / RUSSIA / SAUDI ARABIA / SINGAPORE / SLOVAKIA
SPAIN / SWEDEN / SWITZERLAND / TAIWAN / UKRAINE / UNITED ARAB EMIRATES / UK / USA