# Public Services contribution to smart, sustainable and inclusive growth

## Energy and Climate Change

Client: CEEP

Rotterdam, June 6, 2011

The aim of this fact sheet is to provide participants in the conference the 16-17 June with information to grasp the complexity of the various selected topics. As a second step, this document highlights some links with current EU policies and suggest points for debates.

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Final report

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# Table of contents




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## Executive Summary

Climate change, resource scarcity and energy security are new challenges for the 21st century Europe. We are increasingly becoming aware of our environmental impact and the negative effects thereof. In fact, the Economist proclaims that we have entered the Anthropocene, the Age of Man, where we are able to influence the very natural processes which regulated all forms of life. “Going green” is becoming a strategy for survival but also for growth and prosperity.

Providers of Services of General Interest (SGIs) represents somewhere around 30-40% of GDP around Europe which clearly provides leverage in promoting green initiatives. Governmental initiatives such as greening public procurement and investing in renewable energy are one step forwards, but many other routes are available. This fact sheet takes a snap-shot at European policy for moving towards a low carbon economy. It zooms in on renewables, smart grids, smart metering, buildings efficiency and climate adaptation, and provides local examples of best-practices from all over Europe. The idea is to show the many ways possible to “green” SGIs and challenge the reader to think about what their specific field can add to the equation.

## Points for discussion and debate

To add to the reading, we would like to challenge you to think about a few things:

- Consumption seem to be an underlying problem to many of the green challenges, how can we sustain growth while greening our economy?
- Energy is key for economic growth, how can SGIs work towards a more sustainable energy flow, utilising the many varieties of energy sources currently out there?
- Financing is key to many of the potential gains to be made in greening SGIs, especially since pay-back times long. How can SGIs address the problem of financing?
- Curbing energy demand or at least changing the way we use energy is the goal of smart meters, what other instruments would be interesting?

# 1 The greening of SGIs

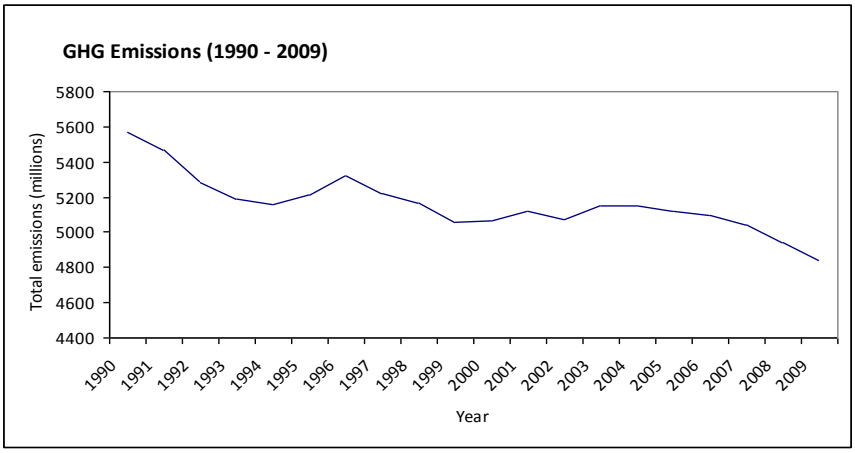
In a recent issue of the Economist, a British weekly, the front-page reads “Welcome to the antrophocene”.[1] We have entered the Age of Man, it proclaims, where human activity is influencing basically all natural cycles which regulates our environment. And as a matter of fact, climate change, energy security and environmental awareness have emerged as among the most important challenges for human-kind in the 21st century. We have slowly begun to understand that economic growth relies on sustainable resource use allowing for nature to replenish. Climate change compounds the challenges of achieving sustainability and threatens to seriously alter the way we live.

CEEP members both contribute to the problem and the solutions to climate change. Energy providers, manufacturers, public transport and environmental management firms are all potential forerunners to find innovative solutions to both reduction of Greenhouse Gases (GHGs) and adapting to new climatic circumstances. Local and regional authorities are essential in catalyzing the change and finding good incentive systems for consumers and firms to act more “green”.

On a European level, decision-makers have taken on the challenge on local, regional and international scales and unified around both short-term and long-term targets. Now implementation remains. The trick is to address all parts of the value-chain, from consumer demand to energy supply. Providers of Services of General Interest (SGIs) are key stakeholders throughout the whole cycle. SGIs are provided by over 500.000 enterprises and employ almost 64 million people throughout Europe. Therefore, SGIs will be pivotal in paving the way for a low-carbon and energy efficient economy addressing climate change.

Over the last years, however, efforts to combat climate change have been severely influenced by the economic crisis with projects, investments and programmes being scrapped or put on hold. On the other hand, the crisis has lowered GHG emissions in Europe with -17.3% from 1990s levels which is only 2.7% away from the 20% target by 2020.[2]

**Figure 1 GHG emission in EU27 (1990-2009)**




*Source: Eurostat with Ecorys calculations*

[1] The Economist, June 2011, Vol. 399, No. 8735.

[2] EEA (2010) Tracking progress towards Kyoto and 2020 targets in Europe. EEA Report No 7/2010

The dramatic reduction in emissions has been due to slowed economic activity however it is unclear if these low levels will remain once the economy rebounds.[3] The rebound would sincerely benefit from a green touch and the time is ripe for a frog-leap towards a more sustainable economy.

This paper should be read as a starting point for further discussions on what SGIs can do to promote a low carbon and resource efficient growth. The general text aims to provide background information on particular areas which are part of strategy to achieve a low carbon growth. The text boxes contain examples where SGIs have managed to successfully address problems and established good practices.

## 1.1 What is the problem?

During the 1900's, industrialisation introduced a fossil-fuel based growth and the emission levels of Greenhouse Gasses (GHG) released into the atmosphere started to increase dramatically. The climatic effects of GHG emissions were discovered over 100 years ago, however, we are only now starting to understand the large implications on nature and economy of climate change.

The GHG's intensifies the greenhouse effect which regulates earth's temperature. The results are potentially devastating such as sea-level rise, increase in floods and more extreme heat waves implying that climate change comes with a price. The Stern Report for example calculated costs to be somewhere between 5-20% of global GDP for damages and costs for avoiding dangerous climate change to 1% of global GDP per year.

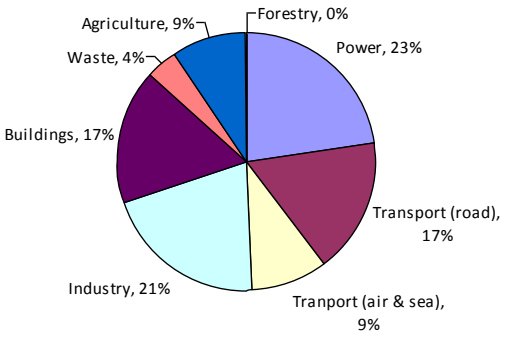
In the beginning climate change was perceived as a major threat to Western life-styles and our industrialised economy. Having built a foundation on coal, gas and oil use, EU industry and Member States connected climate change action with costs that were not incurred to non-EU competitors. With strong measures against climate change the EU competitiveness would suffer and jobs would move elsewhere.

The emissions of GHGs are the root of the climate change problem. To avert long-term negative consequences of climate change and move towards a more sustainable low-carbon economy, we must focus on decoupling energy use from economic growth. All parts of the value chain must be addressed to lower GHG emissions, in particular the large emitters such as energy suppliers, transport and buildings, as well as Member States with largest reduction potentials (see figure 2).

[3] Reuters (2010) No big CO2 rebound seen when crisis ends: EEA. http://www.reuters.com/article/2010/10/13/us-climate-summit-mcglade-idUSTRE69C2X820101013

**Figure 2 GHG emissions per sector**

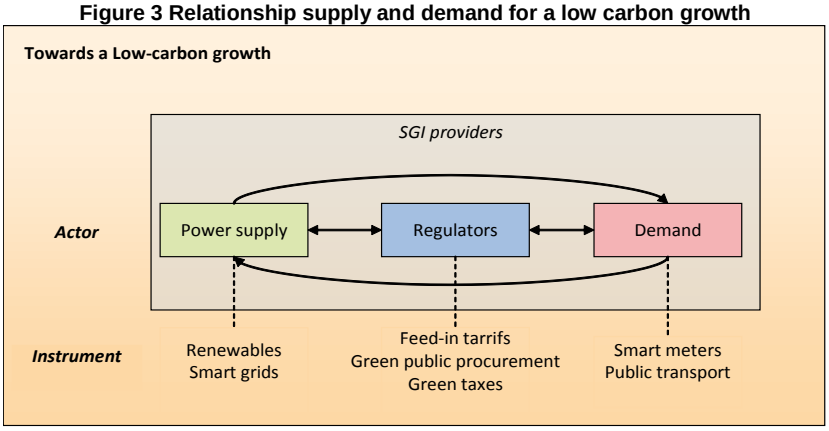
**GHG emissions per sector (2009)**




*Source: Roadmap 2050*

To briefly address all parts of the value chain. (1) Power generation is one of the largest emitters of GHGs. Even if we manage to decouple economic growth and energy use, a prosperous economy needs energy. (2) Power generation answers mainly to demand. And curbing demand requires behavioural change. Regulators hold several stick and carrot instruments to induce change in both demand and supply such as feed-in tariffs, Green public procurement, and eco-taxes. (3) Finally, changes in demand require the means for change. Smart meters for example allow the user to check its levels of use in real time. The drivers and feed-backs can be visualized as follows.

**Figure 3 Relationship supply and demand for a low carbon growth**




## 1.2 What are the solutions?

To “green” the power supply, curb energy demand and kick-start the transition towards a low-carbon society, all stakeholders need to be on board. Actions on European level (see figure 4) need to be matched by local and regional initiatives focusing on implementation.

**The European strategy for a low-carbon economy**

The Europe 2020 Strategy introduces seven flagship initiatives, of which one aims to promote a "Resource efficient Europe". The ultimate goal is to decouple economic growth from use of non-renewable resources. It also aims to increase the use of renewables, energy efficiency and a more modern transport sector. Climate change is but one motivator, the Strategy is also expected to increase competitiveness *vis-à-vis* less environmentally avant-garde regions such as China and the US, and it addresses the urgent need to reduce energy dependence on imports from non-EU countries which ultimately makes our economy vulnerable to price hikes.

In the wake of the Europe 2020 Strategy three important policy initiatives were taken, all released in March 2011 .

- The first is the presentation of a **Roadmap for moving to a competitive low carbon economy in 2050**. The Roadmap sets out a plan to reduce GHG emissions by 80% in 2050. It analyses the potentials of decarbonisation from several perspectives and high-lights the importance of electricity in such an energy transition. The reasoning is that once we move away from fossil fuels, there needs to be an electrification of among other the transport sector. However, thanks to energy efficiency gains the levels of improvements only have to remain at historic growth rates.

- The second is the White Paper on transport called **Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system**. It sets out ten goals for changing the transport system and setting it on track to achieve a 60% GHG emissions reduction by 2050. Key objective are to increase mobility while removing bottle-necks in areas such as fuel growth and employment, including:
  - No more conventionally-fuelled cars in cities.
  - 40% use of sustainable low carbon fuels in aviation; at least 40% cut in shipping emissions.
  - A 50% shift of medium distance intercity passenger and freight journeys from road to rail and waterborne transport..

- Finally, the third is the **Energy Efficiency Plan**. The plan high-lights the importance of energy efficiency as a cost-efficient measure. It emphasises the importance of buildings efficiency, cogeneration of heat and electricity, efficiency in electricity and gas networks, financial support, consumer behaviour, transport and national action. Still, many hurdles remain for implementation of energy efficiency in terms of measuring, financial incentives, targets, and baselines.

The next step in the European policy-making process is the presentation of an **Energy roadmap 2050** which will support the Energy Strategy 2011-2020. The Roadmap is supposed to focus on what needs to be achieved by the energy sector by 2050 to create a low carbon, resource efficient and climate resilient economy.

**Figure 4 EU policies for a low carbon economy**

The success of the policies connected to the Europe 2020 strategy hingelocal implementation. There is now silver bullet and the following pages zoom in renewables, smart gs on rids, smart meters, buildings efficiency and adaptation to climate change. These areas are chosen to be of particular importance of where SGI action could be valuable. Each topic is followed by good examples where implementation has started in often innovative and collaborative ways.

### *1.2.1 Reaping the benefits of renewables*

By increasing renewables in the energy mix we address carbon emissions, promote energy security and create jobs. For example, the Europe 2020 Strategy notes that reaching the 20% renewables

target by 2020 could potentially create over 600,000 jobs. Solar and wind power are exceptionally good examples where providers of SGIs have worked together enabling a dramatic growth in renewables while creating jobs, fostering innovation and increasing competitiveness. In fact there are several means for public authorities and SGI providers to support the uptake of renewables, for example, public finance can 'crowd in' private capital and underpin clean energy investments in 2009.[4] One of the best examples of governmental support to boost an industry is Germany, which has emerged as one of the world's most active installers of solar panels (see figure 5)

**Solar power in Germany – Public institutions crowding in private capital**

After the introduction of a Renewable Energy Act in 2000, which subsidies renewables via feed-in tariffs, the German solar industry has flourished. Boosting the domestic photovoltaic industry has created over 130,000 jobs, according to an industry organisation. Germany is now the world's largest market for solar power totalling 17GW in installations by 2010 and hosting some of the most innovative and successful solar companies world-wide.

In 2010, the German government funnelled about €13 billion into renewables projects, from which about half went to solar power. However, the publicly spent money is crowding in private capital from outside Germany. In a recent case, Google Inc, an American internet company, invested €3.5 million into an 18.7MW solar plant close to Berlin in Germany. 70% of the solar panels are going to be delivered from German companies.

[1] http://eu.techcrunch.com/2011/04/07/google-invests-5-million-in-german-solar-power-plant/

**Figure 5 SGIs and crowding in capital**

If Europe intends to hold on to job opportunities created by renewables, then action is needed. For several technologies non-EU countries are better placed in terms of innovation. To regain market leading positions we need innovation, funding and entrepreneurship.

Public authorities also play a key role on the permitting process and addressing the so called the NIMBY[5] problem which has emerged as an increasingly difficult hurdle to overcome. In the UK, for example, latest statistics indicate that only 33% of onshore wind farms get approved at a local authority level.[6] More collaborative processes have been successful in some countries, for example Denmark (see figure 6).

4 HSBC, 2009 Overview of global green stimulus spending

5 Not-in-my-back-yard, meaning that people are often positive to renewables in general, as long as the windmills are kept away from the vincinity of their dwellings.

6 http://www.guardian.co.uk/environment/cif-green/2011/feb/07/windfarm-nimbyism and http://www.guardian.co.uk/uk/2009/apr/26/nimbys-scotland-renewable-energy?INTCMP=ILCNETTXT3487

**Providing services in collaboration with the public: the self-sustaining island of Samsø**

On the Danish island of Samsø, a 10 year plan to become self-sustaining on renewable energy started in 1998, even before Al Gore hurled climate change onto the public stage. Eleven 1MW wind-mills were erected in 1999-2000 and today the island is completely self-sustaining on energy, excluding vehicles. By experimenting with alternative fuels, district heating, and solar panels, the island is now a show-case for local self-sufficiency.

The most remarkable about Samsø is the collaborative manner in which the island has become self-sustaining. For example, the ownership of renewable energy solutions is now a mish-mash of municipality, private investors, local farmers and cooperatives. Take the 10 off-shore wind-mills as an example: five are owned by the Samsø Municipality, where revenues are reinvested in new energy projects; three mills are privately owned, mainly by farmers sharing the investments and risks; and two are sold to small shareholders in cooperatives.

The unusual way of approaching energy challenges has gained much attraction. Today, scientists, companies and municipalities are doing pilgrimage to the Samsø Energy Academy which hosts Samsø Energy and Environment Office, Samsø Energy Agency and the Samsø branch office of the Danish Energy Service. The Academy arranges seminars and research activities, advising companies, municipalities and politicians on sustainable solutions.

For more information check: http://www.energiakademiet.dk/

**Figure 6 SGI interaction with recipients**

### *1.2.2 Creating a European super grid*

The European ambitions to increasingly rely on low-carbon energy sources require an increase in the use of electricity. Electrifying the car fleet, for example, is expected to increase the need for electricity immensely. It is inevitable that the current energy transportation infrastructure (transmission and distribution) is incapable of coping with future demand. Moreover, renewable energy sources struggle with access to the grid. The off-shore wind parks built or being planned all over coastal Europe find it difficult to access the on-shore grid and "islands of energy" are built up, incapable of facing the rise in demand all over Europe. All this, while off-shore wind farms are being planned in several Member States the output will grow substantially. To reap the benefits of increasing renewable energy input, the grid needs to allow for seamless access and remove bottle-necks. Current energy infrastructure (transmission and distribution) is not only ageing but needs to accommodate a diverse set of new energy sources, often small scale and spread out on large distances. EWEA estimates that 332GW of new electricity capacity needs to be built by 2020 to cope with ageing infrastructure and input from new energy sources. It represents 42% of EU's total energy demand (2009 levels).[7]

The most ambitious way forward is the creation of a European Super grid, smart grids and entry points for renewables. Such a Super Grid could be defined as "*an electricity transmission system, mainly based on direct current, designed to facilitate large-scale sustainable power generation in remote areas for transmission to centres of consumption, one of whose fundamental attributes will be the enhancement of the market in electricity*".[8] It is fundamental if Europe is sincere in its ambitions to create a single electricity market. A super grid includes other grid inventions such as smart grids where supply and demand can be better balanced through two-way digital communications.

[7] http://www.ewea.org/index.php?id=195
[8] http://www.friendsofthesupergrid.eu/

Since both benefits and costs have to be shared by stakeholders, collaborative processes are to be preferred (see figure 7).

**SGIs join forces: Amsterdam Smart City**

The city of Amsterdam has embarked on an ambitious initiative called 'Amsterdam Smart City' to reduce CO2 emissions by 40% by 2025. The project is led by Liander, the regional grid operator, and Amsterdamse Innovatie Motor (AIM). The project brings in a range of partners such as CISCO, the Municipality of Amsterdam, Nyenrode University, Nuon and ABN Amro.

Supporting the development of smart grids is one of the goals and Amsterdam plans to invest €200 million in smart grid development. Amsterdam has also invested in recharge stations around the city for electric cars to load during night. The goal is to have renewables, such as wind, to run during night-time and recharge the cars. Another actions is a trial with 250 clients in Haarlem who are given Plugwise-kits which enable real-time reading of energy consumption via the wifi network. The data will be collected together with interviews and analysed by Liander in cooperation with a University (TBD).

[1] ICT4EE (2010) Report on the session "Smart Sustainable Cities". Brussels, 23-24 February 2010

[2] http://www.amsterdam.nl/parkeren-verkeer/elektrisch-vervoer/elektrisch/nieuws!/@403846/elektrische-auto/

**Figure 7 SGIs in collaboration**

### *1.2.3 Curbing demand by smart-metering*

Part of the smart grids is the roll-out of smart meters and part of the Energy Demand Management (EDM) tool-box. A smart-meter is in essence a device which allows energy consumers in buildings, to monitor their energy consumption in (near) real time. The meters would prompt users to take advantage of off-peak hours which reduces the pressure on the grids on peak-hours, so called peak-shaving. In figure 8, the variability of energy demand in Europe over a 24 hour period is visualised:

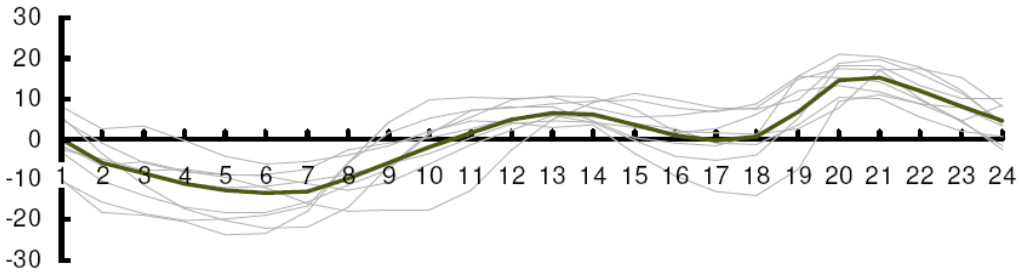



**Figure 8 Energy variability in Europe**

*Explanation: The Y-axis shows the percentage and the X-axis the hours. The thick black line is the EU average and the grey lines are regional variability (ECF, 2010: Roadmap 2050)*

For any energy system Europe creates, the top-load (between in the figure 20.00 and 22.00) must be managed. So far, the roll-out of smart meters has been successful, penetrating over 50% of some markets.[9] However, the EU average is 10 % which is far away from the 3rd energy package adopted in 2009 which says that at least 80% of customers should be equipped with smart meters by 2020. The effectiveness of smart meters is still somewhat unclear. Fitting a house with a smart meter must be accompanied by education and training on how to adjust energy usage behaviour.

[9] McKinsey et Co (2010) How Europe is approaching the smart grid.

**SGIs enabling the largest smart-meter roll-out in the world**

The Italian energy company Enel has revolutionized the introduction of smart-meters. Today, the company manages 32 million costumers remotely via smart-meters and offers an hourly-based tariff system allowing the customer reduce costs by using non-peak hours. Enel customers are now able to read their energy consumption, rates and contract on the meter display. Over the next four years, Enel is planning to extend the programme to 13 million Spanish costumers.

The impacts of the system are still somewhat unclear but Enel estimates a 5% reduction in consumption peaks as a result of increased consumer awareness. Moreover, the operational costs (OPEX) have been reduced significantly, partly due to smart meters, but also from the investment in an emerging smart grid. From 2001-2009, the minutes of interruption per year has gone from 128 to 49 and OPEX has dropped from €80 to €48 per customer.

Some countries and companies are starting to see the benefits of smart-metering. In the UK a 27 million smart-meters roll-out programme has been announced and in Germany, from the start of 2011, smart-meters are compulsory when building a new house, in large-scale renovations or on customer demand.

[1] Petroni, P. (2010) From Smart Metering to Smart Grids: Enel's vision for a Low Carbon future. Presentation at the 1st Smart grid international Forum.

**Figure 9 Smart meters**

### 1.2.4 *Conquering diverging incentives in buildings' efficiency*

Energy efficiency measures are perhaps the most cost-efficient way to reduce our energy use. Impacts of current energy efficiency policies are currently performing sub-optimally.[10]

Buildings account for 40% of EU Member States' energy consumption. The building stock comprises approximately 160 million residential and non-residential buildings of which[11] more than half of the existing residential buildings were built before 1975.[12] Around one third of the dwellings were built during the period 1975-1990. With current turn-over in the building stock most of it will still be standing in 2030 and likely more than one third of it will still be there by 2050. In conjunction with an investment backlog in efficiency, buildings hold vast potentials to increase energy efficiency while creating jobs and positive effects on health (reducing stress from air pollution, noise and weather disturbances).

There are some key challenges to reap the benefits of increased buildings' efficiency. Root causes are found in the diverging interests of stakeholders. Sweatman and Managan (2010) provide a snap-shot of the issue:

| | Stakeholder | Primary economic interest |
|---|---|---|
| **Client** | Building owner<br>Building occupant | Maximize value of building<br>Minimize energy costs, live comfortably, minimal hassle |
| **Finance** | Equity funder | Maximize returns to equity at known risk with a pathway to exit or repayment within a determines horizon, say 5-15 years. |

10 ECF and RAP (2010) Energy Savings 2020: How to triple the impact of Energy Saving policies in Europe.
11 Energy-Efficiency Buildings (EeB) PPP – Multi-Annual Roadmap and Longer Term Strategy 2010.
12 Energy Efficiency in Buildings – Transforming the Market –WBCSD 2009.

| | | |
|---|---|---|
| Utility | Debt providing bank | Wants stable and predictable cash-flows at known risk. |
| | Power generator | Increase regulated sales reduce generating costs. |
| | Power distributor | Increase profit from power distribution revenues. |
| | Electricity retailer | Maximize profit from in electricity retail business (generally volume x price, "quiality aspects" only in highly liberalized markets). |
| | Gas provider | Maximize profit from regulated gas provision (generally prize x volume). |
| | Energy retrofit provider | Maximize profit from retrofits. |
| | Government | CO2 emission reductions at lowest cost, enhance energy security, employment, and economic wellfare. |

**Figure 10 Buildings' efficiency stakeholders**

*Source: Sweatman and Managan (2010) Financing energy efficiency building retrofits. Climate Strategies and partners*

One of the ways to overcome the many different wishes and (often contradicting) incentives among the stakeholders is to use so called energy performance contracting (EPCs).

EPC is a way to reduce operating costs and environmental impacts of a building with low risk to the property owner.[13] In a normal case, an Energy Services Company (ESCO) brings its technical know-how and sometimes equipment, managing the project from start to finish. There are several ways of financing an EPC, but the stakeholders include a building owner, the ESCO and sometimes a third party (such as a bank). The ESCO is responsible for the gains in energy efficiency and the monetary savings are divided in the contract. EPCs have been popular for a relatively long time in the US, in particular for public buildings, but the EU is lagging behind.

**SGIs retrofit London: RE:FIT London**

In early 2010, the city of London, UK, announced a major expansion of a retrofit programme which aims to contribute to the city's goal to cut carbon emission by 60% by 2025. Public buildings are estimated to contribute 10% to London's total carbon footprint. In 42 pilot projects, roughly 146,000 m2 building space has been retrofitted. The measures have delivered over 6,000 tonnes of carbon emission reduction and an average reduction of 28% in energy consumption. The savings made total about £1 million a year which sets the pay-back period to 7 years. The ESCO put a large number of measures in place such as: insulation, draft proofing, pc shutdown software, photovoltaic cells, CHP, and changes in lighting. In the final stages of the programme, London estimates that 40% of public buildings will be covered with 11,000,000 M2 retrofitted and reducing 2,500,000 tonnes of CO2.

[1] http://www.lda.gov.uk/projects/refit/

**Figure 11 RE:FIT London**

### *1.2.5 Adapting to changes in the climate*

While reducing carbon emissions is the focus of most climate change related actions, there is an emerging understanding that we need to be ready for changes to come. The inclusion of adaptation on the climate change agenda has been fuelled by several failed attempt of the global community to negotiate any binding agreements. A European adaptation strategy has begun to take shape by the release of a White Paper on Adaptation in 2009 but still adaptation is done more on a local and regional level.[14]

[13] Mayer, A., D. Supple, V. Kuhn, S. Lines (2010) Energy Performance Contracting in the European Union: creating common "model" definitions, processes and contracts. Institute for Building Efficiency/Johnson Controls

[14] EC (2009) White Paper on Adaptating to climate change: Towards a European framework for action. COM(2009) 147

How to adapt to climate change depends very much on which region one is situated. The most vulnerable parts of Europe are clearly coastal regions and southern countries, with sea-level rise and increasing temperatures. Hence, any adaptation strategy must begin with the mapping of likely consequences.

Take water for example where climate change is expected to bring increasing atmospheric water vapour content; changing precipitation patterns, intensity and extremes; reduced snow cover and widespread melting of ice; and changes in soil moisture and runoff.[15] These changes in turn brings along various socio-economic changes, with costs incurred on society.

| Climatic change | Examples of socio-economic impact |
|---|---|
| Larger variability in precipitation resulting in drought, floods and erosion. | Agriculture (decreasing yields)<br>Water shortages/contamination<br>Hydropower problems<br>Timber harvest<br>Soil and land degradation |
| Rising sea level | Infrastructural damage to coastal regions<br>Floods |
| Decreased snow cover | Negative impact on recreational and tourism |
| Changes in soil moisture and runoff | Agriculture (decreasing yields)<br>Soil quality/fertility |

**Figure 12 Impact from climate change**

The main adaptation challenges in terms of water will be increased water stress in south-eastern Europe and increased flooding over the whole continent.[16]

**Grabs – Green and Blue space adaptation for urban areas and eco-towns**

In an INTERREG funded programme called Grabs, a pan-European network of municipalities, companies, and universities joined forces to share experiences and learn how regions can better adapt to climate change. The project focuses on how green and blue infrastructure best can help to avert negative impacts from climate change and reduce carbon emissions. Creating learning environment and foster innovation are essential, as the three year long ADAM project concluded: “Adaptation is not just attaining a physical outcome, but is a dynamic process that relies on institutional mechanisms to enable implementation of selected measures and to build local capacity.”

[1] http://www.grabs-eu.org/
[2] http://www.adamproject.eu/

**Figure 13 Grabs**

[15] Bates, B.C., Z.W. Kundzewicz, S. Wu and J.P. Palutikof, Eds., 2008: Climate Change and Water. Technical Paper of the Intergovernmental Panel on Climate Change, IPCC Secretariat, Geneva, 210 pp
[16] Bates, B.C., Z.W. Kundzewicz, S. Wu and J.P. Palutikof, Eds., 2008: Climate Change and Water. Technical Paper of the Intergovernmental Panel on Climate Change, IPCC Secretariat, Geneva, 210 pp

## 1.3 Summary

It is clear that Europe 2020 poses a great challenge for SGIs to enable and provide necessary solutions to move towards a sustainable low carbon future. The challenge is nevertheless filled with opportunities. The examples given in the boxes throughout this fact sheet prove that there are plenty of examples where SGIs can support the Europe 2020 while creating jobs, reducing carbon emissions, foster innovation and economic growth. Most examples, such as Sams or Grabs, show how collaborative processes are necessary to tackle complex societal problems with win-win-win solutions. A win for SGIs, a win for the economy and a win for the environment.

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