2013

# Guidelines for transforming workplaces and best practices examples

## Low Carbon at Work: Modelling Agents and Organizations to achieve Transition to a Low Carbon Europe

Grant Agreement number 265155
Workpackage 7 – Deliverable 7.3

WP7 Coordinator:
University of Corunna
(Spain)
31/12/2013

# Table of Contents


1 Authors of this Report ..... 4

2 Summary of this report ..... 4

3 Types of workplaces: LOCAW case studies ..... 6

3.1 Volvo ..... 6

3.2 Shell ..... 7

3.3 University of Coruna ..... 8

3.4 Municipality of Groningen ..... 9

3.5 Aquatim ..... 10

3.6 Enel Green Power ..... 11

4 A framework for promoting sustainability practices in workplaces ..... 12

4.1 Structural conditions set from outside the organisation ..... 13

4.1.1 Legislation and regulation ..... 13

4.1.2 Reputation ..... 13

4.2 Organisational priorities and vertical relationships within the organisation ..... 14

4.2.1 Need to reprioritise environmental issues ..... 14

4.2.2 Importance of monitoring and feedback ..... 14

4.2.3 Structuring social norms ..... 15

4.2.4 Autonomy and perceived control ..... 16

4.3 Horizontal relationships among workers ..... 17

4.3.1 Social norms ..... 17

4.3.2 Horizontal Communication ..... 17

4.3.3 Social Networks ..... 18

4.4 Home – work – third places relationship ..... 18

4.4.1 Transfer of practices between life domains ..... 18

4.5 Focus on technology ..... 20

5 Recommendations for Organisations with examples of best practices ..... 21

5.1 Transform pro-environmental priorities within organisations ..... 21

5.2 Monitor and communicate progress towards and maintenance of sustainable practices ..... 22

5.3 Account for 'off-shoring' activities ..... 23
5.4 Recognise that sustainability is a journey ..... 24
5.5 Provide sustainability training ..... 25
5.6 Reward good sustainability practice ..... 26
5.7 Ensure compliance with environmental policies by management ..... 26
5.8 Remove barriers to pro-environmental actions ..... 27
5.9 Enhance autonomy ..... 28
5.10 Consider the role of the corporate social network and use it wisely ..... 28
5.11 Engage organisation stakeholders ..... 29

# 1 Authors of this Report

**WP7 Co-ordinator**: Ricardo García Mira

**University of Coruña (Spain)**: Ricardo García Mira, Adina Dumitru, Pedro Vega Marcote, Jesus Miguel Muñoz Cantero, Amparo Alonso-Betanzos, Óscar Fontenla-Romero, Miguel García-Rodríguez, Noelia Sánchez-Maroño, Carlota Brinquis Suárez

**James Hutton Institute (UK)**: Tony Craig, Gary Polhill, Simon Heslop, Kathryn Gilchrist

**Sapienza University of Rome, Center for Inter-University Research on Environmental Psychology (Italy)**:Mirilia Bonnes, Marino Bonaiuto, Giuseppe Carrus, Fridanna Maricchiolo, Ferdinando Fornara

**West University of Timisoara (Romania):** Corina Ilin, Daniela Moza, Alexandra Stancu, Andreea Ionescu

**University of Umea (Sweden)**: Nora Rathzel

**University of Surrey (UK):** David Uzzell

**University of Groningen (The Netherlands):** Linda Steg, Angela Ruepert, Kees Keizer.

# 2 Summary of this report

The LOCAW project has studiedmultinational and national companies as well as public sector organisationsof different types with a particular focus on the relationships between everyday production practices and sustainable lifestyles. The patterns of production and consumption in the workplace have been analysed in depth, and a number of important points of integration have been draw out in relation to the legislative and regulatory climates forming the external context in which organisations operate. Examples include the important role played by internal

managerial structures and processes, the interaction between internal and external forces, and the role of reputation as a driver for encouraging sustainable practices.

Many of the barriers and drivers for implementing sustainable practices in the workplace were found to be related to the vertical and horizontal structures within the organisation, and associated communication patterns within and between different groups of workers within organisations.

Looking beyond the immediate boundaries of the organisation, this project has also advanced our understanding of the complex set of relationships between work, home and what might be termed 'third spaces' (spaces that have properties of either home or work but which are located out of the place usually associated with that activity). As we undertook in the proposal, by expanding the conceptual and theoretical ideas of work-home relationships beyond simplistic notions of behavioural 'spill-over', to include greater considerations of the complex nature of 'border-crossing', the project has found that workers are less likely to take sustainable practices from home into the workplace than vice versa. There are some interesting examples of flow and border crossing in the opposite direction, but only under certain conditions.

The findings from multiple case studies and methodologies have been integrated using agent-based models. These agent-based models have been used to test some of the policy tracks suggested by the back casting workshops undertaken as part of the project - examining potential low carbon scenarios for workplaces into the future. These empirically grounded models provide useful simulations of policy tracks, and demonstrate the critical importance of ensuring that interventions are combined appropriately.

The project has also allowed the formulation of a set of guidelines for organizations that can help regulators, managers and, more broadly conceived, decision-makers within organizations to create the conditions under which sustainbale practices can become the norm, rather than the exception. For a detailed description of the evidence on which these recommendations are based, one should refer to the Report on conditions for achieving a successful and effective cooperation among relevant actors, with examples of best practices, including descriptions of scenarios and acompanying models and to Policy Recommendations, available at……

This report is a summary of the guidelines for the transformation of workplaces, with a few examples of good practices encountered in the case studies, or suggested examples based on research results.

# 3 Types of workplaces: LOCAW case studies

The project set out to study three types of organisation: Heavy industry companies, stateorganisations, and private service providers in the field of natural resources/energy. The two heavy industry case studies were **Volvo Trucks** and **Royal Dutch Shell plc**. The particular focus of the analysis in the heavy industry case studies was in the development of a rich understanding of the relationships between workers, management and trade-unions, as well as an in depth understanding of the relationships between work and home. The two state organisations were the **University of Corunna** and the **Municipality of Groningen**. There are clearly differences between the overall purpose of these two types of state organisation - municipalities have a purpose of delivering democracy and implementing structural policies at the local level, whereas the overriding purpose of universities is the delivery of education and research. The two private service providers in the field of natural resources/energy studies were **Aquatim** and **Enel Green Power**. Both of these cases study organisations provide public utility services (water and wastewater treatment for Aquatim, and renewable electricity for Enel Green). All of these organisations are described briefly in the following sections.

## 3.1 Volvo

Volvo Trucks has headquarters in Gothenburg, Sweden. It is the second largest heavy-duty truck brand in the world with circa 17000 employees worldwide. The organisation has eight wholly owned assembly plants and nine factories owned by local interests. It produces over 100 000 units annually. The company's trucks are sold and serviced in more than 140 countries all over the world.

Volvo Trucks manufactures cabs for two of the truck models in Umeå, Sweden, at Volvo Umeverken. The plant has a total area of 300000 m2 and a heated area of 163000 m2. Over 2000 people work at the plant. It has a maximum annual capacity of 90000 cabs. In 2008 the plant produced 62000 cabs.

The production of cabs for Volvo trucks includes a range of activities. Activities include shearing, slitting, pressing, machining and welding sheet metal into finished truck cabs. Thereafter, the preparation of surface, sealing, coating and interior fitting are undertaken.

Volvo trucks has set reduction targets for emissions of carbon dioxide during the production process. Energy consumption and carbon dioxide emissions per truck built dropped by 30 percent between 2001 and 2005. Emissions are calculated on the basis of the production undertaken within the factories and do not include the value chain, i.e. transport to and from the factory. Volvo's goal is to terminate the use of oil and coal for heating purposes entirely. In the Umeå plant ninety percent of the energy consumed in the production process comes from renewable sources.

## 3.2 Shell

Royal Dutch Shell plc is an Anglo-Dutch oil and gas company with around 87,000 employees operating in circa 70 countries. The company is incorporated in the United Kingdom and has its headquarters in the Netherlands.

Shell claims that it aims to meet the energy needs of society in ways that are economically, socially and environmentally viable, now and in the future. The public objectives of the Shell group are to engage efficiently, responsibly, and profitably in oil, oil products, gas, chemicals and other selected businesses and to participate in the search for and development of other sources of energy to meet the world's growing demand for energy.

Shell's areas of business are upstream, downstream, and projects & technology. Upstream business explores for and extracts crude oil and natural gas. Downstream business refines, supplies, trades and ships crude oil, manufactures and markets a range of products, and produces petrochemicals for industrial customers. Projects & technology business manages delivery of major projects and drives research and innovation to create technological solutions.

Shell produces 3.3 million barrels of oil equivalent every day. The company runs more than 30 refineries and chemical plants. Furthermore, it has circa 44000 service stations.

Safety, environmental, and social responsibility are argued to be at the heart of Shell's activities. Shell accepted the Kyoto protocol, recognised climate science, set goals to reduce its own GHG

emissions and invested in renewables, although this has been reduced in recent years. Shell asserts that the best way the company can help secure a sustainable energy future is by focusing on four main areas: natural gas, biofuels, carbon capture and storage, and energy efficiency. Shell has developed a campaign to encourage staff to reduce energy use at work as well as at home: Energy Challenge @ Work.

## 3.3 University of Coruna

The University of Corunna is a public, and relatively new, university. It was founded in 1989 and it has two campuses: A Coruña (with six different spatial locations: Maestranza, Riazor, Elviña, Zapateira, Bastiagueiro and Oza) and Ferrol (with two spatial locations: Esteiro and Serantes). Its staff today consists of 1,513 faculty and 760 administrative and service personnel. It has 24,554 students divided between the two campuses.

The University users, both staff and students, with their patterns of energy and materials consumption, waste generation and organization-related mobility, have a considerable impact on the environment in terms of GHG emissions. Furthermore, the University plays a key role in the education of citizens in general, and thus has the potential to be an important contributor to a low-carbon Europe. Its direct and indirect impact on society is considerable, as it can form citizens who are knowledgeable of environmental problems and solutions in our society today and who also know how to act in sustainable ways both in their homes and in the workplace – and are motivated to do so.

Since its foundation, UDC has developed research on issues related to sustainable development and the environment, through research groups working in Environmental Economy, Environmental Law, Environmental Chemistry and Biology, Environmental Education and Environmental Psychology. In order to integrate environmental knowledge from all these fields, in 1997 the University´s Environmental Institute was created. This institute generated several initiatives, some of which were managed by the Vice-Rectorate for the Environment and Infrastructure, and later a new Office for the Environment was created in order to promote sustainable initiatives in the university as a whole. All these institutional structures, together with the work of several research groups (including the People-Environment Research Group, the Coordinator of the present research, as one of the most active) support multidisciplinary

research on environmental behaviour and on the development of strategies to connect research with public policy within the Network of Municipalities for Sustainability.

## 3.4 Municipality of Groningen

The municipality of Groningen in The Netherlands is responsible for local governmental policies and administrative functions. It is divided into 10 departments, each of which has different tasks and responsibilities. In the realm of sustainability, the municipality is, among other things, responsible for implementation of local policies, waste collection, cleansing of the city and support of sustainable environmental projects.

The municipality of Groningen is an organization that has to operate on EU and national sustainability laws and regulations and in a social and economic context. Most of their policies are built on EU and national sustainability regulations. However, the municipality also introduced policies that go beyond these regulations. For example, the municipality defined and introduced additional sustainability guidelines in the domain of travel, energy use, waste generation and purchase.

Regarding sustainability, the municipality of Groningen has formulated a general goal of acting as sustainably as possible. In light of this goal the municipality has developed a fundamental vision to become CO2 neutral by 2035. This goal has been further specified in two main sub-goals:

- Make sustainability a key criterion in all purchase decisions
- Reduce direct and indirect energy consumption and carbon emission

These goals concern the municipality as an organization, but also the different facilities the municipality is responsible for, such as sport facilities, public transport, and traffic control systems, to name a few.

By transforming the municipality to a sustainable organisation, the municipality aims to function as a good example to the citizens and companies of Groningen. Among others, they have started reconstructing their own buildings to increase the energy-efficiency of these buildings. Additionally, they introduced a wide range of policies related to energy use, transport, waste generation and purchase to decrease $CO_2$ emissions and increase sustainability.

## 3.5 Aquatim

Aquatim ensures the provision of water supply and wastewater collection services and is a regional operating company since 2010. Five subsidiaries were established in order to ensure an efficient operation in the country. The company has a total of 905 employees. The area of supply includes the city of Timișoara and 71 localities throughout the county - 8 towns, 28 communes and 35 villages. At the end of 2012 the company occupied the 36th position out of 39 operators in a national top, with one of the lowest water prices. The two major responsibilities of the company are consumers' health, safety and comfort and the protection of water resources.

The company's commitment for operating performance and quality services is certified by a first class operating license, granted by the National Regulating Authority for Public Utility Community Services, in 2003 . The company has implemented since 2005 a quality, environment, health and occupational safety integrated management system, for its line of business. The system is certified by the Romanina Society for Quality Assurance (SRAC), according to the provisions of ISO 9001, ISO 14001 and OHSAS 18001 specifications.

Aquatim ensures water quality and is concerned with the protection of the aquifer resources. In Timisoara the water is supplied from both ground and surface sources, via three treatment plants, operating with state of the art technologies. The water quality is continuously monitored, from the treatment process up to the customers' taps. There are three levels of control: automatic process flow monitorization and adjustment of parameters, laboratory quality tests and monitoring of the supply system. In the laboratories, over 20 quality parameters are tested on a daily basis, before the water is pumped into the city's distribution network. Throughout the supply system, samples collected from 32 locations, commonly agreed upon with the Public Health Inspectorate, are checked on a weekly basis.

Over 80% of the treatment processes are automatically monitored and controlled, as a result of the investment programs for upgrading equipment The waste water treatment plant's full rehabilitation was completed 2011.

Aquatim is green, according to Green Business Index 2012, where the company ranked the 4th in the general top and the 3rd and 4th in the specialized tops, at the Sustainable development, respectively Green Aquisitions and Environmental impact categories. GBI, a genuine barometer of the environmental responsibility monitored how did 300 companies fulfill their environmental commitments and how did they manage their resources in order to contribute to

the development of a green economy. For the thrid time in the GBI race, Aquatim's performance was the best so far.

The Aquatim R&D department is focused on identifying solutions for water quality improvement, environmental protection and developing cost-efficient technologies to be applied within these processes. The company has participated as a partner in research programs of excellence (PN II, FP7, CEEX), together with national research institutes and academic institutions.

Aquatim is also concerned for consumer's education for a cleaner environment, through the awareness of the threat posed by pollution and water waste. Thus, in recent years, the company has organized many local environmental actions, such as World Water Day, World Environmental Day, Bega Boulevard, and Timisoara Quality Week.

## 3.6 Enel Green Power

Enel Green Power (EGP), founded in December 2008, is the company of the Enel Group dedicated to developing and managing energy generation from renewable sources at an international level, with a presence in Europe and the American continent. Enel is the main energy provider in Italy, and one of the main energy providers in Europe. In Europe, EGP operates in Italy (where it is the leader in three out of the four technologies on renewable energies: geothermal, hydroelectric and solar), Spain, France and Greece.

Italy is the fourth largest user of renewable energy in Europe. Alternative sources account for 15% of energy generated, and this percentage should significantly increase over the next few years. Major projects are also underway in a number of countries in Eastern Europe. In addition, EGP operates in the United States and Canada, primarily with hydroelectric plants and wind farms, and in Central and South America, primarily with hydroelectric plants.

EGP is world leader in the renewable energy sector, with almost 21 TW/h produced every year, covering the energy consumption of about 8 million families and avoiding 16 million tons of $CO_2$ emissions every year. The main mission of EGP is therefore intrinsically committed to contributing to sustainable development. In future years, EGP aims at increasing its installed capacity and boosting development along the value chain, also via strategic partnerships with world-class technological benchmarks.

EGP generates power from all renewable resources, with a vast balanced portfolio of plants using wind, hydroelectric, geothermal, solar and biomass power. EGP operates the Serre Persano plant (near Salerno), one of the world's largest photovoltaic facilities. In the area of advanced technologies, the Archimede Project by EGP has begun testing the solar thermal generation at the Priolo Gargallo plant (near Syracuse). Starting with Italy's first wind farm, which Enel built in 1984 in Alta Nurra (Sardinia), EGP now operates with a total of 31 wind farms. EGP operates 288 water flow plants across the country. The EGP company has geothermal plants, located in Tuscany (in the area of Larderello, Pisa, but also in the area of Val di Cecina and in the area of Mt. Amiata). This "Made in Italy" geothermal power technology has now become a worldwide export for EGP. Two EGP biomass projects are already underway: the conversion of the Mercure thermal plant (Basilicata) to biomass and the installation of a new thermal unit at the Sulcis plant (Cagliari) that will be able to use plant waste for fuel.

# 4 A framework for promoting sustainability practices in workplaces

The synthesis of findings from across the six case study organisations has demonstrated that, to create the necessary conditions for achieving a successful and effective cooperation among actors in the transition to a low carbon economy, an integrated approach which considers each of the following dimensions is required:

- Structural conditions set from outside the organisation
- Organisational priorities and vertical relationships within the organisation
- Horizontal relationships among workers
- Home – work – third places relationship

These four dimensions form a useful framework from which to consider future pathways to sustainable production, both for policy-makers and for organisations.

The integrative framework developed in the LOCAW project incorporates individual, social and structural/material factors which should be considered in policies and interventions to change practices.

## 4.1 Structural conditions set from outside the organisation

### 4.1.1 Legislation and regulation

Legislative and regulatory frameworks were seen to be important drivers for sustainability across the case study organisations. EU regulations are very important as they constitute the background against which national and organisational policies are defined, as well as the criteria established by super-ordinate bodies in particular sectors.

However, regulations can sometimes fail to stimulate progress, particularly where they impose fixed limits of environmental impact. In such cases they may be regarded as limits to be reached and not exceeded and therefore act as boundaries of permissiveness rather than drivers for continual improvement. Regulatory frameworks should therefore strive to encourage improvement rather than reinforce stasis.

### 4.1.2 Reputation

Reputation has a high value for organisations and their success depends on it. Reputational effects were found to be a key driver of sustainability and wider Corporate Social Responsibility practices in transnational corporations, state organisations and private service providers. Whilst in transnational corporations reputation was a primary driver for compliance with regulation, in the state owned organisations and private service organisations emphasis was more often on achieving distinction amongst competitors or comparison groups. The latter situation, where organisations seek not only to be seen to be complying with environmental legislation but to be distinguished by their active efforts to enhance environmental performance, offers significant potential for driving transitions to low carbon economies. However, the strength of reputational drivers may partly depend on the economic incentives for establishing a strong environmental reputation. In the private service providers studied, improved access to funding (e.g. public funding or ethical investment funds) was an important dimension of efforts to enhance the organisation's green reputation. In this sense, boosting market demand for low carbon products and services will be critical in harnessing the full potential of reputational drivers for sustainability in the future.

Creating an environment in which reputation is dependent on environmental performance should therefore be a goal for policy. The crucial step here is moving beyond superficial aspects of image and branding to reputation in a more meaningful sense, i.e. incorporating sustainability and low carbon practices into a company's identity and in workers' everyday

behaviours and practices.



## 4.2 Organisational priorities and vertical relationships within the organisation

### 4.2.1 Need to reprioritise environmental issues

We found that organisations regard environmental goals as important in their mission and objectives, but in practice these goals often appear to be either at odds with, or secondary to, other goals such as profit or safety. There is a need to reprioritise environmental goals in organisations, and to encourage organisations to translate the goals as reflected in their mission and objectives into specific organisational policies and practices. Both formal and informal, and vertical and horizontal communication channels are important in this regard.

One route to overcoming the underlying perception that environmental and economic organisational goals can be antagonistic is to promote the business case for low carbon practices. Many environmental strategies are consistent with direct and indirect economic benefits e.g. through improving efficiency, reducing costs of energy inputs, increasing access to external funding sources and enhancing market share. Where organisations can see a clear business case for sustainability, transforming practices is more likely to be seen as good business sense than a solely altruistic endeavour. It is important, however, that environmental actions are not seen only in terms of their potential economic returns. Opportunities to create an environmental culture - to embed pro-environmental values and foster an environmental identity at the organisational level - should be embraced in order to create a social environment in which workers feel motivated to engage in low carbon practices and to encourage others to do the same.

### 4.2.2 Importance of monitoring and feedback

The research suggests that systems of monitoring and feedback are integral to the creation of an environmental culture in large organisations. Monitoring and feedback to decision makers are critical components of performance evaluation. These rely firstly on adequate systems for monitoring being put in place. Also, crucially, they require capacity and expertise within the organisation to interpret results and to adapt policies and actions in light of this ongoing process of evaluation. Feedback to employees may also play an important role in developing an environmental culture which spans the organisational hierarchy. Previous research suggests that

to maximise the effectiveness of feedback to employees this information should be tailored and allow comparisons (e.g. providing employees with feedback which allows them to gauge the performance of their department against others). Organisations should carefully consider the indicators selected to reflect their environmental performance. Monitoring and reporting of *outcomes* (e.g. carbon emissions) is important to evaluate the effectiveness of organisational policy and possibly also to promote individuals' perceptions of outcome-efficacy (the perception that one´s own behavior can contribute to a positive environmental outcome). However, feedback on the uptake of practices may also be particularly valuable in fostering pro-environmental descriptive norms (the perception that the majority of others around us behave pro-environmentally) within an organisation.

### 4.2.3 Structuring social norms

The study has considered how organisational structures including management procedures relate to workplace pro-environmental social norms. Social norms are informal rules of behavior, based on what is positively or negatively-sanctioned by relevant social groups to which an individual belongs.

The findings from the case studies across the organisational types highlighted the issue of roles and responsibilities for environmental issues within the organisational structure. The research suggests that concentrating the responsibility for environmental management within a single specialised role or in a dedicated department can pose problems in structuring pro-environmental norms across the organisation. When such responsibilities are fully devolved to specialists, other workers do not see themselves as having personal responsibility for environmental practices unless they are asked to act by one of these specialists. This points to the potential value of mainstreaming environmental issues throughout the remit of each department in an organisation, to reinforce perceptions of individual and collective responsibility in all areas of activity. However, it is important to qualify this as there were seen to be limits to which mainstreaming environmental responsibilities can be effective; it is important that some individuals are assigned specific roles since a complete diffusion of environmental responsibility across the workforce is problematic in itself.

The research suggests that the most effective approach may be to combine the advantages of centralised and specialised responsibility and control with the advantages of decentralised everyday practices. Enabling people on all levels of the organisation to develop and suggest

ideas for environmental improvement through participatory mechanisms offers great promise for engaging staff and harnessing the creative potential residing in the workforce. This does, however, require receptiveness on the part of management; a condition which may be more challenging in organisations which adhere to a strict top-down hierarchical structure.

Finally, top-down communications from managers to workers play an important role in structuring social norms. Formal and informal communications from managers and opinion leaders in organisations were identified as central to the development and persistence of positive norms. Developing effective communication strategies should therefore be considered an important part of implementing environmental policies at the organisational level.

### 4.2.4 Autonomy and perceived control

The removal of structural barriers to pro-environmental practices is a necessary prerequisite to the establishment of positive social norms in an organisation. The case studies highlighted the importance of infrastructure at the organisational level (e.g. recycling facilities) and within the wider societal context (e.g. transport and communications infrastructure) in shaping the practices of employees.

Results from the survey of employees in WP4 suggested that individual factors such as environmental self-identity, values and norms have less influence on energy use and mobility practices than recycling at work. This appears to be largely due to differences in the level of autonomy and perceived control workers' have over these different behaviours. Follow-up interviews indicated that a lack of control over centralised heating and cooling systems and constraints on individual autonomy in open-plan offices (e.g. in respect to turning off lights) meant that many felt that energy use was largely outside their sphere of control. Issues relating to transport infrastructure were often seen to limit autonomy and perceived behavioural control over mobility practices.

Whilst the research suggests that there is a need to remove structural barriers in order to offer individuals greater possibilities for choosing sustainable practices, it also recognises that in some cases removing autonomy in the form of 'choice-editing' can be effective (e.g. through strict procedural rules or technologies such as centrally controlled thermostats and motion sensor lighting). However such approaches should be treated with caution. Both our research and previous studies have shown that environmental self-identity is a powerful driver of pro-environmental behaviour, and may contribute to the transfer of positive practices between life

domains and increase the likelihood of transfer of practices between different types of pro-environmental behaviour within a given domain. Actively choosing to carry out pro-environmental behaviours is important in that it contributes to the development and reinforcement of environmental self-identity.

## 4.3 Horizontal relationships among workers

### 4.3.1 Social norms

The research has revealed a number of conditions which influence the transmission of pro-environmental norms within organisation. These were different in different organizations, sugesting the need to adapt interventions to the specific conditions of each organization. Firstly, within Aquatim, horizontal norms transmission occurred in sub-groups where biospheric values were dominant, and where the opinion of an informal leader influenced other colleagues, particularly in small close-knit groups of colleagues. Secondly, across the case studies, those who believed they held an exemplary role were more likely to carry out pro-environmental behaviours relating to waste management, suggesting that emphasising the role of individuals in modelling desirable behaviour may support the development of pro-environmental norms and practices. Finally, additional analyses of the survey data suggest that, across case studies, norms transmission behaviour (i.e. encouraging others to act pro-environmentally) was most commonly reported by individuals who identified strongly with their organisation, and in some cases was positively related to outcome-efficacy. These findings suggest a potential role for interventions targeting individuals' identification with the organisation and perceptions of outcome efficacy to promote the development of pro-environmental social norms in large organisations.

### 4.3.2 Horizontal Communication

The LOCAW project findings identified a number of barriers limiting horizontal communication on environmental issues between employees on the same organisational level and between departments within an organisation. The chief amongst these barriers was the dependence on top-down approaches to environmental change. These were associated with a perceived lack of power over the organisation's environmental impacts on the part of employees. This barrier was particularly salient in the cases of the transnational corporations and in Aquatim, where formal

top-down organisational structures precluded employee participation in setting environmental agendas and suggesting actions.

The structuring of environmental roles and responsibilities within organisations was also found to impact on horizontal communication on sustainability between departments at the same level. For example, at the University of Coruna, where responsibility for environmental issues was the remit of one specialist department, others often felt absolved of responsibility and managers in other departments perceived existing lines of communication to be ineffective. Formal structures for coordination and platforms for participation across departments in an organisation may therefore be necessary to facilitate horizontal communication on environmental issues at the departmental level. This could be achieved by instigating regular meetings amongst intermediate level managers as a forum for discussion and the sharing of good practices.

### 4.3.3 Social Networks

Despite a general lack of evidence of widespread horizontal communication on environmental issues, the findings did suggest that activity- and place-dependent social networks do have a role to play in influencing everyday pro-environmental practices. For example, interviews at Aquatim indicated that pro-environmental behaviours tend to form in small groups of well-acquainted employees. Talking about environmental attitudes and values at work could be considered to be a type of border-crossing from different domains (home to work), because in close relationships at work, employees bring their own attitudes, which were not formed inside the organization due to organizational or structural factors. Social networks were also relevant to developing norms for lower-carbon mobility practices such as car sharing amongst co-workers.

## 4.4 Home – work – third places relationship

### 4.4.1 Transfer of practices between life domains

Analysis of the survey data from the case studies of state organisations and private service provider found correlations between low carbon practices at work and at home, however the qualitative case study research in these organisations, along with the in-depth ethnographic

research in the transnational corporations, indicated that the actual transference of practices between the home and work domains was limited. The research did, however, suggest that when practices *are* transferred, this is most likely to take the form of behaviours adopted in the workplace being carried over to the home domain rather than vice versa.

The WP5 research in transnational corporations considered workers as 'border crossers' between the life domains of work and home, a concept inroduced by Clark (2000). By analysing the nature of the border between work and home and the meanings individuals associate with crossing that border, the research shed light on the barriers to the transference of practices between the two domains. It became clear that the horizontal relationship between workers' practices at home and at work were related to the vertical relationship between workers and management, to the extent that it is not possible to consider these relationships separately. Working within these strictly hierarchical institutional structures was seen to set a context for the development of strong and largely inflexible borders between work and home. The transference of pro-environmental behaviours from home to work is therefore constrained by structural organisational factors when formalised top-down approaches to sustainability deny workers the initiative to adapt their own practices or limit channels for suggestions for improvements to be made and acted on.

Both in the case studies of transnational corporations and in the other large organisations studied, a clear differentiation between the logics of home and work was observed. This translates to a divergence between the work and home domains in the structural, social and individual barriers and drivers applying to similar types of pro-environmental behaviour. For example, energy saving at work may be driven by rules but was often limited by the lack of perceived responsibility that was associated with strict top-down hierarchies and/or constrained by structural factors which limit individual control over energy usage. In contrast, at home the individual may have greater control over heating and lighting systems, and greater motivation to reduce energy use due to the cost of fuel. Similarly, whilst formal rules and penalties for non-compliance encourage pro-environmental practices such as recycling at work, this logic does not transfer to the home environment and indeed having to adhere strictly to such rules at work can put some individuals off recycling at home. Recycling, as with other practices, takes on different meanings at home and at work.

In contrast, norms relating to the safety culture at Shell were seen to be transferred from the work to home domain, suggesting that given the right conditions a strongly embedded

environmental culture at work may offer possibilities for a positive transfer of practices from work to home.

The research suggests that one of the conditions for the transfer of practices between work and home relates to knowledge acquisition. Training given at work can equip workers with knowledge and skills that are carried by the individual across the border between work and home, thereby increasing self-efficacy at both work and home. Also, given a receptive social environment, environmentally aware individuals can bring ideas about how to improve the sustainability of working practices into the workplace. However, additional barriers such as those discussed above mean that whilst borders may be permeable to the flow of ideas and knowledge, the transference of actual practices is more difficult to achieve.

Previous research by members of the LOCAW consortium suggests that environmental self-identity, based on biospheric values and previous environmental behaviour, may be central to the transference of pro-environmental behaviours between life domains.

## 4.5 Focus on technology

Technological solutions were commonly felt to be central to efforts to reduce the organisations' carbon emissionsin all of the LOCAW case studies. In the heavy industries, technological solutions emphasised the product and the technologies of production themselves, whereas the in the less technologically-intensive industries the focus centred more on technologies associated with employees' everyday practices.

In some cases technology was favoured in order to avert the need for behaviour change through structural changes to the working environment (e.g. by automating heating and lighting systems). However, particularly in stakeholders' future visions, technology was also envisaged to facilitate transformative cultural changes in the organisation. A number of these visions saw information and communication technology as integral to the development of a new way of working centred on remote communication, e.g. through virtual offices and classrooms accessed from home. This trajectory has the potential to reduce travel demand and fundamentally change the meaning of the workplace and the nature of the border between the work and home domains. However, we argue that net carbon savings from the widespread adoption of home- and remote-working practices are not guaranteed. A critical approach to this issue, seeking to

develop the evidence base on the implications of the outsourcing of emissions from work to home is therefore warranted.

The focus on technology observed in the case study organisations also highlighted a number of challenges to transformational change at the organisational level. Firstly, in the heavy industries, a single-minded focus on technology was seen to contribute towards short-termist perspectives; the consequence of these being a deprioritisation of the development of alternative (and potentially more innovative) solutions for more systemic change. Secondly, the focus on technology was (particularly in the Groningen and Aquatim case studies) associated with perceptions that the potential impact of behaviour change is slight in comparison to that of structural and technological investments. This can lead to a neglect of individual practices and the social and psychological factors that shape them. Also, because technological solutions are often expensive and involve long payback periods, in challenging economic times this focus on technology can lead to inertia. As was seen in the Municipality of Groningen, when finance for further investment in technology is not available the organisation may feel that there is little more that they can do to reduce their carbon emissions in the short-term.

# 5 Recommendations for Organisations with examples of best practices

Based on the framework of conditions that influence sustainability-related practices in the workplace, the LOCAW project can formulate a set of recommendations for organizations, which can be used as guidelines by decision-makers at all levels.

## 5.1 Transform pro-environmental priorities within organisations

Private sector organisations – particularly those with shareholders – have legal obligations to maximise profit that they cannot ignore. However, they cannot and need not be the exclusive focus of organisation activity. Health and Safety, despite occasional negative press, shows that organisational culture can be transformed to incorporate workplace goals beyond the purely economic. Embedding sustainability goals into policies and everyday practices increases the salience of environmental cues relative to profit, and serves to emphasise that sustainability is more than something to pay lip-service to in the organisation's mission statement.

One key issue here is to educate managers on the effects of human behaviour changes on reducing GHG emissions, which is often underappreciated. There is a commonly held belief that pro-sustainability measures are costly and mainly require infrastructure and technology adaptation. While this is true to a certain extent, and infrastructure adaptation does have a significant role in reducing consumption of energy, for example, or encouraging transitions to sustainable mobility options (bicycle lanes, public transport and walking infrastructure), human behaviour changes can achieve a great deal as well, thus strengthening the effect of even small infrastructure adaptations or, in some cases, at least balancing out the lack of technological or infrastructure solutions.

Some examples of good practices here come from private service providers of water and energy services (Enel Green Power and Aquatim). In both companies, sustainable practices are part of the companies´ identities. In Aquatim, recycling of waste and water is particularly important, while in Enel the creation of a specialized mobility team is concerned with promoting sustainable mobility for workers.

Another example of good practice is the safety culture that Shell has managed to create in offshore activities. Workers in Shell have incorporated safety care in their everyday behavior, both in the workplace and in other life domains such as the home. The creation of a sustainability culture could follow the same steps in organizations.

A quote from a Volvo worker illustrates well the kind of change that is necesary in organizations:

*"If you select one person in the organization which has a portofolio for environmental issues, then people easily think that someone else gets paid to do that, they do not have to think about it. Sometimes people will call me and say, the rubbish bin is full. Well, then you will have to empty it. What, I shall empty it? Yes, precisely, I am here to tell you that you have to empty your rubbish bin. Sometimes it feels a bit as if the responsible person buys the others out. You have to struggle against the wind and keep saying that it is something everybody has to weave into their everyday job, if we are going to make this work."*

## 5.2 Monitor and communicate progress towards and maintenance of sustainable practices

Organizational plans need to be translated into clear objectives and targets to be reached within given time frames and these should be accompanied by adequate implementation of indicators monitoring progress towards goals. Monitoring is effective both for the task of measuring progress and adjusting organizational strategies, but also for the transmission throughout the

workforce of a message reinforcing the importance sustainability has to the organisation. This creates the background against which feedback can be adequately provided, comparing departments and individual workers, and making tailored recommendations. This should be accompanied with creating forums in which these goals and recommendations can be discussed among workers and intermediate-level managers, in order to create a system of shared responsibility and commitment to both the organization and its environmental goals. This type of commitment is likely to have an impact on other organizational productivity indicators, beyond environmental performance ones.

The University of A Coruña has put in place a system for monitoring progress on emissions reductions and the fulfillment of environmental objectives, which includes assessment indicators for energy, waste and mobility. The calculation of the carbon footprint of the university each year allows for the measuring of progress over time and for the formulation of very clear objectives.

The Municipality of Groningen has a very specific and ambitious plan for becoming a 0 emissions organization by 2050. This plan contains specific targets and objectives for change. Measures for energy efficiency are closely monitored to assess progress and strategy is adjusted as a result.

## 5.3 Account for 'off-shoring' activities

Monitoring of sustainable practices needs to take account of activities not exclusively confined to workplace sites. If an organisation encourages home working, then the reduction in commuting needs to be countered with the increase in home energy consumption due to increased occupancy. Similarly, outsourcing activities does not make the emissions they generate or the energy they consume disappear from the organisation's sustainability accounts.

The strategies put in place for the accounting of out-of-the-workplace work activities need to be defined along a fine line between the legitimate assumption of responsibility for emissions generated by work-related activities performed anywhere, and the organizational interference within the home domain, which is perceived as negative by the workers and can backfire through a rejection of flexible working arrangements or through the development of a negative perception of and resistance to organizational sustainability efforts. The systems put in place should be decided within a participatory framework with workers.

Case study organizations in LOCAW did not have flexible working programs in place so it was impossible to assess whether off-work activities are being accounted for. Nevertheless, a pilot programme of flexible working is being assessed at the Aberdeenshire Council, which was the additional case study we used to test the theoretical integration framework designed in the project. Energy use measures are taken to assess the GHG impact of this project.

Nevertheless an example of good practice here would be providing sustainability training for workers in flexible working programs for energy efficiency, minimization of waste generation, waste recycling and low-impact mobility, and providing technical and financial support, together with government bodies, to insulate homes or install sustainable energy sources for heating and cooling.

## 5.4 Recognise that sustainability is a journey

The organisation is not an island, but a part of a global sea of co-adapting and co-evolving corporations, governments, institutions, individuals, societies, legislative frameworks, technological infrastructures and biomes. The sustainability status of everyday practices change, and policies, procedures and practices will need to adapt. The importance of maintaining the sustainability agenda through time rather than treating it as a single one-off intervention is a clear result of the testing of different policy tracks with agent-based modelling tools. In order to create a sustainability culture within any organization, and transform pratices into habitual behaviors which become the norm rather than the exception, it is important to create strategies that reinforce each other at different points in time, and maintain environmental objectives as a priority on the agenda of organizational development.

When performing one-time changes or interventions, even drastic ones that rule out certain behavioral choices, simulations have shown that people end up adapting to those changes and in time finding ways to perform the same unsustainable behaviors as before the intervention was introduced. Organizational decision-makers should take this into account and design progresive strategies maintained over time.

The University of A Coruña has established a plan for energy efficiency which includes measures to be taken over time, at different moments. They include one-time structural changes which improve efficiency through installation of renewable energy sources for example, and repeated measures such as replacement of lighting systems with more efficient ones over time. Campaigns for human behavior change in energy use will be added as a result of the cooperation between researchers and the Office of the Environment of the University in this project.

## 5.5 Provide sustainability training

Training will be needed for managers to model and monitor sustainable practices and design procedures to facilitate pro-environmental behaviour, and for workers to learn new procedures and examples of best practice. Research has shown that managers can underestimate the role played by human behavior changes in reducing emissions in the workplace. Training managers on how to promote sustainable practices and on-going training for workers on sustainable options for behavior in the workplace can be effective in achieving transitions in organizations.

While individuals in general have a good awareness of unsustainable behavior, the knowledge on how to promote change in human behavior in the workplace is less present. The importance of participation of workers in decision-making and of incentives and spaces for workers to make suggestions for changes is not so present in organizations.

Sustainability training in the workplace can be higly efficient beyond the workplace. The folowing quote illustrates what the effects of this type of training are and how it can influence behavior beyond the workplace. The quote comes from a middle manager of Aquatim, a private service provider of water for the Western part of Romania.

*"You asked me if i learned something from my work. Yes, I've learned. I learned a lot when I open and close the water from the tap. Because I know what it means to get water which…I can't stand it… actually I panic when I see, you know? So…even when it's somebody close to me I say: turn off the water! Don't let it run in vain. Because I saw, for example in Jordan, man they don't have water! They don't have anything, Israel has nothing, they are so poor that it breaks your heart, you really can't…you know? You wash with just a little water; I mean I do, knowing what it means not to have it. It's hard. This is what I learned from here, knowing what we work and how we can save. And of course in my family, every time, I told them: it's not allowed, don't, no,*

*and…as much as I can…this is what I learned. This is a thing that I really became aware of."*

## 5.6 Reward good sustainability practice

Related to the need for monitoring and feedback, and to the importance social norms play in promoting sustainable practices in organizations, research has also shown that recognizing good practice constitutes a good incentive for pro-environmental behavior, expecially when these are related to tangible rewards, including financial ones. Many organizations have incentive systems put in place related to the types of behavior they want to encourage in their workers, based on productivity of certain types or on systems of rewards for good performance. Introducing distinctions and rewards for pro-environmental innovation, or efficiency, or notable reductions in certain practices that are particularly unsustainable would be easy to put in place and would constitute a driver for sustainable change in organizations. Coming up with ideas to improve environmental performance could be particularly encouraged and rewarded, given that the participation of workers has been found to contribute positively to sustainable outcomes.

Systems of distinctions and rewards could thus be established for departments and individuals that do well in enhancing and promoting sustainability as part of their everyday work activities. These could be accompanied by increasing costs and disincentives for unsustainable practices.

We could not find clear examples of distinctions established within the organization for sustainable behavior or initiatives. The University of A Coruña publishes every year comparative emissions reductions tables per university building. A system of distinction such as a special mention or an award could be put in place for the best performance or for the best initiative being put in place in a department or centre.

## 5.7 Ensure compliance with environmental policies by management

The personal example of managers in adopting and being at the forefront of sustainable everyday practices at the workplace is a particularly important driver for change. If managers act in sustainable ways at the workplace, social norms that favour pro-environmental practices are strenghtened and they become more effective.

Organizations should also stress that fellow colleagues respect pro-environmental norms as well, by having systems of recognition in place for those groups and individuals that are especially good at it. When using campaigns to promote pro-environmental norms in the workplace, it is important that practices and procedures are adhered to by management.

> An example of good practice here is illustrated by a production manager in Volvo, talking about being an example for environmental practices. Asked whether he has to fight to push environmental issues forward, he says:
>
> *"No, but that is, is has to be, it is about (…) meaning what we say, that is, we have to show this with our actions. Go ahead with a god example, show through our actions. It is not enough to formulate some environmental ideas, one has to mean it. It is only then that you reach people. … We need the experience, and we don´t have it on the environmental front. We need to engage a bit more if we mean it seriously. "*

## 5.8 Remove barriers to pro-environmental actions

Barriers in the workplace can be either structural or social. Structural barriers refer to characteristics of the workplace that hinder the capacity to act pro-environmentally even when workers would want to do it, such as lack of availability of recycling bins, the lack of water fountains that woud avoid the buying of plastic water bottles, the lack of an efficient public transport system allowing workers to leave the car at home, or the lack of control over heating and cooling systems, to name just a few examples. Social barriers refer to defficient systems of communication of sustainable strategies and practices performed by workers or undertaken by the organization as a whole, and to barriers to positive influence taking place among workers or departments, when sustainable initiatives do arise or are put in place. These social barriers can be removed by adequate systems of communication, by increasing the visibility of pro-environmental behavior, and by encouraging suggestions and drawing on the knowledge and skills of workers. Removing these barriers enables people to act upon their personal norm to act pro-environmentally at work, which is a powerful determinant of individual pro-environmental behavior. Doing so also enables the creation of virtuous cycles of change in organizations, where innovations in one department or coming from a few individual workers can be upscaled for the whole organization.

One example of good practice here would be the organization of middle management meeting at the university, for example, allowing managers of different departments and university bodies to consider environmental issues and learn from each other´s experience and solutions to environmental problems.

The existence and visibility of recycling bins and provisions for selective waste recycling in Aquatim or Shell are an example of the removal of barriers to act pro-environmentally in the workplace.

## 5.9 Enhance autonomy

Engaging the workforce in designing procedures and mechanisms for pro-environmental change allows agreement to be established around targets for pro-environmental policies and mutual ownership of the organisation's sustainability agenda that will be more robustly adopted. This can be done through the facilitation of structures that allow participation in decision-making, but also promote ideas and creativity in the workplace.

Regular meetings between intermediate level managers or discussions among trade union groups and the responsible persons or departments for the environment in the organization have been examples of proposed mechanisms.

## 5.10 Consider the role of the corporate social network and use it wisely

People influence each other in any community, and they do so in the workplace, wich is a community of practices, values and identities. Social influence accounts for a high amount of change in any human system, and processes of social influence are key drivers in promoting change. Social networks act as the medium for norm transmission, and their structure has been shown to affect organisation level behaviour dynamics. The corporate hierarchy, matrix and workplace geography all have a role to play in mediating day-to-day interactions including those concerning sustainability. Simulations have also shown how social networks play a role in either making certain one-time sustainable interventions inneffective in the long run, or being vehicles for the perpetuation of sustainable practices started by a small group within the organization. Understanding the role of social networks in an organization and how they work can contribute to using the elements of visibility, systems of incentives, adequate communication and reward

systems as well as shared ownership and responsibility to generate virtuous cycles of sustainable practices in organizations.

> Although we did not find significant examples of good practice in using the social network wisely for environmental purposes, examples can be taken from creating a health and safety culture in many organizations. The visibility of positive behavior and the sanctioning of behavior that falls outside of regulations around health and safety have been important elements in the development of such cultures. Also, implemented training programmes for workers on these issues have been a success.

## 5.11 Engage organisation stakeholders

The organization´s external environment has an important influence on an organization´s performance, independent of its type. An organization´s success depends to a significant extent on its reputation and this is an important motivator for organizations to adopt practices that correspond to or respect social values even when they are costly. But organizations can also act as communities of practices that can influence other organizations and the behavior of workers in other life domains. Company to company transmission of sustainable practices can take place through certain categories of stakeholders or through workers themselves. Large-scale organizations can contribute to generating demand for sustainability by facilitating take-up of environmental agendas by stakeholders in the organisations (e.g. unions, staff associations, students, customers, suppliers, taxpayers). There are opportunities for larger and well-resourced companies to act as mentors to smaller companies, and to use their financial and contractual negotiating muscle to drive change in a sustainable direction.

> Good pactices here should include the creation of virtuous cycles of influence among organizations and their stakeholders. Unions can play a particularly important role in pushing a sustainability agenda in organizations. Customers and taxpayers can also act as drivers and this should be facilitated by the creation of bodies such as the Social Council of the University of A Coruña, which takes care of pushing social requests and demands on the university´s agenda, or by encouraging the take-up of environmental agendas by consumer associations all over the world through government support and training.