Building blocks: six cases of strategic environmental management

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2011

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BUILDING BLOCKS

Six Cases of Strategic Environmental Management

SED 2011 Project Locations

- Zabrze, Poland
- Jerez de la Frontera, Spain
- Umeå, Sweden
- Chişinău, Moldova
- Zákolony, Czech Republic
- Catalonia, Spain

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This publication should be cited as:

International Institute for Industrial Environmental Economics (IIIEE). 2011. Building Blocks: Six Cases of Strategic Environmental Management. Lund: IIIEE.

ISBN 978-91-889 02-72-6

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Introducing Strategic Environmental Development

Environmental issues are becoming increasingly urgent. Hence, organisations such as businesses and local governments are under pressure to proactively manage their environmental impacts in a strategic manner. To succeed, these actors need to strive towards continuous improvements of their environmental performance and engage all key stakeholders in the process. Environmental advancement can take multiple forms. Making resource efficiency gains, implementing an environmental management system, and creating sustainability strategies are all important steps on the path towards enhanced environmental performance.

The key success factors for these initiatives include a mix of hard and soft measures. Tangible measures such as implementing best available technologies and processes must be complemented with soft, more intangible, measures which ensure that relevant actors are engaged in the course of action. Examples include adequate consumer and employee education, aligning the organisational set-up with the vision and goals, fostering a culture of conservation and forming beneficial partnerships. By

leveraging environmental achievements, organisations can gain sustainable competitive advantage. Joining environmental strategies with daily operations and communicating progress and goals to all stakeholders enables organisations to take full advantage of sustainable development.

These concepts and strategies are incorporated in the "Strategic Environmental Development", SED, course, which explores practical applications of sustainability tools. It is a hands-on, strategic learning exercise and an opportunity to gain unique insight and experience on how to apply theoretical knowledge in practice. Applying the building blocks for sustainable development in real and complex systems challenges the teams to develop a systematic approach, and arrive at practical analyses in a professional context. This report is the output of the 2011 Strategic Environmental Development course.

This report constitutes six different projects, completed by six student groups under the supervision of members of the IIIEE staff. The projects were requested by clients in five different European countries and were tailored to meet their needs.

The group in Zabrze, Poland started the municipality on the path to a sustainable waste management system for municipal solid waste. In Umeå, Sweden another team provided guidance on how to optimise the integration of mobility management in municipal work. In addition, this group identified best practices for approaching and involving businesses in mobility management partnerships. In Raimat, Spain, students had the opportunity to assist the winery in implementing an ISO 14001 certified Environmental Management System (EMS), focussing on water

efficiency improvements as an illustration of how the EMS should be structured. In Zákolany, Czech Republic, the group provided the ground-work for the village to drive and implement a complete Community Sustainability Strategy. The students explored how energy sustainability and life-long learning could be addressed in such a strategy. Challenges for improving energy efficiency in buildings were addressed by the group in Moldova and recommendations were made on how to proceed at this stage. Finally, the González Byass group in Spain explained how the company could elevate its environmental management system to a strategic level.

The case studies in this volume explore several, complementing building blocks of a sustainable common future. In the six case studies, the teams were responsible for utilising current practices as a stepping stone to proposed strategic environmental management practices. The report is a combined effort of many individuals, both at the institute and the hosting organisations. Exploring the six projects has been a true pleasure, leading to new insights and unforgettable experiences. We hope that the reader will enjoy the case studies and that they will inspire to engage in the further pursuit of sustainable solutions.

The Six Teams Worked in

Zabrze, Poland

Bernice Charles – From the Seychelles. Bachelor degree in Urban and Regional Planning. Bernice has worked in the governmental Land-Use Planning Department in the Seychelles.

Caroline Steinvig – From Sweden. Bachelor degree in Environmental Science. Caroline has worked as an Environmental and Quality Consultant in Sweden.

Chihiro Sawaki – From Japan. Bachelor degree in International Relations. Chihiro has worked for a Japanese Environmental NGO in the field of renewable energy and climate change policies.

Cornelia Moser – From Switzerland. Bachelor of Honours in International Management. Cornelia has worked in the Communications Department of an international company in the power industry in Switzerland.

With their supervisor *Mikael Backman*, a senior research fellow at the IIIEE, who has been involved in developing the Swedish waste management system and particularly the deposit-return system and extended producer responsibility.

Zákolany, Czech Republic

Tomas Naujokaitis – From Lithuania. Academic background in International Affairs from the U.S. Coast Guard Academy. Tomas is a navy officer in the Lithuanian Navy.

Wain Anthony Collen – From South Africa. Academic background in Business Management. Wain has experience in and passion for local sustainable development.

Tanzina Azad – From Bangladesh. Academic background in business administration. Tanzina has worked as a university teacher as well as for The World Bank group IFC.

Kai Maembe – From Tanzania. Academic background in international business and business administration. Kai is a local entrepreneur, running a boarding house in Dar Es Salaam, Tanzania.

With their supervisor *Thomas Lindhqvist*, an associate professor at IIIEE, who is the father of the Extended Producer Responsibility principle as well as the concept of Environmental Product Declarations.


Team Zákolany

Umeå, Sweden

Elaheh Alasti – From Iran. Academic background in governmental management. Elaheh has worked for a Social Security organization in Iran as an individual accounts expert.

Christian Brandt – From Germany. Bachelor degree in European Studies. Christian has worked for a Slovenian environmental NGO working on energy efficiency policies on a national and EU level.

Maria Remstam – From Sweden. LLM in Swedish law. Maria wrote her thesis at Stellenbosch University in South Africa, and has studied French and Hebrew at Gothenburg University.

Emma Rogers – From Canada. Academic background in political science. Emma has worked for the regional government of Ontario on waste management policies and an NGO contributing to the development of industry stewardship programs for waste products.

Antina Sander – From Germany. Academic background in business studies. Antina has been working in the consumer goods industry, in business consulting and with the UN.

With their supervisor *Peter Arnfalk*. Associate Professor at IIIEE, with special interest in the inter-linkages between information and communication technologies (IT) and sustainable development issues.


Team Zabrze

Team Umeå

Team Jerez de la Frontera

Jerez de la Frontera, Spain

Tamás Dávid Erdélyi – From Hungary. Multi-disciplinary academic background in Electrical Engineering, Sociology, International Business and Environmental Management and Policy.

Henrique Simões – From Portugal. Academic background in Environmental Engineering. Henrique has worked in several organisations in Brussels (European Commission, EEB etc.) as well as in the private sector in Portugal.

Lucas Playford – From Canada. Academic background in Geography/ Urban Development from the University of Western Ontario. Lucas has a professional background in sales, marketing and corporate communications.

Maria Zondervan – Born in Sweden, nowadays living in the US. BSc in Wildlife Ecology and Conservation. Maria works as a biologist for a water management district in Florida, having experience in land, water and wildlife management.

With their supervisor *Åke Thidell*, Chemical Engineer and Assistant Professor at IIIEE, who has been working with cleaner production and preventative environmental strategies in businesses operations for many years. Åke is particularly interested in connections between businesses and other actors for the shaping of sustainable regions.

Chişinău, Moldova

Martin Albrecht – From Germany. Bachelor degree in Public Management & Governance from the Zeppelin University in Germany. Martin has work experience in development cooperation from Nepal, the Institute for Ecological Economy Research in Germany and the Saxon Liason Office in Brussels, Belgium.


Team Chişinău

Mike Harris – From Canada. Bachelor degree in Business Administration from Simon Fraser University in Vancouver. Mike has work experience in conventional oil and gas exploration as well as volunteer projects in Uganda and Mexico.

Lena Michel – From Germany. Bachelor degree in European Studies from Maastricht University in the Netherlands. Lena has work experience in sustainability consulting at the Fraunhofer Institute.

Pia Långström – Born in Finland, grew up in Sweden. MSc in Business and Economics from Uppsala University. Pia has extensive, global experience from international marketing, PR and analyst relations in IT, telecoms, sustainable and energy solutions. Started own consultancy.

With their supervisor *Lars Strupeit*, a research coordinator at IIIEE. Lars has considerable experience in on-line education. He also has been working with various projects in the field of renewable energy, energy efficiency, sustainable transport, as well as policies and strategies for air pollution prevention and control.

Catalonia, Spain

Daniel Olbe – From Sweden. Academic background in Industrial Engineering/ Management (MSc). Daniel has vast entrepreneurial experience.

Inês Ribeiro – From Canada. Honours B.A. in Environment and Development Studies. Inês has research experience in organic and urban agriculture.

Wei Huang – From China. BSc in Biology and Biochemistry (China) and MSc in Marine Biology (Sweden).

Geert-Jan van der Zanden – From the Netherlands. MBA studies from Business Schools in Spain (I.E.S.E.) and USA (Dartmouth). Geert-Jan is a management consultant and wine industry expert.

With their supervisor *Philip Peck*. Associate Professor at IIIEE, with special interest in environmental, socio-economic, policy and deployment of new technology systems.

Team Catalonia

Energy Efficiency in Buildings in the Republic of Moldova

Lena Michel, Martin Albrecht, Mike Harris, Pia Långström

Introduction

Few European countries face as many energy difficulties as the Republic of Moldova. A small nation bordered by Romania and the Ukraine, with no access to the sea. Russia and the legacy of the Soviet era still have strong influence on the country. With virtually no energy reserves of its own, Moldova depends on Russia for more than 90% of its gas supply and receives 80% of its electricity from the Russian-supported break-away province of Transnistria [1,2]. Much of the country's building stock was constructed during the Soviet era, when little attention was paid to insulation or double paned windows. The country's network of district heating was not very efficient to begin with, is now in a state of neglect [3,2].

Despite these difficulties, the country remains optimistic about its energy future. Government officials, academics and entrepreneurs are focused on the potentials of biomass, wind and solar energy. The country's growing economy, stabilising government and private sector reforms supports the aspirations to join the EU in a foreseeable future.

However, according to statistics this country has the smallest gross domestic product (GDP) per capita in Europe [4]. Improving energy efficiency in the country, a proven and cost-effective method to achieve energy security, appears to be one good starting point [4]. Utilising budgets for improving energy efficiency in buildings, both public and residential, represents an area which is relatively easy to begin with and possible to generate positive results.

Capital	Chişinău
Proven oil reserves	Nil
Proven Natural Gas Reserves	Unknown
Gas Consumption	2.52 bcm (2007)
Recoverable Coal Reserves	Nil
Coal Consumption	5.27 Mt (2007)
Electricity Installed Capacity	1.026 GWe (2007)
Electricity Production	3.617 b. kWh (2007)
Electricity Consumption	4.37 b. kWh (2008)
Average Income	105 Euros/Month

Moldova Country facts [30]

Buildings account for up to 40% of energy use in the country. Considering the current low level of efficiency, large energy savings

can be realised with some relatively simple measures [5,2].

Until now, even straightforward measures have proven difficult to implement in the country. The report aims to understand what some of the reasons for this may be. It is based on a literature review, innovation system theory and interviews with stakeholders having interests in the energy efficiency in the building sector [6,7]. This report starts with an overview of the stakeholders, provides some general impressions of energy efficiency in the country. Then identifies five key challenges and their potential solutions, which if implemented could enable moving sustainable development.

Stakeholders relevant to energy efficiency in buildings

The key stakeholders to enable energy efficiency in buildings include the international community, Moldovan governmental agencies, the commercial sector and energy companies, academia and the energy consumers (interviewed organisations are listed under references).

International community

Swedish International Development Cooperation Agency: SIDA is one of the largest bi-lateral donor to Moldova having a budget of EUR 12.1 million per year from 2011-2014 [I;8]. As one of main donors, SIDA also coordinates the other major donor organisations to align activities. Energy Efficiency is one of SIDA's focus areas. They have worked together with Termocom, a local utility, to provide new heating substations in old apartment blocks. SIDA works closely with the European Bank for Reconstruction and Development (EBRD) and the World Bank (WB) in joint projects.

European Bank for Reconstruction and Development: The EBRD provides loans for energy efficiency in buildings. They also provide technical assistance and help develop buildings standards, certificates, auditing and the transposition of EU directives [IV].

European Union: The EU is the largest donor to the nation [4]. As Moldova is an aspiring EU member, EU legislation plays a major role in shaping domestic policy [10, 11].

German Development Cooperation: GIZ works on modernisation of public services and developing a building energy efficiency certification programme [II].

Norwegian Aid: Provided important groundwork in the area of energy auditing in cooperation with the Technical University of Moldova [III].

USAID and Hellenic Aid: The Greek and American development agencies together promote energy efficiency in buildings through their "synergy" collaboration, and assisted in developing the Moldovan Energy Efficiency Action plan [9].

World Bank: The WB has two long-standing programmes for financing efficiency improvements in the energy sector known as Energy I and II [IV,12].

Moldovan government stakeholders

Ministry of Economy: The Ministry of Economy develops and implements the Energy Strategy for the country [V,VI]. It handles technical regulations and standards, drafting energy-related legislation, international investment in the energy sector, and all activities related to energy efficiency.

Ministry of Environment: The ministry is responsible for all climate change issues,

but not directly in charge of energy efficiency activities.. As energy efficiency measures can contribute to the reduction of greenhouse gas emissions, the Ministry of Environment is an active participant in energy efficiency discussions.

Ministry of Regional Development and Construction: The ministry's primary role is setting policy for construction and design of infrastructure and buildings. They are the main actors involved in setting energy efficiency standards and policies for the building sector.

Carbon Finance Unit: The CFU is the responsible institution for the Clean Development Mechanism (CDM) of the Kyoto Protocol. It has the potential to become a source of funding for Energy Efficiency projects to reduce greenhouse gas emissions. The unit supports and informs potential beneficiaries of CDM projects [XIII].

Municipality of Chişinău: Chişinău is the capital and the largest city in Moldova, with most of the buildings and major infrastructure. The Municipal Building Office sets polices for building ownership and associations in the region. The majority of residential building stock is managed by the municipality. They are also responsible for the largest number of public buildings in the country.

Private sector

Entrepreneurs: Private Moldovan entrepreneurs have initiated their own energy efficiency projects. An example is "Proiect Willpower", a private partnership between local Moldovan entrepreneurs and Tillväxtverket, a Swedish economic development organisation.

Utility companies: Utility or energy companies, supply heat and power to buildings and are important stakeholders to achieve energy efficiency. The largest utility, Termocom, is the main supplier of heat in the Chişinău region. Termocom supports energy efficiency improvements in their own network, pipes and heat exchangers, to reduce energy consumption. This may help reduce consumer bills to an affordable level. The company currently experiences a 50% rate of non-payment. This is eventually covered by the Municipality of Chişinău.

Technical University of Moldova (TUM)

Department of Gas, Supply and Ventilation: The department worked with Norwegian Aid to set up the first domestic programme for educating and training auditors in energy efficiency in buildings.

Department of Urban Development and Architecture: The department has integrated the topic of energy efficiency as part of their master programmes.

Department of Energy: The department educates electrical engineers at the undergraduate and master level. It includes the topic of energy efficiency in buildings in its course curricula.

Energy consumers

End users: Households in Chişinău receive heat from Termocom and power from Union Fenosa. Most live in poorly insulated housing and have no ability to regulate heating individually besides using electric heaters. Due to design flaws, customers at the top of a building often experience different levels of heat than those at the bottom. Costs from heat losses are passed on to the consumer. During the winter period, home owner's total energy costs can almost consume their monthly average income. [2,30].

Residential Apartment Building in Chişinău, Moldova

Policy status quo

In terms of relevant multilateral and bilateral cooperation, Moldova is part of the Council of Europe [13] and has been actively engaged in EU Partnerships [14] until the European Neighbourhood Policy (ENP) [15] was joined, which includes a Moldova specified Action Plan [16] and Eastern Partnership [17]. Since 2009, Moldova is also part of the European Energy Community and the Black Sea Synergy [18], which is EU external development cooperation tailored towards countries along the Black Sea.

As part requirement of the European Energy Community [19], Moldova had to adapt national legislation to EU energy policies and is following an Energy Strategy. The strategy aims at "...ensuring the country's energy security, raising the energy sector efficiency, wider using of renewable energy sources, energy market liberalisation and restructuring of the energy complex in the light of requirements to be met with countries seeking integration into the European energy system.", according to Vladimir Antosii, the last Minister of Industry and Infrastructure. The ministry is now part of the Ministry of Economy [20].

As part of a government looking towards the EU, the country is currently in the process of transposing EU legislation, as part of the Action Plan. This also includes several directives related to energy efficiency, which are taken as a legal base in order to implement a National Energy Efficiency Programme until 2020 [21]. The draft includes:

- energy efficiency agency and fund, as well as a budget law;
- requirements, mechanisms and incentives, which include a two-part tariff, social assistance for low income households; and
- building capacity for management, auditors, inspectors, experts and services, as well as metering information for consumers [21].

Positive impressions

During the interviews, it became evident that there is a lot of enthusiasm and commitment towards energy efficiency. The wish to becoming an EU member is strong at all levels of society in the capital. The initiative to enter the Energy Community was taken under the previous government. The possibility of making Moldova energy independent will help ensure a secure and reliable energy supply, and further stabilise the economy. Important steps are already being taken in domestic law. Many of the requirements to further align towards EU regulation are on the agenda. As part of the Neighbourhood Policy and Energy Community, Moldova follows a set mandate to implement EU legislation. This includes the Directive on Energy Performance Building (2010/31 EU) and the Energy Service Directive (2006/32 EC), which are at a draft stage [22,23].

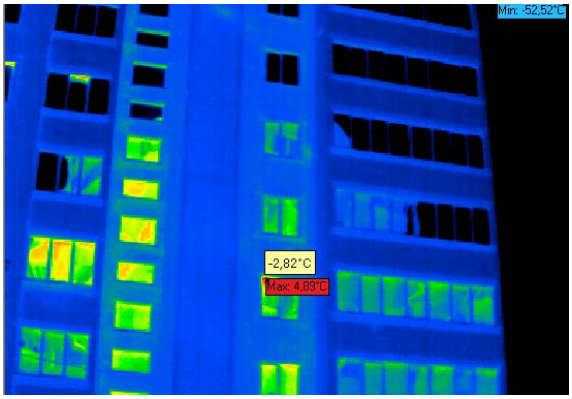

Photo made with thermal imager of the building on M. Dragan 38/2 str. and the neighboring building on M. Dragan 36/2 str. [IX]

One contradiction identified through the research appeared to be the external perception that the country lacks capacity in the areas of energy efficiency. In fact, one of the key findings demonstrated that much of the required capacity and knowledge already exists domestically. Based on interviews at the Municipality of Chişinău, Ministers in the national government, professors at the Technical University and the private industry, the impression is that there is substantial, documented knowledge on how to address energy efficiency in the building sector. This includes feasibility studies, draft legislation and training programmes. Moldovan construction companies are aware of, or already build according to, European energy efficiency standards. The Technical University Department of Architecture teaches courses in energy efficiency, and previously had a programme for certifying energy efficiency auditors. However, the lack of standards, absence of market for energy-efficient buildings and paid positions for energy auditors has resulted in modest progress and low awareness.

It is apparent that the country's institutions can still benefit greatly from international assistance, as the programmes in place may not meet the full requirements of international standards or need a restart to achieve long-term establishment. International organisations operating in Moldova seem to somewhat misjudge the level of technical capacity that is already available in the country in regards to energy efficiency in buildings. An observation made is that in many cases, international assistance could be used to overcome resistance, help augment as well as improve existing domestic capabilities. Moldova is currently experiencing relatively high international involvement e.g. by SIDA, GIZ and the EBRD. This also benefits Moldova in terms of energy efficiency. Swedish and international entrepreneurs are exploring investment opportunities. A Chinese company is looking to establish manufacturing of solar panels in Moldova to be able to claim European origin. A pilot project on solar power micro-generation is being launched by "Proiect Willpower" to test and evaluate the opportunities and capabilities for larger scale deployments.

The inherited culture from the Soviet era of expecting the state to take care of people is still present partly in the residential building sector [VII]. On the other hand, many home owners are indifferent to, or tired of, institutions and the lack of clear responsibility, accountability and auditing. Moldova has a poor Transparency International corruption ranking, 88th out of 178 [24]. Generally, the perception is that few institutions seem to have the best interests of the Moldovan citizens in mind. This is manifested in a reluctance to use banks, the refusal by apartment owners to allow entrance of energy and construction companies, and a disbelief that the government would deliver on improving services to regular people. Since the dissolution of the

Soviet Union, the country has experienced a difficult transition to a market economy. Today, many feel worse off, with energy prices for average consumers having doubled over the past five years. Some homeowners are taking their own, ad-hoc, energy efficiency measures by changing windows, sealing windows with tape, adding insulation to the outer walls of the own apartment. To avoid a "patchwork city profile", as a result of a variation of outer wall insulation of single apartments, the municipality is legislating to ensure uniform insulation and colour.

A positive side effect of implementing energy efficiency measures includes improved living conditions, social equity, job creation and a better environment. As a start, five major challenges have been identified that need to be solved in order to address energy efficiency and trigger further positive development in Moldova, including *coordination and communication, funding, housing associations and performance budgeting*.

Challenge 1: lack of coordination and communication

Coordination, communication as well as sharing of knowledge and information are essential for any working system. During the research it became apparent that the stakeholders involved only have a limited, or at least incomplete, picture of the challenges and learnings each of the relevant stakeholders have experienced. As a result, transaction costs are high and policy makers might not be informed sufficiently on areas that require more attention. During the interviews, several stakeholders expressed a need for coordination and forums or platforms to enable information exchange. Furthermore, many stakeholders were expressing disappointment towards the lack of incorporating their considerations in the policy making process [VIII,IX]. Sharing experiences of completed or on-going activities that are being implemented is a way to avoid reinventing the wheel and ensuring that stakeholders are updated on current developments and have access to information. Through increased information exchange and knowledge sharing, pitfalls can be avoided and success stories repeated.

The Norwegian Aid initiative is one example of a successful project, focusing on energy auditing in order to improve energy efficiency and buildings. However, once the funding for the project run out, the learnings and developed capacity was not institutionalised. Neither the process, nor the knowledge nor the certificates for the trained energy auditors were officially recognised by a governmental body [II].

Awareness and knowledge about the existence and capacity of the Moldovan experts is not sufficiently spread to all the necessary stakeholders. During the interviews, it was emphasised that multilateral institutions like the EBRD and the World Bank are not necessarily aware of their respective efforts in Moldova [I].

Other examples of unleveraged potential for coordination of knowledge and sharing information are the existing cases from other countries with similar conditions in terms of energy efficiency in buildings [25-28]. Despite obvious parallels to other Central and Eastern European countries in the vicinity, learnings and experiences from those countries when it comes to policy and transposition of European directives appear not to have been applied to a large

extent. By leveraging on Romanian examples, with the benefit of a common language, it would be possible to speed up the policy-making process.

One obstacle that has been identified repeatedly is a general distrust by many Moldovans when it comes to the accountability of institutions – be it banks, national and municipal governments, utilities, or universities. As a consequence, it is increasingly difficult to implement reforms that could improve energy efficiency. Scepticism and resistance is high towards the benefits of implementing measures such as installing electricity, water and heat metering, changing housing association rules for apartments or modifying building codes.

A potential solution: using the upcoming Energy Efficiency Agency in a broader sense

In the previous sections, central issues in the area of stakeholder coordination and missing platforms for knowledge and capacity sharing have been highlighted. In Moldova, an agency for energy conservation used to exist in the past, and it is now is in the process of being re-established in the form of a new Energy Efficiency Agency [1]. The agency will have a permanent staff of twelve people. The fresh start of an Energy Efficiency Agency provides a chance to establish not only higher government expertise, but also to create a national platform for all stakeholders involved with regards to energy efficiency. Such a platform would bring stakeholders together that currently do not necessarily know about each others' problems and solutions. Under the general theme of energy efficiency, different panels could be created focusing on specific problems such as energy efficiency in buildings. The task of the panel could be to agree on common problems and find common solutions. Their recommendations would benefit from increased credibility as it would not be the agenda of just one stakeholder, thus making the Agency more accountable. Panel recommendations then can be transferred to the Energy Efficiency Agency executive body, which has the task to implement the recommended solutions. The panel recommendations should also include priority areas for investment that can be linked to possible investments for the upcoming Energy Efficiency Fund. To decentralise the process, national panel institutions should have decentralised units possibly located in the regional development agencies.

Apart from decision-making procedures, alignment and creating buy-in, the new Energy Efficiency Agency should also play an important role in educating and spreading information, and maintaining a knowledge bank about energy efficiency in e.g. buildings. The knowledge that needs to be gathered should include domestic examples from Moldovan institutions and donors based in Moldova, but also relevant international experiences in the vicinity or EU. Ideally, this would produce technical expertise that can be replicated across, as well as success stories that are known to a wider public and can be repeated in their individual context.

The Agency should be responsible for informing and educating the general public. Benefits of energy efficiency projects, like refurbishment of apartments, should be communicated through information campaigns in order to overcome distrust and resistance. To reach the entire population, a mix of channels and type of information is needed. This includes an up-to-date informative website, an annual report, easy

to understand direct mail, contact for information, presence at fairs and forums are tools to help spread information about energy efficiency in general and in buildings. Communication with the Agency should also be made easier for energy consumers who are looking for advice on their own energy efficiency efforts. The agency may use an ombudsman and spokesperson to manage the communication, which could help build trust across the population.

Challenge 2: lack of long term and affordable funding for energy efficiency projects in buildings

Access to affordable sources to funding was repeatedly identified as a barrier to implementing energy efficiency measures in the building sector. Domestic banks are highly reluctant to provide long-term loans. When they do, interest rates can be as high as 18% [4]. This strongly constrains potential borrowers for energy efficiency improvements as well as private companies. Reasons for such high interest rates include lack of international competition and technical ability to evaluate risk for energy efficiency projects [4].

The lack of access to capital from commercial banks means international donors like SIDA, GIZ and the Norwegian Development Agency have partly filled the gap by funding individual energy efficiency projects. However, donor funding is seldom long lasting. Several projects begun with international donor funding were discontinued when the budget ran out.

To make matters worse, the knowledge and learnings from the projects are often lost as well. So far, the Moldovan government and the donor community have failed to organise a funding mechanism that could offer long-term financing and also provide lower interest rates. Donors themselves appear to distrust funding mechanisms that do not originate from their own institutions. The role of the CFU to support the funding of projects though the Clean Development Mechanism, CDM, appears to need some fine tuning to functioning well. The main CDM requirement is the additionality to be fulfilled for project validation and registration. The CDM project needs to ensure available finances for solving an eco-logical problem and realize carbon revenue and contribute to sustainable development. It should be conducted as voluntary project and bring ecological, social, economic and community benefits [XIII]. Currently, there are not enough platforms, forums and self-sustaining funds to provide necessary financial capital for energy efficiency projects.

Potential solution: Energy Efficiency Fund

One possible solution is to develop an Energy Efficiency Fund to serve as a financial entity, separated from the government. Funds for energy efficiency improvements are common in many countries, providing direct capital to approved projects or loan guarantees to lenders. Financing through the fund may be bundled with performance incentives. As an example, by providing part of the funds at lower interest rates, a portion as a grant for projects that achieve a set energy reduction target.

The fund can be placed centrally to benefit organisations, business and government actors. By being earmarked and existing externally to the government budget, there is less risk of funds being used for other

purposes. By providing guarantees, the fund removes concerns for long-term lending and payback time for energy efficiency projects.

The Energy Efficiency Fund has been in the pipeline for some time and Moldova passed a law in 2008 making the fund mandatory. Currently no such fund exists, neither the decision on who should manage it or a strategy to ensure that it is a revolving fund.

According to the Ministry of Economy, the widespread view is that international donors initially should secure the fund with some contribution from the government. SIDA has expressed interest, but is hesitant to transfer funds without securing how it will be spent. The EU, WB and other members of the international financial community also agree on creating such a fund. Consequently, start-up funding is feasible. Still, ensuring a relevant approval process of projects and sustainability of the fund needs to be resolved.

Applying the current EBRD approach may be the solution. EBRD partners with three local Moldovan financial institutions, and provides guarantees for renewable energy and energy efficiency projects. An external consultancy body, the Moldovan Sustainable Energy Financing Facility (MoSEFF), coordinates the bank and project. It identifies potential projects, conducts the initial energy audit to establish a baseline, enables the application for funds and performs the final audit after project completion.

There is a risk that the initiative may terminate if the EBRD changes priorities. Therefore, a similar, but independent Moldovan fund is preferred. The Energy Efficiency Agency could partner with local actors that fulfil the function as MoSEFF. Multiple, credible organisations with relevant expertise could remove the risk of one single actor with access to the Energy Efficiency Fund. There is a contradiction in being eligible for and actually receiving CDM funds, it is not possible to combine it with other donor funding. The role of the carbon finance unit and possibilities of CDM projects in Moldova should be explored further.

Ensuring a permanent fund is more difficult. Funds such as the Bulgarian Energy Efficiency Fund operates similar to a bank by charging interest rates on the money they lend although often lower than market rates [29]. Potentially, a portion of the money saved by the borrowers through efficiency improvements could be returned to the fund for a set time period, although such a mechanism would require strict auditing and a high percentage of total energy saving. Further potential sources of self-financing would need to be researched.

Consequently, a functioning Energy Efficiency Fund needs to be protected and managed by strict legislative measures to reduce the risk of misuse. Initially, it should be funded through partnerships between the government and international financial institutions. Partnerships with organisations capable of sourcing, investigating, and evaluating potential projects, can offer long-term funding for energy projects when banks are not an option.

Challenge 3: lack of functioning housing associations

According the Chişinău Municipal Housing Officer, the creation of housing associations was neglected during the transition from a planned to a market economy. In

Soviet times, the state owned the apartment buildings and was responsible for the common areas and provision of water, electricity and heat. Decisions about renovations and other investments were made at the state level. This changed in 1991, when citizens became the sole owners of their apartments. Currently, few Chişinău apartments are organised into a housing association. Those who are organised are often non-functioning and non-accountable [VII]. Without an association there is no central decision maker for the building. As a result, implementing energy efficiency improvements at the building level would require consensus, agreement and funding from each individual apartment owner.

In many countries, a housing association elects representatives that can make decisions for the building and with whom the city, construction or utility company can deal with rather than each individual owner. The association is also a legal entity, sometimes in the form of a limited company, which is eligible for bank loans.

Today almost 95% of the population own their apartment and the common infrastructure in the building; the remaining apartments that were not privatised are rental flats [VII]. However, not everyone is aware of the fact that owners are responsible for electricity, heating and water infrastructure and other common areas. Hence, maintenance is neglected. In many ways this challenge resembles the tragedy of the commons.

Municipalities and the residents pay a small fee of approximately EUR 0.05 per square meter for the services [1]. However, the services financed through this fee have not been defined clearly which has caused irritation. The fee is perceived as expensive compared to the earlier fee of one Eurocent. Yet, the current fee of 5 Eurocents per square meter is insufficient; appropriate building maintenance would require a fee level of about 25 Eurocents per square meter.

It is not permitted to collect funds for common infrastructure work and renovations in municipality managed buildings. This is not the case in 25% of the apartments that are managed independently.

The lack of functioning housing associations to manage buildings and limited possibility for households to get a bank loan complicates the situation. There is no housing organisation or representative that is recognised by the bank. Furthermore, if funds are available, there is a lack of trust to let companies like construction companies or utilities [IX] access the building or private apartments. The situation appears slightly different in new buildings, where the majority is younger. Recently, associations are being established from the very beginning in new buildings. The home-ownership structure is the same in all buildings [VII].

When a housing association exists, there are other challenges as well. In municipality-managed buildings the major appoints the chairman. In independently run associations the chairman is elected, but one problem is the large size of the association, it may cover several apartment blocks and hundreds of dwellings. This means that no one knows who their neighbour is or even who their elected chairperson is. If a chairperson turns out to be a mistake, 75% of apartment owners need to vote for someone else and the current chairperson only need to achieve 26% to stay in position. The municipality has no legal right to interfere with independent associations. Hence, a chairperson can be “elected for life” and

sometimes act in their interest, while living elsewhere. The system appears flawed and does not enable transparency or developing trust as the chair person can act according to their own agenda.

Possible solution: modify housing association rules and incentives

The resistance towards creating housing associations needs to be overcome with incentives. Creating public awareness of the fact that the residents collectively own the entire building and through creating associations can get access to funding and loans to improve quality of life. The first steps may be taken through projects linked to the Energy Efficiency Fund or similar financial incentives. One way to get attention and positive response may be to offer subsidies for investments in relevant, quality infrastructure that will also meet future demands to avoid residents only buying the cheapest version. The financial contribution would be made in return for gaining access to the individual apartment and install and tune the solutions. In addition, if not managed earlier, an apartment should automatically become part of an association when ownership changes.

Housing associations

Legislation change is needed to make the individual chairperson accountable and create democratic associations. One block, or building, should equal one association, to enable people to get to know each other and develop trust as well as being able to influence. To enable funding for maintenance, firstly there needs to be a common legal framework for how the association should operate and secondly, there needs to be an identified and recognised interface that the bank will lend money to.

There are different ways of forming associations in EU. In Sweden, the majority of non-rental apartments are managed through a home-owner cooperative. The organisation owns the building and the "owners" buy the right to occupy a proportion of the building equalling the size of the home. A monthly maintenance fee is charged based on the size of the apartment to cover common costs for hot water and heating as well as facilities such as common laundry room, sauna, storage and terrace. The fee usually also covers future infrastructure investments to mitigate the risk of avoid hefty surprise costs. The chair is elected once a year by the members. In Finland, the residents own their individual apartment and the association is organised as a limited company. The chair is elected regularly in the same manner as in Sweden. The monthly fee is smaller and only covers maintenance, for larger projects each owner pays. The association negotiates a loan which is then paid through an increased monthly fee. It is also fairly common that the ground level is rented out for commercial activities. Hence, some associations can waive the maintenance fee since it is covered by the rent income.

Independently of ownership structure and different set-ups, it appears that a legal structure that ensures a democratic elected chair and active members is the way to proceed in Moldova. The Finnish system

Team Moldova visiting residential building block in Chişinău, Moldova

with a limited company may be the preferred organisational format as this forces openness and transparency in bookkeeping, everyone becomes a "shareholder" in their building and it would be recognised as a legal entity, eligible for a bank loan like any other business. Given the low income levels, it may be worthwhile to consider adding a small sum to the maintenance fee for future renovations but for this to happen trust is required. In addition, explore if there are other factors than age of residents in how associations in new buildings are managed. Given the situation, awareness is crucial and providing incentives for openness to develop trust as well as a careful monitoring of the chair and the reporting system. On paper, this appears to be one challenge that could fairly easily be addressed to trigger a change and empower people.

Challenge 4: lack of coherent building codes with regards to energy efficiency standards

Building codes are the national recognised standards that construction companies must meet when building any new structure. Building codes exist for structural integrity, but there are currently no standards explicitly related to energy efficiency for buildings. Despite this, new building construction appears to be meeting a minimum European standard for insulation. For old buildings, a much larger concern, the lack of building codes for energy efficiency means that building refurbishments have no guide to follow, nor is there a level of quality ensured.

Another aspect is that as Moldova attempts to align its domestic laws with EU Directives in an effort to move towards EU accession, it will need to adopt EU common standards concerning the construction of buildings and the conduct of energy efficiency audits. As Moldova is already at the draft stage of implementing the European Building Directive (2010/31 EU) [22], setting energy efficiency building codes and certification standards on auditors becomes mandatory.

Possible solution: modify building code in line with EBP Directive

The easiest way to address both these problems is to accelerate the implementation of the EU building directives [22]. A building code based on the European Buildings Performance Directive (former 2009/91 EC, now 2010/31 EU) is recommended in order to streamline norms and align with the EU (please also refer to Figure 1). This would include the existing Building Norms carried on from the Soviet era, which includes the compliance of buildings to be earthquake proof to be extended towards energy efficiency.

The four key points of the Building Performance Directive include [22]:

1. a common methodology for calculating the integrated energy performance of buildings;
2. minimum standards on the energy performance of new buildings and existing buildings that are subject to major renovation;
3. systems for the energy certification of new and existing buildings and, for public buildings, prominent display of this certification and other relevant information. Certificates must be less than five years old;
4. regular inspection of boilers and central air-conditioning systems in buildings and in addition an assessment of heating installations in which the boilers are more than 15 years old.

Figure 1: Key points in the Building Performance Directive [22]

Residential building block in Chişinău, Moldova

The building code however, needs to establish a common methodology, minimum standards, and a certification system and inspections on energy efficiency. This requires adequate capacity in higher education in order to build capacity in the auditing sector, as well as construction and architecture. In order for the Housing Code to work sufficiently, education and information measures need to be undertaken, not only with involved parties such as constructors and auditors, but also with the general population.

The capacity to train such professionals exists. In 2005, the Technical University of Moldova, in cooperation with a Norwegian NGO, developed a course curriculum for training and certifying building energy efficiency auditors [III]. The training programme was based on European standards for auditing. According to a professor at the university who helped develop the programme, approximately 45 graduates finished the programme. However, as there was not yet a market for certified energy-efficient buildings, there was no use for these graduates and the programme discontinued. While the curriculum and materials still exists and could be re-started, there is still no state-level accreditation body to certify-the-certifiers [II]. GIZ is working with the government to create such a body that would be capable of accrediting certifiers to a European-wide standard for energy efficiency auditing. This programme by the GIZ could be used to benchmark the existing capacity at the Technical University and make use of the auditing graduates.

Challenge 5: current energy budgeting does not provide incentives to save energy

According to one member of the Ministry of Economy [V], there are currently no incentives for public buildings to invest parts of their budget into energy efficiency improvements. Currently, the budgets for heating and electricity for public buildings are set each year, based on the previous year's usage. Consequently, if a manager of a school or another public building finds the money to invest new double pane windows and insulation, which reduces the buildings energy cost, the budget gets aligned with the next years costs, hence a cut in budget occurs [I]. As the payoff for investing in energy efficiency measures typically requires several years, few public buildings in Moldova have invested in efficiency measures on their own accord.

Possible solution: performance budgeting

One relatively simple reform to address this issue would be for municipalities to enact legislation that would make part of the buildings energy budget contingent on meeting energy efficiency targets. Thus, a public building manager can invest on own initiative and meet energy efficiency targets. Thereby savings can be kept for a set number of years and be able to invest them

in other areas (such as new textbooks in the case of a school) or even get additional funds exceeding its previous budget if it meets a higher energy efficiency performance target. There are currently on-going activities to enable this change in the capital and to spread it across the country as well. Several countries have experiences from such a system, and their learnings and regulatory frameworks could be transposed to the Moldovan context. This reform would, however, need to be coupled with a robust system for conducting both pre and post-investment energy auditing in order to establish baseline energy use and the effectiveness of efficiency investments be considered legitimate. While such auditing expertise exists domestically and is taught at the Technical University, a certification standard of auditors is still under development.

Conclusions

Progress has been made and Moldova still has some challenges to overcome to ensuring energy efficiency and security. In addressing energy efficiency in buildings, one of the most cost-effective means of improving energy security, the authors have identified a positive attitude among most key stakeholders. There is existing capacity in Moldova in regards to energy efficiency in buildings, for example when it comes to energy auditing and the actual construction. Also, there are concrete action plans for transposing relevant EU Directives. Among these are the Energy Performance in Buildings Directives as well as the Energy End-Use Efficiency and Energy Services Directive. Throughout the research, the authors repeatedly in discussions came across five key challenges that may be considered as bottlenecks.

First, there is an apparent lack of coordination and communication among stakeholders regarding each others' efforts and knowledge when it comes to energy efficiency in buildings. The suggestion is to use the re-emerging Energy Efficiency Agency as a forum to bring all relevant key stakeholders together in a panel that develop and deliver common agreements and documents on problems and solutions.

Second, the lack of long-term and affordable funding for energy efficiency projects in buildings. Due to unfavourable interest rates in the domestic banking sector, credit costs are too high which causes underinvestment in refurbishment of existing buildings. A potential solution is to re-establish the Energy Efficiency Fund as a self-sustaining fund working that provides education and enables low interest rate loans to homeowners, housing associations etc.

Third, a highly relevant organisational problem is the lack of functioning housing associations. As many refurbishments address the building shell as a whole, private apartment owners need to form associations in order to be able to secure investments and to lower transaction costs for companies. Currently, many buildings lack such associations or the associations are dysfunctional. The suggestion is to shortly revise the regulation to enable the creation of relevant associations, enabling a legal entity that is recognised by the bank and create strict regulation around the accountability of the chairperson and nomination.

Fourth, there is a lack of coherent building codes in regards to energy efficiency standards. This problem applies mostly to existing building stock. As a way to handle that the authors suggest to apply experi-

ences from other countries but mostly to transpose the relevant EU legislation. Through more detailed requirements for energy efficiency when it comes to refurbishment of existing building the government can ensure a quality level, which also allows building certification.

Fifth, the final challenge that was identified relates to public buildings only and shows that current energy budgeting in public buildings does not provide incentives to save energy. Due to the nature of one year budgets and government accounting, investing in energy efficiency measures results in a cut of energy budgets in the next year. Hence, public building managers do not get a payback for their investment, as a result have no incentive to invest. The authors suggest addressing this by either allowing multiple year budgets for energy costs or by increasing budgets if certain energy efficiency performance budgeting targets are reached.

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Waste Management in Zabrze

Pathways to a more sustainable system

By Bernice Charles, Caroline Steinvig, Chihiro Sawaki, Cornelia Moser

Introduction

Zabrze is a medium-sized town in Poland in the region of Silesia with just below 200 000 inhabitants. Zabrze, originally an industrial town with massive emissions and pollution-related health problems, is currently developing new industries mostly based on services and tourism. On its path to becoming a sustainable city, Zabrze collaborates with its environmental twin-city Lund to take on experiences gathered in Sweden over the last decades.

The city of Zabrze

This report, which is part of the collaboration between the city of Lund and the city of Zabrze, is written within the framework of the Strategic Environmental Development module of the Master Programme in Environmental Management & Policy at the International Institute for Industrial Environmental Economics (IIIEE). The customer of this project is the city of Zabrze and more specifically the Department of Ecology.

The report provides possible starting points and indicates pathways to municipal solid waste reduction and a more sustainable waste management system for Municipal Solid Waste (MSW) in Zabrze. While industrial waste still accounts for the largest part of waste production in the city, MSW has become an increasing problem for the city of Zabrze with a rising number of illegal dumps and very low recycling rates [1]. By taking mainly Sweden and the region of Skåne (Southern Sweden) as an example for waste management development, both positive and negative learning experiences are considered and analysed.

Information about the local situation in Poland and Zabrze was gathered during a site visit between the 9th and 16th of April 2011. Based on information from various stakeholders in Zabrze, ideas for improvements and conclusions are drawn, reflecting the differences and similarities of the twin cities.

This project was enabled by the kind support of the municipality of Zabrze and the Swedish Polish Sustainable Energy Platform. We hope that our work brings Zabrze one step further on its journey towards sustainability and sustainable waste management.

The municipal solid waste situation in Poland

In Poland, waste management within the National Environmental Policy is seen as an important issue for environmental protection. Waste generation averaged 316 kg per person per year in 2009 [2,3]. MSW is obtained from households, shops, offices, schools, graveyards, municipal green areas and infrastructure facilities.

The municipal waste composition is highly dependent on a number of factors such as residents' wealth, segregation of recyclable materials, in-house composting and seasons. The greatest share of MSW consists of organic waste, paper and cardboard, plastics, glass, combustible mixed waste, fabric and sanitary products, however differing from city to city [2].

MSW is continually increasing in Poland. This increase has not been accompanied by the development of a sound waste disposal system as can be seen from the waste hierarchy comparison below. In some instances, hazardous waste such as drugs and batteries are being deposited along with mixed waste [4]. In addition, illegal dumping has become a big issue in Poland. Waste dumps can include municipal and hazardous waste leading to significant impacts to the environment, especially for ground and surface water [5].

Incineration is increasingly being seen as an option to reduce the amount of waste being landfilled and to recover energy in the process. Incineration is, however, not viewed favourably by the Polish people. It is a solution that carries high costs compared to other methods [6].

Polish government funding for waste management, partially supported by the EU cohesion fund, is limited as the budget for environmental protection is shared amongst water, air and soil management. The biggest share goes to air protection and water management and only ten to fifteen percent of the money goes to soil protection which also includes waste management [4]. According to estimates from 2001, it will cost Poland EUR 3.6 billion to implement a sound waste management system, which complies with European Union (EU) directives regarding waste, landfill, packages, hazardous substances, electronic waste etc.

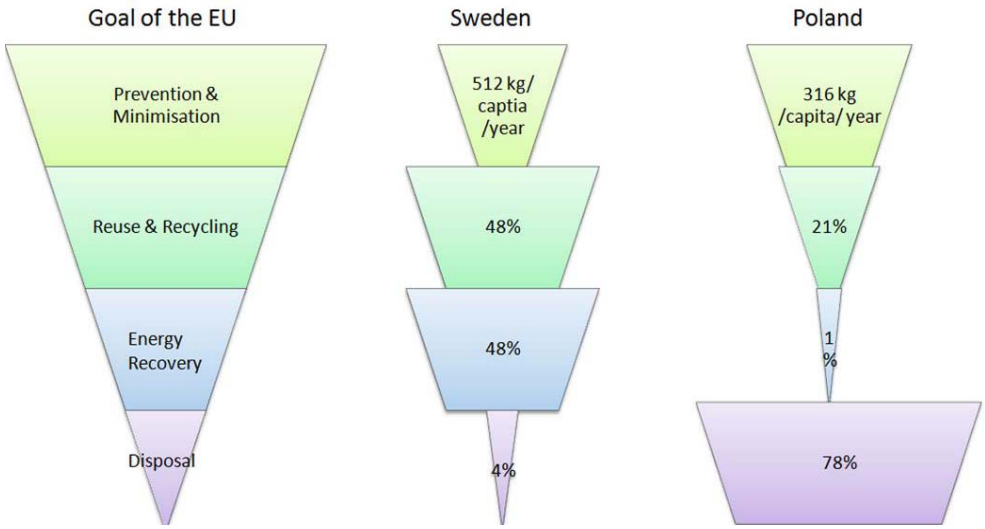


Figure 1: Comparison of the waste hierarchy between the EU goal, Sweden and Poland

The new Polish waste law [11]

The Polish government recently proposed a new Polish MSW law that transfers the ownership of MSW from private collection companies to municipalities. If the new law is accepted by the Polish Parliament, it will be implemented in the course of 2011. According to the Polish Environmental Minister Andrzej Kraszewski, the new law will cause a "waste revolution" in Poland.

Currently, Poland is paying EUR 40 000 daily in fines to the EU for non-compliance with waste management and disposal. If Poland does not manage to reduce landfilled waste to less than 50 % of current volumes, their non-compliance fines will be as high as EUR 250 000 per day by 2013 [7].

Attitudes towards waste in Poland

The major determinant of recycling behaviour seems to be the attitudes towards recycling.

Factors influencing behaviour are [8]:

- Existing infrastructure
- Knowledge on how and why to recycle
- Barriers to physical recycling
  - Time
  - Convenience
  - Space
- Concerns for the community
- Previous experience and consequences of recycling

More broadly, these factors can be separated into environmental values, situational and psychological variables which need to be considered for waste campaigns. A very important point is that different kinds of campaigns are needed to promote the repair and reuse of materials compared to campaigns aiming to reduce waste at the point of purchase. Recycling behaviour can be changed by *convenience, knowledge and/or incentives,* while waste minimisation behaviour depends on the individual concern for the environment and is thereby a lot more difficult to influence [9].

Waste management in Zabrze

Zabrze generated approximately 56 000 tonnes of MSW in 2009 [10]. Currently, private companies are responsible for waste management. With the planned implementation of the new waste law this may soon change.

Mixed waste bin in Zabrze

However, for the past ten years the Parliament has been deliberating on the introduction of a new waste law with little progress. As a result, many municipalities like Zabrze feel that this change will not take place and thus the Department of Ecology in Zabrze has not set up any plans to accommodate the possible change in waste management. Once the law is approved, the municipalities will have one year to implement it [12]. The law may however have good chances for introduction with the EU pushing for its implementation. Today, waste companies negotiate contracts with owners and property managers to collect waste generated by households. The households and property managers are re-

sponsible for supplying waste containers and ensuring that they have a contract with a waste collection company [10]. The collection companies make their profit on mixed waste and hence do not inform their customers about recycling options [13].

Waste container in the city of Zabrze

The role of the municipality is to issue permits to waste collection companies along with ensuring that all local residents have signed contracts and are included in the waste management system. Such permits are issued once and are valid for an unlimited amount of time. The only communication with the waste collection companies is a yearly report which the companies have to hand in.

In Zabrze, different types of waste are collected separately. The department of City Infrastructure is responsible for the elimination of illegal dumping sites of which 105 were cleaned up in 2010 for a total cost of EUR 62 000 [10]. The two main problems for Zabrze, regarding its waste management, are according to the Department of Ecology:

1) The ownership of the waste, which is not municipally owned yet
2) The lack of financial means

Zabrze is part of the Upper Silesian Metropolitan Association which prepares projects for the region. Within this council, the construction of two waste incineration plants has been planned. However, the capacity of those plants is unclear and protests have lead to the consideration of cutting the capacity to 250 000 tonnes/year instead of the planned 500 000 tonnes/year for one of the plants. The council does not have (EU) funding for the plants at the moment and the scheduled commission is earliest in 2018. In addition, private investors have shown interest in setting up incineration plants. However, as the municipality cannot guarantee access to waste for a given amount of years, investments are not very attractive at the moment. This situation will not improve until the municipality becomes the owner of the waste through the new law.

Recycling containers for glass, plastic and paper

The city, together with a few private providers, maintains over 400 collection points for recyclables across Zabrze for the collection of plastics, paper and glass. These materials are then taken to the segregation center for manual sorting where they are further segregated, pressed and sold to recycling companies. In addition, the city maintains mobile

containers for bulk waste such as fridges, furniture etc. which are manned and moved around in the city. The same concept of containers is applied to collect garden waste. It is announced in the newspaper and online where the containers are positioned.

The landfill in Zabrze

The landfill in Zabrze is owned by MOSiR, a limited company with 100% of the shares owned by the Zabrze municipality [14]. The landfill is currently cost-effective due to the large amounts of waste received (approximately 50 000 tonnes/year). The collection companies that deliver waste to the landfill pay a waste tax of PLN 105 (EUR 26) per tonne of waste and also a treatment charge of PLN 65 (EUR 16) per tonne of waste. Once the new law is implemented it is likely that the amount of landfilled waste will be reduced, and hence with it the revenue for MOSiR. As the legislation in Poland does not allow environmental funding for projects that generate profit such as the use of methane, MOSiR has to collaborate with external companies for the extraction of gas from the landfill. To balance the expected reduced profit from the landfilling operation, MOSiR is planning to build a landfill for hazardous waste, such as asbestos, for additional income [14,15].

The segregation plant in Zabrze was sold by the municipality in 2010 and is now owned by the private company .A.S.A. The segregation plant is currently going with a financial loss because of the small amounts of recyclables that they receive from the 400 collection points in the city. However, .A.S.A. is expecting the new law to be implemented shortly and once in place they will work with the municipality to increase the collection rates of glass, plastic and paper. The company is also trying to educate the citizens on how to sort their recyclables by arranging study visits to the segregation plant and handing out information materials during theme weeks such as “Cleaning the World” week [16]. Besides sorted recyclables, the segregation plant receives green waste from parks and gardens, and also kitchen waste from a pilot area in Zabrze (approximately 500 households).

Pszczyna - a Polish case study

The city of Pszczyna has taken over responsibility for waste management itself. This has led to a better working waste management system of which Zabrze could learn from. Therefore, the case is introduced here.

Waste containers in Pszczyna: yellow for the dry fraction, black for the wet fraction

In 2006 the city of Pszczyna arranged a referendum for transferring the ownership of waste to the municipality. Thanks to heavy campaigning and education by the municipality six months in advance almost 37% of the residents voted and the result was yes to the proposed change. After the referendum it took the municipality two years to prepare the new waste system [17]. Several assumptions were made such as:

1. Every citizen is assumed to generate 50 litres of mixed waste per month
2. The system allows for unlimited amounts of recyclables
3. Collection of the wet (mixed) and dry fractions (recyclables) every two weeks.
4. Collection of bulky waste (e.g. furniture, fridges) twice every year

According to the mayor of Pszczyna, these assumptions have been accurate and work well for single-family households but problems arise with block houses. This is because the residents in block houses are not separating their recyclables as well as the residents in single-family houses. As a result the bins for mixed waste are often overflowing [17]. To improve the situation in the block house areas, the municipality is actively educating the residents by putting up posters, visiting schools and closing the waste chutes ("holes") in the wall of block-houses.

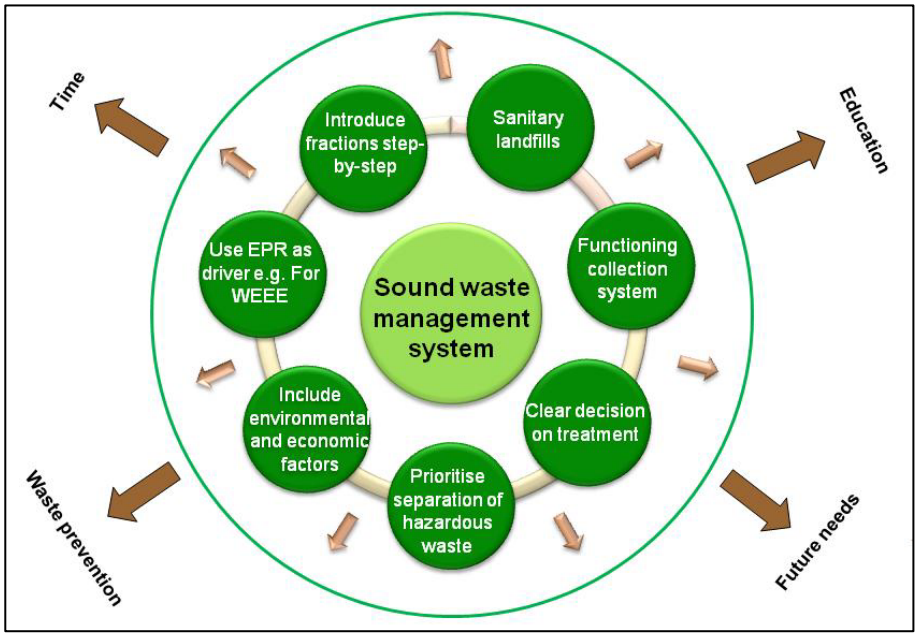
Experiences from Sweden

Sweden has been working on the improvement of its waste management system for over 40 years. It is therefore useful to look at lessons learned and apply selected aspects to Zabrze.

The assignment of *responsibilities* has been the first and most important step in setting up a functioning waste management system in Sweden. If responsibilities are not clear, no investments can be assigned from governmental departments and it is difficult to create a vision and implement laws on a regional and local level. Ideally, waste management systems are controlled by one authority only, with the possibility of outsourcing all elements necessary [18].

A second crucial element for the development of a functioning system is the assignment of concrete *environmental goals*. While municipalities and waste companies in Sweden chose different paths, they all had to achieve the same national goals

Figure 2: Elements of the current Swedish waste management system



which requires recycling, source separation and minimisation of waste [18]. An important lesson at the time was that waste sorting has to take place at the source, that markets for recycled products needed to be available and that dangerous goods (e.g. batteries) needed particular focus to avoid contamination of other waste fractions. Focus has therefore been given to consumer education [19,20].

A third important point is the *financial aspects*. It needs to be very clear who is paying for what and to whom. Monetary aspects include for example waste taxes, landfill and incineration taxes. The different allocation of taxes and costs may make a system more or less attractive for municipalities and possibly lead to frustration if monetary revenues and duties do not match. In Sweden, the national implementation of the EU Landfill Directive as well as the landfill tax proved to be effective approaches [21,22].

Waste management in Sweden

The overall goal of the Swedish waste management system is to work towards reducing the amounts and hazardousness of waste. Laws, taxes and national environmental objectives are used as guidance on how to best manage the waste [23]. Elements which the Swedish Waste Management Organisation underestimated at the beginning are the separation of contaminated mixed waste and the segregation of electronic and electronic waste (WEEE), which was introduced at a later point.

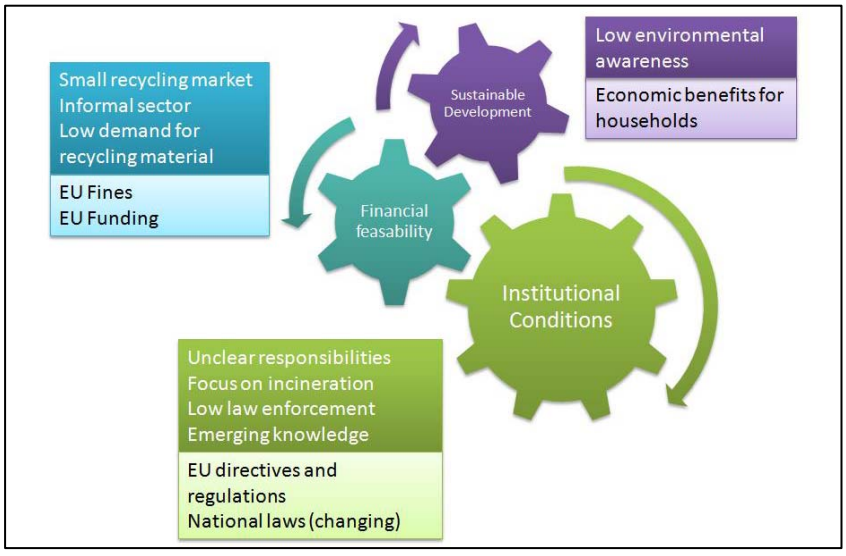
Another important lesson is that incineration cannot be considered as panacea. It pays off to think through and focus on other elements such as waste minimisation, re-use and recycling right from the beginning when setting up a waste management system [24].

EU legislations control many of the operations in the Swedish waste management system such as landfilling, incineration and how to treat hazardous waste. When it comes to biological treatment it is the Swedish national laws that control how this should be done [25].

Factors influencing systems

In order for Poland, and particularly the city of Zabrze, to advance their waste management system as fast as possible, positive and negative learning experiences from Sweden and other places can be used to leapfrog the development and avoid problems encountered in other systems.

Figure 3: Factors influencing the development of waste management systems
Source adapted from Mundaca & Rodhe,2005 [26]

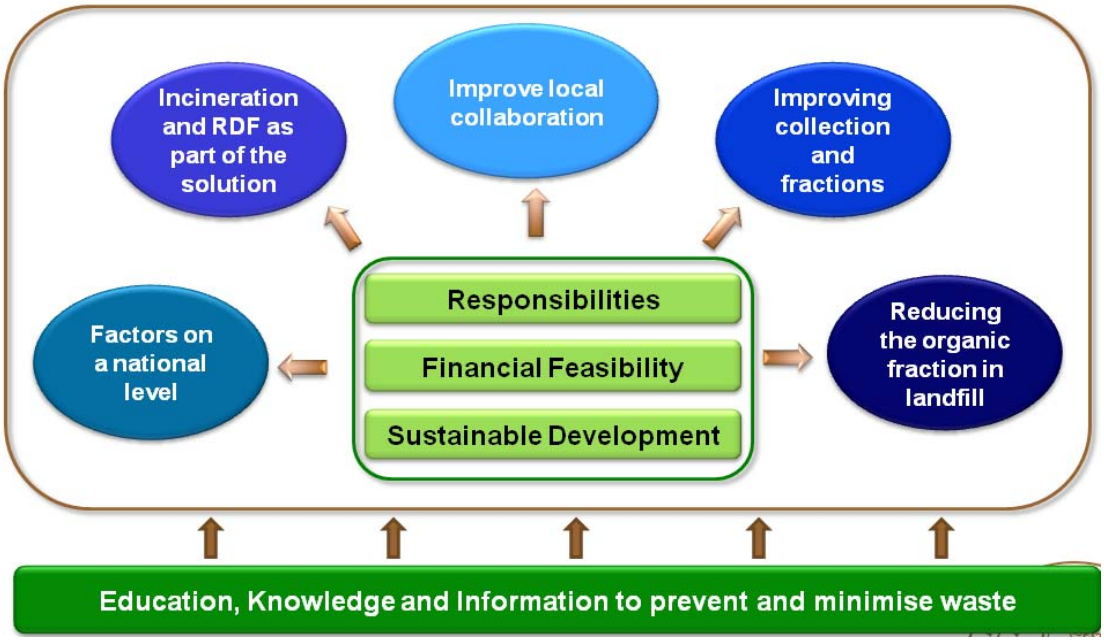


The size of the gears in the illustration below indicates the importance of the various aspects with the textboxes referring to some major barriers and drivers. Further aspects which must be considered are amongst others the costs vs. the benefits, the infrastructure available and institutions, the level of know-how, the availability of materials and present and future market conditions [8]. Poland receives financial help from the EU for improvements in waste management. The EU provides help to countries within the EU which have gross domestic products (GDP) of less than 75% of the overall EU average [27]. Between 2007 and 2013, total investments of the EU in Poland amounted to EUR 67 billion, of this EUR 17.8 billion are allocated for the protection of the environment, with a large part focusing on waste water facilities [27]. The second priority in the environmental field is waste management. Waste management programmes include investments related to prevention and reduction of MSW, recycling technologies and end-treatment as well as the elimination of "hazards relating from waste disposal" [28].

Key drivers and barriers to a more sustainable system

Experiences from Sweden and other Polish cities, such as Pszczyna, cannot be taken directly for the implementation in Zabrze. In Sweden, institutional factors are different and more favourable to waste management. The same holds true for smaller town with 50 000 inhabitants and many more single-family-houses like Pszczyna. However, some of the elements should be possible to take on in order to prepare the city of Zabrze in the best way for the coming new law and to allow for a more forward-oriented waste management system. The graph below provides an overview of various activities, which could be starting points for a more sustainable waste management system in the future.

Figure 4: Starting points to improve the waste management system in Zabrze



Responsibility, financial aspects and sustainability

Given the current situation, with the new waste law looming, it is difficult to establish responsibilities, assign financial means and decide on a long-term sustainable strategy. However, there are things that can be done to prepare for change:

Recommendations: action plan and education

- The municipality should put focus on preparing for the coming change in waste ownership. This can include an action plan including amongst others:
  - Designed of new system to encourage segregation
  - Distribution of responsibility within the municipality
  - Educational and informational campaigns needed to inform and educate residents to segregate and recycle
  - Specific milestones and intermediary goals within a specific timeframe
- Close all loopholes to ensure that small businesses do not use bins meant for block houses

Tackle limitations by factors caused on a national level

Certain important limitations which hinder the implementation of an effective waste management system are at the national level and need to be changed there. Barriers on a national level include:

- The national government does not ensure that the producer responsibility is effective in achieving the set targets and that packages are collected everywhere.
- There is no deposit-return system on a national level. Only the national government can set up such a system for PET-bottles and cans.
- The national government does not seem to have a coherent plan of action for the collection, recovery and recycling of WEEE.
- The timeframe for the new waste law is unclear leading to uncertainty, where municipalities currently do not know how to act and in which timeframe they will have to make changes and whether this will take place or not. Financial support for the change is also unclear.
- It is unclear how fines are levied on national and regional level if EU targets are not met. If incentives for reaching EU goals were provided to municipalities, this could become a driver to increase recycling.
- There is a lack of national government funding for educational campaigns or environmental activities at schools.

Recommendation: lobbying

Despite the obstacles described, municipalities can still play a role in removing these hinders by joining together and lobby at the level of the national government to bring about changes.

Specifically, Zabrze should increase its collaboration efforts within the Upper Silesia Metropolitan Association.

Incineration and refused derived fuel (RDF) as part of the solution

The Upper Silesian Metropolitan Association is planning to build two incineration plants that will be in operation no earlier than 2018 [12]. Since Poland is not meeting the requirements in the EU Landfill Directive and will have to pay even higher fines in the near future one can understand why incineration seems to be an attractive alternative. However, incineration should not be seen as a solution to waste prob-

lems. In fact, apart from landfilling, incineration is regarded as the second worst option by the EU when it comes to waste management. Construction of incineration plants is very costly and installing the required cleaning systems along with operation costs makes waste-to-energy plants an investment with a very long payback time.

RDF in Zabrze

RDF is a technique where waste with high calorific value (e.g. plastic) is pre-treated and used as alternative fuel in e.g. cement plants. Already today, small volumes of municipal waste in Zabrze are used for RDF. However, there are no current plans to convert coal-fired plants to RDF-plants or to further expand the use in cement plants [12].

Uncertainty exists regarding if and when an incineration plant will be built since consensus has not been reached in the regional association. Apart from being an expensive investment, incineration is also a lock-in solution and does not encourage the minimisation of waste. Once the waste-to-energy plant is in place there will be a constant need for generating enough waste to make it cost-efficient. There is also a risk that the recycling market, which is essential to close material-loops and achieve a sustainable society, will not be properly developed due to disincentives from the incineration technology.

Recommendation: avoid lock-in technologies

It is very important that waste-to-energy is not considered as THE solution. There will always be some fractions that will have to be incinerated, fractions that should not remain in society. In that way incineration is part of the solution. However, a stronger focus should be put on developing the recycling market, in line with EU policies.

Local collaboration

The city of Zabrze cooperates with 14 other municipalities, which are all members of the metropolitan association. Their tasks are to prepare projects such as the construction of new incineration plants. Additionally, Zabrze already deploys actions for educational campaigns and research to organisations such as research institutes.

It would, however, be desirable to have a more holistic waste management collaboration across municipalities. As an example, even the city of Pszczyna, with its high recycling rates, is having problems with illegal dumping. The reason for those problems is that surrounding municipalities have not implemented similar collecting system and are therefore dumping their waste in the neighbouring municipality.

Zabrze, and the surrounding municipalities, should collaborate more strongly and push the national government to change policies. It may be possible for the city to start a local initiative and collaborate with other municipalities and other sectors such as educational, economic, industrial and non-governmental organisations to push national policies in the long-term.

Recommendations: increased stakeholder involvement

Local collaboration with various stakeholders is an important factor to advance the waste management system and policies on a national level. Other cases show that this takes time but is possible!

How to improve collection of MSW

Besides the lack of municipal ownership of waste, another big problem for Zabrze is the high number of block houses. In these places waste sorting is not successful. Due

to the issue of anonymity some of the residents misuse the facilities and put their waste in the wrong bins.

Convenience, knowledge and incentives are the cornerstones of a successful waste collection system.

Recommendations: increase convenience

Potential starting points to improve the collection are:

- Extend the waste management system with colour codes by sing different coloured bins for the different fractions
- Apply visual information.
- Small openings on the bins for recyclables to prevent misuse
- Expand collection points for recyclables and hazardous materials to increase convenience and coverage area
- Install large recycling centres, which are accessible by cars, to encourage the legal disposal of waste free of charge
- Enforce the frequency of collection to ensure that recyclable waste does not overflow at collection points.
- Create collection points for WEEE to ensure that such waste is being collected properly.
- Introduce zoning for waste collection companies to efficiency in collection.
- Close the waste chutes in block houses so that people use segregation containers, instead. In addition, closing the chutes reduces the risk of fires.
- Conduct small-scale pilot project at e.g. block houses using education, information or other means to see what works best.

A locked waste chute in Sweden

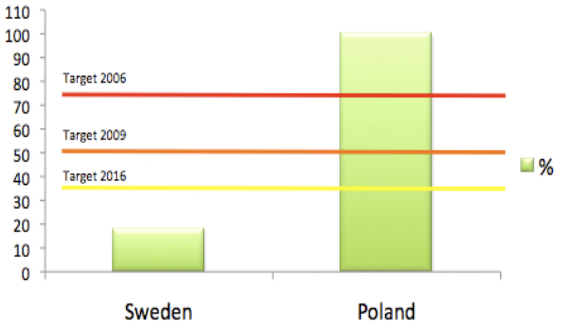
Reduce organic waste fractions

Organic waste must be reduced in landfills according to the EU Landfill Directive. The directive requires a reduction of municipal organic waste by 25% of the amounts generated in 1995 until 2006, further reductions to 50% by 2009, and 65% by 2016 (all figures in relation to 1995-levels), Poland had a four year extension to achieve each of these targets [30]. Poland has however not yet achieved its 2010 target (including the four years extension given by the EU) and hence still needs to work on reducing organic waste and collect it separately from each household as well as from restaurants, supermarkets and wholesalers.

Collected organic waste can be transported to a biogas plant where the gas can be used for generating heat and/or electricity as well as upgraded to vehicle fuel for cars, buses and trucks. Currently Zabrze does not have a biogas plant, however, such a facility could be part of a long-term vision on how to meet EU directives and would probably qualify for EU funding.

The increase in collection of the organic fraction is difficult to achieve and needs time. It is important to have a long-term vision to achieve the goals.

Figure 5: Municipal organic waste landfill in 2006 compared to targets of the EU Landfill Directive; targets for Poland are derogated by four years
Source: European Environment Agency, 2010 [32]



Recommendations: long-term vision

Activities which could increase collection rates by citizens are:

- Educational campaigns
- Introduction of a paper-bag system for separate collection
- Introduce a fee for mixed waste to encourage segregation. The risk however, is that illegal dumping may increase

As an example the Swedish waste management company, NSR, successfully uses paper bags for the collection of organic waste from households. However, the organic waste fraction from restaurants and supermarkets needs to be considered. To smooth the start of organic waste collection, these shops could be prioritised and equipped with special containers for organic waste.

Prevent waste!

Awareness of why recycling is important is not the most significant factor when it comes to making people *recycle more*. Instead, it has been shown that convenience is by far the most essential element in a successful recycling system. On the other hand, awareness and knowledge on our environmental impacts is a key factor for *preventing and minimising* waste generation in the long run [31].

The city of Zabrze could start by making the citizens more aware about the issues of waste management and waste generation. Campaigns in the city could be a good way to reach out to a large share of the citizens. All channels such as TV, billboards, posters and radio should be utilised. What seem to have worked best in other cities are focused campaigns on one issue (e.g. plastic waste) in order not to cause confusion. As with any education there is a strong need for repetition!

On a final note it is important to keep in mind that changing people's behaviour takes time but it is possible! Although waste prevention should be the long-term goal and vision, starting by making the current system for recyclables more convenient is crucial in order to make the waste management system sustainable. Recyclable waste should be seen primarily as a valuable raw material rather than a source for energy.

Recommendation: increase educational awareness

Convenience and incentives are important elements to increase recycling. However, for the overall goal of waste prevention and reduction of waste, educational awareness needs to be increased.

It is therefore recommended to balance education with supplying appropriate infrastructure for recycling such as bins close to property or easily accessible collection points.

Conclusions

It takes a long time to make municipal waste management systems more sustainable. As this report clearly shows, reasons are the complexity and the many factors influencing waste management systems on national and regional levels. This fact is exemplified by looking at the Swedish case, where the development of waste management has been ongoing for the last 40 years with improvements still under way.

The experience from Sweden shows that the assignment of *responsibility, national environmental goals* and *financial aspects* play a crucial role in the development of a sustainable waste management system. Given the current institutional and financial situation in Poland it is difficult for Zabrze to take a path similar to the Swed-

ish case. However, some elements and experiences may still suit the local situation in Upper Silesia and can be adapted and used as inspiration and starting points to a more sustainable system.

Even without the new waste law in place, Zabrze should act more proactively and prepare itself for future development and business opportunities in the area of recyclables and waste management. Important starting points, which should be prioritised, are:

1. Educational activities to reduce, prevent and segregate waste
2. Aim to receive EU funding for waste infrastructure and educational campaigns
3. Increase the collaboration within the region across municipalities, business sectors, schools and non-governmental organisations.

As previously mentioned, incineration cannot be regarded as the solution to the waste problem. The focus needs to be on recycling and developing the market for recyclables, following the EU waste hierarchy.

It is important for the city of Zabrze to note that it will take a considerable amount of time to change to a more sustainable waste management system. Convincing citizens and businesses as well as other municipalities that waste prevention and segregation is not only beneficial, but crucial for the future of our society will require great efforts. A long-term vision and strong commitment are needed to achieve the necessary changes.

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How to Strengthen the *Soft* Approach to Sustainable Travel

A strategic assessment of mobility management in Umeå

By Antina Sander, Christian Brandt, Elaheh Alasti, Emma Rogers and Maria Remstam

Mobility Management (MM) is defined as the promotion of sustainable transport and the use of measures that change traveller's attitudes and behaviour to influence the demand for car use [1]. The city of Umeå has had a MM team since 2008 as part of an initiative to improve the city's air quality. The team's work has been successful and led to concrete results. However, the office is in essence working independently from the municipal transportation planning and is limited by the horizons of its project funding. The city's Planning Department also foresees a more continuous role for the team in the implementation of Umeå's new Comprehensive Plan (Översiktsplan - CP) – the municipal strategy aiming towards a growing, but more sustainable city. This will demand a different set-up in terms of cooperation with other municipal units.

The team has also had limited success in establishing cooperation with a key external stakeholder – businesses, whose employees cause a major share of travel related air pollution through commuting.

This SED report therefore aims to:

1) Provide a roadmap on how to integrate MM into the municipal work to ensure a continuous and coordinated collaboration in the implementation of the CP.

2) Identify best practices for approaching businesses to take part in partnerships in order to influence work-related travel behaviour.

To determine the path forward for Umeå's mobility work, research was undertaken on the development and organisation of MM in Sweden and on how other municipalities are working with businesses to meet mutually beneficial sustainable travel objectives. Recommendations and next steps for Umeå were developed based on the relevance of these experiences for their situation.

Heavy traffic crossing the city on the E4 highway

Mobility management in Sweden

Road traffic increases annually, which results in more emissions, accidents and noise. MM works to shift behaviour toward more sustainable modes of travel (e.g. bi-

cycling), which can increase physical fitness and improve health, while also reducing emissions associated with climate change and air pollution.

Typical MM measures are defined as "soft measures", such as education, promotion, and coordination of services [1]. MM is most effective when introduced with the appropriate "hard measures"; including changes to physical infrastructure and economic incentives, for a comprehensive solution to induce the shift in behaviour (see Figure 1). MM can be viewed as marketing for the "sustainable transport" product, and promotion is more effective if the product is well designed and at the right price point [2].

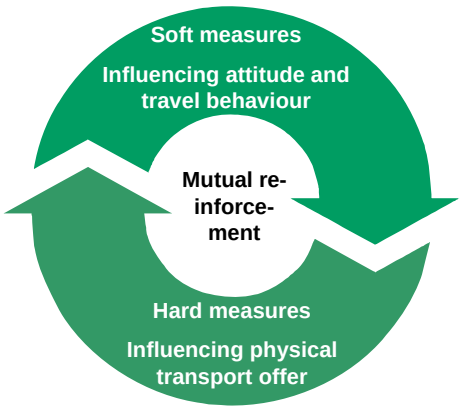

Figure 1: Mutual reinforcement of measures

Since the mid-1990s, Sweden has been working with MM, encouraging local governments to create sustainable transport plans. The importance of measures that affect transportation needs and the mode before others, such as building new roads, is also demonstrated at a national level by the Swedish Road Administration's four step principle.

At the same time, European Union (EU) member states and local authorities have been collaborating to strengthen MM work since 1999 and have contributed to the development of a quality management approach for implementing MM in small and medium-sized cities. The approach emphasises the importance of:

- integration with a City's transport policy objectives;
- long-term activities and financing;
- clear commitments from partners (e.g. working groups); and
- leadership in promoting the use of MM in relevant decision-making [1,3].

Today, many municipalities across Sweden are working with MM measures and there are at least fifteen cities with dedicated MM staff. The MM offices tend to work on a project basis and are for the most part supported by EU, national and regional government climate change and environment funds [4]. More recently, a number of the long-standing offices are being rolled into City budgets and are integrated into the municipal administration [4; 5]. The integration of the MM concept with the typical land-use planning processes of the City is also a very effective way for MM to influence travel behaviour [6].

Mobility management in five cities: the evolution toward integration

MM staff from five Swedish municipalities were interviewed (Lund, Malmö, Göteborg, Helsingborg and Mölndal) to determine how to organise mobility work to most effectively contribute to achieving a city's sustainable travel goals. The municipalities chosen were considered to be among the MM leaders in Sweden.

These five municipalities demonstrated that a common evolution of MM takes

	Lund	Malmö	Göteborg	Helsingborg	Mölndal
Structure	• 3 staff in Street and Traffic Dept.	• 6 staff in Traffic-Environment unit within the Streets & Parks Dept.	• 8 staff within Traffic and Public Transport Dept.	• 2 staff working in City Planning (traffic planning occurs here)	• 3 staff in Traffic & Transportation Dept.
Funding	• Long-term funding • Relied on external funding until 2005	• Long-term funding • Began with EU funding	• Long-term funding • External funding at very beginning	• Long-term funding • Swedish EPA funding	• Long-term funding • Swedish EPA funding at beginning

Table 1: Organisation of mobility management in five municipalities

place from project to a more integrated municipal role. These findings also confirm Vägverket's 2007 study, which looked at the MM work of smaller municipalities in Sweden (Lund, Jönköping, Kalmar, Karlstad and Växjö). It is clear that MM offices are continuously moving toward a greater balance of process-related work, and away from independent projects.

The development of MM was often sparked by poor air quality resulting from transport pollution (i.e. Malmö, Helsingborg) as was the case for Umeå. Although the political orientation of the community and broader desire for a sustainable transport system were pre-conditions for MM in other municipalities (i.e. Lund, Göteborg, Mölndal). The MM activities were usually set in motion with recognition from a key leader (political or administrative) that "soft measures" have a role in shifting transport demand. The MM seed then blossomed with funding support from external partners to the municipality – typically national and/or EU funding. This allowed the MM team to run carefully designed result-driven campaigns in order to prove the value and build internal understanding of the MM role. This early stage proved to be important for many municipalities and was found even among the "later bloomers" (e.g. Mölndal).

After a number of years of external funding support and short-term activity planning the MM teams became more integrated. They were eventually located within the department most closely associated with traffic engineering or transportation planning, with permanent positions funded by the municipality and were focused on long-term projects aligned with departmental activities (see Table 1).

In Lund's case, the development of MM is relatively unique with a comprehensive sustainable transport approach being introduced early with the 1998 version of LundaMaTs. Lund has a long tradition of support for environmental considerations in transport policy and planning. Dating back to the 1970s, Lund had restrictions on car use in the City centre and parking fees, and made a decision to maintain the "Medieval" road network in the City centre. Lund has also had long-standing political and community support for alternative modes of transport [7]. However, the development of MM even in this case has many similarities to the other municipalities investigated. In Lund, even though MM was an early component of the trans-

port strategy the office operated externally from the Traffic Department until 2005; the MM team was located physically in a separate office and reliant on project funding. Their current integrated status is viewed as crucial to their ability to influence the behaviour of Lund residents and has allowed them to have a more long-term outlook that is more closely connected to the physical structures of the City. Ylva Åqvist, Lund's MM Project Manager, views their integration as a slow process, which they can still improve with closer cooperation with both the traffic engineers and the strategic planners [8].

Cross-departmental cooperation usually involves not only aligning activities, but also acting as an internal sustainable travel promoter to ensure that the product they are marketing matches the "consumer need". Malmö's Traffic & Environment Manager, Magnus Fahl, explains that this can mean that MM takes on a broader role as an internal advocate for alternative transport modes, not just an external communicator. This might begin with "advocating", but may mean that with time the office is sought for advice regarding the accessibility of new developments to public transport and cycle routes or ensuring that bicycle parking is considered as an option for reducing car parking spaces. As seen in Lund, Malmö and Helsingborg, and more recently, in Mölndal, this broader role for the MM staff is one that develops over time, once they have greater internal access and the capabilities of the staff are recognised.

Although the municipalities interviewed were in different stages of their development and had a number of differences in terms of staff resources and project focuses (see Table 1), they each had a common desired position within the municipality. The position consisted of:

- a permanent and dedicated MM staff;
- long-term municipal funding;
- organisation of MM in Traffic Dept.;
- formal cooperation procedures with relevant departments, such as planning;
- partnerships with a wide-spectrum of external partners.

In addition, the key common ingredients to aid the evolution were: early awareness building, a strong and strategic promoter and active internal communication.

Early awareness building

When first establishing MM work in the City it is crucial to build awareness and support for the MM approach among internal stakeholders – both decision-makers and municipal administration colleagues. This was done in most cases with externally funded result-oriented campaigns. The results were then used to demonstrate the value of the work and aid the MM promoters in their case for a long-term role for "soft measures". Lund and Malmö both lobbied actively for the long-term role for MM at the political-level and across departments with the results of their short-term projects [8,9].

A strong and strategic promoter

Hans Arby who has worked closely with Göteborg municipality's MM team believes in the importance of the strategic leader. MM requires internal lobbying to evolve into its long-term role and this requires strategic and influential leadership. Reaching the desired position can involve overcoming internal power dynamics, for instance between a long-time planner and a

young innovative mobility manager. Planning norms may need to be changed and actions without a measureable result may be employed to change behaviour over the long-term, which may necessitate an actor with influence. In addition, the promoter should also consider how to "frame" the MM work. Arby suggests that there are drawbacks to being too closely connected to environmental work. Rather, the office should promote the work as essential to meet the City's strategic objectives e.g. cost-effective growth or an attractive City [2].

Active internal communication

Active promotion of the importance of MM is not only necessary in the "early stage" of MM office development, but consistently until the desired position within the City is reached. Even in Lund and Malmö, where MM activities are supported politically and the offices are relatively well-established within the appropriate unit, MM still needs to be explained internally.

In 2009, Malmö's MM team actively communicated its role and worked to foster cooperation through workshops with the MM team and relevant departments [9]. Helsingborg has also used workshops [10].

Active internal communication helps to build cooperation, which can secure the MM's contribution to meeting sustainable travel goals. There are a number of types of cooperation that can be established: regulated cooperation; working groups linked to certain projects; and informal networking [9].

In many cases, a level of "regulated" communication is desired by the MM team for activities by key departments, namely the planning department. This would mean a department has an obligation to seek input from the MM perspective. However, working groups between departments are more common; as used by Göteborg, Malmö, and Helsingborg. A level of cooperation is also established by Helsingborg's organisation with a steering committee of members from planning, environment and city management who directs the MM office's work.

A close physical location can also reduce the need to actively communicate with a department and builds cooperation naturally with discussions occurring in office corridors and quickly arranged informal meetings. This was for most of the municipalities a key benefit in their eventual office location within the traffic or transport planning department.

Mobility management in Umeå

Umeå is the capital city of the Västerbotten County. It is situated by the Ume River on the north east coast of Sweden. There are currently 114 000 persons living in Umeå [11]. The political aspiration is to grow to a city of 200 000.

Umeå city from the air. Photo courtesy of County Museum of Västerbotten.

Umeå is faced with the challenge of poor air quality. The emitted levels of NO_x and VOCs (Volatile Organic Compounds) are above the permitted EU standard. The

European roads, E4 and E12 run through the centre transporting trucks, buses and cars resulting in heavy traffic. Being a northern city in Sweden, Umeå also regularly suffers from inversion, which means that a warm air "cap" stops the cold air from rising and keeps emissions close to ground level; exacerbating the air pollution situation [12].

The poor air quality spurred the establishment of the MM office. The MM office began in 2008 with base funding from the City's Air Quality Program and additional funding for specific projects from local, regional and national organisations as well as the EU [13]. At present the MM team has five staff; a project leader Carina Aschan, communicators Martin Svensson and Jenny Brantholm, and coordinators Ida Lundström and Emma Ödling [14].

From 2008-2011 the MM office was running the Hållbart Resande project, which involved testing different methods to promote sustainable travel to the community [14]. Examples include:

- "Pedal for Medal" – employees of companies in Umeå competed in teams to cycle the longest distance during a fixed period of time. This competition encouraged bicycling to and from work.

- The "test traveller" project – people that habitually travel by car to work had the opportunity of going by bus free of charge for a month. This campaign aimed to get motorists into new sustainable travel habits and experience the advantages of public transport.

- "School for sustainable travel" – schools in Umeå joined and worked to decrease the car traffic surrounding them. The schools encouraged students and their parents to bicycle and walk back and forth to school. A map in each school was used to keep track of how far their new transport modes took them.

The map of Europe that the schools in Umeå use. Photo courtesy of the MM office.

The MM office's next major project, Green Citizens of Europe, runs from 2011 to 2015 with three main components: demonstration of energy-saving systems and new sustainable mobility systems, as well as community awareness campaigns to encourage environmentally sustainable behaviour. A number of the successful Hållbart Resande campaigns are also planned to run again.

In addition, the MM office is foreseen to take a more integrated and long-term role in the City's implementation of its future Comprehensive Plan (CP).

The present CP of Umeå has been in force since 1998. However, to grow and improve the air quality a new plan is necessary and expected to be finalised in May 2011. There is political unanimity of coming to terms with the air quality by infrastructure measures and promotion of public transport, walking and bicycle usage. The traffic strategy in the proposed plan states that it is important to integrate traffic and land use planning to promote environmental friendly modes of transport and decrease and limit the need of car travel. The proposed plan also commits to continue to work with MM [15].

Challenges faced by the MM team

Interview partners throughout the municipality confirm the high visibility of campaigns, quantitative results underline the impact of projects undertaken by the MM team. However, as of today, most projects are planned independently from the rest of the municipality. The team is located within the city's Development Department where the application for EU funds occurs that mainly finance the team's activities. The resulting independence from the municipality was an initial objective of the chosen set-up [16].

As a consequence, the team rarely seeks cooperation within the municipality beyond what is needed for specific projects. The MM Steering Committee (SC) also does not seem to actively foster integration. Apparently SC members do not work to disseminate the MM concept to their organisational units. Due to funding reasons, despite the acknowledged link of MM and public transport, the organisation in charge of public transport does not hold an ongoing position within the SC.

Changes to the current set-up are necessary to be a long-term, integrated partner in the implementation of the CP.

The team has also been struggling with establishing projects with businesses.

A key reason for congestion on urban and suburban roads is commuting and efforts should be directed at the origin of this problem. Close cooperation between employers and employees can play a role in finding a sustainable solution. Employers have the ability to run mobility plans and encourage sustainable travel planning in their company [17].

Given that commuting is responsible for a large share of inner-city travel, there is a need to understand how to establish successful business partnerships.

1) Integrated Comprehensive plan implementation

Define the what, for whom and how

At the current stage, the MM team does not have a clear perspective on its future role. The project portfolio is largely driven by funding opportunities. No overarching strategy supports the different choices of projects [18]. With regard to the overall objective of influencing travel behaviour more effectively, the team needs to overcome its current position as a EU project team and assure a continuous role in implementing the CP. To achieve this the MM team should determine a strategic framework identifying what its precise product offering is, to whom it is offered and how it can best be provided [19].

On the "what"'

While most municipalities interviewed pointed out the role of MM in promoting the concept of sustainable travel, it was found that in Umeå there is already a large buy-in to amend city structures in favour of more sustainable travel: the city has chosen to carry a significant share of the costs to build bypasses for the two national highways that currently cross town-centre. For all traffic projects within the city centre, there is a clear priority to build structures for pedestrians and cyclists [20]. Available parking within the city centre will be reduced and parking areas outside the town centres will be built with accessible park and ride solutions. Parking fees within the city centre will be increased. Public transport service has improved with a bigger budget over the last years and a

pilot to use hybrid electric buses is just starting [21-23].

The overall direction chosen is already strongly supporting amendments of physical structures to promote more sustainable travel behaviour. There is a general agreement, that these efforts will be ongoing out of sheer necessity. The cities growth ambitions will intensify air pollution that already surpasses EU legal thresholds and breaching this law can force a limit on building activities [24,25].

The MM team therefore does not have to take a big role in demanding amendment of physical structures. Its stake is in increasing the acceptance and therefore usage of those physical structures, something that does not necessarily come by itself: better public transport and bike lanes can easily be ignored by a population that is used to car-usage. Reduced inner-city parking and increased fees can lead to an outcry of the population, a situation that is certainly not desirable. The team's confirmed core competency of communicating with the general public and raising positive awareness should be applied to "sell" changes in the physical structure to the population.

At the same time, with each project, the team collects important insight into the opinions and behaviours of the population. This information can be highly relevant to other parts of the municipality as well [20, 21] – so strengthening their advisory role should be the focus of the MM team.

On the "to whom"

As explained before, MM projects today mostly target traveller populations without necessarily building on amendments to the physical transport-related offerings. Cooperation with other departments is reduced to time-limited singled out projects. Continuous ongoing coordination is not a priority.

To change this, the MM team should perceive other municipal units in charge of physical changes as their target group. As reflected by the CP and supported by several interviews, units dealing with traffic/road building, the public transport, land use and parking solutions are the most important partners MM needs to cooperate with (see Figure 2). Out of those, the department where traffic solutions are developed – in Umeå the Streets and Parks Department – is by far the most important partner (see above).

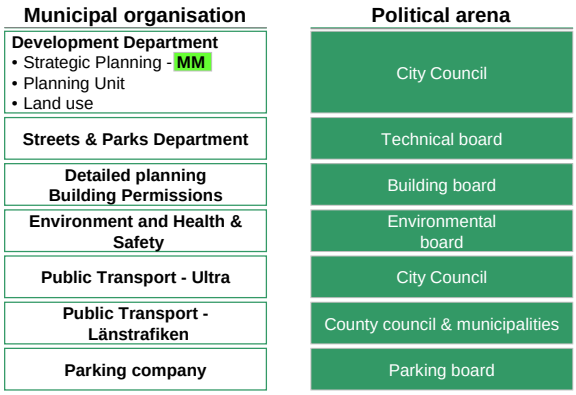

Figure 2: Important municipal and political partners

On the "how"

The MM should participate in defining the right activities and mutually work with other units to design campaigns alongside the traffic solutions developed in order to increase the acceptance of those activities by the population. Representatives from the Streets and Parks Department and from the public transport company confirm they would welcome access to the team's skills on a more regular basis [20,21].

The following steps are recommended to enhance the transition towards a closer co-operation:

Intensify existing partnerships

Until recently, meetings with representatives from the Development, Detailed Planning, Streets and Parks and Environment Departments were used to mutually inform each other about ongoing projects. These meetings were coordinated by the Streets and Parks Department and have stopped in autumn 2010 due to lack of staff. No other unit has taken the initiative to organize the meetings. It is recommended that the MM team takes the initiative to revitalize this meeting circle. It should also be considered how these meetings can be made more relevant and beneficial to participants. According to Marie Frostvinge, meetings used to have an informational character, giving each other insight into ongoing projects at a rather advanced point in time. The focus of the meetings should therefore shift towards seeking opportunities to cooperate. In addition, the meetings should become a platform to actively consult each other, ask for advice and transfer knowledge.

A further step to intensify cooperation should be achieved by aligning the unit's activity plans.

As the highest level guiding document, the CP points out the shared objectives of the municipality. Municipal units work on achieving these same objectives through different activities. To make those mutually supportive, the MM team should strive to align its own activity plan with those of other units. Possible opportunities to cooperate would be detected even before the planning phase of specific projects.

Relocate the unit

The above mentioned steps will certainly help to increase the current level of cooperation with the Streets and Parks Department. However, it will not lead to the same level of integration that would arise if the MM team was part of the Department where a common director would support collaboration.

Marie Frostvinge, Traffic Planner (Trafikplaneringschef), the Streets & Parks Dept.

Isabella Forsgren, head of the Planning Unit within the Development Department and one of the "mothers" of the MM team, states that the team's work could have had more of an effect if it had been located within the Streets and Parks Department. The hierarchical location within the Development Department can be considered somewhat coincidental and is mainly justified because this is where the decision to have a MM team was taken and where EU funding applications are done.

In addition to the chance for closer cooperation, a need for secure future funding is a reason to consider relocation of the MM team. While Carina Aschan assumes that EU funds will be available for a number of

more years, Isabella Forsgren is less positive on this aspect. Creating fixed MM positions within the Streets and Parks Department would add a level of security for the MM efforts [24].

The downside of being relocated is that the team would lose a certain level of its independence. As Carina Aschan points out, the intervention from the political side on the team's activities can be expected to be much higher. Furthermore, EU fundraising could no longer be "outsourced" to the Development Department. The team itself would have to take care of this – a task that is described as extremely time-consuming by other municipalities interviewed (see above). So, it should be confirmed that the current base funding granted to the MM team by the City Council for its role in the Air Quality Programme could be kept to provide more flexibility.

The relocation requires a political decision of the Technical Board that has to decide it grants funds for a MM team within the Streets and Parks Department (see Figure 2). The MM currently belongs to the Development Department and it has to be assumed that awareness of the value of MM is highest within that unit and its political counterpart the City Council and certainly lower within the Technical Board [24]. Consequently promotion of the team's work is needed to trigger the relocation decision. This should include more active self-promotion of the team towards the political target group and additional support of possible influential promoters should be sought. The MM's Steering Committee and the administrative head of the Streets and Traffic Department are first on the list.

In this process it is crucial that politicians understand what the exact added-value of the MM team is – its strength in campaigning – to avoid being forced away from this focus over time due to budgetary reasons. It is also necessary that the key decision-makers understand that the team will have to collaborate closely with other municipal departments. Relocation into the Streets and Parks Department cannot imply that cooperation with other units comes to a halt – instead, an overall higher level of integration should be the objective.

Formalise consultation processes

Formalised consultation process can strengthen the MM team's role as a partner and advisor to other municipal units. At the current stage, consultation with the MM team on major urban planning projects, such as the rebuilding of the central train station, is not foreseen. The choice to seek advice about projects is largely driven by individual project managers and certainly influenced by personal relationships and physical proximity [18,20,21]. A consistent role could be established if municipal rules requested a mutual consultation process [26].

Setting up a formalised process requires a more extensive level of self-promotion. The question of who needs to be consulted in which municipal decision processes is an ongoing powerplay and base for discussion. The buy-in from a wide range of municipal decision-makers and political counterparts would be needed to give MM a formalised role in consultation processes [18]; see Figure 2. Nonetheless, projects within planning and detailed planning, public transport, parking or the environment units could most likely benefit from the formalised advice of the MM team.

Improved self-promotion

As pointed out above, to achieve the recommended changes, the MM team

needs to reconsider not only to whom, but also how to promote itself.

The MM team has a website presenting projects and results. It contains a lot of relevant information, but is likely to attract attention from only those already aware of MM and its benefits. For less aware target groups, other formats such as one-on-one meetings with heads of departments or workshops with political boards or municipal units may be more appropriate tools of self-promotion.

Mobility management unit branded bicycle

To support a relocation and adjoint budgetary decision by the Technical Board it is assumed that a more quantititative way of presenting results is necessary. Measuring impacts of behavioural change campaigns is a challenge, but will be necessary to justify long-term funding. A closer collaboration with the Transportation Research Unit at Umeå University could lead to further useful insights on how to achieve this [27].

The team should also seek support of (semi)-external promoters of their work. The SC should have a role in this, but other personalitites in influential positions can further spur the transition. Systematically thinking through who these people could be and approaching them is a first step.

Proximity to the development unit

It is hard to tell what will happen once the ringroads have been built, inner city traffic has been reduced and European emmission thresholds are no longer being surpassed. Politicians might decide to keep pushing the reduction of inner city traffic or they could deprioritise sustainable transport ambitions. A MM unit should therefore closely follow the tone of the general discussion and be aware that strong political buy-in for sustainable travel can cease once the biggest problem has been solved. It has been reported by the Lund MM team that the political buy-in to build a sustainable city has ceased over the years and that from today's perspective lobbying to prevent this shift in thinking should have continued as the cities growth ambitions today often directly conflict with the objective of supporting sustainable travel [28].

2) Business partnerships

Even though various attempts by the MM team have been made to get in touch with businesses, only a few joint projects have resulted from this.

For companies, there are several benefits resulting from a change in the mobility behavior of their employees, e.g. better accessibility to the company for employees, freight and visitors, and health and safety of employees. MM can also help companies communicate their commitment to society and the environment [17].

MM opportunities and challenges

According to findings from interviews with several municipalities (Lund, Malmö, Göteborg, Kungälv, Mölndal and Helsingborg), creation of networks that include municipal organisations and businesses

would be an opportunity to share knowledge and experience. Also cooperation with the municipal department for entrepreneurship or business development can influence businesses to be more sustainable. Companies that have the same working time or have to pay high parking fees and also transport intensive businesses and those companies that are close to public transport should be the first target groups.

However, in most cases, the perceived benefits associated with working on MM are not big enough for companies to encourage them to participate. In companies budget constraints also limit their cooperation with MM. It is important to know that initial efforts in companies are driven by progressive individuals and/or overall company strategy. In addition, the company's employees can be powerful partners; their needs and wants are important factors for employers.

How to approach businesses

Two key ways for MM office to improve cooperation with businesses were identified. They are not to be used exclusively, but should be used in combination.

Driven through the municipality

Efforts can involve working as an *internal partner* within the municipality. In this case, the *municipal department for entrepreneurship/business development department* is an important actor. Efforts should be made to make the Business Department aware of the benefits for businesses that are associated with activities around MM and encourage them to promote MM activities to businesses. Since the Business Department is in regular contact with business and is constantly communicating business relevant information, it is more likely that businesses will consider their advice and start working on MM issues. Therefore finding a strong partner within the municipality will enhance the outreach to businesses. At the same time the Business Department can communicate to other new businesses wanting to settle around Umeå that the municipality is offering services to companies to support them with MM activities. This contributes to make businesses more attractive to new employees and will also increase its own reputation.

Driven from within the business

Efforts can also be focused directly toward the businesses. When approaching businesses different questions should be considered beforehand that will provide clear focus and structure, and can help to set priorities. The questions that should be considered are the following:

How to choose companies?

It is suggested to *approach companies in a systematic way* by focusing on different aspects such as location, size, working time and reputation. Front-running industry leaders that are eager to reduce their overall environmental impact and are more likely to be convinced to work on MM activities should therefore be targeted first.

How to approach businesses?

Since the on-going projects of MM office in Umeå are mainly targeting employees and their traveling behaviour directly, it would be efficient to *use employees as a leverage* to get companies involved in MM activities. Since employees know their company best and can influence companies' behaviour, they are in the position to promote benefits of MM activities to their co-workers as well as demand more actions to be taken from the company itself.

Another suggestion is to *cooperate with companies that already established cooperation with other companies* and where common platforms to exchange ideas and experiences on environmental aspects of their work already exist. Such cooperation was initiated for example by Umeå Airport, which is closely working with companies that are situated in the close vicinity. The MM office could offer their services to those stakeholders that are part of this cooperation and thereby reach a wide range of businesses at the same time.

Successful collaboration with Umeå Airport

Another possibility to approach businesses is to *create a common business platform* where the municipalities and businesses in a region interact with each other and exchange information and experience in regard to MM as it was done in Mölndal.

Moreover, *third party events* such as fairs, business gatherings and regional conferences offer a promising platform to promote activities around MM and thereby will also increase the presence of the MM office to various stakeholders.

How to sell Mobility Management?

When communicating with businesses it is crucial to promote the benefits of MM for companies themselves. Such benefits are associated with reduced parking costs due to decrease in demand of parking space and reduced sick leaves and healthier work force that inherently will lead to reduced costs for businesses. Also increasing reputational aspects should be addressed that might help attract new employees and might be a good way for companies to promote their efforts to be more environmentally responsible business.

Another aspect that could be worth addressing is the potential of reduced fuel costs to the company related to company cars. Even though only parts of the emissions triggered by company cars are relevant for Umeå's air quality, arguing with costs is usually a good hook to get companies attention.

Along the same lines, *the company budget can be challenged* by looking into how these are used toward unsustainable transport activities, such as providing company cars to employees. These costs should be compared with potential investments for providing employees with discounts for bus/train passes. Thereby the focus should be *on designing company transport policies to create incentives for sustainable commuting*. It is crucial to point out that the intention is not for companies to tell their employees how to travel to work and back home, but rather to provide financial incentives to use more sustainable transport modes.

Existing projects open doors

Besides the previous mentioned recommendations, there is a potential to utilise existing projects of the MM office to further engage with businesses. The main projects identified that already target employees were: "Pedal for Medal", "Rent a bike", "Test travellers" and "The most ridiculous car trip". All of these projects are wrapped-

up with a feedback session for all the participants. This feedback session should be further utilised to:

- Encourage employees to promote MM activities among their colleagues
- Find the right contact within each company that the MM office could use for further engagement into MM activities
- Encourage/support employees to internally lobby for more sustainable travel activities from their employers

Umeå Energi, a winning "Pedal for Medal" team. Photo courtesy of the MM office.

Moreover, employees from different companies apply each year to participate in MM projects and this can lead to new contacts and opportunities for cooperating with businesses. Asking participants to state their occupation and company that they are working for when registering for a project can be beneficial for the MM office. This obtained information will help to create better links between the company, their employees and the MM office when approaching businesses to promote MM.

Next steps

To assure a continuous role of Umeå's MM team in the implementation of the CP, the team needs to increase its internal self-promotion. Existing relationships should be intensified, ideally through integration of activity plans. Over a longer term, the unit should be relocated to the Streets and Parks Department and consultation procedures with other units should be formalised. See Figure 3 below for a timeline.

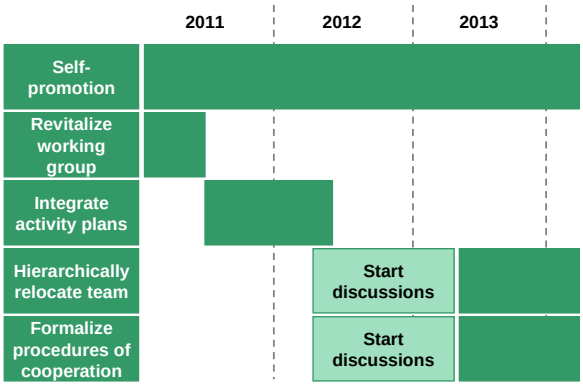

Figure 3: Timeline for integration of MM team

To intensify business partnerships in the short-term the utilisation of existing projects that the MM office is running this year and using employees as a leverage to get companies involved in MM activities is recommended. Efforts that are more long-term are the intensified cooperation with the Business Department of Umeå municipality, as well as establishing a more systematic framework on how to approach businesses. In addition, the MM office should target corporate transport policies and provide advice for companies on how to create incentive schemes for their employees to use more sustainable transport modes.

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Sustainable Community Development in the Czech Republic

Initial steps for Zákolany village

By Kai Maembe, Tanzina Azad, Tomas Naujokaitis and Wain Collen

Zákolany: the village

The objective of this assignment was to work with the Czech village of Zákolany, and provide technical support to help address key community sustainability concerns.

Zákolany village

Zákolany, with a population of around 600 people, is a peaceful community situated in natural surroundings 16 km from Prague. The village is made up of three "sub-villages" all within walking distance of each other called Zákolany, Kováry, and Trněný Újezd. These three parts of Zákolany are picturesquely located within two green valleys, bordered by a series of small hills.

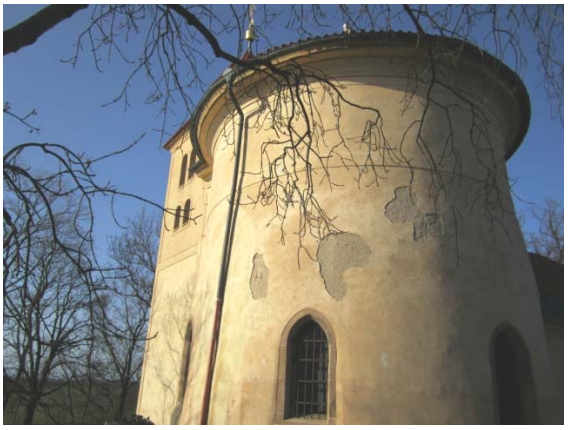
Zákolany village has certain important historic significance in the Czech Republic with a history of civilised settlement dating back to the Celts over 2500 years ago. The village is home to the Czech Republic's oldest construction, the Budeč Rotunda which is a chief attraction for day tourists in the summer months.

The village population is socio-economically diverse and this is influenced by sev-

eral factors. Firstly, Zákolany Village has been impacted during the latter part of the twentieth century by several important political upheavals; the most severe of which include the communist take-over in 1948 and the subsequent fall of communism in 1989. These changes impacted on the village in different ways. Some villagers lost their land, while others were incarcerated, and others may have benefitted from the changes. Some discord from these events is still evident amongst some of the older residents in the village.

The village developed economically in the second half of the 20th century under communism with large industry, including several large mills and factories. After 1989, however, larger industry in Zákolany was abandoned and today economic activity is limited to small business. There are few opportunities for professional development in Zákolany as such, but the village has recently attracted economically active and educated residents from Prague who buy property in Zákolany to benefit from the village atmosphere while being able to commute daily to Prague. It is mainly from within this group that sustainability issues, like air pollution, are being raised. This trend has also resulted in a discernible economic gap between residents, as well as perception and worldview differences.

In terms of municipal governance, conditions have also changed. The three sub-villages, which were initially independent municipal districts, became united under one municipal authority – Zákolany, in the first half of the 20th century. This brought the three villages closer in terms of municipal funding but also resulted in a centralisation of activity around Zákolany, which to some residents is not favourably seen. Despite the differences, this diversity



Budeč rotunda, circa 905 A.D.

is part of the village's charm, and the atmosphere in the village is peaceful and residents pride themselves on living in Zákolany. As such, the diverse mix of residents do have a similar broad vision regarding development – members value the peaceful small village environment and want to preserve that above all else. As one resident put it "some development is ok, but not too much".

In terms of project development, the village has limited fixed financial resources, with tax revenue of around one million Czech crowns (EUR 40 000) per year remaining after fixed costs. Nevertheless, additional community projects that need to be undertaken can usually qualify for national funding of between 60 - 95% of total expenditure. Two of the village's most recent projects; a new park in the town centre and a walkway between Kováry and Zákolany were both financed by subsidies.

Zákolany sustainability issues

From this context, Zákolany presented four potential target areas to the IIIEE team related to sustainability. The hope was to identify opportunities in these areas that could benefit the community and ideally be

Air pollution hanging over one of the Zákolany valleys

financed externally. The four areas presented included 1) sustainable energy, 2) education for sustainability, 3) brownfields, and 4) tourism. After some consideration, it was decided to focus on *sustainable energy* and *education for sustainability*, and within education – a focus on sustainable gardening.

Investigating the village brownfields in this assignment did not present immediate solutions, mainly since these sites are privately owned, and secondly, renovating such constructions can be very expensive – up to, and often beyond 50% of the cost of re-building the construction from the start.

Regarding tourism, previous research on tourism in Zákolany had been undertaken in 2008, and recommendations made that in order for the tourism industry to advance, important infrastructure would need to be built [1]. Considering that this topic had already been investigated and some of the suggestions implemented by the community, this assignment does not look at tourism.

Air pollution, however, was clearly a problem for many community members, especially in winter with high coal use and old boiler technology. Additionally, with rising fuel costs and energy security issues becoming more prominent on the global agenda, communities that address energy sustainability issues can become more resilient to such changes.

In terms of education for sustainability, in a survey undertaken by Zákolany municipality, the village had shown relatively high interest in learning more about gardening [2]. The current assignment provides a good opportunity to investigate further this interest and evaluate the potential for developing a lifelong learning programme on sustainable gardening in Zákolany.

Local sustainable development: the broader context

Local Agenda 21

Local community sustainable development has been receiving increasing attention due to recognition of the pressure being placed on the planet's natural resources under a globalised economy. An important initiative promoting local development is "Local

Agenda 21", or LA 21; a global programme, agreed upon within Agenda 21 at the Rio Earth Summit in 1992, to implement sustainable development at the local level [3]. LA 21 is intended to address local sustainable development concerns through the implementation of long-term strategic plans [4]. Each country present at the Rio Summit was urged to present an LA 21 strategy with the agenda set by the local community rather than by central government [5]. LA 21 is a non-binding commitment signed by 178 countries (including the Czech Republic) [6] and thus relevant to Zákolany as it considers addressing sustainability issues.

Nevertheless, there are concerns that LA 21 is sometimes not an effective instrument at achieving integrated community development, since it can be too focused on environmental objectives and thus fails to incentivise groups who don't feel represented [7]. More specifically to the Czech Republic, there are concerns that LA 21 is rather mechanistic, with an over-emphasis on indicators and measurement and less on integrated community empowerment over the long-term [2].

Lucas et al. (2001), argue that many LA 21 initiatives focus on the projects and less on *the process* of implementing LA 21. LA 21 provides the planning elements, or generic steps in community development, but very little on how to go about implementing them [7]. We concur with Lucas et al (2001) that it is "crucial to understand better the factors involved in take up, effectiveness, and success of community development initiatives." In line with sustainable development this implies addressing not only environmental issues, but also social and economic factors. During initial discussions of the parameters of this assignment, Zákolany community leaders manifested that they were not motivated to develop a Community Sustainability Strategy (CSS) that complied simply with LA 21 standards in the Czech Republic, but rather preferred to investigate an approach that went beyond compliance – a CSS aimed at strengthening the community from the bottom-up [2].

Funding opportunities

Without undervaluing the importance of potential community empowerment through CSS, another important driver for implementing a CSS is an improved profile with organisations providing funding for community development. A well designed CSS that reflects and addresses community priorities reflects a heightened level of community organisation and inspires confidence. Zákolany has options at national and at EU level as well as important municipal funds which can be used as counterpart funding for projects that are part of a CSS.

Czech Republic funding for rural communities

The government of the Czech Republic supports several programmes in rural community development. Under the Ministry of Regional Development, the Czech Republic supports economically weak and structurally afflicted communities. The Czech government also has a National Strategic Rural Development plan 2009-2013, which aims to improve rural community activities, improve amenities and services, support renewable energy, encourage tourism as well as improve education quality. The Czech government specifically supports LA 21 initiatives under the Sustainable Development Strategy of the Czech

Republic, and is coordinated by the Czech Environmental Information Agency (CENIA) [8].

EU funding options

On the EU level there are several sources of funding for local community development initiatives. For example, the European Regional Development Funds (ERDF) provides funding for projects that promote regional development, with one core area being rural development. The European Social Fund (ESF) aims to reduce disparities in income and wealth with a focus on the poorer European regions. Additionally, Intelligent Energy Europe (IEE) provides funding for local energy sustainability initiatives that encourage the use of renewable sources of fuel [9]. This is not a comprehensive list of options, but gives an idea of options available for well organised communities.

Funding options from Zákolany

Besides national and EU programmes by the Czech government, Zákolany has its own sources of finance that can be used as counterpart to external funding. The principal source currently is the sale of land for small-scale property development [2].

Sustainability in practice in Zákolany

The following section provides an analysis of sustainable gardening and sustainable energy; two areas which present both sustainability challenges and opportunities to Zákolany community. From information gathered on-site via interviews and data collection working closely with the community, findings reflect the current situation in these two areas, constraints for developing action plans, and recommendations to overcome said constraints.

Lifelong learning: sustainable gardening

Lifelong learning (LLL) is a continuous activity, with a view to improving knowledge, skills and aptitude within an individual's life with a social, civil or employment related perspective [10]. As such, the concept of LLL deals with continuous education or professional development for all ages. Ideally LLL helps the community to bring formal, informal, and non-formal local agendas in to one basket to reach local goals [11]. Before a community initiates lifelong learning it is important to determine the interest topics and demand for learning. As already mentioned, according to an earlier study done in Zákolany residents had shown preliminary interest in LLL in the area of gardening.

Zákolany school

Overview of gardening in Zákolany

A sustainable garden is one that thrives with minimal inputs of labour, water, fertilizer and pesticides. Bearing this definition in mind, the objectives of the onsite investigation were to gather information to assess current gardening practices and levels of sustainable gardening, evaluate community interest and motivations for expanding their learning on gardening, and finally determine the feasibility of estab-

Strawberry patch in Zákolany

lishing a programme of gardening within the context of lifelong learning in Zákolany.

Interviews show a few gardeners grow flowers and some have vegetables. Interestingly, all the families interviewed with gardens in the village use compost. Villagers with vegetable and fruit gardens do, however, use pesticides to deal with pests. Besides composting, some of the villagers who do gardening water their gardens from local wells on their property, and usually do not use fertilizers. Common crops that are grown in the gardens are carrots, broccoli, peas, apple trees, herbs, and flowers. Flower gardeners garden for fun and as a hobby to make their homes look nice. A majority of the households have fruit gardens in their houses, since less care is required for the fruit trees. Some households are sceptical about growing vegetables in their garden as more attention and use of pesticides are required. An additional challenge is the cost of growing vegetables. Vegetables can be found cheaply in the market, making it less attractive for them to grow vegetables in home gardens. This may provide an opportunity as some village members show interest in learning how to deal with vegetable pests in an effective and inexpensive manner.

According to our definition of sustainable gardening, it appears that some of the villagers who garden are already practicing at least to some degree, sustainable gardening.

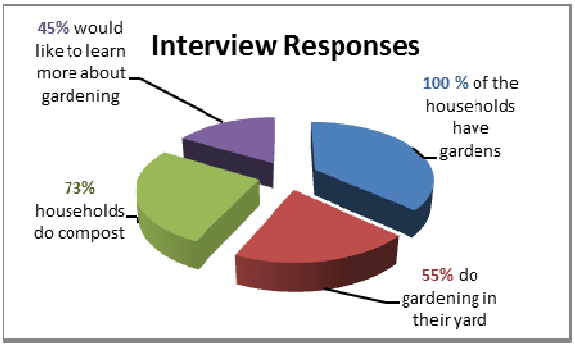
There are, however, some constraints to sustainable gardening in Zákolany, in addition to the use of pesticides. The majority of the people interviewed do not have extra time for putting more attention on growing vegetables in a sustainable manner.

Furthermore, some of the households have gardens in hilly areas. Watering the plants and finding suitable trees and plants for those areas are quite challenging for the households. As a result they leave that hilly area unutilised or for some natural fruit gardens that do not need much care.

Findings also show that gardening interest groups are scattered, and there is no coordination or communication between these groups. External collaboration (related institutions and NGOs) is not present either. The school in Zákolany which might have acted as a pioneer for sustainable gardening practices in the community has

Decorative flower garden

been found less interested in gardening for various reasons, for instance, they do not have much space for gardening: most of the wide spaces are occupied for the playground, as well as time limitations and importantly, due to national law, food grown on the premises can't be used to feed school children.



Subjects of interest for additional learning on sustainable gardening include gardening practices on hill sides, how to make a garden flourish, that is to say – fight off pests, and general gardening practices.

Discussion

As shown in the survey undertaken by the municipality previous to this work, there is interest in learning more about gardening. However, upon deeper investigation into this interest, villagers become sceptical when faced with certain practicalities of becoming part of a lifelong learning programme. Despite the earlier survey showing high interest in gardening, the outcome of the present interviews showed only moderate interest with time constraints being a main limiting factor for residents.

Initiating a fully-fledged gardening programme with fixed and scheduled hours faces certain constraints. As mentioned, the main constraint is for village members finding additional time to garden and attend structured class. This is especially relevant for working families. Much of the gardening activities in the village are done by elderly people and pensioners who spend most of their time in their homes.

The interviews show that an internal gardening club could be a good source of learning and information for villagers, and a better alternative to a formal and structured programme. The club could attract gardeners attention by organising a few interesting workshops that address specifically some of the most urgent issues, for instance, "naturally managing pests that attack vegetables", or "sustainable crops for rocky hillsides". The village has a local expert named Kateřina Pazderů (professor of Agricultural University of Prague) who could facilitate the first workshops that address some of these issues and help to arrange experts.

A gardening club could also facilitate information sharing between members. The core gardeners are present, but they are a group of people, mainly pensioners, who spend lot of time in home but do not have a forum for sharing gardening knowledge with the community. For example, some households are already using natural fertilizers (from animal manure) in a sustainable manner that reduces their gardening costs. A garden club could bring together this group of knowledgeable people and those eager to learn and provide a space to share knowledge. This could be an important motivating factor for other interested people who want to grow vegetables.

It was also found that an important, but smaller group of people who should engage with the "local professionals" are those that are most motivated in learning new skills. These enthusiasts can trigger the interest of gardening among the low-level interest groups. Activating an enjoyable space whereby villagers can bond with nature

and build closer relationships with each other could become key drivers for a gardening club gaining popularity.

According to the villagers, additional methods for communicating useful information could also be helpful. One method to do this would be through the local newspaper that can publish articles containing information about sustainable gardening. Good practices by the locals can be highlighted in the newspaper to encourage people.

To administer the garden club and communication activities, a similar association like the school parents association could be established for the gardeners. The objectives of the association might be to coordinate workshops, and communicate, and integrate the information and knowledge of the best practices on gardening.

In conclusion, a fully-fledged gardening programme at this stage may be too demanding a venture for interested villagers to undertake, given the time constraints and some scepticism to the potential to learn new knowledge on gardening. However, there are members who are enthusiastic about learning more, the knowledge is available locally and there is space to "infect" other community members with this enthusiasm through a less formal gardening club that brings in specialists who can address evident gardening needs. Forming a club will require less funding than a programme, can develop organically and can flourish if the enthusiasm of the community is sufficient. This will in essence be a small test to see if lifelong learning in gardening is really a topic that can be taken forward. If interest grows and villagers enjoy the learning process, then additional and more modern, but exciting avenues, like permaculture and agroforestry may be investigated.

A building in Zákolany using coal for heating

Zákolany: clean energy?

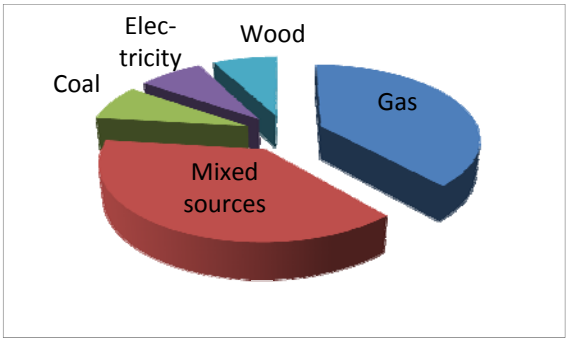
An important concern regarding energy for the community is local air pollution generated by inefficient coal-fired boilers used in some of the buildings. Despite a natural gas piping system throughout the community, around 20 - 30% of the residents still use coal (15 - 20% of which are using inefficient and "dirty" boilers), mainly due to its low price relative to gas. Although coal in Zakolany is about 30 – 40% cheaper than gas, the combustion of coal produces several local pollutants that are hazardous to human health, chiefly Sulphur Dioxide (SO_2), Nitrogen Oxides (NO_x), and particulates. Furthermore, visual and odour pollution caused by soot in the community is a concern to some residents.

However, this is a sensitive issue for the community to deal with since many of the residents using coal are economically unable to afford other energy sources. This situation is not uncommon, and as shown in the Kuznet's Curve there are recognised links between poverty and environmental degradation (for more, see Yandle et al., 2002 [12]). Finding a solution to a dilemma of this nature can be complicated since a "polluter pays" scenario is unfeasi-

ble. Attempts to foster a move away from coal by educating residents on the health impacts of coal by means of articles written in the local newspaper have had little impact and concerned village members are unsure how to proceed.

In an attempt to understand better this issue; thirteen in-depth interviews were performed with local citizens representing the different socioeconomic groups. It needs to be noted that due to time constraints, interviewing more people was not possible, and a limitation to this study's results is the relatively low number of interviews providing primary data in the analysis.

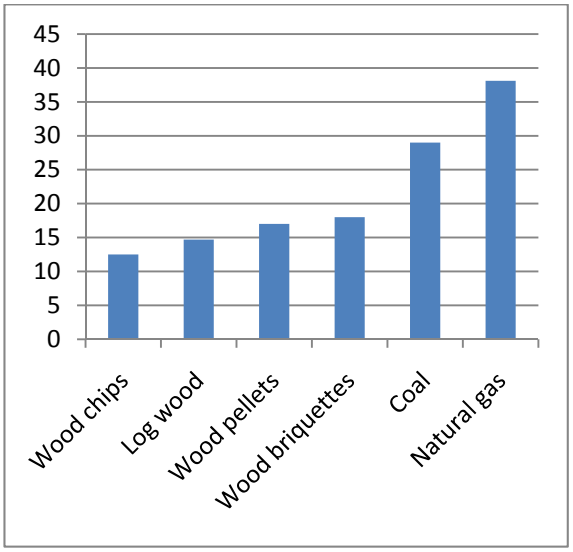
According to this information, results show that the community uses a *very* wide variety of energy sources, and technology in the village with little consensus currently on which options are best to address pollution.



Distribution of energy sources of people interviewed

The rationale behind fuel choice differs widely amongst community members. One clear element affecting many of the people is the price of fuel and the boiler technology. However, some do prefer to pay more for a fuel, like gas, that is more convenient and more environmentally friendly. There are also a fraction of people who perceive gas to be dangerous and thus choose other alternatives – usually electricity or coal.

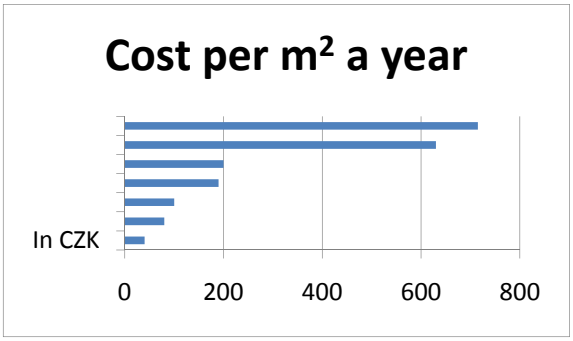
Some villagers believe the right approach to face the challenges of cost and pollution is by using a mix of fuels. However, these residents are often more knowledgeable than the "norm", and this is usually after having installed diverse energy systems. This reflects that know-how could be a key ingredient to energy sustainability. For example, some residents believe that solid fuels such as coal might be better during the colder winter months since it is able to provide more heat in shorter time, while gas is more efficient at keeping a constant temperature, while electricity appears to be an overall expensive, but convenient energy source for heating.



Typical calorific values of fuels (MJ/kg)

The price for energy paid for one m² per year also differs vastly between interviewees from as low as CZK 40 (EUR 1.7) to as much as CZK 700 (EUR 29)! (There was, however, a lack of precise data on the size of houses and money spent). Calculations also did not take into account some potentially important factors such as an indoor temperature; however, this is still an important figure representing the magnitude of the difference in the amount spent on

energy in a household. It hints to the potential for increased learning amongst villagers for more sustainable energy.



Difference in cost of energy of people interviewed

Pollution is perceived to be a big problem by seven interviewees out of thirteen; three claimed it to be somewhat of a problem while another three said air pollution in the village is not a problem. There was no strong correlation found between the energy source used and the perception of pollution. Yet, those who do not perceive pollution as a problem are mainly older residents in Zákolany and reflect about when air pollution was even worse, thus they do not see a need for a change. One older resident interviewed enjoyed seeing smoke coming out of the chimneys against the backdrop of snow in winter, since this meant to her that those inside the building were nice and warm.

Among the community there is also a wide range of different perceptions towards tackling air pollution. Some argue that there should be no coal used in the village while others argue that coal is fine as long as efficient boilers are used. A third opinion claims that coal is not a problem since "it has always been that way" and a more cynical view is that there is simply no affordable alternative. All this shows that there is little consensus among the citizens on this topic.

A key reason for the lack of consensus is that the village is lacking precise data on the range of energy sources and technologies being used, as well as the scale of the problem. Precise information would give a better grasp on the scale of the pollution issue. Expert information on the pollution from various fuels would help citizens to realize the real impacts and possibly would move them towards a cleaner alternative. The difference in the amount spent heating shows the importance of knowledge related to the different characteristics of various energy sources as well as regarding insulation. Other areas requiring more data include the productive capacity of the Zákolany forests, trends in energy prices, as well as addressing certain assumptions regarding the danger related to gas and use, the heating performance of coal in cold weather, amongst others.

Despite these challenges, the community has a strong leadership, or "visionaries" who can be important assets. These people are well rounded in different disciplines and have a clear vision of what direction they want their village to be developing when it comes to energy use. The community has shown a level of effectiveness and cohesion by successfully blocking the construction of a national highway through the

A "dirty" boiler and accompanying coal supply.

community. This social capital could be important in an evolution to cleaner energy in Zákolany

Discussion

When reflecting on these findings it becomes clear that there is no single, "one size fits all" answer to air pollution. The wide variety of fuel sources and technologies used, diverse opinions and socio-economic conditions make a single solution in the short-term unlikely. This is especially true at the current junction where a lack of reliable and trusted information has resulted in a village that contains many "half-experts" but no recognised and trusted authority on energy matters. These conditions make achieving a common decision on how to move forward on air pollution unlikely at this stage.

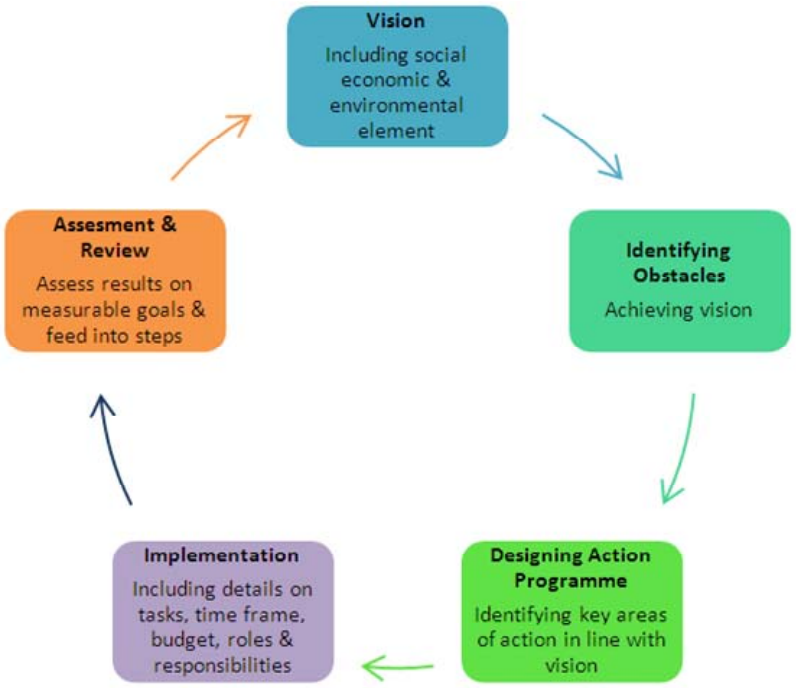
Various interesting options on how to reduce pollution were presented by community members, including replacing all inefficient coal boilers with gas boilers, while others manifest that replacing inefficient coal boilers with efficient coal boilers would make a noticeable difference without raising energy costs for poorer residents. There may also be potential for the municipality to deal with the worst polluters by better optimising the forest biomass in the Zákolany forests, or through sourcing a stable and affordable supply of wood pellets that pollute less than coal. The above options would all also make more sense and be more efficient if accompanied by insulation to reduce the energy demand to heat houses during the winter. At first glance, these alternatives make sense on different levels to different groups; however, none stands out as "the" solution at this stage, mainly due to a lack of information. As a result, either one of the above is unlikely to be wholeheartedly accepted or supported by the majority of residents at present.

To ensure community buy-in, the village should prioritise collecting objective information that is precise and trusted. This information should aim to determine the seriousness of air pollution in Zákolany, accurate costs of different fuel types and technologies, costs of upgrading to cleaner alternatives, energy efficiencies, and the implications for households of implementing possible alternatives.

Improved information will help to target air pollution more effectively and identify solutions that are adequate and cost-effective. When the community reaches the stage where a solution is agreed upon, and funding is needed, a project proposal that reflects a deeper understanding of the problem is more likely to attract funding.

Recommendations: an integrated solution

Confronting these two sustainability challenges characterised by diverse opinions and lack of complete information; we recommend rather than focusing on isolated environmental projects, a more beneficial route to follow over the long-term is by initiating an integrated Community Sustainability Strategy (CSS). The motivation for this is that a holistic development plan founded on community vision would not only help strengthen the village through bottom-up participation, decision-making and learning, but would also be more attractive to potential donors of community development. An integrated Community Sustainability Strategy (CSS) based on a shared community vision would better enable Zákolany to unify opinions and projects into a cohesive long-term plan, and



The Community Sustainability Strategy process

establish the strategic partnerships necessary for sustainable community development.

The steps in a CSS

The CSS procedure is similar in structure to other learning and adaptive processes, like Total Quality Management (TQM), and project management, amongst others, that essentially ask – where are we now, where do we want to go, and how do we get there?

Although there may be small variations, the basic steps in a CSS include, firstly, developing *a vision for the future* incorporating social, environmental and economic elements. This is in essence "Where do we want to go?" A shared vision may be achieved by evaluating potential *scenarios* in a participatory process, and identifying those scenarios, for example, that community members would like their children to grow up in. Next, the community *identifies obstacles* that may be preventing the community from achieving their vision. This could be "what are our strengths and weaknesses". The third step is developing *an action programme with key areas*. This is "What areas will need to be addressed and what needs to be done in these areas to contribute to achieving the vision?" The fourth step is *implementation*, and is "How will we implement this in practice?" It includes details on tasks, timelines, budget, roles and responsibilities, etc. The fifth and final step is *indicators, assessment and review*. Indicators are determined by asking "What are our measurable goals?" These indicators are then employed by the community to assess and evaluate CSS progress.

Although these steps are similar to other learning processes, like TQM, community development can be more complicated than corporate learning due to the wide variety of actors, lack of unifying mission, and the general complexity that arises when groups of people are attempting to making communal decisions that may affect their lives. Thus, a key set of principles needs to be carefully considered by Zákolany in this process.

Principles to be employed

In cooperative behaviours, trust is a core element as "trust lubricates cooperation and cooperation builds trust" [13]. In a

comparative study of community project implementation, Walker et al. (2009) find that trust has an important role in building respect, fostering collaboration and building social capital [13]. This investigation shows that there is a potential lack of trust regarding new solutions, especially regarding energy, and trust will need to be built for options to address pollution to be seriously considered.

There are several elements that can influence trust in a community development process. Walker et al. (2009) continue that in more rural, small communities embarking on a sustainability path, it is advisable that technologies promoted are uncontroversial and unobtrusive. This hints that for coal users who can't afford more expensive fuels, "second-best" options, like wood pellets, or locally harvested wood might need to be considered, although they are not as "clean" as gas. This will still reduce dirty coal pollution and provide an affordable alternative for less affluent village members. Additionally, it is important that benefits are collective and don't favour one group over another [13]. This means that one group's interest should not be prioritised over another's. This can be addressed by both coal users and non-coal users identifying a common vision for energy, based on reliable information, which goes beyond the current rhetoric, that some might feel blames them for their choices.

To achieve programme equity, a participatory and collective process that works on a manageable scale helps to establish common purpose between different groups. Increasing participation should be a priority for Zákolany or local rivalries could flare up as decisions are made or marginal groups may be neglected.

This sensitive communal learning process can often benefit from outside facilitation [14]. It is recommended that a community, like Zákolany with its diverse set of residents and "bumpy" history seriously consider such facilitation, since individual residents attempting to facilitate such a process may automatically be perceived as falling into one interest group or another which would make internal facilitation a legitimacy challenge.

Despite the benefits of a participatory process in terms of trust and common purpose, communities need to realise when tasks and finer details need to be delegated to smaller groups or committees [15]. For instance, this is the case for the gardening process. Community members don't have additional time to be organising gardening events, and will require a committee who is delegated the responsibility of putting workshops with experts together.

Another element that is both a benefit of and is necessary for a successful CSS is the formation of institutional partnerships [7]. A CSS process can be challenging on many levels. Technical, educational and financial partnerships, either with NGOs specialising in community development or with other communities on similar development paths, can help facilitate the process, deal with challenges and avoid mistakes. In terms of energy, which is a technical and currently, divisive issue, the community should establish partnerships with a recognised national authority, like the air regulation body, that is able to provide unbiased and regular information concerning air quality. This will help to unify opinions without needing to "strong-arm" certain community members. The results of this monitoring should be published in the village newspaper, or distributed through

Village residents discuss with IIIEE team members

pamphlets with the accompanying health impacts. This process will help to bring village knowledge about air pollution and its impacts onto the same level. The process of communal learning is thus fostered this way.

Following on from this, fostering a culture of continuous learning is beneficial in a CSS so that mistakes can be learned from and future decisions become more sophisticated. To achieve this, it is important to maximise access to information, knowledge and skills for all those who need to play a part in community solutions [7]. When attempting to identify and implement solutions that require finding common purpose and possibly new technology, new knowledge is required and mistakes are made. Experienced facilitation which incorporates these experiences into the CSS process as opportunities for learning can help build social capital. For example, questions that need to be answered by Zákolany in terms of energy are "just how damaging to human health is coal pollution in the community?" "How harmful are the current levels of air pollution? And "what are the real alternatives?"

Regular monitoring and evaluation provides the sustenance for continuous learning. As such, relevant indicators should be identified and monitoring and presentation of results undertaken in a predictable and continuous manner.

In summary, Zákolany village has the ingredients to initiate very interesting sustainable activities in terms of gardening and sustainable energy. These can become pilot experiences for a more complete CSS that can grow to include other areas of sustainability, like waste management, recycling and other areas. However, it is very important to start the process by developing common vision, or preferred scenarios, and making this the platform for a detailed strategy. This is best achieved by gathering and sharing precise and useful information with residents to facilitate a continuous learning process that leads to better decision-making.

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Environmental Management at Codorníu

EMS implementation & resource efficiency opportunities at the Raimat winery

By Daniel Olbe, Geert-Jan van der Zanden, Inês Ribeiro, Wei Huang

Raimat vineyard and winery

Raimat – Part of the wine giant Codorníu

Raimat is one of the largest cellars and brands within the Spanish Codorníu Group, one of the country's most renowned wine makers and among the world's largest producers of the sparkling wine Cava.

Still owned by the founding family, the winemaking traditions of Codorníu date back to the mid sixteenth century. Over the years the operations of the Codorníu Group have expanded to cover not only several cellars and brands in Spain, but also vineyards and cellars in Argentina and in the United States. The group now counts a total of eight wineries and has an annual turnover of around EUR 220 million [1].

Established in 1914, the 2 000 hectares estate of Raimat is not only the largest within the group, but according to the company website also the largest family-owned single vineyard in Europe [2]. The vineyard, located in Lerida, Catalonia in Northeast Spain, is planted with a variety of international and classic Spanish grapes, used for making red and white still wines as well as for sparkling wine. It produces around 23 000 tonnes of grapes per year, of which 40-50% is used for Raimat branded wines and 50-60% is sent to the cellar in Sant Sadurní where the classic Cava is produced. Of the group's around 800 employees, about 70 are based at the Raimat winery [1].

The project

The IIIEE team partnered with the Quality Safety and Environment (QSE) Manager Eduardo Mas and his team at Raimat to assist the winery in implementing its Environmental Management System (EMS) according to the ISO 14001 standard for its cellar. The team was also responsible for seeking out water efficiency improvements in the winery operations and demonstrat-

ing how these improvements could be made using the EMS. The on-site portion of the project was completed during the second week of April 2011, in which the IIIEE team conducted fifteen interviews with employees in various departments and carried out an overview water audit in one of two tours of the cellar facilities. On the eight of April, the IIIEE team facilitated a workshop with the interviewees, the head winemaker, and other Raimat employees, where the preliminary results of the project were presented and discussed. The workshop also included a visioning session, in which participants were invited to think of what the most sustainable Raimat in 2030 would look like.

Once the on-site portion of the project was completed, the QSE manager requested some research on how the EMS can be used for marketing or positioning purposes. In this report, Orsato's framework is used to explain how an EMS can fit into Raimat's overall positioning strategy.

Key deliverables:

- Structuring of EMS implementation, including EMS manual outline;
- Overview water audit and action programme;
- EMS Implementation Workshop.

Environmental management at Raimat

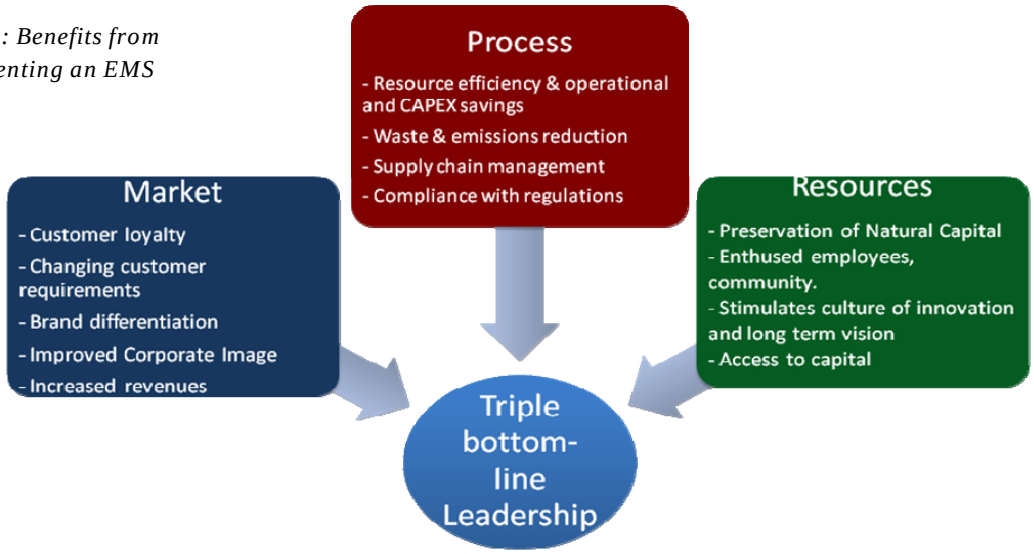
Benefits of ISO 14001

An EMS is a powerful tool that can be used by an organisation to structure and improve its environmental performance.

ISO 14001 requires an organisation to demonstrate a commitment to compliance with different environmental laws and regulations, pollution prevention, and continual improvement. With several requirements related to continual improvement in the main body of the ISO standard, clearly the aim of an EMS is to improve the system on a continual basis, and gradually lead to improved overall performance. This is achieved through objectives and targets and based on a combination of corrective and preventive action programs, internal audits, and a management review.

Figure 1 shows several benefits from implementing an EMS: it can bring commercial benefits, lower process-related costs and better preservation of natural and hu-

Figure 1: Benefits from implementing an EMS



man capital, allowing companies to improve their triple bottom line.

Status of EMS at Raimat

Raimat has made great strides in shifting to more sustainable viticulture (grape production) over the past decades. The company would like to extend this improved environmental performance to its cellars through the use of an ISO 14001 certified EMS.

To determine the state of the EMS at Raimat, interviews were conducted with employees who were asked about their awareness of the EMS, their role in it, and the importance of the EMS for Raimat.

Although an internal survey by Raimat indicates that Spanish operations have over 100 environmental employee initiatives started or already in place, it became clear during interviews that so far, these initiatives are not implemented in a structured way. The EMS would provide a systematic approach for setting objectives, targets, and programmes for achieving them.

Currently, the implementation of the EMS at Raimat is in its initial stages. A number of procedures from the Quality Management System (ISO 9001 certified) at the Sant Sadurní cellar located circa 35 km from Barcelona have been adapted for the EMS but few procedures specific to the EMS have been written. During the course of the project, the IIIEE team assisted in creating examples of such EMS-specific procedures and drawing up the EMS manual that outlined the EMS as a whole.

The Raimat cellar

The results from the interviews showed that many employees had limited awareness of what an EMS was and did not see themselves as having a vital role in its implementation or use [1]. The EMS process was usually viewed as the work of the QSE team alone. At this early stage in the EMS implementation process, this perception of the EMS among employees is common. However, in order for an EMS to be successful, employees must feel ownership of the project, so that they will implement necessary procedures and provide ideas for objectives, targets, and changes to operations that will improve the company's environmental performance. Encouraging and following through employee ideas can also have a very motivating effect on the work force.

As a result, *the IIIEE team recommends that Raimat's QSE department clarifies the roles and responsibilities of individuals in different departments with respect to the implementation of the EMS and its use.*

When asked, all interviewees found the EMS to be important, but cited different reasons for and benefits of EMS certification. Meeting customer requirements, company image opportunities, and the chance for cost savings through increased eco-efficiency were all cited as reasons for implementing the EMS [1]. A couple of interviewees also said that having a certified EMS was a "natural step" for the company, which has made a significant number of environmental improvements in their viticulture activities – all as moves towards

sustainable viticulture – and could expand these to the cellar [1]. *In order to achieve broad-based employee support the main reasons for implementing an EMS should be emphasised to all employees.*

The main concern interviewees had regarding EMS implementation was that it would put additional pressure on employees because the process requires time and money. Experience has shown that allocating sufficient employee time for the EMS is a key success factor for the EMS to be properly maintained and used as a tool for continual improvement [11]. To address this concern, *it is important that Raimat ensures that sufficient time and resources are allocated to the EMS. Explicit recognition from top management that specific individuals in the organisation are to be involved in the EMS – and that time and resource are allocated for this – also facilitates this process.*

Another way to minimise time constraints is to *avoid creating double work by building on existing systems and procedures*. One example that arose during the interviews was the extended use of the current *prevention circles*, where Occupational Health and Safety (OHS) issues are discussed. This platform can be used by employees to interact with the EMS through suggesting and discussing environmental improvements for the company.

Finally, *the EMS can be viewed not as an added cost to the company, but rather as an investment*. Experience shows that eco-efficiency measures related to an EMS give the EMS itself an average payback period of only one to two years.

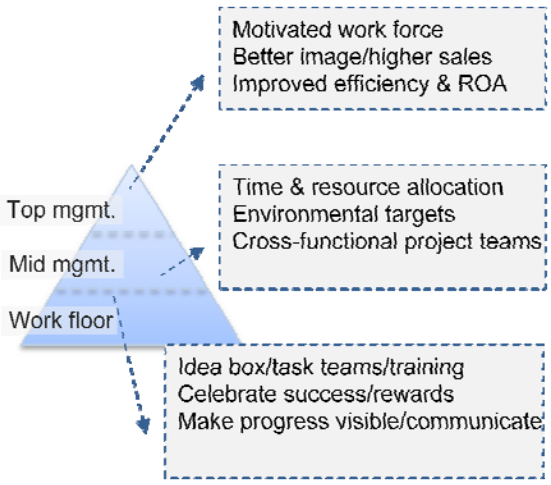
To ensure ISO 14001 certification, Raimat must pay attention to informing employees of what the EMS entails, what their roles in the EMS are, and the main reasons why Raimat is starting this process. The company must also ensure that sufficient employee time is allocated to implementing and maintaining the EMS and that employee's ideas for improvement are encouraged and used. Limiting the scope of the EMS, by focusing only on the Raimat cellar for now and excluding the Sant Sadurní cellar, will make success more likely. Finally, Raimat can avoid double work by building its EMS from existing procedures such as OHS prevention circles and systems such the ISO 9001 Quality System.

Bringing the EMS alive: employee involvement

Since Raimat is still building its EMS, it is facing important challenges. In order to bring the EMS alive, three levels of organisation need to be involved: top management, middle management and the work floor. For a summary of the benefits and motivating factors for each of these levels, related to successful EMS implementation, see **Error! Reference source not found.**.

Without support from top management, the EMS cannot be established. Arguments

Figure 2: How to bring an EMS alive



supporting the EMS related to having a motivated work force, better image, higher sales, improved efficiency and ROA (Return on Asset) could be best utilised to consolidate top level support.

For middle management, Raimat can set environmental targets, using their current *prevention circles* and/or set up cross-functional teams to create a future vision for Raimat, while assuring sufficient allocation of time and resources. Articulating targets and implementing programmes based on the vision can help middle management promote the EMS further, and can build a rapport with workers on the ground floor.

People who work on the floor actually have the greatest potential to bring the EMS alive. Some incentives can help to motivate these employees, including having an Idea Box, task training, public rewards, celebrations of success, progress made visible and adequate communication about environmental issues.

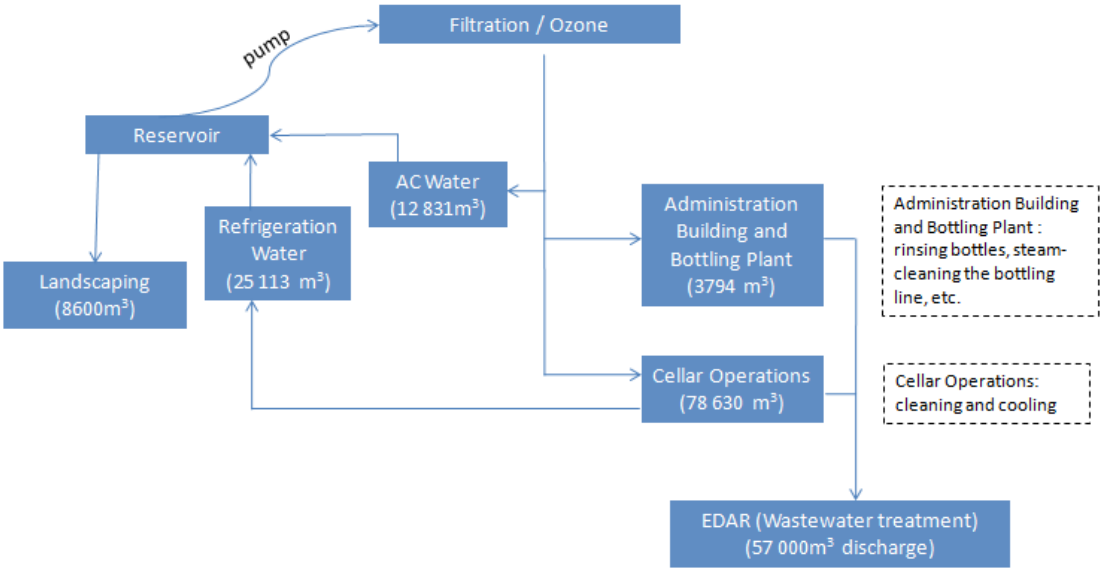
Opportunities for resource efficiency

The IIIEE team was asked to assess Raimat's performance and identify opportunities for improved resource efficiency in the winery operations, excluding viticulture. With the main focus, as requested by Raimat, on water, special attention was paid to:

- *Water usage*: Including not only the amount of water used in the process but also the quality needed;
- *Wastewater discharge*: Including amount of discharged water, types of contaminants in the wastewater and the concentration of these.

A simple "walk-through" audit process was undertaken. This was followed up by interviews and information collection (from purchase records etc.). The initial data collection was based on a high-level process flow mapping, interviews and by retrieving existing input-output data. An overview of the flow is depicted in Figure 3.

Figure 3: Raimat water usage schematic



A systems approach

While water efficiency was the main focus of the audit, it is important to stress the interlinked nature of the flows of water, energy and materials (raw materials and chemicals) in the process.

The core functions in the winery's process are related to the pre-treatment of the grapes upon arrival, several steps of the vinifying process and eventually bottling.

In order to avoid inefficiencies and to assure improvements on a systems level, the initial phase of the audit included looking upstream to assess water use and related costs in the viticulture, supplying the winery with grapes.

In the winery the main areas of water use were identified as cleaning, moving wine and cooling.

Internal visit in Raimat winery

The 4Rs as guiding principles

The identified improvements were based on industry best practices (e.g. The Best Winery Guidebook and The Wine Institute's Sustainable Management of Winery Water and Associated Energy) in accordance "the 4Rs", a step-by-step approach to identifying and implementing improvements [3,4].

- *Refuse/Rethink*: Questioning and carrying out substitution, process modifications, optimised sequencing and good housekeeping practices can limit the need for source water and prevent overuse;
- *Reduce*: E.g. by incorporating water minimisation measures in standard operating procedures;
- *Reuse*: Identifying opportunities for reusing water or materials within the process, e.g. looping water or recovering chemicals for reuse;
- *Recycle*: Identifying opportunities for recycling of water or materials through adequate separation and treatment.

Water focus

Both the IIIEE and Raimat teams agree that water is one of the significant environmental aspects at Raimat, in both the viticulture and winery operations. The efficiency of its use is intimately related to the use of other resources, and it is thus advisable to analyse water usage and water treatment needs as part of the larger system at Raimat, not as isolated activities.

This is clearly illustrated by looking at the total costs of water use. Viticulture, mainly through irrigation of the company's 2 000 hectares, uses an estimated five million m^3 of water each year. The cost of this agricultural water is approximately EUR 100 000, but an additional EUR 60 000 is spent on electricity for pumping alone. This is why a project is being evaluated to use water from a higher-lying dam, making use of gravity for moving the water. Raimat is also planning to significantly reduce water usage by replacing the remaining 30% of sprinkler installations with highly efficient drip irrigation that is applied to the rest of the vineyard.

In comparison to viticulture, the amount of water used by the winery operations is approximately 82 000 m^3. This is only 1.6% of the volume used in viticulture. The direct cost of this water is only EUR 4 500, but costs of pre-treatment, pumping and wastewater treatment amount to about EUR 75 000, bringing the total water-related expenditure in the winery close to EUR 80 000 (excluding capital expenditures). This leads one to conclude that while water seems inexpensive, related costs are high. Just 1.6% of water at Raimat represents over 33% of the water-related costs, while also constituting a risk in terms of hygiene and dependence on external supply. At the same time, the inefficient use of water in the winery is contributing significantly to Raimat's CO_2 footprint, through methane emissions from the wastewater treatment plant. This should provide a strong driver for reducing water usage.

In their evaluation, the IIIEE team was asked to focus on the water usage related to Raimat's winery operations. Both water usage and wastewater discharge was identified as significant environmental aspects. Procedures on how to determine objectives, targets and action programmes for each aspect will be established in the EMS, but on the basis of the audit and literature review, the IIIEE team believes that the following objectives, targets, and programme tasks are achievable.

Best practices

Examples abound of wineries systematically reducing their water usage significantly (30-70%), even while growing their production volume [3-5]. Sources such as Water Efficiency Opportunities Drink Processing - Wine Making Best Practice Guide [5] and Best Winery Guidebook [3] identify the following operations in *Table 1* as the most water intensive and providing the biggest potential for savings.

Activity	Reduction measures (potential reduction compared to basic techniques)
Crushing and pressing operations	Mechanical cleaning and sweeping floors before washing (20%)
Cleaning tanks and barrels	High-pressure nozzles & automatic shutoff devices (40%-50%), Automatic cleaning systems/hot water (80%)
Hosing down of floors and equipment	Sweeping floors before water washing (20%)
Water used for pushing wine through pipes	Shortening pipes; reducing transfers to <4 or using CO_2 for pushing wine
Cooling	Reduce cooling needs/Reuse water from other processes for cooling / reduce bleed off (20%)
Bottling facilities	Reduce hot water in boilers

Table 1: Activities for water savings

Environmental aspect: water usage

The IIIEE team made several plant visits and had interviews with plant personnel, to review practices and identify opportunities to "refuse/rethink, reduce, reuse and recycle" water. Literature research showed that industry benchmarks are normally around three litres of water used for one litre of wine produced. A number of opportunities were identified to help Raimat get closer to the industry benchmark, leading us to propose the following objective, target and programme tasks for Raimat (to be approved by the management of Raimat for inclusion in the new EMS, including assignment of responsibilities, budgets and timing).

Objective: Reduce total water usage in Raimat's winery operations by 40% by 2020 (from a 2010 basis).

Target: Reduce total water usage in the winery from today's 82 000 m^3 to 72 000 m^3 in 2012.

Water usage programme:

1. Start measuring individual operations. Currently, the only data available are total water volume pre-treated (approximately 82 000 m^3), used in bottling/offices (approximately 4 000 m^3), used in other plant operations (54 000 m^3), for cooling (25 000 m^3, returned to dam). Apart from this, 12 800 m^3 are consumed by air-conditioning for the offices and 8 600 m^3 (untreated) for irrigation of the non-native vegetation that makes up Raimat's gardens. This is a rudimentary estimate. To be able to manage water consumption, it is recommended that Raimat start measuring water consumption, continuously or on an ad hoc basis, in individual operations such as tank cleaning, wine pushing, cleaning of crushing and press areas, etc.

2. Limit water use in cleaning through use of higher temperature water and/or reuse of rinsing water. From the interviews, the IIIEE team estimated that 45 000 m^3 of water is used in cleaning of crusher, press areas and tank and barrel cleaning. High pressure, high temperature cleaning consumes considerably less water (however related energy costs have to be taken into account). An opportunity exists to upgrade the heat in the cooling water (now discharged), through the use of a heat pump and heat exchanger, and use the higher temperature water for high pressure cleaning of some of these operations (already used in barrel cleaning). An immediate opportunity identified is to reuse tank rinsing water, by looping it. There is 65% of the tank cleaning at Raimat that is done by running water along the insides of the tanks for ten minutes and discharging all of it; an estimated 1 000 litres. We recommend tests to change this cycle to e.g. one minute (100 litres) first rinse and discharge, followed by eight minutes (200 litres) of "looped" water rinse, followed by one last minute (100 litres) of clean rinsing. 'Looping' or reusing of rinsing water is common practice in wineries and can save up to 60% of the water volume used in rinsing.

3. Limit water use in pushing wine, currently using an estimated 9 000 m^3. This can be achieved by shortening pipelines and planning production for the minimisation of tank transfers. According to benchmarks provided by the University of California at Davis [6], there should be no need to transfer wine or juice more than four times during the production cycle. An alternative way of pushing wine is by using CO_2, which has several benefits and can be captured from Raimat's own fermenting operations. This will be discussed later.

4. Limit water use in cooling, currently 25 000 m^3. The cooling at Raimat is the activity with the greatest savings potential for water, electricity and capital expenditure in stand-by cooling equipment. Applying the 4Rs:

- *Refuse/Rethink* cooling to an important extent by shading the cooling equipment and tanks. This was the biggest opportunity observed by the IIIEE team and we recommend evaluating the options of installing permanent or temporary roofs over the tanks and cooling equipment.
- *Reduce* cooling needs by routing the glycol through Nitrogen and Carbon Di-

oxide evaporation equipment, which upon evaporation absorbs very significant amounts of thermal energy. Also, optimising the location of cooling equipment or using mobile cooling equipment reduces losses in transport.

- *Reuse* the water used in cooling for use in other operations, e.g. rinsing or, using a heat pump or solar water heater, upgrading it to hot water.
- *Recycle* the cooling water, which is high quality, at the plant, using filters, rather than dispatching it back into the dam, as is done currently.

Environmental aspect: wastewater discharge

Wastewater discharge implies high treatment costs as well as environmental impact because of methane emissions from the largely anaerobic digestion of biological components in the wastewater. To lower these impacts, the size of the discharge flow as well as its BOD (Biochemical Oxygen Demand) and COD (Chemical Oxygen Demand) concentration should be minimised. We propose the following objective, targets and programme, to be included in the EMS:

Objective: Make wastewater treatment plant obsolete.

This is an ambitious, but not impossible objective in the longer term. If Raimat prefers to set a more moderate objective, it could phrase it as follows: Minimise the need for wastewater treatment and treat it in the environmentally cleanest way possible.

Targets: Fifteen percent reduction of water volume discharged in 2012 (from a 2010 basis); fifteen percent reduction of total BOD discharged in 2012 (from a 2010 basis).

Wastewater treatment programme:

1. Treat waste streams separately and concentrate the final stream that goes to the treatment plant. 'Grey' water can be reused or recycled at the plant using simple filtering, separating solids from liquids and sending solids to the lees and skins that are sold off for distilling. Measures to achieve separating and concentrating of waste streams are: maximising mechanical cleaning, (ultra) filtration and reuse of grey water, as well as looping of water in rinsing operations.

2. Evaluate the possibility to replace sodium based cleaning agents with potassium based ones, a common practice in wineries. Potassium based agents can be more easily be recovered from the waste flow and reused, either for using cleaning-in-place solutions or for enriching the irrigation water, especially if the soil at Raimat is quite poor in potassium.

3. Use a fluidised bed crystalliser for tartaric recovery. Instead of chilling entire tanks for tartaric precipitation, which later require intense cleaning and generate waste streams high in BOD, a fluidised bed crystalliser only chills the fluidised bed. While a fluidised bed crystalliser requires an investment, it significantly reduces cooling needs (read: electricity reduction up to 90%, less water, less capital expenditure in cooling capacity and in DE filtration equipment, lower CO_2 emissions), while allowing for capture of the tartaric crystals in the filter bed. It thus reduces BOD of the waste stream and also reduces the need for tank cleaning with sodium or potassium, largely reducing the need for wastewater treatment.

Strategic directions

To help Raimat in its long-term thinking, the IIIEE team organised a brief visioning session with a select number of Raimat employees. Although it was not part of the original deliverables, in this segment we will present some insights into consumers and trade trends with respect to green and ethical products, as well as introduce a conceptual framework to help Raimat evaluate its strategic options for marketing the environmental aspects of the Raimat brand. We will also briefly highlight the long-term impact of climate change on the company and the importance of calculating a water footprint.

Raimat vision for 2030

On the eight of April, the workshop with Raimat employees included a visioning session, where employees were split into pairs of two to answer the question: "What is the most sustainable Raimat you can imagine for 2030?" Once participants had brainstormed in pairs, the whole group came together to create a comprehensive list of improvements for the company's operations. Suggestions included smaller changes, such as having more virtual meetings, carpooling, and reusing or minimising packaging, as well as the more ambitious goals of becoming energy self-sufficient and putting tanks underground to reduce cooling needs. Due to the time limitation of the session, the ideas generally focussed more on supply side and practices, rather than high impact, more integrated solutions for resource efficiency. For the full list of ideas see *Box 1*:

Participants discussing the vision

Raimat 2030 Vision - Ideas from Breakout Sessions
• Recovering CO_2 from fermentation
• Using gravity for pushing wine
• Reusing wastewater (closed loop)
• Reusing/minimising packaging
• Having all employees aware of his/her environmental impacts
• Carpooling & virtual meetings
• Energy self-sufficiency
• Rainwater harvesting
• Tanks underground for cooling
• Site planning: to reduce environmental impact

Box 1: Full list of ideas for Raimat 2030

The goal of energy self-sufficiency was then used as an example to do *back-casting*, a technique where long-term objectives are translated into medium and short-term actions to arrive at this objective. The group was asked what five to ten year objectives would help them get on the path to the 2030 vision. Objectives included energy efficiency measures, such as introducing insulation and energy-efficient lighting, as well as energy source goals, such as having a biomass plant, hydroelectric, wind, and solar power.

The exercise was done to provide insights into how a vision could become a reality with the use of back-casting – and the role of an EMS in supporting such work. The vision's objectives and the targets that they are broken down into can be met in a systematic way with the use of a programme under the EMS. EMS programmes outline the responsibilities, budget and time frame for targets and objectives.

Visioning and back-casting methods can also be used as a tool to help crystallise the vision for Raimat's positioning strategy.

Market trend: sustainability among Nordic buyers and consumers

The Nordic countries represent the second biggest market for Raimat wines, following the domestic market. Alcohol retail in Sweden, Finland, Norway and Iceland are all controlled by state monopolies, Sweden being by far the largest monopoly, see *Box 2*.

The Swedish Case – Systembolaget

- One of the world's largest buyers of wine
- 2010: total sales of wine increased 3.6%
- 2010: sales of organic wines were up 40%

"We see that more and more customers actively choose eco-friendly wines and packaging. It strengthens us in our goal of creating a sustainable range"

Marie Nygren, Purchasing Director and Vice President Systembolaget, 2011

Box 2: Systembolaget - the Swedish case

In accordance with the state monopoly maintained in Sweden, all alcohol beverages in Sweden are purchased through one retailer – Systembolaget. In their launch plan for 2011 Systembolaget points out eight key trends, of which two can be identified as directly related to sustainability matters [7]:

1. Products in environmentally sound packaging (such as wines in bags, PET bottles and cartons) are in greater demand because CSR issues are becoming more important.
2. Organic products and Fair Trade products are growing, because more people want to "do the right thing".

The trend towards focus on sustainability among the buyers is further underscored by a joint effort of the alcohol monopolies in the Nordic countries. In their Responsible Suppliers Programme, a five-year Nordic strategy in five stages is outlined, including the Nordic Code of Conduct that will be part of the purchasing agreements as of 2012, see *Box 3* [7].

Systembolaget implementing the Nordic Strategy

"By 2013, when all five stages will have been implemented, our goal is to have established a systematic methodology for creating a sustainable drinks supplier chain. As part of this work, Systembolaget is offering its suppliers training courses and a range of different tools that will support them in their efforts to establish a sustainable drinks supplier chain" (Systembolaget Launch Plan 2011, p. 49)

B*ox 3: A common five-year Nordic strategy*

Environmental strategy – when does it pay to be green?

How can Raimat's sustainability efforts be translated into a competitive advantage for the firm? By assessing the environmental investments within a framework of Environmental Strategies [9] one of four key strategies can be identified as the way forward for Raimat (see Figure 4*)*.

Eco-Efficiency: This strategy focuses on the productivity of the organisational processes with the aim of decreasing the environmental impact and associated costs. The strategy is particularly suitable for firms supplying industrial markets, with high processing costs and that generate large volumes of waste and/or by-products.

Beyond Compliance Leadership: In addition to focus on efficiency, this strategy entails efforts going beyond what is required by law and established social norms for environmental performance in order to meet expectations from stakeholders (now or in the future), notably customers, authorities and owners. Efforts should be communicated and may exert indirect influence on a firm's image.

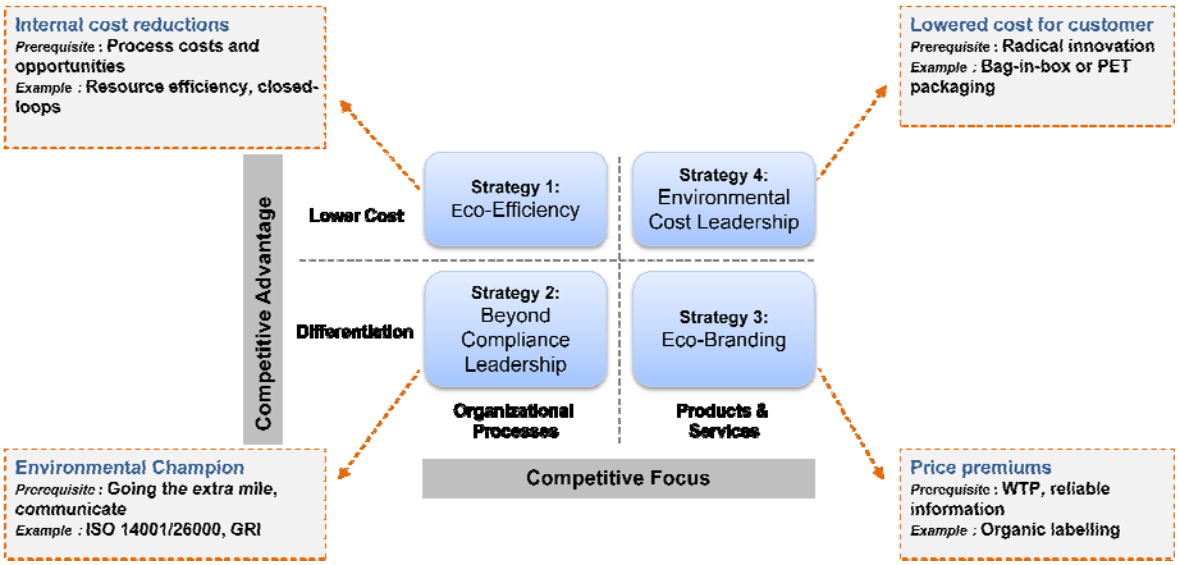


Figure 4: Orsato's framework of environmental strategies

Eco-Branding: This strategy aims directly at the consumers and their perceived benefit of clearly eco-branded products and willingness to pay for the ecological differentiation and associated attributes. A successful Eco-Branding strategy also relies on credible information made available to consumers and uniqueness difficult to imitate by competitors.

Environmental Cost Leadership: This strategy relies on the firm's capability to cut costs for its price sensitive customers while improving the environmental performance of the product. Successful implementation is typically based on radical re-thinking of products, packaging or business models. This could be of particular relevance in the tender process for Nordic markets.

This project has not included a complete analysis of Raimat's environmental positioning and choice of appropriate strategy. It is however clear that Raimat and the Codorníu Group in general are well equipped to turn their environmental traditions and ambitious efforts into competitive advantages likely to make their eco-investments "pay off". The final strategy depends on the context that the company operates in, its capabilities and the potential benefit associated with its strategic decisions.

If Raimat chooses to go the route of eco-branding for more of its products, as it has for the newly launched Terra brand, there are a number of important lessons from Ottman [10] that can help the company take advantage of its improved environmental performance:

Firstly, companies must establish credibility before engaging in eco-branding in order to avoid "green washing" and consequent criticism from environmental groups and the public [10]. Credibility comes with achieving environmental performance based on the life cycle of products before communicating it. This can be done and with the help of reputable environmental groups, which also adds credibility. Secondly, *green* attributes are added value to the traditional characteristics of products that consumers desire; product quality cannot be compromised for these *green* attributes [10]. Finally, eco-products must

be targeted to the appropriate segment of green consumers; although 83% of consumers are some shade of green [10], each segment of these consumers exhibits different purchasing behaviour that an eco-branding strategy can cater to.

Experience in the wine market seems to show that end consumers are generally not interested in the environmental practices of the production of wine in the cellar as much as in viticulture, which is more salient and identifiable for them. Raimat is focussing its current eco-branding efforts in this direction.

However, as previously stated, buyers, especially in the Nordic market, are interested in the environmental profiles of their supply chain. In this case, the performance of the cellar becomes vitally important and must be properly communicated to buyers.

Climate change: variations in temperature and water availability

Scientists largely agree that climate change is taking place and that this will result in more extreme weather events. Not enough statistical information is available at Raimat to be able to distinguish a local trend in temperatures or precipitation patterns. However, the long-term view that the company and the owning Raventós family are taking with respect to the protection of the natural capital as represented by the vineyards, obliges them to take a pro-active approach with respect to climate change.

Raimat does not perceive water availability as an issue yet, because enough water is available from the Pyrenees and the company considers itself a small user compared to the Lerida fruit producers. However, Spain has been suffering from water shortages and the issue is not only how much Raimat uses, but also how much water is left available downstream. It is not impossible to imagine the Segre and Ebro rivers in 30-50 years not supplying enough water for the needs of the entire region and water being restricted, as already occurred during the drought a few years ago, or more expensive for agricultural use.

Temperature increases will affect the ripening cycle of the grapes and investigation is necessary into possible mitigation through vineyard management or introduction of new clones or grape varieties. The current trend in many markets towards fresher, lower alcohol wines should also be considered in this equation.

Another impact of climate change is the loss of biodiversity at the local level, related to changes in populations of sensitive species. Considering the use of ecological and integrated production methods at Raimat, changes in biodiversity could have a big impact and should be monitored and studied.

Raimat's reaction to possible changes in temperature, precipitation levels or biodiversity is largely a viticultural one and is not within the scope of our study, but we recommend Raimat do a 30-year scenario analysis to be prepared.

Water footprint

Not included in this report is the water footprint calculation for Raimat or its products. We expect "embedded" water in products or services to become a very relevant issue for food retailers in the next ten years and recommend Raimat to do a calculation of its products' water footprint within the next two to three years. Apart from the very significant footprint generated in viticulture, the selection of ingredients and packaging materials for wine production has an important impact in the to-

tal calculation. E.g. carton and paper typically have embedded water content of 400-500 litres per kilogram, having a similar contribution to the water footprint of a bottle of wine as all of the winery operations combined.

Other recommendations

A sustainable winery optimises the amount of closed loops in its resource cycles and aims to be self-sufficient to the largest extent possible. Despite the focus on water, the IIIEE team identified two clear opportunities for resource efficiency:

1. *CO_2 capture and reuse* technology has developed so much that it is now feasible to have CO_2 recovery units in wineries.

Assuming one tonne of CO_2 produced for each ten tonnes of grapes fermented, Raimat's operations generate approximately 2 300 tonnes of CO_2 per year. In the production process, currently approximately 51 tonnes of CO_2 are used, at a cost of around EUR 27 000. Using a relatively small CO_2 recovery unit (off-the-shelf units start at 30 kg/h) covering only part of the fermentation tanks, Raimat could capture enough CO_2 to supply the entire Codorníu Group with low cost CO_2. Moreover, CO_2 recovery systems can be integrated with refrigeration systems, further optimising efficiency and reducing capital and operational expenditure in cooling equipment.

2. *Take advantage of waste heat in cooling water* using a heat pump or solar water heaters in combination with heat exchangers. The large amount of cooling taking place generates important amounts of waste heat. This heat, captured in cooling water, is now lost because the water is discharged back into the dam, but through the use of heat exchangers, heat pumps or solar water heaters, this heat can be upgraded to provide low cost high temperature water that can be used for more efficient cleaning. Heat pumps and heat exchangers are relatively modest investments, but can result in savings in water usage, thus optimising the wastewater discharge, as well as reducing the need for boilers (saving both diesel and capital expenditure).

Conclusions

Raimat's long-standing interest in the environmental impact of its production has mostly been expressed in its viticulture practices, but now the environmental performance of the cellar can also continually improve with an ISO 14001 certified EMS. The EMS can be a tool to bring the company's vision to life, and to enthuse employees and customers alike.

The main task ahead for Raimat is to ensure success through involving employees in the implementation process while providing them sufficient resources and building on existing systems and procedures. The real key to success is fostering a conservation culture in the company where seeking resource efficiency becomes a natural part of the continual improvement work.

Raimat can implement programmes like the water programme presented here, which treats the company as a system and prioritises actions according to the 4Rs.

As part of the EMS process, these programmes can support the company's larger strategy in the face of climate change and evolving market conditions.

The subject of possible green marketing strategies for Raimat merits further investigation. Raimat seems to have focussed its

marketing efforts mainly on Catalonia and we recommend doing a more in-depth study of consumer attitudes and trade dynamics in other key markets, such as Nordics, Germany, and the United States in order to better tailor Raimat's competitive environmental strategy to these actors.

Raimat castle - the IIIEE team's guesthouse

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González Byass

Past, present, future

By Henrique Simões, Lucas Playford, Maria Zondervan and Tamás Erdélyi

Introduction

González Byass is a wine company founded in 1835 by Manuel Maria González. The business has remained primarily in the ownership and management of the González family and they specialise in fine sherry wines from the Jerez region of Spain. The focus of our efforts were on the incorporation of this successful company's Environmental Management System (EMS) into all aspects of their business, how to make their goals more aggressive and overall improve their environmental image. We underline how environmental initiatives can be used to make the company more appealing to new generations, thereby increasing their future market share, but with an emphasis on the fact that the efforts need to be genuine – no "green washing." González Byass has a proud tradition stemming back five generations, and we suggest that they take the approach of looking ahead through the next five generations within their planning.

Past

González Byass has a long history of wine making, with emphasis on quality and maintaining the historic winemaking techniques that their business is founded upon. Twenty years after the business was founded in Jerez de la Frontera, in Southern Spain, Mr. González decided to bring his English agent, Robert Blake Byass, into the business and González Byass was formed. However, in 1998, the Byass family withdrew from the business, leaving the González family almost complete ownership of the company. Only a few minor shares are held by their distributors in Switzerland and Japan.

Tio Pepe icon seen in Spain

Over the years, this five generation winemaking family has combined tradition with modern innovation in their ever expanding portfolio of sherry, still wine and brandy. Tio Pepe is the name of González Byass's world renowned Fino Sherry and their Tio Pepe logo has become a familiar site all throughout Spain.

Sherry wine production is rather different from regular wine production. Grape cultivation and harvesting are similar, but storage and aging varies greatly.

Cridera and Solera System

What gives sherry vine its unique flavour is its biological aging process – the wine is aged under a natural layer of yeast, known as "Flor del vino," that protects the wine from the air.

It is aged in American Oak barrels (casks), but one will not find "vintage labels" on any bottles of sherry. This is because there is no one true vintage. Sherries are blends of all the different vintages produced at one wine cellar, producing a consistent quality and taste year after year. The unique blending process requires a dynamic cask stacking and aging system called the "Cridera and Solera System." The youngest vintage within the blend will be three years, but portions may be over 50 years of age [1].

González Byass has made environment concerns and quality part of its business. Already in 1955, they opened their own research centre which deals with quality and environmental management, along with the development and innovation of oenological (wine making) processes. They have an EMS that is ISO 14001 certified. They are also ISO 9001 certified Quality Management System, and have third party certification of their Integrated Production practices within their vineyards.

Jerez Vineyard

Present

Presently, González Byass employs approximately 420 people on a fulltime basis

Display at González Byass winery showing the darkening of brandy with age

throughout its locations. This report will primarily focus on operations in Jerez de la Frontera, Spain, where they employ roughly 160 people. They produce approximately 11 500 000 bottles of wine and brandy per year at their Jerez winery.

González Byass owns five vineyards in the Jerez region, growing primarily Palomino grapes, and will buy additional grapes from other Jerez vineyards if they need more than their own vineyards can produce.

Environmental Management System

Environmental management system (EMS) refers to an organised, systematic, planned and documented method for managing an organisation's environmental programmes. It should include proper planning and resource allocation for developing, implementing and maintaining policies that protect the environment.

Environmental management in practice means minimising the environmental impact of the company's processes, products and services, but it also means finding business opportunities in correct environmental behaviour.

How should an EMS be set up in order to achieve best results? For company managers, the main aim of environmental management systems is to improve control and

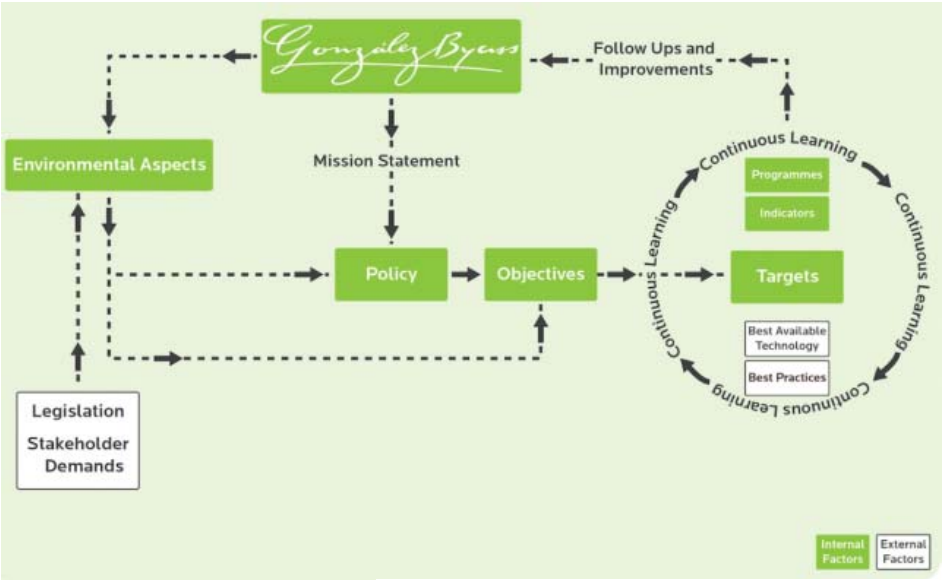
reduce environmental impacts while at the same time developing business opportunities. In order to achieve these goals, the system needs to be set up in a way that encourages the best possible outcomes.

Ideally the mission statement of the company embraces the triple bottom line (profits, people and environment). The environmental aspects of the company has to be identified and ranked according to whether or not they are significant or non-significant and direct or indirect. Life-cycle thinking should be utilised when identifying these aspects to relate to all product stages from materials acquisition through to disposal. External factors such as national and international legislation as well as stakeholder demands play an important role during the definition of these aspects.

With an environmental policy defined, it can then influence the creation of objectives. These are long-term, and strive to put the developed policy into practice by setting several aims and goals. Objectives can be ambitious, such as reducing the carbon footprint of the company by 80% by 2030. To achieve the objectives, targets need to be set. Following the above example, a target could be to replace 10% of fossil fuel vehicles by the next year. Targets are generally set with a shorter time frame and are more detailed than the preceding objective.

Targets are achieved with programmes designed to address the specifics of a given target. Programmes are the activities that need to be performed in order to achieve targets and ultimately to achieve the objectives. Indicators need to be in place to check the programme progress, effectiveness and efficiency, enabling corrective actions and ultimately the company's performance.

Keeping updated with Best Available Techniques and Best Practices plays an important role at this stage, as they can influence the design of the Programmes. There is the need to make this entire process a continuous learning activity – this should be the main driver of the entire system. This generates improvements, such as cost savings, resource use reduction and data gathering to be used for further learning. Notice that the follow-up exercise and improvements gathered will then be used in the revision of the system by the management in order to update the environmental aspects and thus continuing the natural flow of the environmental management system.



EMS Diagram

The EMS diagram above illustrates how an ideal environmental management system should function and shows the interactions between the different components of the system and the desired outcomes generated by each.

Many companies hold the ISO 14001 flag up high without making the best use out of it. An environmental management system should not be seen as a stand-alone tool but as an instrument that can deliver outstanding environmental performance that can be translated to production and cost effectiveness. How does González Byass use its environmental management system and how can it be improved in order to achieve best results?

Objectives and targets

Over the previous three years, from 2008 onwards, there has been only one environmentally related objective/target contemplated within the quality and environmental system. In 2008 the objective was to engage in the development of the carbon footprint. It was a five-year objective, which had no targets or indicators in place to support it. It was put on hold due to the fact that there was still not an accepted method to calculate such a footprint.

The following year the "objective" was to cooperate with a local school in terms of environmental awareness. This is a truly respectable objective but by itself falls short of influencing the core business of González Byass. In terms of what has been described above, it is not possible to say that González Byass establishes adequate targets (quantitative and with a set period of time). It is of great importance to align the objectives set out within the environmental management system with González Byass' vision and mission statement.

Indicators are already in use at González Byass but only those related to production efficiency and production costs, without any link to a specific target or objective. It is important to keep in mind that environmental indicators used in line with environmental targets and objectives will in the end be reflected in objectives that relate both to production and costs.

It is recommended that González Byass develop either new objectives or targets, or strengthen and improve existing ones on a yearly basis. At the same time, González Byass should create programmes and indicators that will help to both achieve and keep track of the progress made in achieving such objectives and targets.

Environmental aspects

Currently González Byass has at its disposal a well-developed list of environmental aspects, but should nevertheless not be seen as a static document. It may require adjustments if stricter internal or external policies or legislation affect González Byass' operations in the future. A distinction must be made between direct and indirect aspects. Also, some aspects were not included, such as the direct aspect of the normal uses of R-22 (refrigeration), or the indirect aspect of the fuel consumption of transport vehicles of contractors that are bringing González Byass' products to market.

It is also recommended that tourism be included in the list of environmental aspects. In doing so, tourism would then need to be assessed to determine whether or not it is a significant aspect. The recommendation is given due to the roughly 227 000 yearly visitors to the Jerez winery, which add to both water and energy consumption, as well as waste generation at González Byass' Jerez operations.

Energy

The main energy source of the operations of González Byass is electricity from the grid, but there is also some use of natural gas and diesel for distillation and running of vehicles. Presently there are three main meters in place that are read by the energy provider to determine how much González Byass pays for their energy consumption. One meter is found at the Jerez Central location and two at the main production area in Jerez, known as Las Copas. At Central, there are no secondary meters, but at Las Copas where there are eighteen additional meters to help determine where energy uses are the highest and to detect changes in energy use.

The main energy consumers at González Byass are the pressing machines, cooling equipment for office facilities and production processes, pumps used in moving liquids, compressed air system at the bottling facilities, boilers for the heating of process water, transportation of goods and employees, and facility lighting. Some of potential savings within these areas are outlined below, others were provided in a more detailed document to González Byass.

In general, to reduced energy consumption, lean thinking should be followed; machines should run only for the time when they are in use. The identification of all large consumers of energy, through additional metering, can highlight hot spots where small and relatively inexpensive improvements can be made, that could result in substantial energy savings. Maintenance of machines and cleaning of lighting, filters and inlets are important to keep the system running at an optimal efficiency rate.

Bottling line

Compressed air: Looking into specific areas, the use of compressed air throughout much of the facility (particularly the bottling area) represents a large inefficiency. Compressed air has an efficiency rating of approximately ten percent when converting electrical energy into mechanical work, compared to electric motors which are around 90% efficient. The replacement of all the compressed air systems would be expensive, but it is something to consider in the future if equipment needs to be replaced. In the meanwhile, it is important to recognise how inefficient this system is and therefore minimise losses within the compressed air system.

During site visits at Las Copas, multiple leaks in the system were detected at the brandy and sherry bottling lines and around the compressed air tanks. Also, all parts of the system seemed to be pressurised, even if large parts of the system were not in use. The system is also running after hours when no work is occurring. It is preferable to close down those parts of the system where compressed air is not needed, in order to reduce the energy requirements needed to maintain pressure and reduce the area where possible leakage can occur.

When the compressed air system is not in use, reducing the pressure or even turning off all the compressors could save a considerable amount of energy. There are four

Going over the numbers

compressors at González Byass. Shutting down just one when not needed, could save in a year around 96 000 kWh electric energy, or around EUR 13 000 at Las Copas (using twelve hours shut down of a 22 kW compressor with an electricity cost of 0.1365 EUR/kWh).

Air Conditioning: Currently at González Byass ambient temperature in offices and inside of rooms rented for weddings, conferences and other uses is set to 21-24ºC depending on the outside temperature. According to the US Environmental Protection Agency, by setting the inside temperature higher, approximately 5-6% of the cooling costs can be saved for each degree above current ambient levels [2]. Studies have shown that the inside temperature of offices can be set to 25ºC without risking lower productivity rates amongst employees. During weddings and conferences, depending on the actual program, when less concentration is needed, even higher temperatures 26-27ºC could be sufficient. Setting the air conditioning system to a higher temperature level at night and times when it is not needed or turning it off altogether can achieve additional savings.

Nitrogen for cooling: Gonzales Byass is using nitrogen for bottling and during the cold stabilisation of fino sherry wines. This nitrogen is stored in liquid form in a tank outside of the facilities without any insulation. The liquid nitrogen at atmospheric pressure has a boiling point of -196ºC. The cold stored in the nitrogen which is at the moment wasted, could be used for cooling.

Boiler insulation and maintenance: At the bottling stations hot water is used for sanitising the bottles before filling. The hot water is made in electronic boilers which were observed emitting steam on the top and had hot spots on the side of the tanks that represents unnecessary losses of energy. Heat losses to the surroundings should be avoided by proper insulation and maintenance of the boilers and hot water pipes.

Lighting: During the visits to Las Copas, lighting in the facilities was still on at night after working shifts had ended. Assuming a facility has twenty-four 200 W high pressure sodium lamps, keeping them turned off for four extra hours per working day would result in 4992 kWh less energy consumption per facility area per year. This requires no investment and the savings increase with the number of lighting fixtures per facility and the time they are kept turned off. Whenever a lighting fixture needs to be changed, the fixture should be replaced with an energy saving option. Lights can also be placed closer to the area needing lighting, thereby reducing the

Lighting at bottling facility

lighting capacity required for the same function.

Connecting lighting to motion detectors and photosensitive automatic dimmers would reduce lighting even further. Lighting in the facilities would only be on in those areas where work is being completed and where there is no sufficient natural light. Tubular solar skylights can be used to reduce reliance on electrical lighting in warehouse and production facilities and provide the equivalent of up to 1 450 W per fixture [3].

Solar Power: From 2009 to 2010, González Byass saw an increase in their energy bills on 32% per kWh. By switching to self-generated solar power, such high cost increases in the future could be avoided, while at the same time lowering greenhouse gas (GHG) emissions. If capital investment is an issue, there are a few companies that will install photovoltaic panels for free or at a very low cost, and then sell the energy back at a fixed price that is generally at or below the current energy grid prices.

Video Conferencing: Travelling by car and plane contributes significantly to energy consumption and GHG emissions at González Byass. As a reference, the yearly energy consumption of forklifts and tractors in Jerez facilities along with corporate and commercial vehicles at González Byass, are respectively around 30 000 kWh, 22 000 kWh and 137 000 kWh (assuming 9 kWh energy content per one litre of fuel). The energy consumption of taking flights is around the same magnitude, considering a return flight from Jerez to Madrid every day of the year results around 121 000 kWh energy consumption (using Airbus 320 with a 0.0401 l/passenger km as a reference). Video conferencing provides a comfortable alternative to face-to-face meetings and avoids the energy-intensive and costly trips of employees. Video conferencing can substitute for daily or practical meetings, where the subject of the meeting and the conversations are more important than personal presence. González Byass already has video conferencing capabilities that it could utilise more. Creating small video conferencing rooms at all sites could further extend virtual meeting capabilities. Video conferencing allows the virtual presence of partners on meetings when it is more convenient to attend a meeting without travelling.

Water

In total, González Byass uses approximately 61 000 m^3 of water a year combined at its Las Copas and Central production facilities in Jerez. Water is used in production processes, cleaning and maintenance and in general domestic uses including sinks, toilets and washing facilities associated with tourism. Costs associated with water use vary between the two locations in Jerez with Las Copas experiencing rates of EUR 1.77/m^3 and Central EUR 3.53/m^3.

A number of measures have been put in place to reduce water consumption as Jerez facilities such as the recouping and reuse of water from bottling lines and fermentation tank cooling as well as the use of rainwater pools for the cleaning of harvest equipment on-site in the vineyards. Although sherry production is not as water-intensive as table wine production – mainly due to the lack of irrigation in the vineyards and the low turnover of barrels during production that reduces water consumption in cleaning – a number of water reduction and cost saving opportunities have be identified at González Byass' Jerez facilities.

Many options are considered to be "low-hanging" fruits to increase efficiency and can easily be achievable with low levels of capital expenditure. A number of recommendations and options for the reduction of water consumption are detailed below and in a case study on domestic water use provided separately to González Byass.

Areas of the bodega (winery) are used for conferences and weddings

In general, understanding where and when water is used is essential in tackling issues related to water consumption. Effective monitoring should be combined with an inventory of water consumption so that possibilities can be identified to reduce water use throughout all operations in Jerez. As important as all the following recommendations are, the behavioural aspects of water consumption play a vital role in any water efficiency programme.

Having clear communication and instructions about the proper use of equipment and facilities makes employees aware of their own individual consumption and greatly enhance the effectiveness of any technical solutions and efforts made in the area of water conservation.

More specifically, when replacing equipment, equipment that uses the minimum amount of water and energy necessary to complete the job effectively should take precedence over lower-cost and lower efficiency models when appropriate. For instance, pass-through type commercial dishwasher, such as those used in banquet facilities, typically consume between 15 l to 75 l of water per pass. Based on tourist numbers at Central and assuming three glasses per visitor, over 600 000 glasses will need to be washed in a given year. A standard commercial washer can wash 1000 pieces an hour. The number of glasses needed to be washed at Central would mean an average of 60 cycles a day and an annual water use of between 330-1645 m^3 of water a year depending on the model's specifications. As an illustrative example, although high-efficiency models cost more, their relative water and energy consumption and extended service lives compared to standard models make for overall reduced life-cycle costs in the range of 60%.

In cleaning operations, having hoses with low-volume high-pressure nozzles and that are equipped with shut off valves at the end of the hoses are an easy and inexpensive way to reduce cleaning-related water consumption. Both employees of González Byass and sub-contracted cleaning employees were seen using hoses that allowed for the free flowing of water through the hose with no means of flow control or shutoff capability.

Matching the proper quality of water required for each job can be an effective strategy in reducing water consumption. At both Las Copas and Central reverse osmosis (RO) equipment is utilised and results in roughly 6 000 m^3 of RO reject water being discarded annually [4]. This RO reject water, if divided between the two sites equally, represents a cost of nearly EUR 16 000. Although this water has a high conductivity it is still suitable for use

in the primary rinsing of barrels and tank cleaning, and can be diverted to non-potable uses including domestic water requirements in toilets and general cleaning.

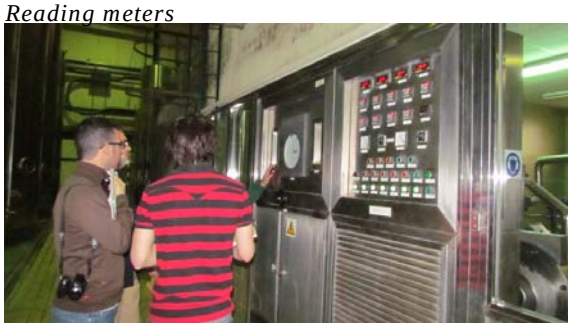
Low-flow and high-efficiency fixtures represent an area where great steps can be made to reduce domestic water use throughout the Jerez facilities. Features such as waterless urinals not only conserve water but also play an important role in signalling González Byass' environmental ambitions to both employees and visitors. Low-pressure valves placed before sinks and faucets for general employee use can reduce water consumption at these points by up to 60%. A water case on this topic was provided separately to González Byass.

Metering and monitoring

It was observed that decisions had been made in developing both metering and monitoring practices at Las Copas and at Central. Figures relating to water and energy, although giving some level of resolution into the consumption level of certain processes, still have a tendency to aggregate several figures that are of high importance (Reverse osmosis) with others that are not so relevant to have a dedicated meter (outdoor lighting).

It is important to keep in mind that the data that can be gathered by such exercises can lead to environmental improvements and ultimately reduce costs while at the same time providing González Byass with an accurate view of its environmental performance. It is therefore recommended that an assessment be made in order to decide which areas/equipment needs dedicated instruments to gather consumption data, such as the reverse osmosis equipment, bottling line, compressed air system, etc.

Reading meters



After the data is gathered, indicators and programmes need to be put into place to allow for the best usage of consumption figures. Measurements need to be reliable, therefore a programme for the continuous calibration of machines and meters needs to be put in place.

Supply chain management

González Byass has a tool in place to evaluate new suppliers, but it could use some improvement. Currently, if a supplier possesses a quality management system under ISO 9001:2008 no further evaluation is required. This means no environmental aspects are being evaluated and therefore does not reflect the concerns González Byass has for the environment.

The only mention of the environment within the current tool is an area stating that is it appreciated if the supplier has an EMS. It was also noted that there is no "green" purchasing policy, meaning that there is no focus on the environment at the purchasing stage. This can lead to environmentally unsound decisions when choosing materials, equipment and machinery, contractors and other relevant actors in the supply chain of González Byass.

In order for environmental concerns and compliance to be addressed both upstream (suppliers) and downstream (costumers), a number of changes are needed. Firstly, a stricter, more complete, supplier evalua-

tion procedure is needed. In addition to the initial evaluation, suppliers that continue to do business with González Byass should be re-evaluated on a regular basis, with priority given to those that play the most important roles towards the processes developed at González Byass.

An environmental purchasing policy should be developed that would reflect the concerns and demands of González Byass' EMS that need to be passed along the supply chain.

In doing so, González Byass would have better control over which suppliers meet the environmental requirements outlined by the system in order to judge their eligibility to work with González Byass. It is important to integrate such an environmental purchasing document into the already existing environmental system, in order not to burden employees with tasks that could overlap if not identified. A sample supplier evaluation procedure was provided separately to González Byass.

Tio Pepe Gift Shop

Training

At González Byass most training is done on-the-job. This type of training has its merits, but it is also subject to some flaws – such as the passing on of bad habits from existing employees to new employees. There is no procedure in place for specific types of training, such as environmentally focused training. Coupled with this, there is also the lack of instructions on how to evaluate and follow up on the training sessions. This renders the training sessions useless, as it is impossible to recognise if they were effective or not. There is no link between the training of the employees and the yearly objectives within the environmental management system. No training targets, programmes or indicators were outlined in the documents, making it difficult to train both older and newer employees in environmentally related matters. Not having sufficient training in areas relating to the EMS can have a detrimental effect on technical solutions and procedural changes put in place to reduce environmental aspect of the company.

It is vital to be able to effectively train employees. Maintaining training as a continuous activity throughout the year and having it reflected within the EMS is essential. Training needs to be an activity that runs throughout all of González Byass' organisational structure.

Communication

The need for information to flow within González Byass is of great importance. It was noticeable and also referred to during some of the conducted interviews that communication within the company and the means to facilitate this communication, especially in regards to the environmental management system, were lacking. The EMS was not available and therefore not influencing many departments throughout the company both at Las Copas and in Central. This can prove to be detrimental to both internal communication and to the proper functioning of the environmental management system in place at González Byass.

Today, when holding an ISO-certified environmental system is common practice,

González Byass should look into going beyond what is merely required both by legislation and the standard itself. This is referred to in the context of the current choice not to externally communicate environmental aspects of the business to stakeholders through a yearly environmental report.

At present, González Byass – even though it states "no external communication" – does communicate with the relevant authorities on pertinent environmentally related matters and as well as in a limited number of marketing activities.

It is critical that González Byass devotes significant efforts in developing and implementing an effective, simplified and harmonised internal communication system. In order to achieve this, it is recommended that developments be made towards setting up a computer-based intranet that can be accessed by employees both in the most vital areas of Las Copas and Central as well as at home.

Regarding external communication, the first area that it is recommended to act upon is with the company website. Often the first point of contact between González Byass and a potential new customer is the company's webpage. First impressions of a company is often based on what visitors to the website see, or do not see, on the company's homepage. It is important to note that this also holds true in the case of external audits.

Winery tours are also an excellent way to communicate the environmental policy and ambitions of González Byass to its customers. These tours could also be utilised as a dedicated funding source for future environmental improvement programmes at González Byass. The introduction of an "enviro fee" of one or two Euros added to tour ticket prices, has the potential to raise between EUR 200 000 – EUR 400 000 a year.

Train taking tourist for a tour of the winery

Allowing those paying the fee to help decide how the money is to be used by offering a number of environmental initiatives options is an excellent way to engage stakeholders in the process of continually improving González Byass' environmental profile. These activities would help to strengthen the brand's identity, increase goodwill and help to differentiate González Byass within the market. It is important to remember the strong signalling effect these seemingly minor environmental considerations have on visitors to the winery.

If González Byass does decide to communicate externally, one of the best and most effective manner to do so, is to develop an annual environmental report. A yearly report can help the company to clarify and emphasise its environmental concerns and performance. The outline and the needed topics to cover have been communicated to González Byass.

Possible non-conformities

The assessment performed was not an attempt to conduct an audit. However, a few

non-conformities were noticed while touring the facilities. These items were made known to González Byass in a separate report. It was by no means a complete list of potential problems, but rather it should be considered a list of examples of the type of issues for which González Byass should be alert.

González Byass has to maintain a close eye on situations of this nature and realise that for the environmental management system to perform at its best these need addressing in the planning stage in order to minimise the chances of non-conformities to occur.

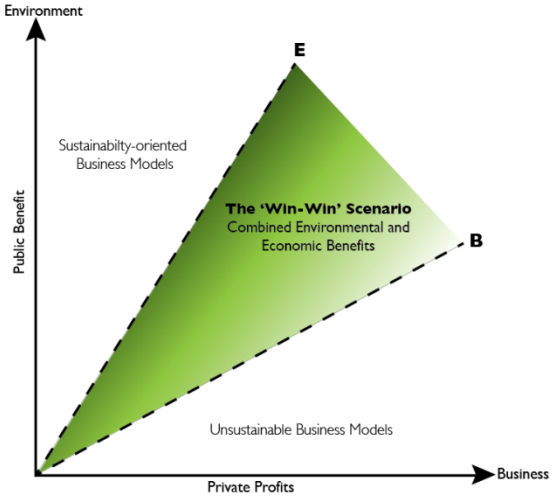
Future

Sustainability and competitive environmental strategy

In a broad sense, sustainability is concerned with a business' ability to take into consideration its operations from a triple-bottom line perspective: profits, people and the environment.

What does corporate environmental sustainability look like? Corporate environmental sustainability is neither black nor white and can often be viewed as varying shades of grey, or in this case green. How green a company decides to be depends on a number of factors that affect its business such as its internal capabilities and the context of the market in which it operates.

The figure below depicts the scope of corporate sustainability with public benefit – those actions taken by a company that result in improved environmental conditions for all on the vertical axis. On the horizontal axis are private profits – actions taken by a company that result in lower cost associated with environmental burdens due to reduced water consumption for example.



Scope of Corporate Responsibility, adopted from [5]

Pursuing strategies that fall between Line E, that delineates actions that result in more public benefit than private profits and Line B, that delineates actions that result in more profits than public benefit, are considered to be a "win-win" scenario for both business and society and are considered sustainable from a triple-bottom-line perspective.

Developing a competitive environmental strategy for González Byass

From the earth and vines that provide grapes for production, the barrels used in aging, to the long history of González Byass' attachment to the economy of people of the Jerez de la Frontera region, the triple-bottom-line way of thinking already plays a central role in guiding the growth of González Byass.

González Byass has inherent, within its business, a number of key elements of sustainability that it can build upon in developing a strong competitive environmental strategy to help guide the business into the future. However, it must be acknowledged that these elements need to be strengthened and elevated to a strategic level in order to meet the changing demands of cur-

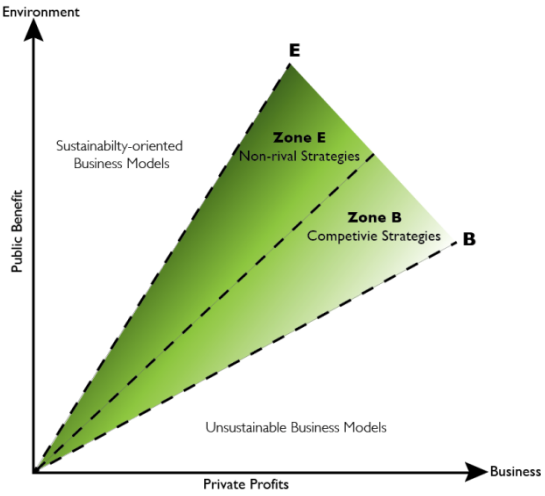
rent markets and as a means to manage risk and uncertainty associated with the business' operations in the future.

Both the implementation of an environmental management system and gaining ISO 14001 certification are steps in the right direction for González Byass. Despite this, these two elements alone may not necessarily lead to better environmental performance in the short-term. Instead, a certified EMS should be viewed as a building block and crucial in developing an environmental strategy for improving the environmental profile of the business and to ensure the long-term future performance and overall viability of González Byass. For the company this means taking what is in place at present and developing a strategy that both enhances its position within the sherry wine market while at the same time recognising that the brand and its core products compete in a market that encompasses a wider scope of alcoholic beverages.

What is the right environmental strategy for González Byass?

Due to the nature of the market in which González Byass products compete, González Byass should primarily pursue a competitive environmental strategy that is defined as Zone B in the figure below.

A competitive environmental strategy is one where eco-investments in relation to products or production methods and processes generate chances for the creation of larger private profits than public benefit. In this regard, future eco-investments by González Byass would be treated as assets subject to competition and would allow for greater profits than purely environmentally driven investment decisions.



Environmental Strategy, adopted from [5]

However, as private profits and environmental benefits are not mutually exclusive entities in a sustainability context, it is important to value the future benefit of reduced dependence on inputs such as energy, water and other raw materials that environmentally informed investments may bring from both a cost and environmental perspective.

The development of a competitive environmental strategy for González Byass plays two key roles: 1) helping the company to lessen costs related to environmental burdens through eco-efficiency measures in production processes and products and 2) helping to strengthen the overall perception of the brand amongst current and potential customers.

The second point is central in helping González Byass differentiate its products in the market place and can lead to an increased willingness to pay on behalf of its consumers. Achieving these goals requires González Byass to develop a competitive environmental strategy that goes above and beyond what is required from the company by legislation that governs its operations and to better understand what are the en-

vironmental expectations of its consumers and key stakeholders.

As reputation, such as González Byass' for authenticity, history and quality, needs to be developed over time, gaining differentiation based on the environmental profile of the business should be viewed as a medium to long-term activity. Addressing environmental aspects relating to González Byass and its products will help to hedge against future reputational risk due to environmental factors including energy and water scarcity or the carbon footprint of the business.

Although becoming ISO 14001 certified is a step in the right direction, it is almost considered a license to operate in many businesses today and hence being certified will not differentiate González Byass from their competitors for very long. A number of steps should be taken in developing a strong environmental strategy for González Byass and these are detailed below in the Five+Five concept.

Five+Five - An environmental strategy for González Byass

Building on the five generations of owners, employees and consumers that came before, the Five+Five concept employs backcasting to envision what will be required and demanded of González Byass in 20, 50 and 100 years. Looking at the business from a medium to long-term perspective will allow for the development of a strategy that ensures the business remains a frontrunner in the years ahead.

As businesses are increasingly under pressure to meet the demands of a growing portfolio of stakeholders, a proactive rather than reactive, mentality must be embraced concerning the environmental profile of González Byass. By looking ahead, anticipating and making contingencies for changing legislative requirements, increasing cost of production inputs and shifting consumer demands and expectations, González Byass can gain a strategic advantage against competitors within the sherry and wider alcoholic beverage market.

The key to gaining strategic advantage through improving the environmental profile of González Byass is elevating the environmental management system to a strategic level and viewing it as a natural part of doing business. This can be achieved by integrating the environmental management system into the business in the following five ways:

1. In environmental production management – as this is where the most visible environmental problems arise. Having a robust and well-functioning environmental management system in place will allow for reductions in costs associated will environmental aspects and help the business to be ahead of future environmental demands from both government regulators and customers.

2. In research & development and innovation – to help the development and implementation of cleaner technologies, production processes and products such as new packaging options or a larger portfolio of organic wines and, if future developments permit, sherries.

3. In organisation – as an aspect of organisational structure and culture. Environmental management requires an appropriate high-standing within the company and should be elevated to a position where it has the ability to interact with and influence all management departments to ensure that the goals and aims of the environmental management system are

achieved and learned by the organisation as a whole. Communication with stakeholders about the environmental aspects and ambitions of the company through voluntary environmental initiatives, such a corporate responsibility reporting, need to be embraced.

4. In human resources management – as this is where the seeds for long-term change are sowed. How employees learn about, embrace and contribute to the environmental management system is key in its ability to deliver measurable outcomes and achieve continual improvement.

5. As a marketing activity – in order to capitalise on the improved performance a well-functioning environmental management system brings, the environmental management system must deliver to the marketing department results that can be used throughout marketing activities.

These can include a clear and well-defined environmental vision for the company as well as the activities and programmes in place to achieve target and goals outlined in the EMS. Marketing can utilise deliverables from the environmental management system to help differentiate the brand within the market and capitalised on the emotional and symbolic appeal of an improved environmental profile.

Addressing environmental aspects of the business through an integrated approach within the organisation has the ability to turn what were once costs into cost savings. The Five+Five concept cements sustainability and the cost saving and strategic importance associated with it, within the corporate culture of González Byass. Doing so will be central to ensuring the business remains a caring, competitive market leader within the industry well into the future.

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List of people interviewed

Alberto, J. (2011 April 4), Manager of CIDMIA.

Argudo, J. (2011, April 8), Brand Manger Tio Pepe.

Bergara, B. (2011 April 7), Marketing Department.

Blázquez, L. (2011, April 4), Quality and Environmental Manager.

González-Gordon, V. (2011, April 7), International Marketing Director.

Guimerá, S. (2011, April 6), Vineyard Manager.

Hochenleyter, E. (2011 April 6), Bottling Manager.

Pinedo, J. (2011, April 6), Production Manager.

Sanz de Alvaro, J. (2011, April 8), Technical Area Director.

Team members at González Byass winery

Key Learnings and Recommendations from Each of the Projects

Zabrze

Given the limited influence of the municipality, the main obstacles for an improved waste management in the city of Zabrze are on a national level. However, with the new Polish waste law expected to be introduced shortly, it is strongly recommended that the city of Zabrze takes proactive actions now.

A stronger focus on education, availability of infrastructure and incentives for collection will allow for an improved waste management system once the necessary institutional conditions are in place.

Zákolany

Coal pollution and the issue of alternative energy in Zákolany have no single or simple solution. The IIIEE team recommended the municipality to address divided opinion by raising and sharing more precise and trusted information regarding energy sources and technology. To convert gardening into a lifelong learning process, the team recommended the establishment of a gardening club and identification of gardening visionaries who can motivate villagers with interest in sustainable gardening. These activities are best incorporated into a long-term sustainability strategy based on continuous learning at the community level.

Moldova

While addressing energy efficiency in buildings, one of the most cost-effective means of improving energy security, the SED Moldova team identified positive attitudes towards the subject among almost all key stakeholders.

There is existing capacity in Moldova with regards to energy efficiency in buildings, but several things can help keep the momentum going. The team recommends: institutionalizing stakeholder dialogue through the Energy Efficiency Agency; cre-

ating a self-sustaining Energy Efficiency Fund; revising the housing association regulation; reforming buildings codes for existing building stock and refurbishments, and including elements of performance budgeting for energy efficiency measures in public buildings.

Umeå

The Umeå experience showed the importance of having a vision and preparing a bigger plan to suit this vision and at the same time give guidance on day-to-day work. Measuring results facilitates building a 'business' case to be able to sell future projects. Special attention also needs to be paid to reducing resistance, making change for those who are impacted by it convenient is one key lever to this.

Working groups and platforms can be helpful to share knowledge and increase momentum, while it is key to find strong allies – enlightened individuals in influential positions that can trigger big changes.

Raimat

Implementation of an Environmental Management System can be a tool to bring the company's vision to life, enthuse employees and increase customer loyalty around the shared interest of sustainability.

The main task ahead for Raimat is to ensure success through involving employees in the implementation process while providing them sufficient resources and building on existing systems and procedures. Climate change as well as evolving consumer and market conditions should motivate Raimat to increase its efforts in defining and evaluating its options for green marketing strategies.

González-Byass /Jerez

González Byass – a privately held sherry producer – uses an ISO 14001 certified environmental management system to address its environmental aspects. Implementing ISO 14001 is a reflection of the environmental consciousness that has been with the company for five generations.

It is recommended that in order for the environmental management system to play a central role in guiding the company in the next five generations it needs to be strengthened and elevated to a strategic level.

Acknowledgements

The *Poland team* would like to thank the city of Zabrze and the Swedish Polish Sustainable Energy Platform for making this project possible. This journey has truly been full of knowledge and cultural exchange. We would like to extend our appreciation to the many interviewees that we got to meet both in Sweden and Poland. Without your input, this report would have lacked a connection to the "real world" and we would not have been able to customise our recommendations for the city of Zabrze. We would like to send our warmest gratitude to Marcin Lesiak and Ewa Pawlowska. Final acknowledgements to our supervisor Mikael Backman: thank you for initiating this project and sharing your love for Poland with us. Dziękuję!

The *Czech team* would like to express its gratitude to all the people of the Zákolany community for a great reception and collaboration during our visit. In particular, we would like to thank the mayor of Zákolany Lucie Wittlichová for continued support while we were in the village, vice mayor Vladimir Dobeš for cooperating with us and making our stay comfortable and Mrs. Martina Armstrong for translating and assisting with our project work. We would also like to thank the families that hosted us, Otto and Pavlina Urbanova, Michal and Jana Nosek and Kristina Langerová. Last but not least, we would like to thank the primary school in Zákolany, the director of School Hanna Hlinková, staff and the children at the school for spending the day with us, and feeding us a tomato soup lunch. Special thanks are also due to our supervisor Thomas Lindhqvist for being with us and sharing his ideas with us while we were working on the project.

The *Spain-Catalonia team* would like to express its gratitude to everyone at Raimat, especially Eduardo Mas for making this project possible. His enthusiasm for sustainability issues and the organisation of all the interviews with the key people in the Codorníu and Raimat organisations allowed us to have a pleasant, interesting and highly productive week. We also thank Daniel Garcia and Mónica Vidal for their hard work in answering our questions and collaborating on the creation of the numerous documents required for Raimat's new EMS. Also special thanks to Raimat's production manager Marc Nairn for his valuable explanations and input, as well as to all of the Raimat and Codorníu employees who spared time to answer our interview questions. We also need to underline that we never would have been able to do the job without the motherly care of the ladies at the Raimat Castle. Thank you for preparing the delicious breakfasts and dinners! Last but not least, thanks to IIIEE supervisor Philip Peck for his valuable contributions.

The *Spain-Jerez team* received tremendous support in the production of this report. We were assisted by gracious staff before, during and after our site visits to the González Byass' Jerez de la Frontera

facilities and vineyards. They provided us with documentation, tours, interviews, work areas, local information and much more. We were treated with the greatest of hospitality and all our requests were granted with upmost efficiency. This report would not have been possible without their support.

We would especially like to thank the following people:

José Manuel Pinedo Contreras
Javier Sanz de Alvaro
Leonor Blázquez Villar
Remedios García Villalva
Victoria González-Gordon
José Argudo López de Carrizosa
Salvador Guimerá Girón
Beatriz Bergara
Enrique Hochenleyter
Jozé Alberto Casas Asín

On behalf of our entire team, Thank You So Very Much!

The *Moldova team* would like to acknowledge all the stakeholders that took time out of their busy schedules to meet with us and answer our questions. Their help went far beyond all expectations. To all: Mulţumesc! A loud tack så mycket goes out to fearless team leader Lars Strupeit of the IIIEE. The authors would like to thank the Moldovan Ministry of Environment, who provided financial support during our stay. Finally, this report would not have been possible without the tireless effort from IIIEE alumna Lucia Sop, of the Moldovan Cleaner Production Programme. Warm regards from Sweden.

The *Umeå Team* would like to thank Carina Aschan for inviting us to come to Umeå in the first place, Martin Svensson for the most unique Umeå city tour that has ever been given, the entire Umeå Mobility Management team for incredible hospitality, patience in answering our questions, discussion time and continuous coffee, tea and cookie provision to bring us through the days.

Thanks to Ulf Pilerot for suggesting to do this project and to Ylva Åqvist for initiating us to the miraculous world of Mobility Management. Thanks also to our additional 27 interview partners for the time and interest in answering our questions, guiding our learning and helping us to come up with the report at hand.

Lastly, thanks to Peter Arnfalk for the no-worries-all-solutions provided package to the North, an awesome weekend in Kittelfjäll and the obstinate determination in both converting our culinary approach from 7 days of pasta and pesto to international haute-cuisine and our raw diamond versions of report and presentation into something that can actually be shown to the public.

The students of the Environmental Management and Policy programme would like to thank the IIIEE for arranging the SED course and making it possible for all of us to apply our skills from previous courses.

The International Institute for Industrial Environmental Economics

The principal idea that *prevention is better than cure* is the core foundation of the International Institute for Industrial Environmental Economics, IIIEE, at Lund University. The institute is a unique initiative, established in 1994 with the purpose of addressing the global challenges of sustainable development. At that time, the proactive approach emerged out of the concern that decisions impacting the environment were reactive.

Today, securing a sustainable future has become a common, global concern. As a result, the institute is engaged in *multidisciplinary* research and activities, bringing together cultures from all parts of the world. The ambition is to advance preventive strategies, policies and systems supporting sustainable development. The topics include environmental law, extended producer responsibility, sustainable consumption, design for the environment, energy efficiency and renewables, and various aspects of corporate environmental management as well as product, energy and climate policy. Since its establishment, the institute has developed noteworthy relationships with Swedish and European industries, governments and NGOs, that are leveraged throughout the programmes.

The institute educates through PhD and MSc programmes. The two master programmes focus on Environmental Sciences, Policy and Management, MESPOM, and Environmental Management and Policy, EMP. The research aims at developing and implementing new systems for production and consumption that are capable of decoupling economic development and improvements of quality of life from environmental and cultural deterioration.

The EMP programme has been a part of the institute since its inception. EMP is an applied programme, a 120 ECTS credits

master's degree, designed to provide graduates with a solid foundation for action in the area of preventive environmental management and strategies. The emphasis is on creating preventative environmental solutions for industry and governments, understanding the public and industrial societal systems, and applying appropriate policies and measures to solve integrated environmental problems. Theoretical education is combined with hands-on activities, such as assessing industrial systems in the field. The students conduct a large number of study visits and work with a broad range of organisations to create solutions that can be applied within industry, government and NGOs.

It is a global classroom, with a multicultural atmosphere and cross-disciplinary perspectives. Managing environmental issues in industry and government are the core themes. Consequently, the programme covers the basics of environmental challenges, the opportunities in technical systems, organisational and managerial strategies, the economic background to law and policy, and a range of policy instruments.

Students come from all over the world and this year's Batch 16 is made up of students from Bangladesh, Canada, China, Finland, Germany, Hungary, Iran, Japan, Lithuania, Netherlands, Portugal, Seychelles, South Africa, Sweden, Tanzania and USA. The candidates have academic degrees and several years of work experience. The graduates are trained to communicate effectively with key stakeholders at all levels.

The programme is structured so that the first year takes the form of online learning, allowing students to continue working in their home countries. After completing the distance component, the students meet in Lund for an intense, challenging and fun year on campus. The courses and cross-cultural group work are demanding, but also create strong professional and personal networks. The staff at IIIEE are committed and actively involved.

The programme opens the door to a wide range of international environmental careers. The 500+ alumni are found within consulting, industry, research, NGOs, and in international and national government institutions; contributing to advancing the environmental agenda. After graduation, students continue sharing knowledge and cooperating through the alumni network, meeting regularly at alumni conferences.

IIIEE was awarded with the E-xcellence label from The European Association of Distance Teaching Universities – EADTU – for the online, distance component of the EMP programme. The award demonstrates the programme's quality controlled e-learning and recognises that the programme keeps up to date with the latest developments.

The vision of the IIIEE is to transform technical and management structures, and public and private sector policies into forms required to advance broad changes to sustainable consumption and production systems.

IIIEE was established by the Swedish Parliament in 1994. The institute is part of Lund University and governed by a Board appointed by the University and the Government. For more information, please refer to www.iiiee.lu.se.

The IIIEE building in central Lund at Tegnérplatsen 4