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Recipes for Sustainability Success

Serving Seven Strategic Solutions

IIIEE SED-REPORT 2018 | LUND UNIVERSITY





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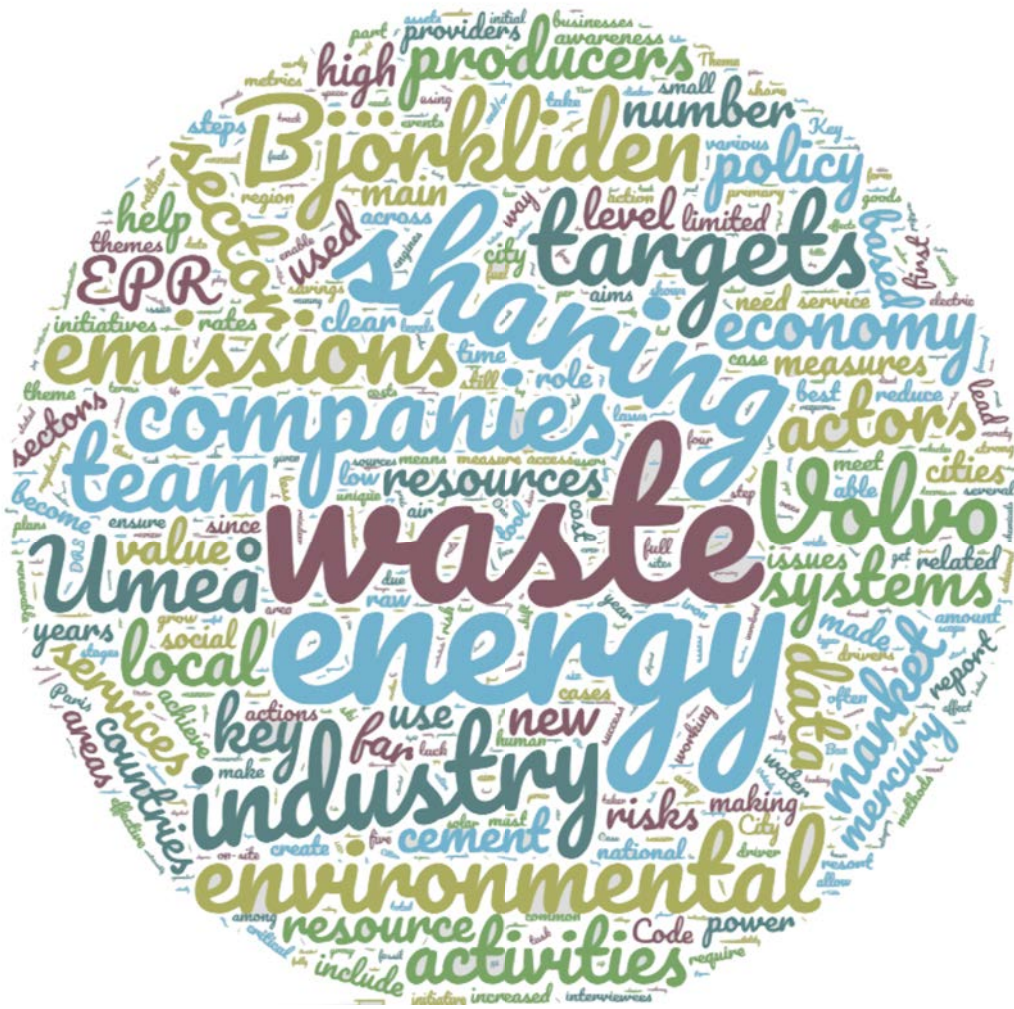
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Introduction

The International Institute for Industrial Environmental Economics (IIIEE) is an international and interdisciplinary research centre at Lund University, Sweden, which aims to advance strategies for sustainable solutions. This report draws together seven projects conducted by the Institute's MSc candidates in the Environmental Management and Policy (EMP) programme, as part of the Strategic Environmental Development (SED) course.

Finding solutions, whereby equitable economic growth can be delivered without compromising the integrity of the environment, is the rationale that underpins the SED course. It is the capstone exercise of the EMP programme, which students must complete before diving into the arduous thesis semester. It provides a unique learning experience for the students, allowing them to apply the knowledge and skills developed over the two-year programme to solve real-world sustainability problems for a wide variety of global clients.

This year's seven SED groups consulted on projects across Europe, with clients operating in both the public and private sectors, and on national and local levels. The groups worked both on campus in Lund and on location (across Sweden to Portugal to Georgia) to deliver the best possible solutions for their clients. In addition to the client reports, the students have produced this joint report to share their SED experiences with a broader audience.

This joint report, '*Recipes for sustainability success*,' is based on the notion that all seven consultancy projects cross-cut a host of themes related to resource efficiency and cleaner production. Leadership, commitment within organisations, as well as the need for collaboration and community-led initiatives are just some of the important features that can be observed. There is no one 'ingredient' that characterises any one project, but rather a mix of many ingredients, balanced appropriately, is necessary to produce fair, sustainable, long-term (and palatable!) solutions.

The seven reports weave neatly through three overarching sustainability approaches that structure the rest of this publication: (1) The influence of environmental policy and energy transition on business & industry; (2) opportunities from new sustainable economy models - circular and sharing; and (3) strategies for bottom-up community-based initiatives.

The first project, developed for Coca-Cola in Georgia, reviewed what ambitious changes to national waste policy means for companies in the country's beverage industry. Companies must navigate a complex policy process that not only includes Government and civil society, but international donors and aid organisations too. The second project looks at policy development from the opposite perspective, where another group based in Georgia supported their client UNIDO on policies that can assist the national government in meeting international obligations. They explored ways in which heavy industries can modernise to

reduce emissions to meet obligations under the Paris Climate Change Agreement, Stockholm Convention and Minamata Convention.

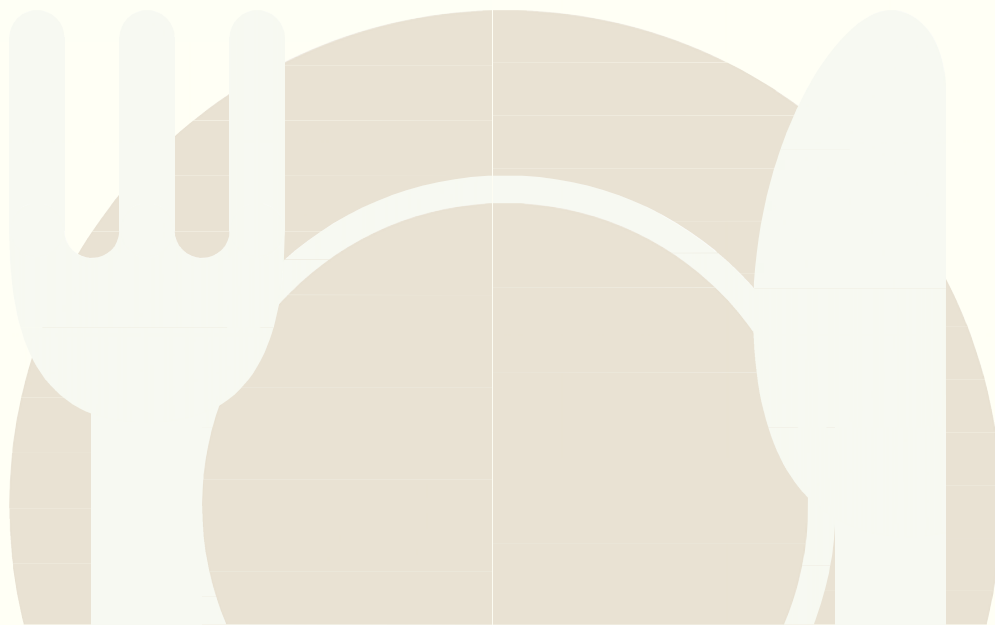
Shaping business strategies in response to policy and energy trends was a feature in the third project. Based closer to home in Gothenburg, the team advising Volvo Penta explored market trends and opportunities in microgrids - an emerging solution to decarbonise our energy system.

Another key theme in this recipe book is captured best in the following two projects, and revolves around new, more sustainable economic models. They underline the need to take a wider systems approach to our political, social and economic systems and consider where new ways of doing things are necessary to redress consumption habits and business-as-usual.

Like Volvo Penta, the fourth project also revolved around investment decisions, but within the context of the circular economy agenda. Based in Stockholm, they looked at how the circular economy will shape the financial sector for their client GES, a responsible investment consultancy. Meanwhile the fifth project, in supporting the Swedish municipality of Umeå, reviewed how another promising economic model - the sharing economy - could deliver benefits for smaller cities. It also reflects how the environment and sustainability are important drivers for community enhancement - as is reflected in our final two projects.

In Alentejo, Portugal, the sixth project's client, the regional wine commission hopes to 'lift up' the local wine sector by encouraging sustainability among its winemakers. The project exemplifies how stewardship of the land relies upon catalysing the people most connected to it. Similarly, up in the Swedish Arctic Circle at Björkliden, the seventh and final group visited a popular resort to demonstrate how embracing sustainability in its business practices offers tangible benefits for the business, its customers and the local inhabitants.

We hope you enjoy. Bon appétit!





Coca-Cola



Overview

With an ambitious vision to become a preventing and recycling society, Georgia's 2014 Waste Management Code adopts a modern paradigm. Inspired by its association process with the EU, the country has embraced the principle of Extended Producer Responsibility. Companies now face extremely ambitious management targets to manage post-consumer packaging waste from 2020 onwards. The Georgia/Coca-Cola team on behalf of their client, Coca-Cola Bottlers Georgia, assess the feasibility of these targets based on international experiences and Georgia's current situation. A revised pathway is proposed offering progressive but realistic steps towards the targets.

The Team

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Photo: (from left) Qintong Liu, Thomas Lindqvist (supervisor), Banne Matutu, Joshua Newton and Niklas Wehner.

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We wish to extend our thanks to everyone at The Coca-Cola Company and Coca-Cola Bottlers Georgia for supporting this project through their wealth of knowledge, providing access to key stakeholders and generously supporting our travels and accommodation. Givi Kalandadze - CCBG's Environmental Manager and IIIIEE alumnus – cannot be thanked enough. This project would not have gone far without his tireless efforts to introduce us to stakeholders and drive progress on EPR. We could not have asked for a better host. You ensured an unforgettable experience of Georgia's rich culture.

It goes without saying that this project depended very much on the expertise of many people in Georgia and around the world. We wish to thank all our interviewees for the significant time they dedicated to speaking with us and the knowledge that they shared. Finally, we want to express our gratitude to Thomas Lindqvist, Senior Lecturer at the IIIIEE and probably one of the biggest advocates of Georgian-Swedish relationships. Thank you Thomas for your invaluable advice, helping to contrast current challenges with 30 years of EPR history!

Stakeholders in Georgia have demonstrated an incredible willingness to make ambitions work and expressed realistic views on how things need to move ahead. This leaves us with an optimistic view on the Georgian waste management sector's future, to which we can only add - წარმატებები (Good luck)!

Containing ambition: Go Fast or Go Far

Informing implementation of EPR in Georgia's Beverage Industry

By Qintong Liu, Banne Matutu, Joshua Newton & Niklas Wehner

Introduction

Poorly managed packaging waste (glass, metal, paper and plastic) is choking ecosystems and threatens livelihoods worldwide. Conservative estimates indicate that damage from production emissions and waste plastic packaging leaked from waste management systems exceeds the global plastic packaging industry's USD 40 billion net profit [1]. This economic damage not only stems from pollution, but also underlines massive resource inefficiency as significant amounts of packaging escape reuse and recycling.

Extending producer responsibility, beyond providing a safe product to include post-use phases, is a crucial step to tackle this global issue. As a global frontrunner, the EU first raised the principle of Extended Producer Responsibility (see Box 1) within its Packaging and Packaging Waste Directive in 1994.

Box 1. Extended Producer Responsibility (EPR)

Article 9 of Georgia's 2014 Waste Management Code sets out EPR obligations, the principle requiring producers or importers of goods to go beyond their existing role and oversee post-use/end-of-life phase of products. This means taking financial responsibility for collection, transport, recovery and disposal.

Following its Association Agreement with the EU, Georgia introduced the 2014 Waste Management Code (hereafter "the Code") to

follow this direction and align its environmental policies with the EU. The Code thus allocates responsibilities for waste management that include obligations for companies placing packaging and packaged goods on the market including targets for managing waste (see Box 2).

Box 2. Georgia's 2014 Waste Management Code

- First holistic waste management framework
- Transposes EU Waste Framework Directive and related ones (e.g. 2004 Directive on Packaging and Packaging Waste)
- Introduces waste hierarchy (reduce, reuse, recycle, recover) and Extended Producer Responsibility (EPR) principles
- Supported by a 15-year Strategy [4] and 5-yearly Action Plans [5] with targets for various waste streams, including a 40% "management" target for packaging waste in 2020; 75% in 2025 and 90% in 2030.

However, since prior to the Code's introduction, existing collection and recycling capabilities have been poorly understood. This has sparked legitimate concerns that the targets set are not realistically achievable.

The client, Coca-Cola Bottlers of Georgia (CCBG), the local beverage industry's market leader, approached the IIIIEE for advice on meeting these targets. To support CCBG and their commitment to improving waste management in Georgia we agreed to:

1. Map existing Georgian waste practices and consider readiness to meet targets;

2. Identify and summarise international examples of EPR for packaging;
3. Propose a revised pathway for packaging collection and end-of-life management that is progressive but achievable, including targets and actions to achieve them.

The task also presents other exciting opportunities; that CCBG is a subsidiary of the globally renowned Coca-Cola Company who recently announced its vision of a “World without Waste”. The US beverage giant aims to help collect and recycle the equivalent of 100 percent of the beverage containers it sells by 2030 [2].

The report next outlines the activities and methods undertaken, before summarising our key findings in line with our deliverables. Georgia’s waste management framework and implementation progress is reviewed to determine the country’s readiness of meeting targets. Next, an analysis of international experience provides relevant lessons from elsewhere. Recommendations are then presented.

Project Activities

This report is the output of a six-week research project, including desktop studies and outreach to experts and stakeholders, locally and internationally. The project’s intention was to inform the joint efforts of Georgian stakeholders that are necessary to make the Code a success.

The four-week desktop study in Lund involved two primary tasks: i) to profile Georgia; and ii) to identify relevant country examples. The Code, related policy papers and studies were reviewed to understand the existing situation in Georgia. Country examples were compiled to draw conclusions for the EPR implementation in Georgia.

Additionally, Eurostat waste management data was analysed to understand waste recycling trends in Europe.

Snowball sampling was used to interview over 40 experts via in-person meetings, calls and written questionnaires. This included EPR practitioners, academics, former Georgian ministers and current government officials, NGOs and development agencies. We also oversaw two half-day workshops with recyclers and leading beverage producers in Georgia for further information-gathering.

International interviewees were selected for their expertise on recycling and EPR in other countries as well as their understanding of the Georgian targets’ feasibility. Georgian interviewees were chosen to create a comprehensive understanding of the current status by talking to all relevant stakeholder groups (see *list of interviewees*).



Picture 1. Project team with Irma Gurguliani, Deputy Head of Waste and Chemicals Department, Ministry of Environment and Agriculture

The review of available policy documents, reports and interviews with many key stakeholders produced a comprehensive basis for our conclusions. However, we acknowledge the issue of data accessibility and responsiveness of relevant ministries. The limited scope and resources allocated to this study also do not allow to draw definite

conclusions on specific issues such as recycling capacities and other data-dependent topics. While data availability is a significant challenge, the reliability of available data on the Georgian waste sector seems to be equally questionable.

In addition to our research activities and final report, a number of other important outputs of this project included:

- Presentation of preliminary work to CCBG management (10/04)
- Workshop with six Georgian recycling companies (13/04)
- Media interview to raise awareness of Georgia’s EPR readiness on Georgian TV Pirveli (13/04)
- Workshop with leading beverage producers (16/04)
- Presentation of findings and recommendations at EPR conference in Kobuleti (20/04)



Picture 2. EPR Conference at Kobuleti

Profiling Georgia

The Code sets a modern paradigm for waste management practices in Georgia, adopting the ‘waste hierarchy’, ‘extended producer responsibility’ (see Box 1) and an ambitious, commendable vision to become a preventing and recycling society.

The Code requires a series of transformational steps from existing practices which are rudimentary and uncoordinated – there

is no organised data collection system and knowledge of sector activities is fragmented.

Cross-government work is led by the Ministry of Environment implementing the Code through a 15-year National Waste Management Strategy (NWMS) and 5-year Action Plan (NWMAP). Works include cleaning up dumpsites, landfill modernisation, licensing of waste handlers, sites and transporters, as well as setting up a waste database. All municipalities must develop waste plans, so too must companies. Such works are understandably very complex, take time and must not be understated.

The drafting of the NWMS & NWMAP and resulting works have relied heavily on donor support and technical assistance from foreign development agencies and consultancies. In the absence of official statistics (currently in development), data is based on estimates or samples reported by local NGOs.

Box 3. Producer Responsibility Organisation (PRO)

Producers comply with EPR obligations through the establishment and financing of a PRO which then oversees end-of-life tasks on producers’ behalf. Action 7.2.1 in NWMS requires producers to agree and establish a PRO structure. This varies country to country.

In order for producers to comply with obligations in the Code, they are relying on the Government to complete nine ‘actions’ between 2017 and 2020. These include the designing of economic instruments to ensure EPR implementation and supporting the establishment of producer associations (see Box 3). A further by-law to clarify several aspects deferred from the original Code must also be adopted by Government. So far, work is progressing on EPR notably on more environmentally sensitive streams such as electronic and hazardous/chemical

waste [3]. Work on packaging waste appears imminent but so far consultation – or indeed any coordination – by Government with industry and recyclers seems insufficient and time is short.

Understanding the targets

Through interviews and analysis of relevant documents, our project observes a number of ambiguities on the targets which undermine meaningful delivery.

Setting of targets – besides a desire to be ambitious, there is no clear rationale or information explaining how targets were set or how Government expects they might be achieved. They appear arbitrary given no official statistics yet exist.

Targets are ill-defined – there is no definition of the 40% ‘management’ target, whether it relates to collection or recycling rates of products sold or collected. Nor is it clear whether the target applies to each waste stream within packaging or all streams combined, both have significant ramifications for costs and producers. If it would apply to all streams combined, the targets may lead to the recovery of heavier materials, not according to environmental harm. Separate stream targets are cited elsewhere in NWMS, and were assumed (although not confirmed) as relevant to packaging by donor funded reports [4].

Stringency of targets – it is not clear whether or how failure by a producer to meet the targets would be sanctioned. Anecdotally from key interviewees we understand targets should be considered more aspirational than fixed requirements, but presently this uncertainty is unhelpful to producers trying to understand their obligations.

Assessing existing infrastructure

In order to assess how targets might be achieved from 2020, we reviewed existing practices and capabilities for packaging collection and recycling. Key observations are then organised as opportunities and barriers.

Requests were made to relevant Ministries for official statistics but are not yet forthcoming. Table 1 compiles best available data and estimates used in recent reports. Waste management policy and planning is based on wide-ranging estimates that our project has not been able to verify – and in some instances, such as plastics, prove inaccurate.

Table 1. Waste management situation in Georgia (Data derived from [4-6])

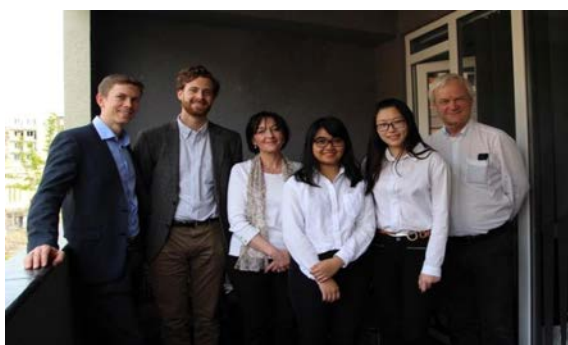
Material stream	Annual total waste streams (t)	National waste to be “recycled”	Annual beverage-specific waste stream (t)	Packaging waste to be managed	Existing domestic recycling capacity
Plastic	122 400	30%	26 000-33 000	40%	6 000
Paper	95 400	30%	45 000-50 000	40%	9 000
Glass	34 200	20%	90 000-100 000	40%	?
Metal	16 200	70%	?	40%	n/a

In 2015, total municipal waste was estimated at 900 000 tonnes which mostly ended in landfills and dumpsites. Through compiling average waste fractions from four samples – estimated total waste streams relevant to, but not exclusive of, packaging may add up to 250 000 tonnes.

Currently there is only limited waste separation at source opportunities through donor-funded pilot projects at a handful of supermarkets and villages. Only the Rustavi landfill conducts dry separation activities, extracting under 500 tonnes of all streams

annually. The Solid Waste Management Company (SWMC) is making progress in modernising landfill infrastructure, but installing dry separation at further sites is not guaranteed since extraction has proven costly, and yields low quality recyclables. However, SWMC has potential to offer space for separate collections at planned transfer stations, but as yet the company has no defined role for supporting recycling.

Municipal waste plans are currently in development but are widely understood by NGOs to be severely under-resourced, lacking expertise and far from ready to assist with substantive separate collection activities in the coming years.



Picture 3. Project team with Khatuna Gogaladze from Georgian Environmental Outlook, former Environment Minister involved in drafting of Code

The entire recycling market stands to gain from EPR implementation but is underdeveloped and Table 1 shows recycling capacity in Georgia falls way below targets. A number of companies only handle materials before exporting to Turkey and elsewhere for treatment. Through interviews, it appears informal waste pickers provide a fluctuating but key source of PET and glass material to recyclers. Recycling waste from the commercial sector does not appear far established. To date, the state of the informal sector and commercial waste collection has been overlooked in official studies but are important factors in other countries

achieving high recycling rates. For Georgia to maximise job opportunities and growth in the sector, financial incentives and industry support are essential [5].



Picture 4. Workshop with Georgian Recycling Companies

Opportunities

Ambition – we identified a common agreement across all interviewees in full support of the principles behind the Code and a clear willingness and spirit for Georgia to become a preventing and recycling society.

By-law on packaging waste – although the existing time frame is short, a by-law is not only necessary to clarify a number of ambiguities in the existing code, it is essential that the appointed consultants work together with industry to create a strong foundation to deliver progressive but realistic collection and recycling rates. Rushing this process would be a missed opportunity and communicating how exactly industry can provide input should be done as early as possible.

Recycling potential in Georgia – the recycling sector has key characteristics that, with proper technical support and capacity building, will deliver jobs and improve Georgia's natural environment [5].

Population density – as a dense conurbation that makes up a third of the country's population as well as hosting a growing

tourism industry, Tbilisi could by itself help kick-start strong collection and recycling rates and give other municipalities more time and experience to develop robust waste management plans.

Barriers

Communication gap – despite sharing a common ambition in support of Georgia’s waste management vision, there is a misunderstanding in expectations between the Ministry of Environment and industries over who, when and how actors should participate within the NWMAP. To overcome this, the Government could take the lead by writing to all companies using information within the waste database to update companies on their expectations and help overcome uncertainties, and to provide citizens with adequate information on how to adjust their lives to a recycling model.



Picture 5. Television interview on Georgian TV Pirveli

Status of progress – work on EPR issues as part of the wide-ranging set of tasks for the Ministry appears to be moving forward, but it seems a number of ‘actions’ in need of coordination with industries have not commenced as scheduled or been communicated sufficiently. The NWMS does not provide any systematic approach for how coordination with industry will be achieved, or whether certain actions have been pushed back. This has exacerbated the communication gap.

Box 4. Georgia’s situation in a nutshell

- The absence of reliable data and ill-defined targets make an informed judgement on recycling and collection capacities difficult.
- Until a robust data collection system is in place there is no means for assessing feasibility of targets accurately.
- Getting management systems in place, including the establishment of a producer responsibility organisation, in a timely manner, should be the priority.
- Capacity for recycling in the country is very low and should targets be reached, material will have to be exported, missing opportunity for growing the recycling industry currently lacking technical capacity and knowledge.
- SWMC could assist municipalities and producers with recycling, and this should be explored by the Ministry.

International Experiences

As shown in Table 2, the Georgian targets significantly exceed EU ambitions, even compared to the long-term 2030 targets. The Code sets higher targets for 16 years than what the EU is considering over a 36 year timeframe.

Table 2. EU/Georgian recycling targets

	2001	2008	2020	2025	2030
EU	22-45	55-80	-	65	75
GE	-	-	40	75	90

Moreover, most countries that joined the EU after 2003 were notably allowed target deferrals of up to four years – despite also starting with more advanced waste management infrastructure than what currently exists in Georgia.

When looking at outcomes rather than targets, experience from the EU 28 reveals that countries starting with low packaging recycling rates required 3.4 years on average to achieve 40% [7]. Through our profiling of

EPR experience, further relevant learnings are summarised below.

A - Well defined and achievable targets play a key role in advancing waste management practices and achieving meaningful recycling levels. Latvia for example saw far more significant increases of its recycling rates after the introduction of relevant targets compared to the introduction of other instruments, including taxes [8]. There is, however, consensus among everyone interviewed that targets should be set at levels where enforcement is possible without overburdening industry or undermining credibility when non-compliance is not sanctioned.

B - Data reliability is a key challenge in waste management systems globally. Over-reporting, omission of significant waste fractions and inconsistent data collection are only a few challenges when setting targets. Even in mature systems, significant over-reporting is common and experts anticipate new EU reporting standards will see reported recycling rates dropping by up to 10%. Georgia's NWMC has made decisive steps introducing a waste management register and database, but guidance on how exact rates are measured remain absent. Learning lessons from the EU experience and getting a robust methodology in place must be a top priority for the Georgian government.

C - The informal sector should be recognised, as solid waste management systems in many EU countries coexist with significant activities of waste pickers and non-licensed recyclers [9]. They can be very important sources of cleanly separated recyclables that provide significant contributions towards national recycling targets. Many systems have however been unwilling or unable to consider these actors, which is

why they are often dismissed in studies and national statistics. In Bulgaria, this has led to unnecessary conflict between informal and official collections complicating the system [10].

Box 5. Overview- Estonia

- Adopted EPR in 2004, including Deposit Refund Systems (DRS).
- Early priorities were fencing and modernising landfill infrastructure.
- Limited domestic recycling capacity and accessibility issues.

Targets

- Agreed transitional period for EU targets to focus on getting system in place, now exceeds EU Directive standards
- After meeting targets earlier than planned in 2008 introduced revised targets for 2020: 60% packaging – 16 years after EPR introduction

Key learnings

- Pay attention to methodology to calculate, control and verify waste amounts.
- DRS are complex to organise but pivotal for success of system
- Initial focus on cities with bespoke plans agreed for municipalities

D – Engagement is key as successful recycling is dependent on informed citizens that embrace a culture of waste separation. Many of the late EU entrants had considerable experiences with return systems for glass, amongst others. Knowledge and habits were still present at significant levels, supporting the introduction of separate collection and EPR. But even acclaimed recycling leaders, such as Germany, cannot simply rely on tradition and a (supposedly) well-informed population. The Federal Association for Secondary Raw Material and Disposal recently highlighted that in far too many regions up to 60% of recycling bin contents were actually misplaced, making

recycling nearly impossible [10]. Significant efforts in terms of targeted communication and education are therefore critical success factors.

E - Deposit Refund Systems (DRS) are a common feature in a number of successful EU countries that, on average, achieve far higher recycling rates for certain beverage containers than countries without. They have the potential to enable fast progress and support achieving high recycling targets for individual packaging streams at low cost [11].

Critics mention the risk of DRS cannibalising on separate collection by diverting high value materials that would otherwise be significant sources of revenues for PROs [12]. Estonia provides an important lesson here to countries that are in the starting blocks for separate collection. Conflicts were mitigated by ensuring a parallel introduction of both systems, thereby limiting the dependency on material value from the start. DRS also provide an effective economic incentive, but require robust anti-tampering mechanisms to avoid deposit fraud and corruption. A recent case from California highlights this lesson, where a recycling company was able to illegally extract USD 80.3 million in deposits, threatening the local system’s survival [13].

DRS can be complex to implement, needing a balanced and transparent management structure, action to prevent fraud and a mechanism to determine pricing. An initial investment is necessary to get systems established. There is a clear trend in more countries from Malta to the UK, adopting a DRS in order to improve collection rates.

F - A balanced policy mix is necessary when introducing EPR to ensure genuine participation from obliged producers and to

enable recycling activities. Effective PROs are crucial and many countries, like Bulgaria [10], introduced packaging taxes that companies were only able to avoid by taking financial responsibility for their waste products through a PRO. Without, the free-riding risk is considerable. Export taxes on non-refined recyclables should also be reviewed to foster a domestic recycling sector. Georgia can learn from good examples within its own industries, such as scrap metal recycling.

Box 6. Overview- Greece

- Adopted EPR in 2001, one PRO now covers over 90% of the population with a single blue bin for mixed recyclables collection
- Partly dysfunctional system as major permitting and monitoring authority ineffective until new laws passed in 2010

Targets

- 1994 Packaging Waste Directive granted lower targets and overall deferral of four years to achieve later targets
- Achieving Georgia’s 2020 targets took Greece up to 9 years, depending on material streams

Lessons learned:

- Ensure administrative infrastructure is functional.
- Investments in registration and data collection mechanisms should be prioritised.
- Avoid mixed collection of all recyclables (incl. glass) to maintain material value.

G - Authority capacities need to be in place as shown in Greece, which introduced EPR in 2001 with the first PROs being operational in 2003. However, the Hellenic Recycling Agency as competent monitoring and enforcement authority was not fully operational until 2010 [14]. This meant that licensing, monitoring and control were neglected. Interviewees indicated that the resulting poor data quality and enforcement have contributed to many noncompliance

issues, including a free-riding rate of up to 40% among obliged companies.

Appropriate funding, clearly defined control mechanisms and unambiguously allocated responsibilities for inspections are also crucial and need to be ensured from the start. An ongoing case in Lithuania illustrates this well (see Box 7).

Box 7. Recycling fraud in Lithuania

While the Government keeps a list of approved recyclers, PROs and industry were still expected to verify that their waste was appropriately treated. This responsibility of inspecting recyclers was not sufficiently communicated to producers and resulted in a case of waste dumping. The industry is now facing fines up to EUR 35 million, far exceeding the industry's actual cost of operating the PRO. This situation can be avoided through effective inspections e.g. PRO funded third-party auditing.

Poor enforcement or failure to allocate responsibilities will only make the achievement of the already ambitious targets even more challenging.

EPR has been applied for some 30 years. Georgia's authorities and industry should carefully evaluate the lessons provided from across numerous countries to avoid building systemic issues into their EPR architecture. From ensuring data reliability and state authority capacities to creating the right policy framework, there are many issues that call for a well-planned introduction that is not driven by short-term targets.

Conclusions

Georgia's targets are not realistically achievable under current circumstances. While they appear arbitrary, without reliable statistics on the system it is difficult to make an informed reassessment. *Targets should be deferred for at least three years to ensure all actors focus on creating a robust system*

that is necessary to meet Georgia's long-term vision. In all systems reviewed, there are well-documented concerns around reliability of reported rates. *The Government must heed this lesson and prioritise defining a transparent methodology for counting, controlling and verifying waste streams covered by the system.*

A communication gap exists between Government and industry. The Government claims to be open and willing for producers to shape the EPR system, but besides leading producers, awareness among industry remains low. It is important for producers to present a unified set of recommendations as soon as possible. Meanwhile, *Government and consultants involved in EPR should establish a working group to meet routinely with producers.* This will increase awareness and help agree a common set of priorities going forwards.

A by-law related to packaging waste is essential for the proper functioning of any EPR system hereafter. *The by-law must not be completed without meaningful input from producers,* in order to resolve: ambiguities within the Waste Management Code; and set out PRO governance and exact responsibilities – our view is one industry-wide, 'private' PRO at least in the early years of the system would be the best choice.

Finally, the exact structure of the EPR system is beyond this study, but we observe key drivers that could strengthen it.

- A packaging levy on producers with full exemption for PRO members and in line with Strategy target 7.3 on EPR incentives would help curb free-riding.
- The deposit refund system is a proven, complementary tool to achieve better recycling rates but a feasibility study specifically for Georgia is necessary.

- Accessing waste from informal sector, commercial sector and densely populated areas, should be priorities for the PRO to consider.
- Financial transparency of PRO's tender contracts is essential to ensure competitiveness and minimise corruption among recyclers.
- Inspections to verify compliance with permits and reported collection, recovery and recycling rates must be properly resourced and implemented.

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Selective list of people interviewed

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- Bilyana Spasova, Project Officer, ACR+ EPR Club, 26/03
- Irakli Legashvil, Independent EPR Consultant, 11/04
- Irma Gurguliani, Deputy head, Waste and Chemicals Management Department of Georgia, 12/04
- Joachim Quoden, Managing Director, EXPRA, 21/03
- Khatuna Gogaladze, Director, Georgian Environmental Outlook, 16/04
- Knut Sander, Managing Director, Oekopol, 12/04.
- Konstantina Ouzounoglou, Consultant, the Hellenic Recycling Agency, 10/04
- Merab Sharabidze, Chief of Staff, Georgian Dream-Greens Parliamentary Faction, 18/04
- Nikola Doychinov & Andy Whiteman, EPR Specialist & Director, Resources and Waste Advisory (RWA) Group, 23/03 & 03/04
- Nino Chkhobadze, Founder, Caucasus Environmental NGO Network (CENN), 05/04&16/04
- Panate Manomaivibool PhD, Lecturer, Mae Fah Luang University, Thailand, 23/03
- Peeter Eek, Councillor, Ministry of the Environment, Estonia, 20/04
- Petr Sikyr, Chief Operating Officer, Ekokom, 04/04
- Vakhtang Baramia & Medea Chachkhiani, Deputy Director & Head of Env. Protection Division, Solid Waste Management Company of Georgia, 16/04
- Senior representatives from Efes beer, Borjomi, Coca-Cola Bottlers Georgia, 16/04
- Senior representatives from Georgian recyclers, Clean World Ltd, LMY, Neo Print, Paper+, SISECAM/ JSC Mina, 13/04



UNIDO



Overview

Georgia has experienced rapid growth in the industrial sector since 2003. The country has joined international efforts on tackling environmental issues by signing a number of multilateral environmental treaties, among others, the Paris Agreement, the Stockholm Convention on Persistent Organic Pollutants and the Minamata Convention on Mercury. The country is now working towards implementing the necessary regulatory frameworks. To support this process, UNIDO tasked the IIIIEE team with identifying opportunities for the creation of synergies in Georgia's approach for meeting its obligations under the three aforementioned treaties at a national policy level and technological level in the cement and metallurgy industries.

The Team

Diego Cattolica is from Sweden and has professional experience in international aid and development in Paraguay with SIDA and as a research assistant at Lund University. He holds a BSc in International Development and a MSc in Economic Growth, Innovation, and Spatial Dynamics.

Tristan Heß is from Germany and has professional experience in climate diplomacy. He worked for a public sector consultancy in Berlin collaborating with German ministries and international institutions. He holds a BA in Political Science.

Frida Hansson is from Sweden and has professional experience from an internship in Innsbruck, working on impacts of climate change on biodiversity in alpine lakes. She holds a BSc in Biology.

Andreea Miu is from Romania and has professional experience in the renewable energy sector, working with regulation, compliance enforcement, and quality assurance schemes. She holds a BSc in Environmental Science.



Photo: (from left) Diego Cattolica, Frida Hansson, Tristan Heß and Andreea Miu.

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How to Kill Three Birds with One Stone?

The Case of GHG, POPs, and Mercury Emissions Reductions in Georgian Industries

By Diego Cattolica, Frida Hansson, Tristan Heß & Andreea Miu

Introduction

Georgia, located in the Caucasus region between Russia and Turkey, is a country whose economy has undergone large changes since it gained independence from the Soviet Union in 1991. The country's economy has transitioned from a centrally planned economy to a market economy and has for several years experienced an average annual GDP growth of approximately 5%. At the same time, the country is experiencing a structural shift from agriculture to the service sector, and a "rebirth" of its industry. Key industrial sectors include food processing, metals, machinery, chemicals, textiles, and cement.

In 2014, Georgia signed an Association Agreement with the European Union (EU) promoting political association and economic integration and has aspirations to become a full member of the EU.

The country has joined international efforts on tackling global environmental problems by joining a series of international environmental treaties.

The Task

The United Nations Industrial Development Organisation (UNIDO) commissioned the International Institute for Industrial Environmental Economics (IIIEE) to explore opportunities for the creation of synergies in Georgia's approach

to meeting its obligations under the Paris Agreement under the United Nations Framework Convention on Climate Change (Paris Agreement), the Stockholm Convention on Persistent Organic Pollutants (Stockholm Convention) and the Minamata Convention on Mercury (Minamata Convention), with focus on the metallurgy and cement sectors.

The task of the IIIEE team was to identify opportunities for the creation of synergies from a policy perspective but also from a practical, technological perspective i.e. what could industrial actors actually do in their operations to tackle air emissions and help Georgia meet its obligations.

The task steps were:

1. Carry out a baseline assessment of Georgia's metallurgy and cement industries and identify technological needs;
2. Carry out a baseline assessment of Georgian policies related to greenhouse gas (GHG) emissions, persistent organic pollutants (POPs) and mercury emissions in industry and identify policy gaps and needs;
3. Identify and prioritise opportunities for actions as well as opportunities for the creation of synergies at policy level and at technological level.

The scope of the task only included air emissions from the cement and metallurgy sectors.

Greenhouse Gases (GHGs) such as CO₂, methane, ozone and nitrous oxide are atmospheric gases capable of absorbing infrared radiation, thereby trapping heat in the atmosphere, resulting in global warming. Global warming poses a risk to human and animal health as desertification, sea level rise and unpredictable weather patterns will become more prevalent.

Persistent organic pollutants (POPs) are toxic chemicals that resist environmental degradation and persist in the environment. They accumulate in fat tissue of living organisms and can cause health problems such as chronic illness, cancer, birth defects and disruption in the immune, endocrine, and reproductive systems.

Mercury is a naturally occurring heavy metal which moves in the biosphere as a result of natural processes and human activities. Exposure to mercury can cause toxic effects on the nervous, digestive and immune system and can be lethal for humans when exposed to high concentrations.

Metallurgy is the industrial sector concerned with the production of metals. It involves the processing of metal ores, and the mixture of metals, sometimes with other elements, to produce alloys. It can be ferrous (iron based) or non-ferrous (non-iron based).

Cement manufacturing involves heating ingredients such as limestone and minerals at high temperatures to form a rock-like substance called **clinker**. This is then ground into the fine powder called cement.

Research approach

In order to identify synergies at policy and technology level, the IIIIE team conducted a baseline assessment of existing policies and technologies in the country. Data collection was based on desk research and interviews with representatives from

Georgian Ministries (the Ministry of Economy and Sustainable Development, the Ministry of Environment Protection and Agriculture), NGOs and independent experts, both online and on-site in Tbilisi.

Data on industry was mainly collected from online sources. Industry actors were contacted but none responded to the team's queries. Therefore, obtaining a complete picture of the technologies currently used in the cement and metallurgy sector was not possible. This is a limitation that also the ministries and international agencies working with Georgian industry are facing.

Recommendations were then drawn based on the results of the baseline assessments. The technological recommendations are based on the team's cross-reference analysis of documents describing best available techniques and practices for the two sectors.

The report is structured as follows: a background to Georgian industry and international obligations, then findings from the baseline assessments of existing technologies as well as policies, then technological recommendations, and finally a discussion of how the Georgian Government can move forward at a policy level.

Background

Georgian Industry

Georgia's industrial sector has been experiencing significant transformations over the last few decades. While being relatively well-developed and productive under Soviet rule, it suffered a severe collapse in the aftermath of the Soviet Union's breakdown. Sparked by liberalisation and deregulation policies introduced after the 2003 Rose Revolution, the sector has been growing again. During

Soviet times, the country's industry was dominated by large, state-driven enterprises that used Soviet technologies and methods of production. Many of these technologies can now be considered outdated as they are technically inefficient and energy-intensive.



Tbilisi, the capital of Georgia

Since the fall of the Soviet Union, the ownership of industrial enterprises shifted to the private sector, with both domestic and international businesses taking over industrial facilities. In some instances, new ownership brought modern technologies and operation methods, especially when international investors backed this. Nevertheless, most enterprises continue to rely on old Soviet technologies in their production lines with little progress being made in terms of technological development and modernisation [3]. The cement and metallurgy sectors serve as good examples of these two routes of development: the major cement plants in the country have been taken over by the HeidelbergCement Group, a German multinational company, that has invested in their modernisation; progress in the metallurgy industry has been slower, with plants relying on old production technologies and methods of pollution

prevention and control. This is not to say that progress is not being made, however, the rate of modernisation is slower when compared with the cement industry.

Moreover, industrial activities undertaken in Georgia have so far been technically and energetically inefficient when compared to the same activities being undertaken in Western countries. For example:

- The energy intensity of the Georgian industry overall is 2-2.5 higher than that of Western countries [3].
- The average energy intensity of cement production in Georgia is 22% worse than the EU average (4.7 GJ/t of clinker compared to 3.7 GJ/t in the EU) [1][4].
- The energy saving potential for steel produced in countries of the former Soviet Union is higher (ranging between 4-7 GJ/t) than compared with EU countries (below 2 GJ/t) [5].

International Obligations

The scope of the task was the Paris Agreement and the Stockholm and Minamata Conventions. Georgia ratified the Stockholm Convention in 2006 and the Paris Agreement in 2017. It signed the Minamata Convention in 2013 but has not ratified it yet. The team's findings are based on Georgia's obligations under the Paris Agreement and the Stockholm Convention and its future obligations once it ratifies the Minamata Convention.

The Paris Agreement

- Its goal is to reduce global warming to well below 2°C by the end of the century compared to pre-industrial levels.
- Every single state commits itself to GHG emissions reduction feasible within its national context.
- Georgia committed itself to a reduction of 15% below a business-as-usual scenario from 2013 to 2030 and is willing to increase this target to up to 25% depending on the availability of international support.

The Stockholm Convention

- Its goal is to protect human health and the environment from the adverse effects of exposure to chemicals categorised as persistent organic pollutants (POPs).
- It requires Parties to take legal and administrative measures to restrict and eliminate the production, use and trade of these chemicals.

The Minamata Convention

- Its goal is to protect human health and the environment from the adverse effects of exposure to mercury.
- It requires Parties to control the use and release of mercury from a number of activities, to not open new mercury mines, and to phase out mercury from a number of products and processes.

Current Challenges

In order to meet the goals of these treaties, the Georgian Government is facing the challenge of identifying intervention areas and building an institutional framework to support the national implementation of the treaties. There are barriers to this as in its recent history the country has followed a policy of excessive deregulation with many instruments for environmental protection

being abolished. Therefore, the country lacks a strong legal framework and competent institutional and administrative capacities to deal with e.g. management of toxic pollutants such as POPs and mercury or on improving energy efficiency in its industries [3].

The ministries responsible for the implementation of the treaties (the Ministry of Economy and Sustainable Development and the Ministry of Environment and Agriculture) face the challenge of ensuring that they possess the relevant in-house expertise for formulating, implementing and monitoring the relevant policies. In overcoming this challenge, the Government of Georgia is receiving significant support from international organisations such as UNIDO.

Industry Findings

The following section presents the team's findings following the baseline assessment of the Georgian cement and metallurgy industries.

Cement and Metallurgy

The Georgian metallurgy sector consists of more than 350 companies and the cement sector of more than 50. Despite the large number of actors, both industries are dominated by a small number of large players: GeoSteel LLC and Rustavi Steel LLC in the iron and steel sub-sector of metallurgy, and Georgian Manganese LLC in the ferroalloys sub-sector. In the cement sector, the main player is the German HeidelbergCement Group that produces over 70% of the country's cement and owns all the clinker production plants in the country.

Production Techniques Overview

The largest players in the iron and steelmaking sub-sectors of metallurgy in Georgia use the so called Electric Arc Furnace route. One benefit of this production method is the use of recycled metals as raw material rather than having to process iron ore as in the traditional route. Using recycled metals avoids several iron and steel production steps that otherwise would be hotspots for emissions and high energy usage. Therefore, this method of production is overall less energy intense and produces less air emissions than the traditional route [6, 7, 8].

The ferroalloy sub-sector is very closely related to iron and steel production since ferroalloys are used for steelmaking. They are added to the liquid steel to give it the desired composition [9].

Interview-based evidence suggests that many metallurgical plants are still using Soviet-era equipment that is technically inefficient and energy-intensive. Moreover, very few enterprises are carrying out self-reporting and monitoring of energy usage and emissions and this suggests lack of knowledge of plant's performance. According to UNECE, there is lack in cleaner production measures and there is a low understanding of socio-economic benefits from increased energy efficiency and use of cleaner technologies in Georgian metallurgy industry [3].

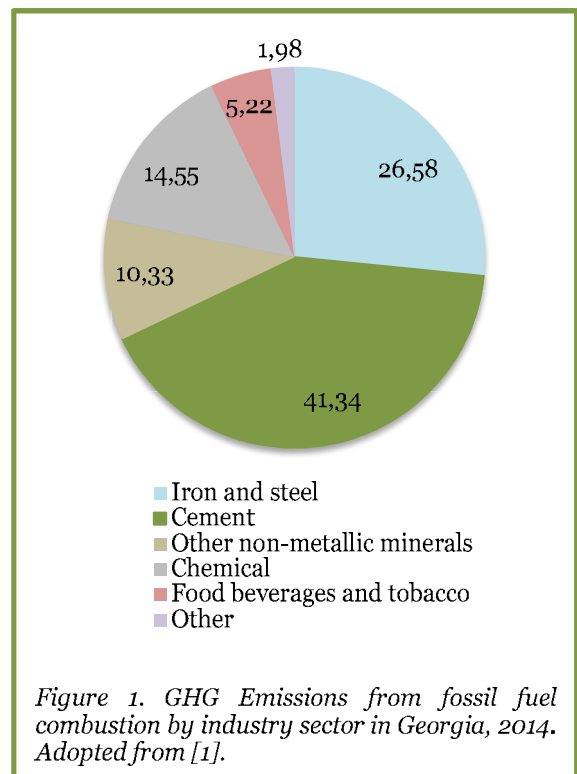
The picture looks different in the cement industry. While historically, the wet clinker production process has been used in manufacturing cement, nowadays modernisation work is being done to upgrade the clinker plants to the dry process. The dry process is more energy-efficient and less polluting than the wet process.

Modernisation work is undertaken by the HeidelbergCement Group who owns all three clinker production plants in the country and has been investing in upgrading two of the plants to the dry clinker production process. Besides gradually upgrading the plants, the company has also been investing in new measures to reduce dust pollution.

Energy Use and Emissions Sources

In Georgia, the metallurgy and cement industries are high consumers of energy, together accounting for over 70% of final energy consumption in industry in 2013 [1]. This is because both sectors require large amounts of fuel and power to operate.

Their operations also account for a high share of national GHG emissions (see Figure 1). These emissions originate mainly from fuel combustion in furnaces and kilns, which use mainly coal and natural gas in the Georgian case.



These industries are also sources for the formation and release of POPs, especially when chlorine is present in the fuel and raw materials. In the metallurgy industry, significant POPs emissions also result from the raw material preparation. In the global cement industry, kilns are capable of destroying POPs pesticide stockpiles by exposing them to high temperatures. This practice brings with it an increased risk of POPs release. While Georgia has cement kilns which might be capable to destroy certain POPs pesticide fractions, this is not currently done yet, but interviewees suggested that this could be considered in the future.

Mercury is naturally found in the raw materials and fuels used in the two industries and is emitted in the combustion processes. Currently, cement production is considered one of the largest emitters of

mercury in Georgia (164.2 kg/year) [2] with primary metal production also being responsible for a high amount of mercury release.

Opportunities for Technological Synergies

The team undertook a cross-reference analysis of the existing documentations describing best environmental practices and best available techniques for increasing industrial energy efficiency and controlling GHG, POPs and mercury emissions. It identified a number of measures that, if adopted by industry actors in both the cement and metallurgy industries, are suited to tackle all issues simultaneously reduce energy use, greenhouse gases, POPs and mercury emissions. A summary of the team’s cross-reference analysis findings is presented in Table 1.

Table 1: Findings on best available techniques/best environmental practices for the reduction of GHG, POPs and mercury emissions

Best Available Techniques/Best Available Practices	Reduce energy use & GHGs	Reducing POPs	Reducing Mercury
Operational measures			
Careful selection of substances entering the production lines and substitution of raw materials & fuel for materials & fuel with low content of e.g. mercury and chlorine.	✓	✓	✓
Focusing on process control optimisation by employing a computer-based automatic control system to ensure a smooth and stable operation.	✓	✓	✓
Employing modern fuel feed systems to ensure a smooth and stable operation.	✓	✓	✓
Installing a heat and material recovery system to re-use exhaust gases as fuel and capture heat losses in the production.	✓	✓	✓
Capital investment measures			
Installing equipment aimed at quick cooling of exhaust gases to temperatures that decrease the risk of formation of POPs and increase the efficiency of pollutant filter.		✓	✓
Installing air pollution control systems to reduce POPs and mercury in the exhaust gases. Examples of systems that can tackle both these pollutants are: electrostatic precipitators, filters, wet scrubbers, absorbent injection, active carbon filter etc.		✓	✓

The team found that both operational measures and capital investment measures have the ability to decrease energy use, GHG, POPs and mercury emissions [6, 7, 8, 10]. Operational measures have a higher environmental effectiveness and are more cost-effective than capital investment measures, thus significant improvements and monetary savings can be achieved by focusing on these measures alone. Capital investment measures are also effective in removing air pollutants, however, in most cases these measures require extra energy inputs and therefore decrease the energy efficiency in the plants.

Operational measures imply the application of the most appropriate combination of environmental control measures and strategies aimed at reducing, eliminating, or preventing pollution, increasing energy efficiency, etc. They involve measures such as good maintenance of facilities and measurement equipment for the effective operation of control and monitoring techniques. They can also involve careful planning, administrative controls, and other facility management practices and commitments from all levels within the organization.

Capital investment measures are mainly techniques that involve the installation of equipment (e.g. filters) at the end of the production process stream/exhaust pipe to reduce emission of pollutants. These are often very expensive hence require large capital investments.

It is the team's opinion that operational measures should be prioritised when choosing methods that can tackle GHG, POPs and mercury emissions and improve energy efficiency, as these present multiple benefits for industry actors. It helps them meet their obligations under environmental regulations in a cost-effective manner and can simultaneously also increase their overall competitiveness.

Policy Findings

The following section presents the team's findings following the baseline assessment of Georgian policies related to greenhouse gas (GHG) emissions, persistent organic pollutants (POPs) and mercury emissions in industry.

Current Body of Laws

Currently, Georgia only has a limited body of laws in place that support it in meeting its obligations under the Paris Agreement, the Stockholm Convention and Minamata Convention. The major laws shaping the regulatory framework for energy and pollution date back to 1999 and were developed before Georgia joined the three treaties. Thus, this earlier body of laws does not necessarily cover GHG, POPs and mercury emissions to a full extent. The Law on Ambient Air Protection e.g. covers over 400 pollutants but does not include any POPs.

Additionally, there is no comprehensive strategy document with regards to policy development for the industrial sector in Georgia [3]. Instead, environmental considerations related to the industrial sector can be found in disparate policy plans and documents, with only topic-specific issues targeted (such as ambient air protection or solid waste management pollution) in documents such as the 'Georgia 2020' Socio-Economic Development Strategy, and the Regional Development Programme for 2015-2017.

On top of this, there is a lack of administrative capacity to fully enforce the regulatory frameworks currently in place. For example, the 2007 Law on Environmental Impact has experienced limited success since its adoption and only 518 industrial facilities have undergone

environmental impact assessments (a procedure needed for obtaining permits for industrial activities), out of approximately 5 500 active industrial facilities.

Formulation of New Policies

Starting 10 years ago, there have been developments in formulating new policies on industrial emissions and energy efficiency that are suited to help Georgia fulfil its obligations under the three treaties. These include various strategic documents and action plans such as the National Environmental Action Plan (2012), covering 10 thematic areas, including air pollution and climate change and the National Implementation Plan for POPs (2011), guiding the legislative framework on the creation of an emissions inventory and the gradual reduction and elimination of POPs. None of the policies have been officially adopted yet. However, a law on energy efficiency is expected to be adopted in 2018.

Policy Gaps

As the main body of laws currently in place shaping the regulatory framework for energy and pollution was adopted before Georgia joined the three treaties, and because no new laws that are better suited to help Georgia meet its obligations have been adopted yet, there are policy gaps in Georgia's approach for meeting its obligations under the three treaties:

Minamata Convention

- Mercury emissions only partly covered under Georgian law (as emission to air for power generation, glass and cement production).

Paris Agreement

- Energy efficiency not covered under Georgian law;
- No energy efficiency reporting.

Stockholm Convention

- POPs not covered under Georgian law;
- No reporting on POPs emissions.

Discussion and Recommendations

Technological Level

As aforementioned, the Georgian cement and metallurgy industries are high energy consumers and emit large amounts of GHGs, POPs and mercury. While improvement efforts have been made in the cement industry with HeidelbergCement switching to more efficient production lines and modern pollution control measures, interview evidence shows that the progress in the metallurgy sector has been slower in comparison.

The team has identified a number of measures that both industries could implement to reduce GHG, POPs and mercury emissions as well as the overall energy use. Operational measures based on the optimisation of the production processes was identified as the most promising for the creation of synergies for industrial actors.

The Georgian Government could promote the optimisation of operational processes, possibly in cooperation with international agencies, by introducing capacity building programmes and staff training for industries as well as by giving support to the industry with the introduction of monitoring routines.

Policy level

Having identified potential opportunities for the creation of synergies at the technological level, the question remains how synergies could be created at the policy level.

The policy assessment has shown that the current body of laws is insufficient to achieve full compliance with Georgia's obligations under the three treaties. However, new laws more suited to fulfil this function are in development. The IIIEE team sees the opportunity that by formulating new policies, the Government of Georgia could close the policy gaps identified in this report and thus ensure that GHGs, POPs and mercury emissions are fully covered under Georgian law.

Experience from within the EU suggests that the policy approach supporting the reduction of industrial emissions could be integrated, resulting in the creation of synergies. The EU initiated a process to gradually integrate its policies on industrial emissions, streamlining the number of policies in this field from seven to only one: the Industrial Emissions Directive (IED). It covers the entire environmental performance of industrial sites including emissions to air, water, land, the creation of waste, raw materials, energy efficiency, noise, accidents and the restoration of industrial sites after their closure.

Having one integrated policy in place rather than several smaller ones is beneficial from the perspective of environmental effectiveness. Complex issues such as industrial emissions need to be looked at in their entirety to be able to identify the most effective measures, otherwise one risks "shifting of pollution from one environmental medium to another rather

than protecting the environment as a whole" [11, recital paragraph 3].

Having one integrated policy in place also makes it easier for industry actors to understand their obligations as they do not have to be familiar with a larger number of policies but only one.

Gradually integrating its body of policies on industrial emissions and using the EU IED as inspiration could thus be beneficial for Georgia and could lead to the creation of synergies on the policy level. Harmonising its policies with those of the EU seems especially beneficial in light of the ongoing EU-Georgian association process.

Conclusion

The findings of this report suggest that there are opportunities for the creation of synergies at both the technological level as well as at policy level with regards to Georgia's approach for meeting its obligations under the Paris Agreement, the Stockholm Convention and the Minamata Convention. The most promising measures for the creation of synergies are: 1) adopting operational measures based on the optimisation of the production processes in Georgian industrial sites and 2) integrating Georgia's policy approach on industrial emissions in the way the EU has done it with its Industrial Emissions Directive.

The scope of this research was limited to the cement and metallurgy sectors and only included emissions to air. However, the findings of this report could also be applicable to other industry sectors: EU experience shows that it is possible to have one central policy (the Industrial Emissions Directive) in place that regulates all industry sectors and the optimisation of operational processes could very well also

lead to synergies in industry sectors other than cement and metallurgy.

In conducting its research, the IIIIEE team identified a number of barriers. Detailed information on industrial processes and emissions data for example was not publicly available in all cases. This again calls for further research to close these knowledge gaps and to assist the Government of Georgia to determine its policy approach on industrial emissions.

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List of people interviewed

- Mr. Malkhaz Adeishvili, independent consultant, 3 & 13 April 2018.
- Mr. Giorgi Todua, UNIDO, National Expert Georgia, 4 & 10 April 2018.
- Ms. Nino Lazashvili, UNIDO, National Expert Georgia, 4 & 10 April 2018.
- Mr. Alverd Chankseliani, Ministry of Environment and Agriculture, Head of Division Waste and Chemicals, 10 April 2018.
- Ms. Ana Berejiani, Ministry of Environment and Agriculture, Chief Specialist Division Waste and Chemicals, 10 April 2018.
- Mr. Klaus Tyrkko, UNIDO, Chief of the UNIDO Stockholm Convention Division, 11 April 2018.
- Mr. Irakli Legashvili, National Project Expert of Georgia, 11 April 2018.
- Mr. George Abulashvili, Energy Efficiency Center Georgia, Director, 13 April 2018.
- Ms. Marina Shvangiradze, Sustainable Development Centre Remissia, Director, 13 April 2018s.
- Ms. Nino Obolashvili, Ministry of Environment and Agriculture, Air Emission Department, 13 April 2018.



Volvo Penta



Overview

The Gothenburg team conducted an exploratory research project for Volvo Penta regarding the development and uptake of microgrid systems. The project aimed to: 1) give an overview of microgrids, market trends, drivers, and typical use cases; 2) indicate the opportunities for Volvo Penta; and 3) consider the role of Volvo Penta in the future. Currently, microgrids are enabling energy transitions, and as a world leading supplier of engines and power solutions, Volvo Penta is fit to engage in this emerging market.

The Team

Giulia Ardito is from Italy and has 6 years working experience as energy markets analyst and consultant, with a specific focus on the power sector long-term transition scenarios. She holds a MSc in Economics from Università Cattolica del Sacro Cuore, Milan, Italy.

David Helsing is from Sweden has over 3 years working experience as a consultant in the energy sector. He holds a BA Sociology from the University of Tokyo.

Angélica Rivera-Díaz is from Puerto Rico and has experience in land management and education in Florida, US. She holds a BSc in Environmental Studies from the University of Central Florida.

Corey Stewart is from the United States and has working experience with public solar development in US. He holds a BSc in Land Use and Resource Management from the Metropolitan State University of Denver.



Photo: (from left) Corey Stewart, Angélica Rivera-Díaz, Giulia Ardito, David Helsing, and Philip Peck (supervisor).

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Charging Ahead

Volvo Penta Energizing the Future of Electromobility

By Giulia Ardito, David Helsing, Angélica Rivera Díaz, & Corey Stewart

A Changing Grid

Microgrids are small grids that can operate both connected to and disconnected from the main electricity grid. They can enable increased use of distributed energy resources (DER), renewables in particular, while enhancing the energy efficiency and stability of the system itself through balancing local generation and use of electricity. They are currently seen as one of the central tools for the energy transition and decarbonisation of the power systems [1], and expected cost reductions in key technologies will make it more and more economically viable. While renewables and storage will play a central role in these systems, traditional combustion engines will continue to have a crucial role in the future, although increasingly as backup systems.

Increasing electricity demand due to economic growth, electrification of energy demand, increased rural electrification and an increased share of intermittent renewable generation have put stress on the main grid. This shift can be more efficiently and sustainably managed thanks to microgrids. The electrification of energy demand – amongst other the transport sector which is relevant to the Volvo Group – is a key element of the energy transition, which will happen while an increasing share of distributed renewable energy sources are integrated in the power systems [2].

This is Volvo Penta

Volvo Penta is a global leading supplier of engines and complete power solutions for marine (“at sea”) and a variety of industrial (“on land”) off-road and power generation applications. Volvo Penta represents 3% of total turnover of Volvo Group, which includes, among others, Volvo Trucks, Volvo Buses and Volvo Construction Equipment [3]. The Group has strong internal communication and collaboration, and Volvo Penta benefits from being part of a global group with strong expertise in different sectors and a solid worldwide reputation.



Figure 1 Volvo Penta engine

Volvo Penta diesel engines and gensets (a diesel engine combined with an electric generator) offer ranges from around 70 kW to 640 kW. The off-road solutions (agriculture, construction, forestry, material handling, mining and special vehicles) engines power range is 105 kW to 565 kW. In the Volvo Group 2017 annual report it is reported that sales have been growing across all segments, especially in industrial off-

road engines, in mining and material handling segments. While the “market for industrial power generation engines is flat, [there are] positive signs in construction and data centres/ecommerce” [3]. Naturally, Volvo Penta have been looking for new growth opportunities for the industrial power generation segment.

The Project

The project was requested by Volvo Penta’s New Business Development Unit, who wanted to initiate an exploration of the microgrid market to see if there are any potential new business opportunities where technologies from Volvo Group can be applied. The New Business Development Unit had further noticed that Volvo Penta’s engines were already being used in some microgrids, or in “stationary power systems” as they are internally named.

The following three main questions were posed to guide study.

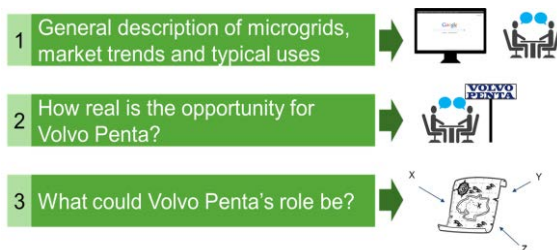


Figure 2 The three questions of the Volvo Penta project

The first task was about providing a working definition of microgrids for Volvo Penta (typical components and size) and understanding the microgrid market trends (market drivers, competitive landscape, use cases and case studies).

This step involved an extensive literature review encompassing academic resources, documents from international and national institutions and consultancy companies.

Interviews were performed with four different actors from companies and researchers engaged in microgrid activities, in order to gain more in-depth understanding.

Examination of the opportunities for Volvo Penta were concentrated within the ten days the team spent in Gothenburg. During this period, ten Volvo Penta and Volvo Group employees with different background and mission, such as product planning, technical development and purchasing, were interviewed. In the interviews applicability of in-house knowledge, possible market strategies, and the potential role of Volvo Penta were discussed. The third step was executed in parallel and was the result of a team-wise elaboration on the information gathered in the two previous steps.

What is a Microgrid?

According to CIGRÉ, the International Council on Large Electrical Systems: “Microgrids are electricity distribution systems containing loads and distributed energy resources, (such as distributed generators, storage devices, or controllable loads) that can be operated in a controlled, coordinated way either while connected to the main power network or while islanded” [4].

In general, a microgrid has two fundamental requirements:

- containing sources and sinks under local control
- possibility to operate either grid-connected or islanded

Microgrids are usually connected to the medium or low voltage distribution network. Distributed energy resources (DER) refers to all energy resources (distributed generation, controllable loads or energy storage) connected to the distribution network at

medium or low voltage. The size of microgrids is fluid, but in this report microgrids refer to grids of a size between 100 kW to several MW, which is in the strike zone of the engines that Volvo Penta produces.

Main Features of a Microgrid

A typical example of a microgrid is depicted in figure 3. It contains demand (houses, offices, factories, etc.), generation (diesel genset, solar photovoltaics, wind turbines, etc.), storage (battery storage, electric vehicles) that can act as both demand and generation, and the distribution infrastructure. It is connected here to the distribution network and can be cut off (“islanded”) if needed. Volvo Penta currently supplies the engine for the genset, but could potentially provide the energy storage and simple control systems in the future.

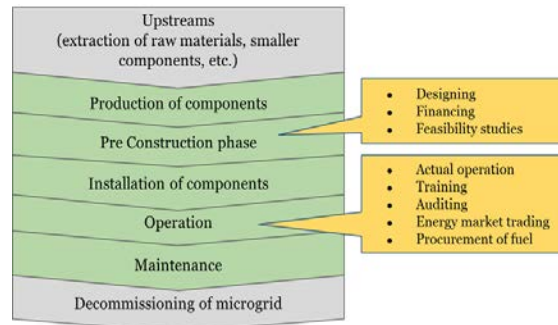


Figure 3 Microgrid value chain – production to operation

Figure 3 shows the stages required to build and operate a microgrid. The different components require separate capabilities to manufacture, install, and maintain; usually many companies are involved in the different phases. In the project the upstream and decommissioning stages were not considered because they were deemed to be too far from the business area of Volvo Penta.

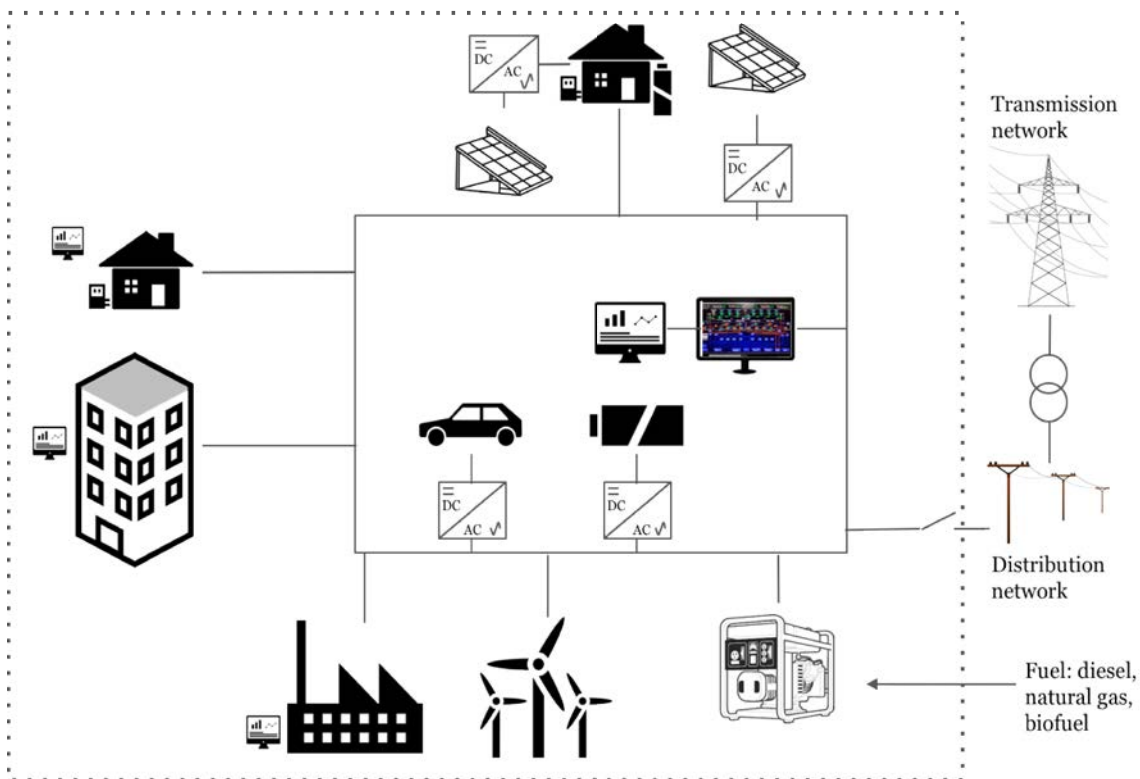


Figure 4 Schematic representation of a microgrid and some of its the main possible components

Needs Driving Microgrid Deployment

Many mega trends point toward an accelerating adoption of microgrids: sustainability, affordability, access to energy, reliability and resilience.



The overarching driver behind the spread and increasing feasibility of microgrids is *sustainability*. As global energy demand and greenhouse gas (GHG) emissions continue to increase, countries have been pushing for policies that aim to reduce emissions, improve energy efficiency, and increase the integration of clean energy [5]. As a result, there has been increased implementation of renewable energy generation in energy systems. Feed-in tariffs, low emissions targets, and distributed energy policies have led to an increase in renewable energy generation, which then has had to be integrated. While microgrids have not been targeted specifically, these kinds of policies have conspired to make microgrids relevant.

Policies have also enabled the advancement of critical technologies (e.g. solar photovoltaics, batteries, and control systems) which has led to reduced costs. *Affordability* of these technologies is allowing DER to supply clean energy to more areas and people. Lower costs are also incentivising the installation of microgrids to reduce costs of energy per kWh. A clear example of this is Australia, where many consumers opt for installing solar panels and batteries, which is less costly than electricity from the grid [6].

Affordable renewable technologies are also helping to bring energy to remote regions and developing countries.



Currently, there are still many who lack *access to energy*; microgrids are an increasingly cost-effective method to provide energy solutions to these people. Remote communities such as Marsabit, Kenya, where connection to the main grid is unlikely [7] can have dependable energy and electricity through a microgrid [8]; examples like this abound. An additional boon is that microgrids allow the utilisation of local renewables which leads to reduced dependence on oil supply, further allowing energy savings. This also shows that the drivers usually work in concert.

Case study: Remote Islands

In the face of climate change, island communities require more resilient grids. Banggi Island, off the coast of Borneo, upgraded their microgrid from its diesel-run system in 2012. The new microgrid combines an energy mix of solar PV, diesel gensets of reduced size, and battery storage to optimize production. The new grid resulted in reduced cost per kWh and reduced the reliance

Integration of renewable energy generation is delivering cleaner, cheaper energy, while leading to more decentralisation of energy systems. However, more decentralised systems lead to more complex grid operation and can cause grid instability. Microgrids have the potential to ameliorate these effects and improve grid *reliability* by optimising generation and managing electricity on the local level. Reliability is particularly important for manufacturing industries that require high quality electricity. Microgrids can also improve weak grids in areas that are in weak parts of the main grid through the installation of solar PV, generators, and/or energy storage to support the grid.



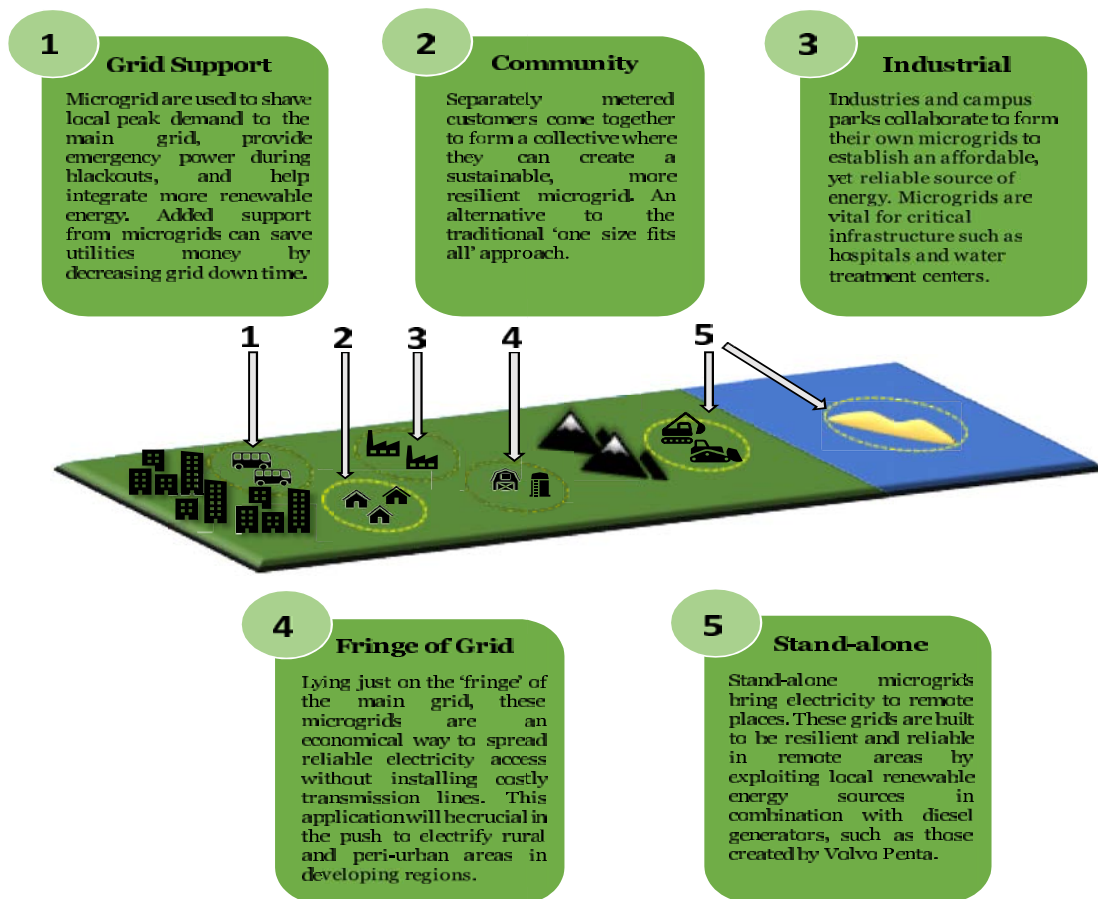


Figure 5 The five typical use cases of microgrids

Apart from providing consistently reliable energy to meet demand, energy systems should also have the capacity to maintain or recover functionality in the event of a disturbance or disruption. Disruptions can occur due to extreme weather events, earthquakes, and security risks. These events can have severe consequences that could affect various parts of society. Therefore, it is crucial to have resilient and reliable infrastructure for critical social functions such as hospitals, water treatment facilities, and data centres. *Resilience* as a driver for microgrids is related to risk management and energy security. In most resilient microgrids, a main component of these are generators and batteries which have been able to continuously provide energy when the main power grid has been interrupted or damaged.



As climate change continues to be a pressing issue with far reaching global effects, society's energy systems need to advance in ways that can help to mitigate risk and adapt to the new conditions. Microgrid systems can be part of the answer in supplying sustainable and equitable energy for all.

Applying Microgrids

This leads to how microgrids are applied in the real world. Microgrids can be categorized by their potential applications in five main areas: (1) Grid Support, (2) Community, (3) Industrial, (4) Fringe of Grid, and (5) Stand-alone. The specific application is to answer the drivers previously mentioned. Each application has the potential to fit various use cases.

Which driver is of most importance depend on the project. Figure 6 shows how

important the drivers would be for a range of different locations.

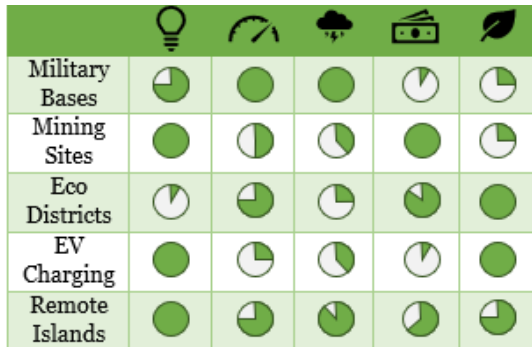


Figure 6 Microgrid applications and their integral drivers.

One specific application that is of extra interest to Volvo Penta is that of strengthening the grid in order to be able to provide charging for electric boats, trucks, and buses, which usually require much more power than the grid was built for. The case study on port electrification presented here is an example of that, and Volvo Penta could potentially play a part in driving this market.

An Evolving Market

The Competitive Landscape

The market for microgrids has been evolving rapidly, and is disrupting the mature

market of the traditional macrogrid service structure, where electricity would flow in one direction from large powerplants to end-customers. In these markets, the players were established. With the rise of distributed generation, energy storage and new features of the grid (such as connectivity, sensors, and a more software-driven approach), new markets have opened up which has been populated by both new and old players.

Globally there are several hundred companies, large and small, that have entered the microgrid business, either as supplier of solutions (e.g. planning, operation, support or installation), supplier of technologies, or as turnkey solution providers. The team decided to focus on a limited number of representative actors to provide a snapshot of the market. The mapping was based on the companies' websites and the press releases, a) the size of the company in the microgrid market, b) the growth strategy, and c) the spectrum of services provided. The result is seen in figure 7.

Some trends can be observed in the microgrid market:

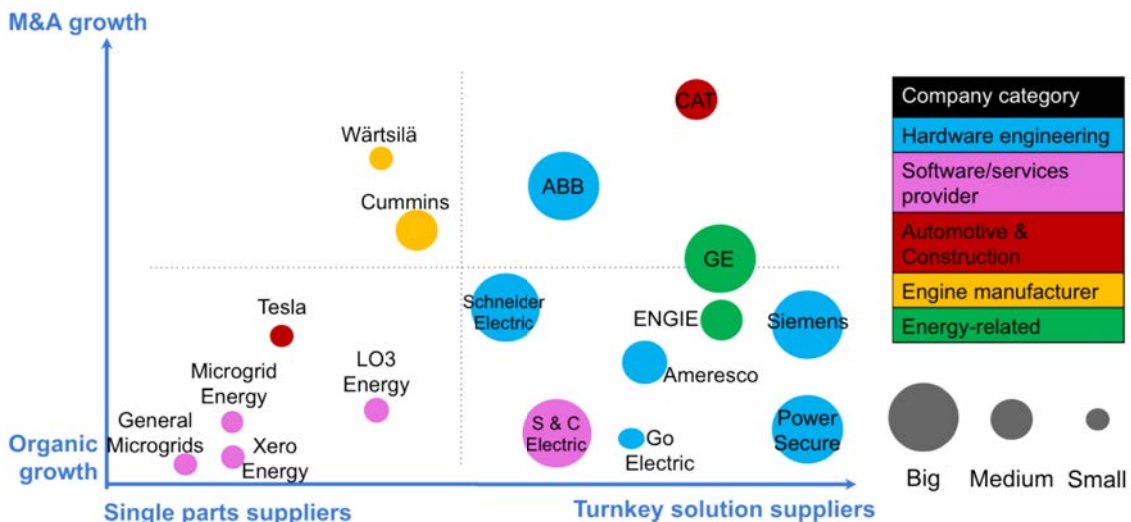


Figure 7 Growth of companies within the microgrid market

- There is a suite of “soft” solution providers that are fairly small players which rely on organic growth.
- A number of larger traditional players, such as ABB and Siemens, provide comprehensive solutions, and often rely more on organic growth.
- Some new-comers, like CAT, Wärtsilä, and Cummins, traditionally providing stationary power solutions based on engine technology and thus competitors to Volvo Penta, have relied on mergers and acquisitions (M&A) to kickstart growth.

Case study: Port Electrification



Tycho Brahe Full Electric Ferry

Electromobility is especially important to Volvo Penta's future use cases such as the Scandlines HH full electric ferry Tycho Brahe. Operating with over 4 MWh of battery storage, the Tycho Brahe travels between Helsingborg, Sweden and Helsingor, Denmark. Each port has a 10 MW cable to charge the batteries within ten minutes; enough power to charge up to 70 electric cars.

It is also observed that while most players supply systems to all types of use cases, some companies, like Wärtsilä and CAT, focus more on their traditional markets, i.e. providing flexible solutions for integrating more renewables for Wärtsilä, and mining sites for CAT.

A Growing Market

A picture emerges: 1) we have falling prices for key technologies (e.g. renewable energy

generation, batteries and digital technologies), 2) many companies are entering the market, and 3) a wide range of markets are emerging. In light of these observations, the projections stating that they will grow substantially over the coming years are easy to understand; market researchers and leading companies foresee the market to grow with a compound annual growth rate in the range of 10 to 20% in the next 5-10 years, with potentially more than 6 GW installed yearly by 2025 [9,10,11,12]. All types of microgrid will see much growth. In terms of geographical location, all markets pose opportunities, with North America and Asia leading the way. Interestingly enough, large charging stations for electromobility (≥ 10 MW at a single spot) are not yet included in these estimations, as the demand for these solutions has not made their breakthrough just yet. This indicates that the market growth will be even higher than projected.

Volvo Penta's position

The examination of *how real is the opportunity of the microgrid business* to Volvo Penta yielded interesting results. In general, all the stakeholders were engaged and viewed the microgrid market as an interesting opportunity.

Through the interviews, six major themes emerged, that were dubbed *internal drivers, or opportunities*.

The first relates to the electrification of various kinds of mobility solutions, namely trucks, buses, construction equipment and boats, all which are represented in the Volvo Group. Volvo Group is currently actively pursuing an electrification strategy. From Volvo Penta's point of view, this will likely lead to *access to large quantities of relatively low-cost battery storage*. While a prediction of exactly when, where, and how

fast this electrification will happen, it can be said that it will follow the standard S-curve which shows how a certain technology proliferates throughout society, and that relatively soon we will have an exponential increase in the amount of batteries on the market. Figure 8 shows an approximation of how far along the different mobility solutions are along the S-curve. When the S-curve approaches its inflection point, batteries will become available to Volvo Penta in high volume, and as this progresses not only new batteries, but spent batteries could be utilised for some kind of offering in microgrids.

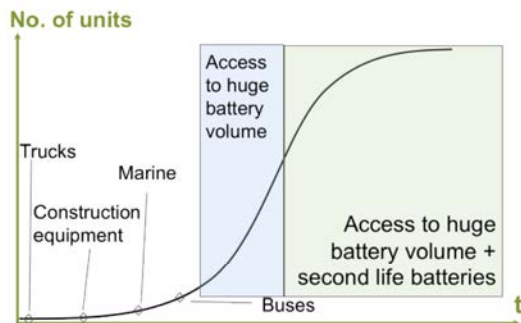


Figure 8 The S-curve for electromobility

A second driver is that *there is an obvious customer interest* which can be seen for the emerging technologies. Interviewees expressed that Volvo Bus has received requests about charging infrastructure when making sales of electric buses. The same can be expected to happen for trucks, marine and construction equipment, where the grid is generally not built to support such loads.

The third driver relates to the second; as the group electrifies, there will be an apparent *need to be able to provide a charging solution that can support the sales growth.*

The fourth driver points towards a *shift towards integrated solutions.* Volvo Penta was originally a part manufacturer; they provided the engine for gensets, boats, and industrial machinery. But with the battery

and the control needed for this, a shift towards solutions could be taken, or as an interviewee said: “The strategy is to sell engine systems, not components” [13].



Figure 9 IPS800 for marine propulsion

The fifth driver relates to the fact that the Volvo Group has “unrivalled representation” as one interviewee put it [13]; no other company has a product range like Volvo Group. This grants Volvo Penta access to many customer channels, technological know-how, and potential partners.

Case study: Electric Vehicle Charging



A Volvo C30 Electric Vehicle

The City of Oslo has partnered with energy companies to create the Vulkan Parking Garage. It’s equipped with 102 EV charging ports with variable power inputs, allowing users the freedom to charge their vehicles without worry.

The final driver points to the potential of embracing a product that can *improve the environmental profile* of Volvo Penta. Traditionally, *environmental care* has been one of the core values at Volvo Penta, aiming to reduce the negative impact of diesel

engines per unit of power produced. However, with a potential entry into the microgrid market, supporting the expansion of electromobility, this could shift from being a minimising negative impact to a maximising positive impact approach.

It was also noted that some barriers exist: providing more complete solutions might be challenged by current customers of Volvo Penta's engines for production of gensets, and any project has to show a return on investment that make sense when choosing among several investment opportunities.

In conclusion: if Volvo Penta adequately leverages Volvo Group's position and know-how, the team sees a real opportunity in the microgrid market.



Figure 10 Drivers and barriers

Tying it all together

The study lead to five main findings that are of relevance to Volvo Penta for going forward in the microgrid market:

1. *Distributed energy resources* are being increasingly used to meet energy demand while ensuring the achievement of decarbonization targets. Various drivers are pushing microgrids to the forefront in dealing with this situation.

2. *Volvo Penta's competitors and other actors have entered the microgrid market.* The market is continuing to grow, and new actors find new roles. One trend is the evolution from simple installation of components to services and complete solutions. This means there is still ample opportunity for new market entries.
3. *Volvo Penta is poised to enter the market.* Volvo Penta is a strong, reputable company with assets capabilities to enter the market.
4. *There is increased electrification of vehicles.* Electrification is opening a unique opportunity in the microgrid market as a key aspect of smart, integrated energy systems.
5. *Volvo Penta is in the right position to potentially be the hub for Volvo Group to provide microgrid energy solutions to the group and its customers.*

Ways Forward

After seeing the larger picture of Volvo Penta's role in the future of microgrids, the team was in the unique position to identify some opportunities for the client to further explore.

Volvo Penta could investigate its opportunities in providing more comprehensive stationary power solutions, especially for charging solutions that will be needed in ports, along highways, and in construction sites, as electromobility spreads. This would entail tweaking the product designs to answer possible future uses. Volvo Penta will also need to further analyse the market to determine its positioning compared to competitors, as well as Volvo Penta's internal

capabilities to determine how market entry should be done if such a decision is made.

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List of people interviewed

Oskar Nilsson - Schneider Electric - Product Technology Expert - 3rd April 2018

Maurizio Verga - Ricerca sul Sistema Energetico - RSE S.p.A. - Responsabile Test Facility di Generazione Distribuita, Dipartimento Tecnologie di Generazione e Materiali - 3rd April 2018

Carlo Sandroni - Ricerca sul Sistema Energetico - RSE S.p.A. - Responsabile Gruppo di Ricerca, Dipartimento Tecnologie di Generazione e Materiali - 3rd April 2018

Jan-Erik Olsson - E.ON Energidistribution AB - Director / Senior advisor - 9th April 2018

Kyriaki Antoniadou-Plytaria - Chalmers University of Technology - Doctoral Student - 10th April 2018

Niklas Thulin - Volvo Penta - Director Electromobility, New Business Development - 10th April 2018

Thorbjörn Lundqvist - Volvo Penta - Director New Technology - 10th April 2018

Christer Hedström - Volvo Penta - Director Product Planning Industrial - 11th April 2018

Cecilia Gunnarsson - Volvo Penta - Environmental Director - 11th April 2018

Emmanuel Varenne - Volvo Group - VP Powertrain Business Strategy - 12th April 2018

Ylva Olofsson - Volvo Group Trucks Technology - System Engineer Electromobility - 12th April 2018

Tobias Husberg - Volvo Penta - Project Manager Engineering - 13th April 2018

[13] Stefan Hillsten - Volvo Penta - Director Purchasing - 13th April 2018

David Hanngren - Volvo Group Venture Capital - Investment Director - 13th April 2018

Jakob Ursby - Volvo Penta - Marine Product Management - 17th April 2018



GES International



Overview

The Stockholm group set out to create a theme engagement on the circular economy for Global Engagement Services International AB (GES). The Swedish asset consultants have over 25 years of experience and have traditionally done all research in-house. However, GES have now decided to join forces with the EMP Masters students. The firm have worked with institutional investors to promote sustainability and the transition towards more responsible investing. The project described in this chapter supported this transition by exploring the opportunities of circular economy in the financial sector and developing two potential engagement themes on the topic for GES International's engagement services.

The Team

Karolina Arvidsson-Kvissberg is from Sweden and has worked in the sustainable fashion industry for fashion brand KappAhl. She has a BA in International Studies from Leiden University.

Cristina Nieto is from Mexico and has worked in the Mexican forestry sector contributing to the implementation of REDD+ in the country, fundraising management and rural community engagement. She has a BA in International Relations from ITESO in Guadalajara.

Mike Toulch is from Canada and has several years experience practicing in civil, administrative and commercial law. He has a Bachelor of Commerce, Finance & International Business from McGill University and a Juris Doctor in Law from the University of British Columbia.

Alexandra Wu is from Canada and Hong Kong. She has extensive experience in environmental consulting, project management and communications in the areas of carbon markets, international development and forestry. She has a BSc in Environmental Science from the University of Waterloo.



Photo: (from left) Håkan Rodhe (supervisor), Mike Toulch, Karolina Arvidsson-Kvissberg, Cristina Nieto and Alexandra Wu.

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Money Makes the World Go Round

Investing in transitions toward a circular economy

By Karolina Arvidsson-Kvissberg, Cristina Nieto, Mike Toulch & Alexandra Wu

The world population is expected to grow from 7.4 billion people in 2016 to 9.5 billion people by 2050 [1], the majority of which (52%) are expected to represent the middle class [2]. Indeed, the greater the economic growth of a country, the more its citizens consume resources and generate waste. This growing middle class means ever-increasing pressure on the environment [3].

Circular Economy

Why is the global ecological footprint so large? One major factor is our linear economy, where *taking, making, using and disposing* resources and products in a linear fashion is considered the norm.

A ‘circular economy’ (CE), by contrast, seeks to close resource loops by minimizing the use of raw materials and the production of residual waste through resource efficient production systems and recycling. It is defined as one that is “restorative and regenerative by design, and which aims to keep products, components and materials at their highest utility and value at all times, distinguishing between technical and biological cycles” [4].

In addition to reducing the global ecological footprint, the circular economy is relevant for businesses because it: 1) tackles risks in resource supply and commodity price volatility; 2) captures value lost through inefficiencies and improved business model design; 3) reduces reputational

and intangible risks upstream (e.g. supply chain non-compliances) and downstream (e.g. poor waste management), and 4) pre-empts regulations that hold businesses increasingly responsible for improving the sustainability of production, consumption and waste management (e.g. EU Eco-Design Directive and UN Resolution on Plastics Pollution).

The ultimate objective of the circular economy is to decouple natural resource depletion and environmental degradation from economic growth.

Responsible Investing

Investors play a crucial role in addressing unsustainable production and consumption patterns through responsible investment, which aims to incorporate environmental, social and governance (ESG) considerations in investment decisions. Responsible investment has seen a shift from passive divestment from controversial sectors (e.g. tobacco, oil and gas) to active engagement with companies aimed at improving their sustainability practices.

Indeed, investors have become increasingly interested in investing in the circular economy, however many have not yet found ways to actualize it. At the same time, businesses that are aware of circular economy concepts may remain hesitant to change, given the restructuring and upfront capital that are often needed to renovate business models and supply chains.

The Client

GES International AB (GES) is a Swedish research and engagement services provider for institutional investors. Established in 1992, the company has over 25 years of experience in advising investors on responsible investment and its clients collectively hold over EUR 1.5 trillion of investments around the world [5].

The two main services provided by GES are: 1) *screening and analysis*, which consist of monitoring and screening news and industry activities for incidents of non-compliance in international ESG norms, and 2) *engagement*, which refers to an investor (or an organization such as GES working on behalf of investors) interacting with companies to improve their sustainability and ESG practices.

Both services help investors become more proactive asset owners in the companies they invest in. Thematic engagement is one type of engagement service that GES provides and is the focus of this project.

Thematic Engagement

GES conducts thematic engagement for investors on specific themes or issues, such as *water*, *palm oil* and *carbon risks*.

Thematic engagement projects typically involve working with around 20 target companies over a three-year timeline, and activities are designed to achieve a set number of key performance indicators (KPIs).

A theme is determined to have engagement potential if:

- It is feasible to conduct and create change over a three-year project
- It is possible to create lasting impact beyond the project
- It provides a clear business and financial case
- It is relevant to a hot-button issue, such as contributing to the United Nations (UN) Sustainable Development Goals (SDGs).

For example, KPIs on the water theme are based on UN SDG 6: ‘Clean Water and Sanitation’, and include indicators such as the extent of water pollution reduction, water-use efficiency and the presence of integrated water resource management.

The Task

Given the urgency to reduce the global ecological footprint, SDG 12 was established to achieve responsible production and consumption. The efforts of numerous actors, including institutional investors, will be needed to achieve SDG 12 and spur the shift towards a less resource intensive and more sustainable economy.

This project supports this transition by developing two engagement themes on CE for GES’s engagement services. This includes a framework for identifying CE KPIs. Importantly, this was the first time that GES had worked with the circular economy and to the best of the team’s knowledge, there has been no prior attempts within the financial sector to extensively engage with companies on CE strategies.

Approach

In order to select two CE engagement themes for GES from a broad universe of potential themes, the team conducted a scoping exercise. For this, the team

considered frameworks created by organizations both working with CE, such as the Ellen MacArthur Foundation (EMF), as well as private-sector standard setting organizations such as the Sustainability Accounting Standards Board (SASB) [6]. Ultimately, two themes were selected based on the following five criteria:

1. Reflective of stakeholder consensus.

The team identified key concepts, trends and challenges of the circular economy that were commonly referred to by different NGOs and research centres, such as the EMF and Circle-Economy [7].

2. Relevant CE aspects across industries.

Through research, the team identified and analysed six hotspot industry sectors for CE: automotive, construction, electronics, food, plastics and textiles.

3. Actionable.

So that the potential themes would be functional both for GES and for companies with which GES engages, the team analysed GES' thematic engagement strategy as well as relevant case studies on companies already implementing CE activities.

4. Potential to affect corporate value.

Based on desk research and interview results, the team identified aspects of the CE

that could potentially influence the operational and financial performance of listed companies (i.e. publicly-traded companies on the MSCI All World Index). The focus was mainly on i) physical, reputational and regulatory risks; ii) CE activities that would prepare companies for future environmental challenges such as resource scarcity; iii) financial aspects such as potential savings and cost of capital (e.g. lost value of waste) and iv) opportunities for innovation.

5. Of interest to investors.

In order to ensure that selected themes could be operational, it was necessary to align them with the needs and interests of GES's clients. For this purpose, interviews were conducted with eleven individuals representing institutional investors and asset managers. The results of the interviews were then used to identify topics of interest (e.g. compatibility with SDG 12 targets), challenges and opportunities for investors.

Theme selection process

Throughout the process, the team considered developing both a general CE theme and a specific theme related to material circularity. However, this approach was determined to not be actionable as it was too broad.

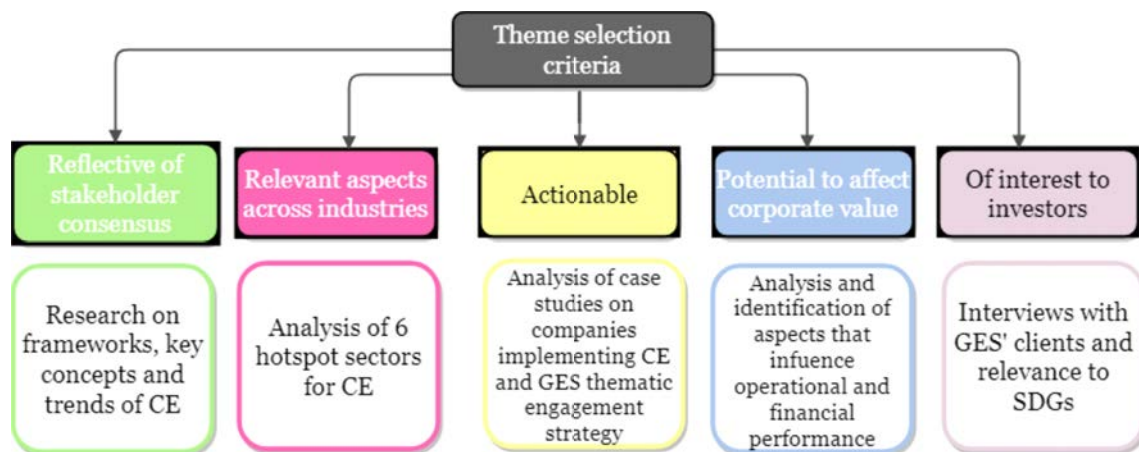


Figure 1: Criteria for developing engagement themes on the circular economy.

As an alternative and based on the team’s research regarding the six hotspot sectors, it was thought that two specific sectors could be developed as the focus of the engagement themes. However, this approach was also ultimately discarded as it was not considered actionable, given that GES's client portfolios are diverse and applying a cross-sectoral approach can help to identify a representative number of potential target companies.

Finally, the team turned to its research on aspects with the potential to affect corporate value. In parallel to the sectoral analysis and investor discussions, the team also identified common challenges and CE topics of interest across multiple industries, which were: carbon intensity, resource efficiency, critical raw materials, plastics and waste. The team then decided to focus on these challenges and narrow them down. For that purpose, each one of these potential themes were evaluated against the five selection criteria which finally led to the following two themes:

- Theme 1. Resource Efficiency and Waste
- Theme 2. Plastics

Theme 1 seeks to create a broad but adaptable framework to measure a company’s progress towards addressing resource scarcity and pollution through

circular economy strategies, and is applicable across multiple sectors. Related to the umbrella of Theme 1, Theme 2 provides an example of a specific framework based on how companies can adopt initiatives to address issues with plastic waste and pollution.

In order to capture the essential aspects of circular economy for the two themes, the team created the ‘CIRCLE Framework’. The KPIs were based off of various agencies that specialize in circular economy [8], sustainable reporting standards [9], and responsible investment reporting [6].

The CIRCLE Framework

The team recognised two key challenges in developing a CE theme: i) identifying those

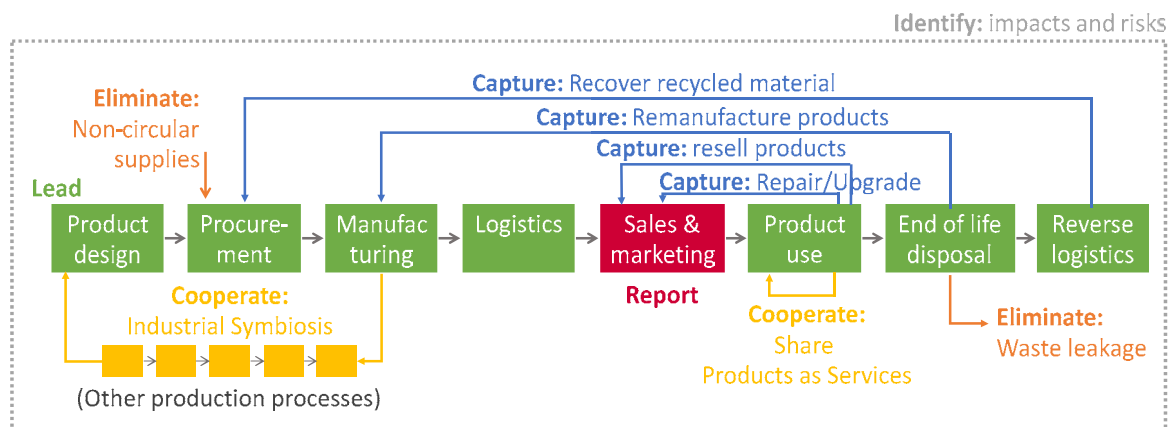


Figure 2: The CIRCLE Framework for developing circular economy KPIs (adapted from [2]).

aspects of the circular economy most material to a company’s operational performance and ii) identifying measurable steps that would be achievable for companies in the early stages of transitioning towards circular economy thinking. Therefore, to develop an engagement tool that would properly capture the essential aspects of circular economy, the team developed a framework that sought to measure a company’s progress towards applying the three fundamental principles of circular business growth: i) Preserving and enhancing natural capital; ii) optimizing resource yields; and, iii) fostering system effectiveness [10].

Capture and Eliminate

In order to provide metrics that would be as material as possible to investors, the framework first focused on indicators that would demonstrate improved operational performance (through resource effectiveness, cost savings, and avoided volatility), and diminished reputational risk (through reduced pollution, sourcing challenges and human rights and health concerns).

Identify and Report

One of the main objectives of proactive

engagement at its initial stages would be to provide companies with a blueprint towards circularity transitions. To that end, the team included indicator categories that would allow companies to track progress towards developing systems-level thinking within their organization, identifying hotspots along their own supply chain using impact assessment methodology, and reporting on circular strategies in a tangible and transparent manner.

Collaborate and Lead

The team also sought to develop a framework that would allow companies to monitor and report on the positive progress being made towards circularity, including how they collaborate with peers and across supply chains, how they foster technological innovation and how they intend to transform business models to create and preserve natural capital moving forward.

Theme 1: Resource Efficiency and Waste

Rationale

Increased resource scarcity has led to commodity price hikes and volatility for companies that are overly reliant on scarce

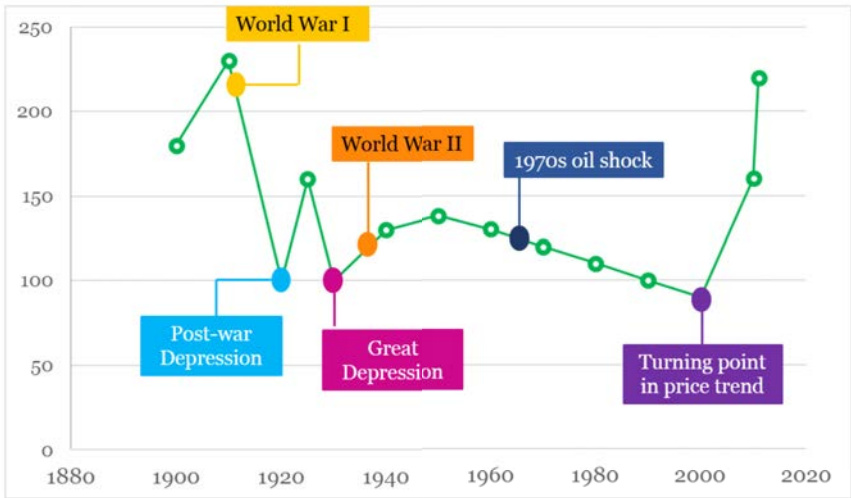


Figure 3: Increased resource scarcity has led to commodity price hikes in the early 2000s (adapted from [10]).

or resource-intense raw materials, which can ultimately impact their cost of capital and reputation. Given historical trends regarding commodity pricing (i.e. food, non-food agricultural items, metals and energy, see figure above) and growing climate risks, resource availability is fast becoming an existential challenge for many companies and industries.

Stricter regulations on private sector pollution and waste responsibility can also present a competitive advantage for those companies able to efficiently recapture value in their own products, and risks for those that cannot. Waste streams remain an underutilized source of value recapture for many companies and sectors. In 2012 for example, material recycling and waste-based energy recovery captured only 5% of the original raw material value of discarded materials in Europe [7]. In addition, companies that lag behind in engaging with circular economy concepts will likely be ill-equipped to adapt to future trends in market demands, technological innovation and business model development.

Engagement Framework

Efficient resource and waste management practices allow companies to anticipate and

react to changing conditions associated with resource scarcity and pollution regulation, to enhance operational efficiency and to diversify value streams. There is a growing need for companies to develop processes that minimize their reliance on increasingly problematic raw materials and eliminate after-market waste and pollution attributable to their products and processes.

As a result, the first engagement theme seeks to apply the CIRCLE framework to measure a company’s progress towards addressing the key challenges of critical resource scarcity and waste pollution through circular economy strategies related to improved resource effectiveness and waste management.

Key Performance Indicators

The initial three-year engagement is intended to focus on aspects of resource efficiency and waste management that are most material to a company’s operational performance and that are reasonably achievable for companies within the consumer retail sector. This theme seeks to focus specifically on key systematic challenges faced by a company or its sector with respect to sourcing and waste management, which included over-reliance on

Theme 1: Resource Efficiency and Waste

Framework	KPI examples
C Capture value throughout a product’s life cycle	<ul style="list-style-type: none"> • Products/packaging materials reclaimed at end-of-life for recycling and/or reuse (collection rates as % of products sold)
I Identify impacts and risks	<ul style="list-style-type: none"> • Reporting on use of Environmental Impact Measurement System (e.g. ISO 14040:2006)
R Report on progress and challenges	<ul style="list-style-type: none"> • Reporting on Circular KPIs/Progress in Annual Reports • Reporting on bill of materials (BoM) used in impact calculations
C Cooperate across the supply chain	<ul style="list-style-type: none"> • Circular Economy principles in Supplier Code of Conduct • Reporting on end-of-life waste recovery partnerships
L Lead within the industry	<ul style="list-style-type: none"> • % of products that meet best-in-class life-cycle performance standards in € by revenue (e.g. EPEAT, Higgs Textiles)
E Eliminate waste and resource risks	<ul style="list-style-type: none"> • % of non-reclaimable toxic materials/compounds used per revenue • Total weight of waste by disposal method

scarce raw materials and the lack of systems to effectively recapture and manage waste.

In the case of resource effectiveness, that meant identifying input materials within a sector/company that posed the biggest risks to long-term growth strategies (e.g. conflict minerals in the electronics sector), and measuring the incremental progress that companies make towards minimizing/eliminating reliance on those materials.

To measure waste management, this meant tracking a company's use and management of materials and components that diminish the recoverability or recyclability of a product at end-of-life (e.g. hazardous chemicals) as well as a company's efforts to manage its own non-recoverable waste.

Theme 1 in practice - example of the electronic sector:

Electronic waste is the fastest growing waste stream and regulations to extend the responsibility of waste management to producers are growing. Electronics companies face both upstream risks (e.g. resource supply volatility for rare earth minerals) and downstream risks (e.g. hazardous pollution from electronic waste). Theme 1 can be used to engage electronics companies to **capture** product value by introducing product take-back and recycling, **eliminate** waste risks by replacing hazardous product components and become industry **leaders** through circular product design.

Theme II: Plastics

Related to the umbrella of Theme 1, Theme 2 provides an example framework on

addressing issues with plastic waste and pollution.

Rationale

The plastics waste issue is currently the fastest growing environmental topic on the political agenda next to climate change [11]. Leaders and citizens are becoming increasingly aware of the substantial impact of plastic. The EU has recently committed to a holistic plastic strategy, and similar agreements are being made internationally. Through this momentum, it is no longer unreasonable for companies to take considerable action to prevent and improve the damage that plastic waste is causing to the environment.

With different regions around the world having taken significant steps to improve their after-use infrastructure, and given innovation and technology breakthroughs, dealing with the massive plastics issue has become increasingly feasible.

Plastic is a vital product to the global economy; however, the way it is being produced, used, and managed has become unsustainable, especially at the use and after-use phases. Each year, at least 8 million tonnes of plastics leak into the ocean —

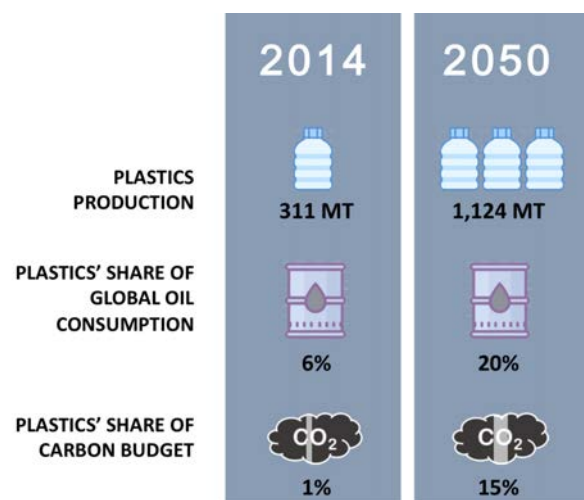


Figure 4: Forecast of impacts from plastics in a business-as-usual scheme (adapted from [12]).

which is equivalent to dumping the contents of one garbage truck [of plastic] into the ocean every minute” [12].

Plastics production also has a significant impact on carbon footprint. Finished plastics products comprise of 90% petrochemicals, and the industry is currently responsible for around 6% of global oil consumption (the same size as the aviation industry) [12]. If these levels continue to grow, targets set under the Paris Agreement will become unreachable [12].

After interviews with various investors it became clear that corporate impacts to health is a key topic for their business focus and ESG. Although the link between plastics and health issues is still being debated, the role of microplastics in food and in human systems remains a growing concern.



Furthermore, air emissions and water toxicity from waste are increasingly linked to the plastics and consumer goods industries [12]. This relationship between health concerns and plastics can highlight, for investors, the benefit of theme engagement in plastics and the downside of carrying on in a business-as-usual scenario.

There are also financial implications of inefficient plastic waste management. Annually, around EUR 65-98 billion is lost around the world due to material plastic

waste [12]. With improvements in recyclability and after-use collection and recycling practices, a significant portion of this value could be saved. Today only about 14% of plastics is recycled, however, in Europe about 50% could be reached with only limited changes and improvements made in collection efforts [12].

Engagement Framework

In light of the above challenges mentioned, it is abundantly clear that a business-as-usual pattern of plastic production and disposal can no longer continue. To change this, three main shifts need to occur:

1. Create an effective after-use economy

Improving the quality of after-use infrastructure will be key in recovering the material value of plastics. Collaborations across industries and with public institutions can help create a more effective after-use economy [12].

2. Reduce leakages and spills

Landfill bans and fines have been adopted by an increasing number of regions. The costs of these for companies, including negative externalities such as aesthetic value and impact of marine life, can be excluded through improved handling and reporting of leakages [12].

3. Decouple from fossil feedstocks

Decoupling from fossil fuels protects companies from raw material price volatility, safeguards their reputation and prepares them for new regulations. With improving efforts towards the use of renewable sources in general across the industry, it is likely that this will play a larger role with respect to plastics [12].

Theme 2: Plastics

Theme		KPI examples
C	Capture value throughout a product's life cycle	<ul style="list-style-type: none"> • % of virgin plastic compared to recycled material in product • Plastic content in total amount of packaging
I	Identify impacts and risks	<ul style="list-style-type: none"> • Use of petrol-based input per kg of final plastic product • Energy usage and GHG emissions
R	Report on progress and challenges	<ul style="list-style-type: none"> • Development of quantitative KPIs to track and monitor improvement • Transparency on bill of materials
C	Cooperate across the supply chain	<ul style="list-style-type: none"> • Degree of industrial symbiosis • % of shared packaging business-to-business
L	Lead within the industry	<ul style="list-style-type: none"> • Innovation in business models and existing processes • Investment in research and innovation
E	Eliminate waste and resource risks	<ul style="list-style-type: none"> • Location, size and material composition and toxicity of leakages • % of plastic waste to landfill

Key Performance Indicators

Capturing the complexities of plastics is a challenge for businesses. The overwhelming impact of plastics is difficult to breakdown and make actionable. Therefore, the focus should be company or industry specific, and focus on distinctive risk areas. Furthermore, aspects like health should be further considered for engagement rather than setting specific KPIs.

When confronting the plastics challenge, focus is oftentimes placed on the packaging industry. Nevertheless, plastic production is used in a wide variety of industries including textiles, electronics, and automobile manufacturing. Therefore, addressing the challenge will require concerted and cooperative efforts from more than just primary producers.

Most of the efforts for this project are focused on business-to-customer companies, therefore there is little focus on the extraction phase. This is in order to promote more actionable and measurable KPIs over more sectors [13].

Using the CIRCLE Framework, examples of KPIs were developed for each stage, shown above.

Conclusion

The circular economy has drawn significant attention from various sectors, but the lack of standardized methods has created barriers for companies to adopt it. However, there is momentum as the link between circular economy approaches and improved financial and operational performance is becoming clearer. Due to CE's complexity however, cooperation between many different actors, including the financial sector, will be crucial to effect a smooth transition.

For investors, this means avoiding unforeseeable portfolio risks associated with unsustainable business practices. For companies like GES, this means fostering effective communication on behalf of investors to sustain cooperation and produce win-win scenarios. For companies, this means obtaining actionable, value-added targets that can foster sustainable value-creation and long-term operational viability.

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List of people interviewed

Flora Gaber, Analyst Responsible Investments, Asset Management, Länsförsäkringar, March 23, 2018

Andreas Stang, Asset Manager, PFA Pension, March 23, 2018

Piet Klop, Senior Advisor Responsible Investment, PGGM Investments, April 3, 2018

Elina Rinta, ESG Analyst, OP Financial Group, April 6, 2018

Christina Hillesöy, Head of Sustainability, Länsförsäkringar, April 6, 2018

Stefan Streiff, Senior Ethics Analyst, Hauck & Aufhäuser (Schweiz) AG, April 10, 2018

Helena Larson, Senior Investment Analyst, Skandia Mutual Life Insurance Co, April 11, 2018

Anonymous, April 12, 2018

Jacob Johansson & Helena Kernell, Senior Analysts, Folksam, April 13, 2018

Gunnela Hahn, Head of Responsible Investing, Svenska Kyrkan, April 13, 2018

Peter Loow, Head of Responsible Investment, Alecetra, April 16, 2018

GES staff (various), GES International, March 13 to April 20, 2018



Umeå



Overview

Under the national programme Sharing Cities Sweden taking place between 2017 and 2020, Umeå is acting as a test bed to develop and evaluate solutions for establishing the sharing economy in Sweden. Umeå Municipality granted the team an opportunity to contribute to the early stages their strategy working closely with the public sector. By collecting the input of numerous project partners, the team gained insight into the local context for sharing and explored ways Umeå should capitalise on its abilities until 2020 and beyond. Focusing on the role of small and medium-sized cities in the sharing economy landscape, the team produced a “Decision-making Compass” that can be used to orient Umeå policymakers as they consider the optimal route to reach their sharing goals to build *resource efficiency, trust* and an *equitable society*.

The Team

Taein Jung is from South Korea and has professional experience in strategy consulting and international development with the Asian Development Bank. She holds a BSc in History & International Relations from the London School of Economics.

Dominika Machek is from Sweden and has over two years work experience in Norway as an assistant buyer for a fashion retailer. She holds a degree in Textile Management & Business Economics from the Swedish School of Textiles.

Michael Port is from the United States of America and has worked for two years in environmental consulting for industrial water permitting. He holds a BA in Environmental Studies.

Simo Sulkakoski is from Finland and has professional experience in investment finance and online retailing. He holds a BA in Business Studies and Economics.



Photo: (from left) Simo Sulkakoski, Taein Jung, Philip Näslund (Project Coordinator), Michael Port and Dominika Machek.

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The team would like to thank Umeå municipality for inviting us to contribute to their early work in developing the local sharing economy. We would firstly like to thank our supervisor Charlotte Leire for her dedicated support to help develop our project and for spending so much time arranging meetings and interviews with Umeå's stakeholders. We would also like to thank Johan Sandström and the acting Sharing City Umeå project coordinator Philip Näslund, for their availability in providing the resources necessary to complete our work and openness in sharing the collective vision for Umeå. Finally, we want to thank the numerous project stakeholders and other actors who showed genuine passion during our interviews to make the region a better place. We appreciate that Umeå sets a high bar for itself to be a positive role model for sustainability work in Sweden and on an international scale.

Sharing Stories from Umeå

A Decision-Making Compass for Smaller Sharing Cities

By Taein Jung, Dominika Machek, Michael Port & Simo Sulkakoski

Sharing economy (SE) is a concept constantly evolving in its content, purpose and extent. While a wealth of research has been conducted on investigating SE strategies and approaches in larger cities, little attention has been given to what the SE implies for smaller cities, since they are typically limited by their management, administrative and financial capacities and may not have a large enough population to attract for-profit sharing organisations. In this SED-project, our team worked with the municipality of Umeå to develop a decision-making model (*Decision-Making Compass*) to support the municipality in its thought processes surrounding the *Sharing City Umeå* (SCU) initiative. With the developed model, the team also provides the municipality recommendations for moving forward with the initiative in a balanced manner.



Workshop at Folkets Hus Umeå

Key concepts

User:

A consumer of a sharing service.

Provider:

An entity that provides, or has organised the delivery of, a sharing service.

Platform:

A physical or a digital meeting place where users and providers convene to (mostly) share, rent, donate or exchange goods, services, ideas or knowledge.

Peer-to-peer:

The interaction between individuals either directly, i.e. face-to-face, or via a platform.

Top-down approach:

Creation and provision of sharing services by central authorities

Bottom-up approach:

Creation and provision of services on a local level.

Sharing Economy in the City

In this project, our team defined the *sharing economy* broadly as a new economic model based on sharing access to, as opposed to ownership of, goods and services to achieve their use at a higher capacity and reduce consumption, and on building social fabric and trust between citizens [1,2]. *Sharing city*, on the other hand, is defined as a city that makes use of the opportunities the SE presents it in terms of, for example, enhancing urban sustainability through improved economic resilience and social cohesion [3].

Sharing City Umeå

Umeå municipality is one of four cities taking part in the national programme *Sharing Cities Sweden* that runs between 2017-2020, along with Stockholm, Gothenburg and Malmö. The national programme aims to develop and critically evaluate the SE in cities by establishing test-beds and through national and international exchange of knowledge and learning. The overall aim of Sharing Cities Sweden is to reduce climate impact, increase resource efficiency and enable sustainable development on a city level covering three sectors of sharing: *spaces, products and services, and mobility*.

Based on the national programme, Umeå municipality aims to incorporate SE in the larger context of its municipal objectives as sharing solutions can bring value to the city and its residents. While the national programme is rather focused on potential environmental gains, Umeå has adapted the programme to the local context, focusing on creating a more resource-efficient, trusting and socially just society.

Current Status of Sharing in Umeå

After three workshops involving different stakeholder groups (general public, potential partners and national actors) in Autumn 2017 as part of Phase I, Umeå laid out the initial plan to implement Sharing City Umeå. Umeå has so far established three initiatives, and three new ones are being planned and implemented. Of the initiatives, one is a private enterprise (Delbar) and five are a mix of municipality- and collaboratively-run projects.

1. U-bike (A municipality-led bike-sharing program)
2. Delbar.se (Peer-to-peer sharing of goods)

3. Fritidsbanken (Sharing of sports equipment)
4. Sharing of green spaces
5. Service hubs
6. Sharing of knowledge and ideas

Our Task & Approach

The team was brought into the project in March 2018 at the beginning of Phase II, one month before the official launch of Sharing Cities Sweden. Umeå's project coordinator described the intent of the project and gave us room to develop an idea that would best serve their needs at this stage.

After a review of other sharing cities in development, the team identified an existing decision-making tool for local governments. Based on this model, we propose a set of questions that Umeå should consider when developing its own model of a sharing city in the form of "decision-making compass". To develop the Compass, the team reviewed ongoing SE activities as part of the SCU initiative and conducted multi-stakeholder interviews, a survey and a workshop attended by approximately 20 project partners. The findings have been compiled into a report for Umea Municipality with case studies from other sharing cities.

Decision-Making Compass

While many learnings on SE in cities can be drawn from pioneering areas such as Seoul, Amsterdam and San Francisco, their sharing city models cannot be transferred directly to smaller cities due to significant differences in resource availability, governance structures and overall local context. Prepared by the city of Guelph in Ontario, Canada, the report titled

Navigating the sharing economy [4] emphasises the important role of municipalities in shaping the development of local SEs and presents a decision-making model for local policy-makers. The decision-making model was adapted to Umeå municipality’s specific case to form the Decision-Making Compass.

Sharing City Decisions

The original decision-making model presents a set of six decisions that a municipality can follow to shape its sharing city approach. The Compass presented here is devised with seven decisions to benefit smaller cities and Umeå in particular.

It is important to note that the different decisions of the Decision-Making Compass ought not to be considered as fixed, but will rather evolve over time with Umeå as the local SE and collective global knowledge on the topic expands. In the following section, the significance of these decisions is elaborated and applied to the context of Umeå.

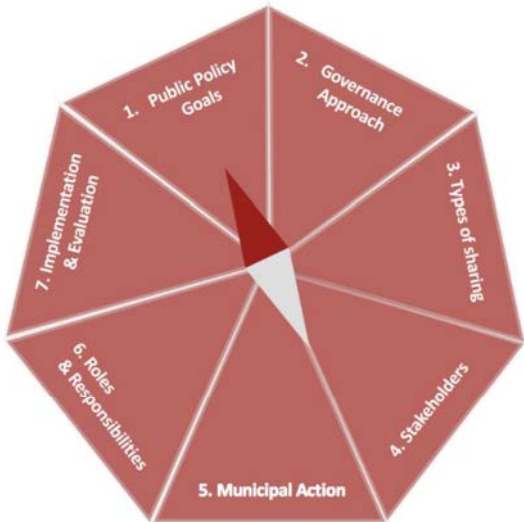


Figure: *Decision-Making Compass*, adapted from the City of Guelph [5]

1. Public Policy Goals

Based on the initial research and multi-stakeholder interviews, three broad policy goals were identified to be associated with SCU.

Firstly, Umeå is seeking to expand its population from 125,000 currently to 200,000 by 2050. This goal is a critical consideration that shapes how activities are carried out in the municipality. Umeå municipality seeks to promote the region through economic development and enhancing the quality of life. Secondly, the pursuit of environmental sustainability is evidenced by their work in various climate and consumption-related projects that target on different angles of resource efficiency. Related to their population growth goal, they are looking for ways to grow sustainably. Lastly, Umeå seeks a cohesive and socially just society with a special focus on gender equality and immigrant integration issues.

Based on these identified policy goals, we analyse key risks and opportunities informed by the background research and Umeå’s observed capabilities. The areas in focus are economic development, environmental benefits and social cohesion and community development.

2. Governance Approach

In planning a sharing city, municipalities may take a combination of approaches to develop local sharing capacity which has been categorised into five different modes of governance. In the context of fossil fuel free transitions, Bulkeley & Kern supply the initial four and the fifth is added by Emtairah et al. [5,6]. Depending on what stage of development the SE lies, the available resources that are present, and the prevailing political and social contexts,

one approach may be more suited than another or be employed simultaneously as appropriate.

1. *Governing by authority* - Steering a policy through jurisdiction and formal authority. This may include measures such as regulation, sanctions, bylaws and policies.

2. *Self-governing* - Leading by example to influence other urban actors and citizens through actions such as instituting sharing activities within public agencies as well as acting as a consumer through public procurement.

3. *Governing by provision* - Providing services and resources to its citizens directly, such as acting as investor and providing financial assistance for sharing providers, and in some cases, delivering the infrastructure itself.

4. *Governing through enabling* - Encouraging engagement from private actors and local communities by raising awareness, forming external partnerships and facilitating the network between stakeholders.

5. *Governing through experimentation* - Testing a combination of the above four modes.

The Local Perspective

In its current form, SCU is a municipality-driven project whereby the municipality is largely acting as the provider of sharing services. There are some initial signs of experimentation suggested by test space approaches in Ålidhem, showrooms and the Smart University City project. Through interviews, it was evident that the stakeholders felt that the municipality needs to act as an enabler of SE as the project progresses. Interviewees indicated

that Umeå has a distinct advantage since it already boasts a high level of collaboration between different actors as a natural characteristic of a trustworthy society.

3. Sharing Prioritisation

There are numerous ways of organising sharing activities and initiatives, which, depending on the nature and type of organising actor, have differing impacts on the local economy and thus the municipality's goals for the SE. These different types of sharing can be categorised as either *market-driven*, or *environmental and/or social purpose-driven sharing* [4,7]. The potential benefits and drawbacks of these sharing types are elaborated next.

Market-Driven Sharing

Some of the key potential *benefits* of market-driven sharing include:

- Intensification of competition, making the markets more efficient and lowering prices of products and services for consumers [7]
- New employment opportunities [8]
- Savings in public procurement and contributions to environmental goals [9]

However, some of the potential *drawbacks* related to this type of sharing are:

- Negative impacts on citizens' living conditions (e.g. increased rental prices due to the presence of AirBnB in a city) [4]
- Difficulty of establishing trust between users and providers
- Unequal treatment of users based on, e.g., sex, race or religion [7]

Purpose-Driven Sharing

Potential *benefits* of environmental and/or social purpose-driven sharing include:

- Formation of closer relationships between users and providers
- Higher chance for community building [10]
- More democratic and equal decision-making processes, value distribution and ownership of shareable capital [4]

Potential *drawbacks* of purpose-driven sharing include:

- Accountability and transparency issues in dispute situations for involved the parties (for the municipality especially when public funds are involved)
- Difficulty of scaling up initiatives [7]
- Possibly less generated aggregate monetary benefits [4]

The Local Perspective

The discussions with stakeholders in Umeå highlighted that a variety of different actors should contribute to the delivery of sharing services, and that more sharing services should be developed with the involvement of individual citizens and communities in the future. In other words, more of a bottom-up approach should be embraced. Currently, sharing activities are handled mostly by the municipality and other large-scale organisations.

Case Study: *Open-Source Food in Todmorden*

In 2007, a woman in a small English village of Todmorden transformed her rose garden into vegetable patch, took down the wall surrounding it and put up a sign telling passers-by to help themselves for the patch's produce. Soon, the practice spread around the town and began a movement called "Incredible Edible Todmorden", transforming vast amounts of public spaces into "open-source" gardens with vegetables and edible herbs. Later on, the movement also incorporated a participatory model titled "three plates", in which businesses donate goods and services, local shops sell planter boxes and schools grow the food.

Eventually, the success of the movement in Todmorden led to the establishment of the Incredible Edible Network, comprising of similar movements around the globe which connect people better to their food systems, bring together different types of stakeholder groups under a joint mission, and fosters a true form of sharing. This kind of movement showcases how a purpose-driven sharing model can be scaled up and spread across different areas [11,12].

4. Stakeholder Engagement

The multi-stakeholder approach used to prepare the Compass aimed to assess the perspectives of different local actors working with or in relation to the SCU project. Drawing from the expertise and capacities of stakeholders is crucial for a smaller municipality like Umeå to maximise effectiveness of policies in light of limited resources.

Interviewees were asked their perceptions of which stakeholders are most important to involve in the development of the SE in Umeå and this information was combined with an assessment of the local context. Umeå Municipality is offered suggestions about how they can work with actors when pursuing sharing activities.

To be more effective, it is recommended that Umeå Municipality performs a more comprehensive stakeholder mapping with a focus on sharing resources and capabilities.

The Local Perspective

During the research and expert interviews, we could see the following three unique demographic groups emerge as a special focus for Umeå: *women, immigrants and students*. They are an interesting focus for sharing, because while young people are more likely to participate in sharing, women and people from socioeconomically

disadvantaged populations with less education and income are likely to be underrepresented in sharing [13].

Focusing on these target groups would allow the municipality to strengthen its strategy to pursue the SCU project objectives by reaching out to citizens who are most prone to participate (students) and those who are most in need of social connectivity and assimilation with the local population (immigrants), and by advancing the municipality's pioneering work in gender equality (women). This could also have the added benefit of differentiating SCU from other sharing cities and building notoriety for the municipality if it can find innovative solutions to its unique issues. This could truly place Umeå on the global sharing cities map.

Case Study: *Enhancing integration and employment*

Hacker spaces are places with technology equipment where typically youths are provided opportunities to learn programming, coding and other useful skills for today's job market. Urban TXT (Teens Exploring Technology) is one such example in Los Angeles aimed at inner-city at-risk youths. The programme focuses on young men of colour between the ages of 11-17 and places them in teams to learn coding and practical life skills like collaboration and ideation of business ideas. The programme has also improved their school performance and abilities to advance into higher education. [14]

5. Municipal Actions

There are a number of actions that Umeå municipality can choose to shape the content and steer the direction of the local SE and align it with the municipality's SCU-related goals. The main actions municipalities often choose to take to intervene in the local SE are summarised

and categorised according to the level of required resources below.

Small amount of resources needed:

- Promoting and raising awareness of sharing services
- Providing marketing support for service providers

Medium amount of resources needed:

- Providing financial support and incentives to service providers
- Supporting cooperation and networking between other actors
- Providing advice on service development and/or technical support
- Monitoring and/or evaluating the participation level and impact of sharing
- Municipal participation in sharing in terms of:
 - Public procurement, or;
 - Public-private partnerships

Large amount of resources needed:

- Municipal provision of sharing services
- Investing in infrastructure to support the delivery of sharing services
- Regulating the SE with municipal standards, regulations and bylaws through:
 - Revision of existing framework, or;
 - Experimentation with new (temporary) regulatory solutions [4,15].

The Local Perspective

Through interviewing and surveying relevant stakeholders on the SE in Umeå, it was identified that some municipal actions were preferred over others.

In line with the preferred direction of municipal approach mentioned in 2. Governance Approach, stakeholders collectively stated that they wish to see the municipality facilitating networking and cooperation between different sharing providers and users. By this, stakeholders

mainly refer to the need for bringing actors together for co-creating solutions for SCU. For example, one of our interviewees with experience in convening stakeholders for similar purposes noted that the best way for achieving this is to physically gather stakeholders together (in some cases repeatedly) to ensure that communication and collaboration is established. However, some actors within the municipal organisation also remarked that generated data, results and experiences from different projects could be utilised more efficiently if there were more active sharing of those between different projects and departments in the municipality.

Other desired municipal actions included investing in infrastructure (for example, physical meeting spaces for people to meet, network or set up sharing facilities), providing financial support to current and future service providers, helping in raising awareness and marketing the sharing services in the municipality, and participating in the SE itself, for instance by procuring sharing services. In addition, the stakeholders often presented the hope that the municipality would improve its communication related to the SCU initiative to external parties, such as the general public. For more information on this municipal action, see 6. Roles and Responsibilities.

Evidently, then, no single action is sufficient for Umeå municipality to support its local SE; rather, a range of tools is needed, which will require the municipality varying amounts of resources.

Case Study: *Smart Map of Gothenburg*

Started in 2014 from a MapJam, the Smart Map of Gothenburg took its current shape after the formalisation of a civil-public partnership in 2016

between the founding party, Collaborative Economy Gothenburg, and the City of Gothenburg. The Smart Map is updated on a continuous basis and shows current and future activities – for example, bike kitchens, digital platforms and give-away shops – but also networks and events across the city, such as clothing swap days. The aim of this is to facilitate networking of people and initiatives and forming of communities, as well as to promote access as opposed to ownership. At the same time, it provides added visibility to service providers, which now add up to over 100 on the platform [16,17].

6. Roles and Responsibilities

The nature and scope of sharing cities extends beyond the traditional roles and responsibilities of municipal government. As such, it is important for the municipality to align and continuously adapt its role with other sharing actors and its citizens against the changing priorities, capacities, risks and benefits [4,10].

By involving different actors within the society, a municipality can allocate the ownership of the sharing economy without having to act as a formal control tower and, instead, advance towards a collaborative governance structure. Further, while each group of sharing actors pursues their own interests, the municipality can assess the potential benefits and risks in relation to its greater municipal objectives, as well as guide the activities towards a desirable direction.

The Local Perspective

Currently, Umeå municipality bears a heavy responsibility in driving the sharing initiatives, since in five of the six existing sharing initiatives, it is either leading the initiative or contributing to their delivery. Furthermore, the Department of Environment acts as the coordinator of

SCU initiative and different initiatives are allocated to relevant departments within the municipality. Although no major concern over the lack of leadership was identified, some concerns about the how the work is coordinated in consideration of many ongoing (and potentially overlapping) environmental initiatives were raised.

Outside the municipal organisation, a number of different stakeholders expressed their interest and commitment to collaborate with the municipality in implementing the SCU project. Our interview findings also demonstrated that there already exists a high level of co-working practices between the municipality and other external actors. Nevertheless, it was stressed that to achieve more collaborative roles and functions that are to be performed by a wider society, elements of openness and inclusivity are important. In addition, stakeholders noted that existing informal sharing practices on the local level ought to be brought in as part of the SCU projects. The municipality, as the enabler, can contribute to this by amassing the grassroots participation and thus help in accumulating the critical mass for a thriving sharing economy.

7. Implementation and Evaluation

Opportunities are present for small cities to experiment with the SE so that key learnings can be made. The evaluation on the progress of SE is important because local governments should be able to identify that the sharing projects contribute to achieving the greater policy objectives [10]. Hence, municipalities should bear in mind of the desired impacts and relevant evaluation criteria at the stage of designing and planning sharing cities.

Currently, there is widespread concern over conducting a holistic impact assessment of SE mainly because of the lack of consensus on the extent of SE, limited access to data and difficulties with measuring rebound effects of sharing activities. However, statistical error can be reduced by setting clearly defined impact categories, further subdivided into different components for detailed assessment. It is also helpful to conduct sector-level analysis to gain a more accurate picture, such as focusing on accommodation and mobility. Compared to larger cities, it could be easier for smaller cities to collect data and evaluate the impact on regular basis, which would facilitate the modification of policy directions and detailed activities in the desired direction without delay.

The Local Perspective

The stakeholders in Umeå put forth their concerns with regards to the SE concept and specifically its sustainability impacts. It was stressed that SCU activities should be evaluated from a critical sustainability standpoint. Furthermore, it is suggested that on-going environmental initiatives in Umeå should be coordinated and aligned with the SCU and then assessed against the public goals to ease the evaluation process. In addition, SE practitioners within Umeå appeared open towards collaboration, some also stating that they would be willing to share their data with the municipality. Emphasis was placed on collecting aggregated learnings from SCU activities to enable further assessment and development with SE in Umeå.

Recommendations

Based on the analysis of the current SE context in Umeå using the Decision-

Making Compass, our team provides the following recommendations to Umeå municipality:

Governance approaches:

- Governance approach should bear in mind of the desirable form of sharing economy in Umeå after the project comes to an end because the sharing city should be able to self-sustain in the absence of heavy municipal support.

Sharing prioritisation:

- A balanced mixture of grassroots-level market-driven & purpose-driven sharing providers:
 - Support companies with community-focus
 - Supporting smaller-scale, purpose-driven initiatives across different areas

Stakeholder engagement:

- Conduct comprehensive stakeholder mapping.

Municipal actions:

- Prioritise less resource-intensive and most desired actions in the short- to medium term and focus on more resource-intensive measures in the long-term:

(Short- to medium-term)

- Form a coherent *narrative* on SCU communication towards external stakeholders.
- Raise public awareness and promote the existing & future providers.
- Invest in supporting infrastructure.
- Provide financial support and incentives for providers.
- Revise prohibiting internal municipal standards and requirements to allow procurement of sharing services.

(Long-term)

- Collaborate with other cities on revision of standards, laws and regulations that affect the SE.

Roles and responsibilities:

- Coordinate and delegate different R&R to sharing actors in the region and monitoring them.

Implementation and evaluation:

- Experiment with sustainability indicators.
- Collaborate with Umeå University and sharing actors to collect data and develop evaluation methods of SE.
- Share & aggregate learnings from SCU activities with relevant actors and lobby for regulatory reforms on SE.

Conclusion

The team found Umeå to be a small city with big ambitions and opportunities to build a unique and thriving sharing city. Among the numerous public and private actors interviewed, all were passionate and driven to collaborate in the hopes of making the municipality a better place to live and work for residents and visitors alike. Municipal actors should continue to capitalise on this collaborative spirit by maintaining high levels of cooperation with traditional partners and seeking out new ones, while maintaining sustained communications about the importance of sharing. Having conducted the research prior to the official launch date of the programme, Sharing City Umeå so far has the right set of motivations and appears to be on the right track during the early stages of planning and development. The framework provided through this project should serve as a guide and benchmark used to move forward as SCU reaches 2020 and beyond.

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Overview

Lorraine, Hanna, Nikki and Jeeva consulted on the Wines of Alentejo Sustainability Programme, in the Alentejo region of Portugal. The programme - a voluntary initiative which aims to promote sustainable practice among the winemakers of the region - is coordinated by an IIEE alumnus, João Barroso. João has sought the expertise of the Institute's Masters students on a number of projects, and this SED group is the fourth to be invited to sunny Alentejo. This year's team was tasked with developing a system to evaluate the programme's annual performance. As a primary deliverable, the team have developed an indicator-based framework that can be used to track the sustainability performance of the programme in years to come. They have also provided recommendations for the improvement of the programme, and a pair of infographics that can be used to communicate the achievements of the programme to its stakeholders.

The Team

Hanna Angel is from Sweden and holds a BSc degree in Physical Geography and Ecosystem Science from Lund University. For three years she's been working part-time as a Sustainability Consultant for Nordic Choice Hotels.

Lorraine Guerin is from Ireland. She has a BSc degree in Ecology from University College Cork. Her research interests include agroecology and agri-environmental policy. She would like to work in the field of sustainable development in the rural west of Ireland.

Nikki Kelderman is from the Netherlands. She obtained her BA in International Business and Management in Amsterdam. She worked as an intern in sustainable development at both Heineken and Pon. She would like to work with circular economy business models.

Jeeva Palugaswewa is from Sri Lanka. She has a BSc degree in Biological Science and Masters in Environmental Science. She is working for the Ministry of Environment of Sri Lanka as an Assistant Director and would like to work on policy initiatives on sustainable consumption and production.



Photo: (from left) Lorraine Guerin, Hanna Angel, Jeeva Palugaswewa, and Nikki Kelderman.

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Evaluating the Performance of a Sustainability Programme in the Wine Sector

Wine Not?

By Hanna Angel, Lorraine Guerin, Nikki Kelderman & Jeeva Palugaswewa

Introduction

The Wines of Alentejo Sustainability Programme (WASP, hereafter) is a voluntary sustainability initiative for the winemakers of the Portuguese region of Alentejo. The programme aims to deliver value to the wine sector of the region by addressing the three pillars of sustainability - social, economic and environmental. Through the use of a web-based self-assessment tool, WASP members track their sustainability performance from year-to-year. Members are encouraged to develop and implement action plans in order to improve their sustainability performance. The WASP management hopes to introduce a third-party validated certification by 2020, to acknowledge the efforts of top performing members.

The Client

WASP was established in 2015 by the Alentejo Regional Vitivincultural Commission (CVRA, hereafter), the authority tasked with ensuring the quality and safety of the commercial wines produced in the region. Those producers whose wines bear the CVRA stamp of approval, and the farmers who produce their grapes, are invited to enroll in the sustainability programme. Currently, the WASP staff consists of just one person: João Barroso. He is responsible for the implementation and development of the programme.



Figure 1. Vineyard of Herdade do Esporão

The Task

WASP has been operational for three years (2015 - 2017) but, thus far, there is no system in place to evaluate the programme's annual performance. Currently a few basic quantitative metrics are being recorded, such as the number of participants (152 at present). However most data is of qualitative nature. In this context, 'qualitative' refers to data being recorded through the self-assessment platform (known as SIVA) where producers can indicate their performance on a scale of 1 – 4 (4 being 'most sustainable') for a host of criteria (e.g. use of energy/water use efficiency measures). The results of the self-assessment are validated either with the submission of photographic 'proofs' by members or with a site visit by WASP staff.

Overall, little data is available regarding the programme's performance over time. Such data and a system to assess this is desired by the client in order for (i) the CVRA to demonstrate the merits of the programme to its stakeholders, and (ii) to facilitate continuous revision and improvement of the programme itself. Additionally, the objectives of the WASP programme - against which its performance should be evaluated - have not been clearly elaborated. Thus, the team were tasked with:

1. Clarifying the aims, objectives and targets of the WASP programme;
2. Developing a framework for evaluating the programme's performance, and;
3. Obtaining feedback of key stakeholders on the programme's performance (through interviews).

Approaching the Task

The project consisted of three different stages: preparatory work; on-site work; and the development of the deliverables. The approach taken by the authors during each phase is described in the following sections.

Preparatory Work

Desk research was conducted prior to the on-site phase. The authors conducted a literature review in order to (i) obtain an overview of similar sustainability programmes within the sector, and (ii) develop a long-list of relevant sustainability indicators. Internal WASP and CVRA documents were reviewed in order to understand the objectives of the programme. Interview guides were developed for use during the on-site work.

On-site Work

During the nine days of fieldwork in Alentejo in April 2018, sixteen interviews were conducted with key stakeholders of the WASP programme. The majority of interviewees were members of the programme, but also included were representatives from the Portuguese Environmental Protection Agency (APA) and the CVRA, as well as the WASP Sustainability Manager/Coordinator, João Barroso. The interviewed producers ranged from small grape growers to some of the largest cooperatives in the region, with varying degrees of sustainability performance and at different stages of implementation of the WASP programme, in order to make the sample as representative as possible within the given timeframe.

Topics addressed in the interviews included capacity of WASP members to measure different sustainability metrics, perceived benefits and challenges of the programme, and recommendations for improvement of the programme.



Figure 2: An interview with a producer

The Sustainability Manager of the WASP programme, João Barroso, was present during all of the interviews (in order to aid with translation and facilitate meetings), which could potentially have influenced

some of the answers of the interviewees and should be considered a limitation of the data collected. However, it is the impression of the authors that the interviewees seemed comfortable in their answers and had an open and honest dialogue with the interviewers.

Development of Deliverables

In order to complete the assigned task, and based on the information gathered during the preparatory and on-site phases, the following deliverables were developed:

- A one-page infographic summary of the achievements of the programme to date, for internal and external communications;
- The primary deliverable: A framework for evaluating the annual performance of WASP based on aims, objectives, targets and indicators developed by the team;



Figure 3: Infographic summary of achievements of WASP to date. Source: Own work

- A list of general recommendations for improvement of the programme.

These deliverables and the logic behind them are presented in the following section.

Deliverables

Summary of Current Achievements

Figure 3 demonstrates the achievements of the WASP programme so far and can be used for both internal and external communications. The results are mostly based on basic quantitative data obtained from internal documents. Specific numbers on environmental impact reductions are not included, as this information has not been recorded. The quotes are obtained from the interviews with the producers and represent the overall opinions.

Evaluation Framework to Assess the Performance of WASP

The framework developed by the team evaluates the performance of the WASP programme and is presented in Table 1. In accordance with the ethos of the programme, the framework is based on the three pillars of sustainability, with objectives divided into 'environmental', 'social' and 'economic' categories. In addition, a separate category - 'organisational' - is included for objectives related to the implementation of the programme (i.e. rate and degree of participation) that do not fit into the previous categories.

The framework consists of a stepwise system of aims, corresponding objectives, targets and indicators (Figure 4).

The method of evaluating the programme has been inspired by Journeault (2016) and Braam (2010) [1, 2], among others. The

formulated indicators are based on a combination of literature review [3, 4, 5] data collected through interviews, internal documents and insights of the team.



Figure 4: An illustration of the stepwise process employed to get from overall project ‘aims’ to developing a set of indicators that can be used to evaluate success with respect to these aims. Source: Own work.

The framework will serve as a basis for the annual evaluation of the performance of the WASP programme. A Microsoft Excel spreadsheet-based tool was also developed to facilitate input of indicator data by WASP staff (Figure 5).

During the development of the framework, various considerations are taken into account. Firstly, in the selection of the indicators, the authors were mindful of the limited resources of the CVRA and the WASP members to measure and record quantitative data. As stated by Bernstein (1992), “the ideal trend indicator should be both ecologically realistic and meaningful and managerially useful” [6]. For this reason, the au-

thors selected few representative indicators in order to make the system both meaningful in terms of sustainability and practical in terms of the ability to collect the necessary data. Secondly, since WASP is a voluntary scheme, the authors do not find it reasonable to set strict, time-bound targets. For this reason the targets in the framework simply suggest continuous improvement on a year-to-year basis.

Thus far, the metrics being recorded by WASP management have been primarily of qualitative nature. In order to evaluate the performance of the system and communicate its achievements in a meaningful way, a broader set of quantitative metrics should be recorded, as reflected in the framework.

The environmental indicators (see framework, Table 1) - water, energy, and agro-chemical use, and amount of waste generated - have been selected for the following reasons: (i) these metrics are already being measured by most members, and (ii) they are easily interpreted by the general public and therefore meaningful for internal and external communications. Our findings from the interviews indicate that fewer members are taking measurements for envi-

	A	B	C	D	E	F	G
1	Category		Indicator	Averages of Measurements			
2				2017	2018	2019	2020
3	Environmental	1	Average water consumed per unit output per member per year (L/per kg of grapes or litre of wine)				
4		2	Average energy consumption per unit output per member per year (kWh/per kg of grapes or litre of wine)				
5		3	Average volume fertilizer per unit area land per member per year (kg/ha)				
6		4	Average volume pesticides per unit area land per member per year (kg/ha)				
7		5	Average volume of residual waste generated per member per year (kg)				
8							
9							
10							
11							
12							

Figure 5: Excel spreadsheet tool for inputting evaluation framework indicator data.

ronmental endpoint indicators (e.g. biodiversity, soil and water quality). While endpoint indicators provide more meaningful measurements of actual environmental impact, the programme is not in a position to measure these metrics yet.

Since it is expected that the PSVA programme will gain members, the indicators chosen consist of averages rather than total amounts. Improvements in overall environmental aspects would be hard to compare and assess through only total amounts when the number of members is increasing. Averages of the environmental metrics will give a more representative indication of the improvements among the producers and the programme itself. The team acknowledges that new members may distort the average score. The PSVA staff may choose only include the same members to see whether their performance have been improved, this can be easily adjusted in the provided Microsoft Excel tool.

In the online self-assessment tool, a broader range of environmental aspects are assessed, although only qualitatively.

Within the 'social' category the focus lies on increasing regional awareness of sustainability. The target is based on the consensus of all stakeholders interviewed, that three workshops and three site visits per year is the ideal amount of educational events. The corresponding indicators reflect the achievement status of this target and take limited resources into account. It emerged during the interviews that only some producers are taking measurements for occupational health and safety (e.g. workplace

odour and noise level). While it would be useful to include such indicators, it is a safe assumption that the majority of smaller producers are not taking such measurements, and since it is a voluntary programme, cannot be expected to at this point. As highlighted in the recommendations (see Table 2), the authors suggest that a broader set of social sustainability metrics should be developed when capacities permit.



Figure 6: The team on a vineyard, Alentejo

The 'economic' category focuses on the contribution to regional economic development as well as on economically sustaining the programme. One of the objectives of WASP is to differentiate the wine of the region and in turn achieve an increase of sales. In order to give an insight into the economic success of the programme the relating indicators are incorporated in the framework. These indicators are easy to measure and indicate whether or not economic benefits (in the form of both cost savings and increased income) are being delivered to WASP members as a result of participation. As a not-for-profit organisation, the CVRA does not have the financial means to sustain the WASP programme without external

Table 1: Framework for evaluating the performance of the Wines of Alentejo Sustainability Programme.

Category	Evaluation Framework to Assess the Performance of WASP			
	Aims	Objectives	Targets	Indicators
Environmental	Reduce environmental impact of winemaking in the region	Reduce regional water stress	Continuously reduce water consumption	Average water consumed per unit output per member per year (L/per kg of grapes or litre of wine)
		Reduce greenhouse gas emissions	Continuously reduce fossil-fuel-based energy consumption	Average energy consumption per unit output per member per year (kWh/per kg of grapes or litre of wine)
		Reduce agrochemical pollution	Continuously reduce amount of agrochemical inputs	Average volume fertilizer per unit area land per member per year (kg/ha)
				Average volume pesticides per unit area land per member per year (kg/ha)
		Reduce waste-related environmental impacts	Continuously reduce amount of generated waste	Average mass of residual waste generated per member per year (kg)
Social	Increase regional awareness of sustainability	Spread awareness of sustainability issues through educational events	Organize 3 site visits and 3 workshops each year	Number of events organized per year
				Proportion of members attending per year (%)
Economic	Contribute to regional economic development	Differentiate the wine of WASP members through sustainability efforts order to improve competitiveness (demand)	Increase sales of members	Total amount of sales of members per year (€)
				Increase average price for product (grapes and wine) of members
		Increase eco-efficiency of WASP members	Achieve cost saving from increased water and energy efficiency	
				Total amount of cost-savings due to increased energy efficiency (€)
	Economically sustain the programme	Obtain financial support for WASP	Obtain a sufficient proportion of the budget for WASP from funding and private investments	Number of applications for funding made per year
				Amount of funding acquired per year (€)
Amount of private investments acquired per year (€)				
Organisational	Continuous improvement of the programme	Increase active participation of CVRA producers in WASP programme	Increase the number of members enrolled in the WASP	Number of members per year
				Proportion of non-members that attend events and end up enrolling
			Increase the sustainability performance of WASP members	Average self-assessment score in SIVA**
				Number of members at developed level**
				Proportion of members who have completed the self-assessment (%)
				Proportion of members who have developed an action plan (%)
				Proportion of members who have implemented an action plan (%)
	Proportion of members visited by WASP staff per year (%)			
Establish a third party certification scheme	Have a third party certification scheme in place by 2020	Presence or absence of third party certification scheme by 2020		

funding. In addition to measuring the amount of public and private funding received, it is relevant to keep track of the number of funding applications in order to encourage the submission of application, increase the probability of receiving funds, and to demonstrate to CVRA management that sufficient effort is being made to obtain funding.

The team believes that the independent ‘organisational’ category is required in order to assess how well the programme is being implemented, i.e. number of participants and degree of active participation. Since it is a core objective of the CVRA management to eventually include all producers of the region in the WASP programme, it is imperative to measure the number of members per year.

Measuring the average self-assessment score, and the proportion of members at the ‘developed’ level (i.e. top performing members) is a crucial insight, that indicates

the overall performance level of the WASP members.

It was communicated to the authors by the stakeholders that there is a proportion of members who enroll, but do not actively participate in the programme (i.e. do not complete self-assessments, etc.). These indicators provide a sense of what proportion of members are actively participating (or otherwise), and if so, what stage of implementation they are at.

Recommendations to Improve the Performance of WASP

Table 2 provides the reader with an overview of the authors’ recommendations for the WASP programme. Recommendations have been according to priority level and

time frame for implementation (short, medium and long-term).

Increase amount of human resources

The major limiting factor of the WASP programme is human resources and it is the opinion of the authors that an additional employee is now required. There is currently only one full-time employee working solely on WASP. Since it is an aim of the CVRA for the programme to continue to grow and take on new members, more human resources will be required to keep things running smoothly as time goes on. Furthermore, during the interviews, a number of producers expressed a need for greater in-person support for implementing the programme, particularly with respect to completion of the self-assessment and development of the action plan. The implementation of a number of the recommendations made in this report will also necessitate additional human resources.

The employment of a full-time staff member is the ideal outcome. However, the authors understand that such an action may not be financially feasible for the CVRA. It may also be possible to hire one or more staff members as interns (e.g. through a graduate internship program with the University of Evora), to consider hiring as full-time staff at a later stage, if funds permit. Personnel with expertise in environmental science and/or marketing would be of particular value.

Transition from qualitative towards quantitative measurements

Up to this point, indicators used for self-assessment in SIVA, as well as for evaluating the performance of the WASP programme itself, have been of qualitative nature. As previously explained (see section ‘The

Task'), within WASP qualitative measures consist of estimations by producers of their perceived performance according to a set of criteria.

For reasons of funding applications, as well as justifying the existence and importance of WASP, numbers are key, and far more convincing than qualitative estimates. The authors recognise that qualitative measures in some occasions can add meaningful insights. However, in order to enable more robust and efficient communication of the achievements of WASP to stakeholders of CVRA, we suggest a transition to more quantitative indicators in those cases where deemed relevant, including environmental, economic, social and organisational aspects. The team developed an example of how

presented in the future is provided in Figure 7.

Data collection through interviews with producers revealed that many producers are already keeping quantitative records of environmental metrics such as water use, energy consumption, amount of generated waste etc. to a large extent. As such, introducing quantitative indicators connected to the environmental performance of producers in SIVA, as well as for the evaluation of WASP performance is considered feasible.

Open up educational events to non-members

The objective of the WASP programme is to increase sustainability in the region, therefore it is important to get an increasing amount of non-members to enroll for

Table 2: Overview of recommendations to improve the PSVA programme

PRIORITY RECOMMENDATIONS	
Short-term	1. Increase PSVA's human resources
	2. Transition from qualitative to quantitative performance metrics
	3. Open up educational events to non-members on a trial basis
	4. Organise events for smaller producers
LOWER PRIORITY RECOMMENDATIONS	
Short-term	a. Clarify benefits and requirements of upcoming third-party certification scheme
	b. Use charismatic members as resource for social media promotional material
	c. Reconsider English acronym/name of programme 'WASP', change to PSVA
	d. Add an anonymous feedback function in the SIVA web platform
	e. Allocate personnel to marketing of PSVA and develop PSVA marketing strategy
	f. Offer to assist new members with funding applications
	h. Use large influential organisations of the region (e.g. cooperatives, ATEVA) to promote PSVA among non-members
	i. Provide in-person support for completion of the first self-assessment
	j. Include training on disaster (i.e. drought and wildfire) preparedness
	Mid-term
Long-term	l. Motivate members to perform better with the addition of a competition

achievements of the programme could be

WASP. We suggest that at least one educa-

tional event (i.e. workshops or site-visits) is opened to non-members annually. The members interviewed perceive the events as very valuable and interesting. Through knowledge sharing of sustainability practices at the events, non-members would see the benefits of the programme in a more concrete way. Moreover, according to CVRA management this would be an inexpensive way to further expand and improve the programme, as little financial resources are required for inviting more people.

Organise events for smaller producers

Throughout the interviews it became clear that many smaller producers feel that they struggle in terms of resources and knowledge to implement sustainability prac-

tices. Several smaller producers interviewed expressed an interest in having site-visits to and with producers of similar size only. The purpose of these site-visits is to see how producers of similar size and with similar resources can reduce their impact on the environment. The site-visit should be hosted at a smaller producer that can show best practices and time should be made available to share knowledge among each other to help solve common challenges.

Conclusions

Since the implementation of the Wines of Alentejo Sustainability Programme in 2015, grape growers and wine producers of Alentejo have made collective efforts to reduce the environmental impact of the wine industry in order to sustain and strengthen the region for generations to come. Up until now, there has been no official system in place to evaluate the performance of the sustainability programme, it has therefore been impossible to assess the significance of the programme. The lack of such a system was addressed by creating an evaluation framework divided into four categories: environmental, social, economic and organizational. The framework entails a set of indicators for each category that WASP staff will be able to feed into an Excel tool to track the programme performance on a yearly basis.

Based on interviews, desktop research, internal documents and insights of the team, a list of recommendations on how to further improve the program was also created. Some of the most important actions to be taken, as suggested by the authors, include increasing human resources in order to have the programme to operate smoothly, and to



Figure 7: Suggested infographic for communication of future achievements data. Source: Own work

transition towards more quantitative performance metrics in order to better estimate efforts of the programme in the future, which will be useful for communication and funding.

Finally, the team developed two infographics that can be used for communication to relevant stakeholders of the programme. One is summarizing the status of the programme so far, while the latter acts as a template for demonstrating the future achievements of the programme in terms of reduced environmental impact and other benefits of the programme.

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List of interviewees

Organisation - Contact(s) (Date)

- Azamor - Alison Luis Gomez (09/04)
A. do Borba - Helena Herreira, Luis Gaspar, Marco Valentim (09/04)
M. de Capela - Clara Roque do Vale (10/04)
LDV - Dora Simões (10/04)
Cartuxa - Mariana Torres, Duarte Lopes (10/04)
APA - Andrés Matoso (10/04)
Teixinha - Miguel Lourenco (11/04)
M. dos Perdigos - Solange Fortunato (11/04)
H. do Esporao - Nuno Oliveira (11/04)
H. Sao Miguel - Raquel Neto, Nuno Franco (12/04)
H. dos Lagos - Helena Manuel (12/04)
H. dos Grous - Miriam Mascarenhas, Luis Costantino (12/04)
H. do Vidigueira - Sandra Silva (13/04)
WASP - João Barroso (13/04)
CVRA - Francisco Mateus (CEO), Maria Pica (16/04)



Björkliden



Overview

A 24-hour train journey from Lund brought this team to its project destination at Björkliden Fjällby, Sweden's classic mountain resort. Its Arctic location offers majestic views of the Lappporten Valley, winter skies painted by the northern lights and summer hikes under the midnight sun. It is also part of Sápmi, the land where the indigenous Sámi people herd their reindeer. However, these features which make Björkliden so unique are threatened by climate change and the negative impacts of tourism. The Björkliden team delivered a compelling business case for sustainability to the management board of the popular resort, providing a strategic vision to support their journey toward "A Better Future With Björkliden".

The Team

Margot Brahmi is from France and holds a BA in Business Administration from the American Business School of Paris. She has worked for an NGO on sustainable development and community empowerment in Los Angeles, USA and variety of other fields including marketing, sustainable film production and tourism.

Gabriela Cordero is from Ecuador. She has a law degree from Universidad del Azuay in Cuenca. Prior to the EMP programme, she worked at the Ecuadorian Development Bank and a number of other public and non-profit institutions.

Maria Jäppinen is from Finland and Russia. She holds a BA in Development Studies from Lund University. She has worked on waste management issues with NGOs in developing countries and with

the private and public sector in developed countries, including at the FIS Nordic World Ski Championship in Lahti.

Julia Winslow is from Germany and the USA. She has a BA in Management with Marketing from the University of Leeds in the UK. Prior to her studies at the IIIIEE, she worked in marketing and public relations in the outdoor apparel industry.



Photo: (from left) Maria Jäppinen, Michael Backman (supervisor), Margot Brahmi, Julia Winslow and Gabriela Cordero (front).

Acknowledgements

Our team would like to thank everyone who helped our project reach great heights. Without our beloved Institute and especially our faithful Supervisor, Mikael Backman, we would not have had the opportunity to work in beautiful Björkliden. Thank you, Mikael, for your enthusiasm and continuous support! To the wonderful staff at Björkliden, especially Per Jonsson and Rita Wallberg: thank you for this opportunity and for your trust in us. To Tomas Kuhmonen from the Sámi Parliament, your valuable perspectives really enhanced the contribution we hope to make with our project. We also extend our gratitude to Keith Larson from Abisko Scientific Research Station, Sofi Nilsson from STF and Dharma Johansson from Kiruna Lapland for your precious time. There ain't no mountain high enough to describe our thanks to all of you!

A Sustainability Strategy with Altitude

Towards Sustainable Tourism at Björkliden Mountain Resort

By Margot Brahmi, Gabriela Cordero, Maria Jäppinen and Julia Winslow

250 km north of the Arctic Circle lies *Björkliden*, a small mountain resort nestled in the majestic Lappporten Valley, at the foot of the great Lake Torneträsk.

Björkliden has a unique draw for tourists – offering experiences of remote arctic landscapes, year-round outdoor activities and the rich cultural heritage of Europe’s northern indigenous community, the Sámi. However, the tourism attracted by these natural and cultural assets is threatened by changes in climate and the impacts of tourism itself.

Based on data gained from off-site research, on-site observations, stakeholder interviews and surveys, our team identified opportunities for managing these impacts sustainably - to ensure that Björkliden will continue to draw and inspire adventure-seekers for generations to come.



Björkliden Resort
(Source: Lapland Resorts Photos Archive)

A Little Bit About Björkliden

Our Client is *Björkliden Fjällby AB* (Björkliden), one of Sweden’s most classic mountain resorts. It originated as rest stop for Swedish Railway workers along the Iron Ore Line in 1926.

Today, Björkliden is operated by *Lapland Resorts AB*, an umbrella organisation which also includes the neighbouring ski resort, *Riksgränsen*. However, it is important to note that the scope of our project is limited to Björkliden only.

Björkliden encompasses a ski resort, Sweden’s northernmost golf course, five lodging types, three restaurants, a small grocery shop and three bars - including Sweden’s highest mountain lodge and bar, *Låktatjåkko*. The number of employees varies from 30 to 60, depending on the season.

A Year-Round Destination

Björkliden has three key seasons: *Winter* (February to May), *Summer* (June to September) and *Northern Lights* (December to mid-February). For every season, the resort offers a variety of exciting activities for its guests. Most are self-operated; a few are externally contracted.

The Winter season in Björkliden often lasts longer than in most Swedish ski resorts, due to its northern location. The majority

of Björkliden's annual revenues come from its high season, typically the eight weeks around Easter when the snow is best [1].

The ski resort is situated at an elevation of 420 m to 1 200 m and comprises of 5 lifts and 35 pistes. A ski school and sports shop with a ski rental service provide the necessary skills and equipment to hit the slopes. For those who prefer untracked snow, opportunities for ski touring, snowmobiling and heli-skiing are abundant. Winter guests can also enjoy a variety of other activities, from dogsledding and ice-fishing to Sámi culture excursions.

In Summer, Björkliden is a portal to breath-taking hiking trails and other outdoor activities under the midnight sun.

The Northern Lights season attracts travellers from far and wide to wonder at the magnificent dance of the aurora borealis on crisp arctic nights. Björkliden's *Aurora Village* camp and viewpoint ensure a prime experience.

Björkliden aims to grow all of its three seasons [1]. Our team sees this as an excellent opportunity to implement a strategy that will ensure that such growth sustains the business, as well the natural environment and local community it operates within, for the long-term.



*Björkliden's Three Seasons:
Winter, Summer and Northern Lights
(Source: Lapland Resorts Photos Archive)*

Our Arctic Mission

Background

Our main contact, Björkliden's Marketing Manager Per Jonsson, expressed a strong interest in improving the sustainability performance of the resort. However, he emphasised that there had been no coordinated attempts to implement a sustainability strategy before our project, due to high workload hindering the ability of the management board to fully commit to sustainability as a goal of the business.

Objective

Our objective was to convince the management board at Björkliden of the need for a strategic approach to sustainability, by:

- 1) identifying the *opportunities* that sustainability can bring to the business,
- 2) illustrating *key areas for action*, and
- 3) providing *first steps* and *tools* to help them get started.

Staff and Visitor Insights

Who better to convince the management board of the need to become more sustainable than their own staff and visitors?

On site, we aimed to understand what attracts visitors and staff to Björkliden, and where they see room for improvements towards sustainability. We were also interested in the travel methods chosen by visitors.

We collected data through surveys, questionnaires and semi-structured interviews. We also filmed a short-video clip with visitor and staff anecdotes, which

was later presented to the management board.

Due to it being high season in resort, staff and visitors were very busy. Semi-structured interviews proved to be the most effective method for data collection. This was complemented by surveys where possible, to get some hard facts and figures.

Our team collected inputs from 25 staff members (including 15 survey responses) and approximately 30 visitors (including 8 survey responses). Due to the limited number of survey responses, the results are far from representative or conclusive, but give a general indication of the opinions and interests of the people we approached.

“What Does Björkliden Mean to You?”

This was our main question to better understand the motivations of visitors and staff for coming to Björkliden. Their responses are illustrated in the following word-cloud.



Word-Cloud of Visitor and Staff Responses

Most tourists had come to Björkliden for skiing and to enjoy the natural beauty of the area. Particularly the staff also spoke

about the quietness and the clean air and water.

“This place is beautiful and special. It allows you to get calm”

Quote from a Visitor (Anonymous)

Not all visitors were tourists; other guests included a film crew, a conference of nano-physics researchers, and students taking their sports science examination. During their free time, these visitors also enjoyed the natural beauty and activities on offer.

A number of interviewees mentioned that they would like to come back in the Summer to see the landscape in bloom and to hike under the midnight sun.

Many Swedish visitors had an intergenerational attachment to the place - they had visited the resort as children and lovingly stated that not much has changed here since. Now they wanted to share it with their own children and grandchildren.

Staff members were very dedicated and passionate about Björkliden. They had made friends for life and felt at home. They were in love with the beautiful surroundings and endless possibilities for outdoor recreation.

“Björkliden feels like home. This place is just magic, don’t you see?”

Quote from Staff Member (Anonymous)

“How did you travel here?”

The majority of our respondents travelled from the Stockholm area; international guests had come from Russia or as far overseas as Japan and Australia.

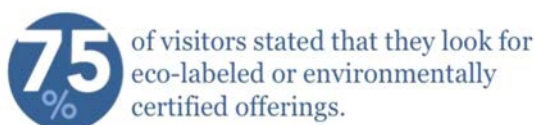
In our survey, 62.5% respondents had travelled to Björkliden by train, 25% by plane and 12.5% by car. The majority who

took the train stated “environmental reasons” and “fun experience” as their motivations for choosing this travel method. Some described it as a way to “slow down from city stress” and “to get into the right mood”.

“Where can Björkliden improve?”

Staff and visitors expressed a strong satisfaction with the resort services and the beauty of the location, but also suggested some improvements for the future.

Some guests had never heard of Björkliden before their trip, and believed that it should be better promoted. The results from our visitor survey indicate an interesting opportunity:

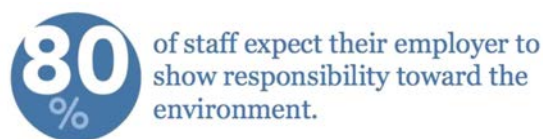


Result from Visitor Survey

Moreover, half of those visitors were willing to pay up to 10% more for eco-labelled or environmentally certified products and services.

Staff mentioned that their high workloads made it difficult to prioritise more long-term decisions such as improving sustainability. A number of staff raised the issue that job roles were often unclear, making it difficult to identify which decisions and duties were within their sphere of responsibility.

Furthermore, the majority of staff are seasonal workers, which is even more conducive to short-term decision-making. This also appears to have resulted in inconsistencies between the training levels of staff. In addition, there seems to be a lack of information-sharing about the natural and cultural heritage of the area.



Result from Staff Responses

Our survey identified that staff expect their employer to show a certain level of environmental responsibility. They viewed Björkliden as generally responsible but felt that Waste Management and Energy Use could be improved. Several staff mentioned that company cars could be better coordinated to combine trips and prevent unnecessary car use.

External Challenges

Being situated in such a unique and remote environment as Björkliden also has some challenges. Interviews with external parties such as Abisko Scientific Research Station, the Sámi Parliament and Kiruna Lapland Economic Association revealed that key risks to the current business are unpredictable weather through climate change, clashes of interest with the local Sámi community, and accessibility of the location.

Unpredictable Weather

Subject to unpredictable Arctic winds, Björkliden is particularly vulnerable to erratic weather and fluctuating temperatures. Keith Larson, researcher and project coordinator for the Climate Impacts Research Centre (Umeå University) at Abisko Scientific Research Station, says that based on current climate data, “ski resorts are gambling”.

The current winter has been particularly difficult for ski tourism and described as “the worst winter since 1935” [1, 2]. Late

and meagre snowfall paired with fluctuating temperatures created a weak snow layer, resulting in poor snow conditions and high avalanche risk for the rest of the season. However, abnormally low temperatures resulted in clear skies, creating optimal conditions for aurora viewing [1].

Conflict of Interests

Swedish Lapland is often misleadingly referred to as “Europe’s Last Wilderness”. In fact, the area has been populated by the Sámi for several thousands of years. Still today, reindeer herding is one of the main livelihoods of the Sámi and an integral part of their cultural identity. The vast stretches of Lapland - or Sápmi, as is its Sámi name - are the traditional grounds for their migratory herding practices. Björkliden is situated within the summer grazing and calving territories of the Gábna Sámi community.

Industrialisation and development has introduced roads, railways and motorised vehicles into the equation. With regards to tourism, snowmobiles, heli-skiing and road vehicles create noise and hard tracks, which can interfere with grazing, especially when path restrictions and regulations are not adhered to or poorly enforced. Unleashed dogs, often from tourists, pose a danger to reindeer. These issues have led to clashes between Sámi and the tourism industry.



*Right: Reindeers crossing the road
Left: Reindeer carcass along road*

The recent winter has also been particularly difficult for the Sámi. The fluctuating temperatures locked lichen and shrubs under a thick layer of ice, forcing herds to seek higher grazing grounds with thinner snow cover. These are traditionally reserved for the summer in order to allow the vegetation time to recover.

These changes in herding patterns have, in turn, limited tourism from snowmobiling and heli-skiing in Björkliden and the surrounding areas through heightened path restrictions in the middle of the high season.

In our interviews with members of both the Sámi community and the tourism industry, both parties expressed the need and desire for improved communication and cooperation. However, limited resources and changes in staff have made it challenging to maintain continuity of communications.

Nevertheless, during our visit we came across some simple yet successful strategies for improving communication. For example, a Facebook group facilitates daily communication between heli-skiing guides and reindeer herders to avoid interferences from heli-skiing tours [4].

Accessibility

The remote location of Björkliden is part of its attraction but can also pose a problem for operational logistics and travel.

The single train track passing through Björkliden was built to transport iron ore from the mining town Kiruna to the port at Narvik. These cargos have priority over passenger trains, which often leads to extreme delays for travellers on the Arctic Circle Train. Adding to this, the train only runs twice a day and both depart within a

few hours of each other - making it inconvenient for day trips. Maintenance work on the railroad is often done in the holidays (high season for Björkliden), in order to keep the tracks clear for priority business travel.

Road conditions can be very difficult in the winter. The Swedish Road Society currently only employs one person to clean the roads, which can lead to huge traffic delays.

Only two airlines fly into Kiruna and tickets are bought up for business travel by the mining company, LKAB, far in advance. This makes air travel a particularly expensive choice for tourists.

There is a concern that these issues with accessibility could discourage visitors from choosing Björkliden over more easily accessible mountain resorts [1].

Turning Challenges into Opportunities

Based on the previous findings, our team identified a number of opportunities and benefits, which could be achieved by integrating sustainability into the core of the business.

Attracting New and Returning Visitors

It is clear that the resort has a special place in the heart of both its visitors and staff. The pristine and beautiful natural landscape, quiet and calm environment, and nostalgic nature of Björkliden attract visitors from both near and far. This is what makes Björkliden unique, and must be preserved and promoted.

An integrated sustainability strategy provides the opportunity for both, by establishing explicit environmental and social policies and creating the opportunity for obtaining eco-labels and environmental certifications, which Björkliden's visitors look for in their travel choices.

Embracing Slow Travel

Those visitors who choose to go to Björkliden despite expensive or unreliable travel options seek the natural beauty, quiet and remoteness, which have been preserved by its limited accessibility.

Our insights show that many visitors value the experience of travelling by train. Increased promotion of "slow travel" by train could encourage this lower-impact method of transportation and provide more lobbying power for improving train services to the area in the long run.

Increasing Staff Satisfaction

The staff is very satisfied at Björkliden, but short-term thinking and inconsistent training pose challenges for long-term decision-making. The staff cares about working for an environmentally responsible employer and believe that Björkliden could improve its waste management and reduce its energy use.

A well-designed and integrated sustainability strategy can address these issues by providing long-term focus, strengthening training policies and improving environmental performance. This, in turn, could help to increase employee satisfaction and improve retention.

Improving Resilience

Integrating a sustainability strategy into the business encourages a long-term focus,

which can help to anticipate risks from the changing climate. A key strength of Björkliden is its diversification across three seasons, thereby reducing its reliance on a snow-secure winter season.

A Stronger Community

The challenges between Sámi and the tourism industry are complex, but communication and cooperation are key. This will take time, commitment and goodwill from both sides.

The tourism industry has the opportunity - indeed, the responsibility - to spread awareness and educate local and international visitors about the cultural heritage of the Sámi and the threats they face. Björkliden recognises and values its role in this process. Our team is confident that an integrated sustainability strategy could help to structure and strengthen this commitment for the long-term.

Key Areas for Action

Based on the opportunities we identified five key areas for Björkliden to start with. This list is not exhaustive, and our team encourages Björkliden to expand its scope for sustainability work as it moves forward with its sustainability strategy.

Awareness

Increased knowledge and awareness about the local biodiversity and cultural heritage amongst visitors and staff could help to reduce negative impacts from tourism and strengthen the local community.

For example, by cooperating with Sámi-owned-and-run tour operators, Björkliden could offer a more authentic experience for its visitors while increasing awareness of

the importance of respecting Sámi land rights and cultural traditions.

The *Naturum* in Abisko provides exhibitions and information about the local landscape and conservation. They have expressed a willingness to cooperate with Björkliden to provide information about the local ecosystems and biodiversity for its guests [5]. This would help to enhance visitors' learning experience and awareness of the rugged yet fragile arctic environment surrounding them and encourage them to 'tread lightly'.

Waste Management

Waste separation in the cabins could also provide cost savings and even revenues. The current waste bin labelling is very limited, making it challenging for visitors to properly recycle. Clearer information for visitors and staff about waste separation could improve recycling rates and reduce the frequency of waste collection necessary by Kiruna municipality.



Waste Bin Labelling at the Cabin Village

Furthermore, our team received information from Returpack that recycling rates of refundable PET bottles and aluminium cans from Björkliden are very low. One of Returpack's goals is to reduce waste in mountain areas and they have

offered their support to improve Björkliden's recycling rates free of charge [6]. Improved recycling of deposit-refund containers could provide a small source of extra revenue.

Food waste collection is not offered by Kiruna municipality; therefore, Björkliden currently does not sort food waste. However, our team learned that from 2019, Kiruna will start using food waste for biogas production, so this sorting capacity will be required in the future. Björkliden could even go a step further and compost its waste, as we observed at the Swedish Tourist Association (STF) in nearby Abisko, who recently acquired a composting machine.

Green Procurement

We have identified some examples of green procurement at Björkliden, for example eco-friendly cleaning products, some organic foods and locally produced goods. Due to Björkliden's remote location, the logistics of green procurement can be a challenge; however, we have seen some good examples in the area, such as at the (STF) in nearby Abisko, who have a KRAV-certified restaurant and tourist shop. We encourage Björkliden to implement explicit policies and targets for green procurement of goods and services where possible and communicate them to gain recognition from stakeholders.



Krav-Certified Tourist Shop at STF in Abisko

Energy Efficiency

Björkliden could save costs and improve its environmental performance by improving energy efficiency and even by generating its own renewable energy.

For example, our team noticed significant heat loss through the roofs of the cabins. Improving the insulation with eco-friendly materials in future renovations could help to save costs and improve environmental performance.



Icicles Forming on the Cabins due to Inefficient Insulation

Due to the advantage of 24-hour sunlight for three months and long days from March to early September, Björkliden has the opportunity to generate its own energy via solar panels and sell excess energy for extra revenues. Abisko Research Center, located 10 km from Björkliden, generates its own energy from solar panels from late spring until early autumn. During the winter season, Björkliden could take advantage of Arctic winds, for example by installing small wind farms on their 80 cabin roofs [3]. These steps could help to reduce the carbon footprint of the resort and make better use of the ecosystem services provided by Björkliden's unique location.

Transportation

Staff members mentioned that there is a need for better coordination among departments to reduce unnecessary car use. Our team suggests using digital tools, which could be as simple as a joint calendar or communication software such as Slack or even social media. This would be simple to implement and could lead to reduced emissions from internal car use.

Guiding the Way to a Sustainable Future

With so many opportunities and priorities areas, where to get started? We recommend developing a structured approach towards sustainability by following these three first steps:



Commitment to Sustainability

Björkliden must start by identifying a key person or responsible team who will drive the company's sustainability commitment. Their task is to motivate and coordinate all departments to get on board and feel

empowered within their individual roles to contribute toward sustainability at Björkliden. Developing and publishing a sustainability policy is a key tool for solidifying and communicating the company's commitment to its stakeholders.



Self-Evaluation

In order to know where you're going, you need to know where you've been. Evaluating current performance in key areas will help to set a baseline for benchmarking future improvements.



Objectives and Targets

By determining objectives and setting clear and time-specific targets, Björkliden can work systematically toward improving performance. Establishing processes for measuring and tracking performance will help to meet the requirements of environmental certifications in the future. The objectives and targets need to be materialised in an action plan.

A Useful Tool: Sustainability Certifications

Certification schemes for sustainable tourism provide credibility and recognition. They require policies and processes for measuring and improving sustainability performance in a systematic way to meet comprehensive criteria in the key areas of:

- environmental management
- natural and cultural conservation, and
- community engagement.

The *Sustainable Arctic Destination* is a new certification scheme, developed by Kiruna Lapland and offered free of charge to its members (such as Björkliden).

This would be an ideal first step for Björkliden to build up its sustainability strategy according to certification criteria, providing a foundation to aim for more internationally recognised certifications in the future.



*Sustainable Arctic Destination
Logotype*



Communication

Communication of the sustainability strategy both internal and to external parties is crucial to its effectiveness.

Our team recommends branding the Björkliden’s sustainability communications with a logotype, to create a sense of structure by demonstrating that the company’s sustainability activities are coordinated under a joint programme. As an example, we suggested to name the programme “*A Future with Björkliden*”.

The choice of the word “*with*” highlights the importance of working together towards preserving the natural and cultural assets of Björkliden for current and future generations.

A Future with Björkliden

Our team is confident that Björkliden has the potential to become a leader in sustainable arctic tourism by structuring their current management system and integrating sustainability into the core of their business. After all, the natural and cultural environment *is* the core of their business. Our project provides the steps to get started.

From all of our impressions and experiences in Björkliden, one thing was crystal clear: all stakeholders share a deep appreciation for this beautiful remote area and wish to preserve it for generations to come. The time to act is now, for a better “Future with Björkliden”.



Sustainability Programme Logo Idea

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List of people interviewed

[1] Per Jonsson, Lapland Resorts AB, Marketing Manager, 17.4.2018

[2] Tomas Kuhmonen, Sámi Parliament, GIS-coordinator, Interview permission granted by Gabna Sámi community chairman Lars-Anders Kuhmonen, 16.4.2018

[3] Keith Larson, Umeå University, researcher and project coordinator for the Climate Impacts Research Centre at Abisko Scientific Research Station, 19.4.2018

[4] Dharma Johansson, Kiruna Lapland, Market Director Asia in Kiruna Lapland Economic Association, 19.4.2018

[5] Lo Fischer, Naturum Abisko, Director, 20.4.2018

[6] Carita Classon, Returpack AB, Product Manager, 18.4.2018

Anne-Marie de Jong, Lapland Resorts AB, Cleaning and Laundry Manager, 16.4.2018

Christian Pettersson, Lapland Resorts AB, Service Manager, 17.4.2018

Henrietta Backman, Lapland Resorts AB, Host of Låktatjåkko Mountain Hotel and Restaurant, 17.4.2018

Lisa Andersson, Lapland Resorts AB, Restaurant assistant, 18.4.2018

Rita Wallberg, Lapland Resorts AB, Operational Manager, 13.4.2018

Sofi Nilsson, Svenska Turistföreningen (STF), Environmental Manager, 19.4.2018

Susanne Jansson, Lapland Resorts AB, Cleaning assistant, 16.4.2018

Final Reflections

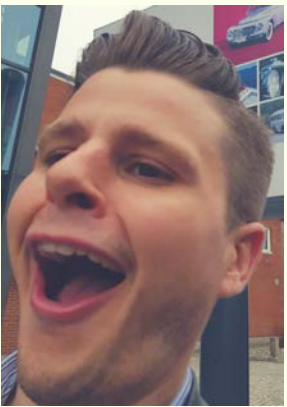
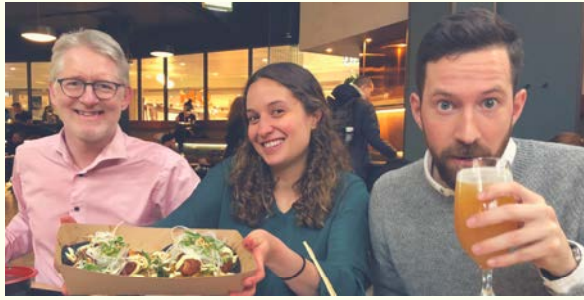
Recipes for sustainability success and the different projects contained within, highlight how sustainable development can and must be addressed at different levels of society, from a small-scale local level to activities that shape the trajectory of whole nations.

As the projects demonstrate in this report, it takes a team of skilled practitioners to be able to identify which ingredients are missing from the problems that challenge sustainability in society and take effective actions to address them. While there may be some common ingredients, it is important to remember that there is no one cure-all solution. The recipe for success must be adapted to meet the needs of the unique context.

The motivations for engaging with sustainable development may vary, but the project partners who invited the teams to collaborate all share a common trait - the courage to search for innovative solutions and expand their sphere of responsibility beyond what has been traditionally expected.

The pursuit of sustainability is not just about 'saving the planet' - it's about taking ownership of everything we allow to happen on it. Both public and private sector actors have the capacity to make progress that provides long-term, tangible benefits for our ecosystems and the social and economic systems that depend on them. These seven projects show that the recipes for greater resource efficiency and cleaner production cater to the betterment of businesses and communities where they coexist.









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