ACTION FOR ENERGY EFFICIENCY IN BALTIC CITIES

ACT NOW!

O3.4 – 7: Sievi

Report on Future Investments in Participating Municipalities - Feasibility Study for Sievi: Finland

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Abbreviations

AFLRA	Association of Finnish Local and Regional Authorities
DSO	distribution system operator
EPC	energy performance contracting
ESCo	energy service company
GDP	Gross Domestic Product
LEEG	Local Energy Efficiency Group
LGFA	Local Government Funding Agency
MuniFin	Municipality Finance Plc.
SDG	Sustainable Development Goal
SEAP	Sustainable Energy Action Plan
SME	small and medium-sized enterprise
TEM	Työ- ja elinkeinoministeriö

1. Aim and Structure of the Study

The following "feasiblity study" for a future energy efficiency investment in the municipality of Sievi contains three building blocks: a general country and municipality background (Chapter 2), details of the planned future investment, especially on the financial and organizational setup (Chapter 3), and results on general observations regarding such investments in Finnish municipalities taken from exchange with Finnish project partners. The description of the background is only partially used for the discussion of financial and organizational setups in Chapter 3 or general findings on energy efficiency financing in Finland in Chapter 4. Rather, it will be used to compare the nine different studies from *Act Now!* municipalities (see list in Table 1) and draw some overall lessons to be learned from the research project. Similarly, issues detailed in Chapter 4 will partly be reflected in the concrete planned investment and its financial and organizational setup, but partly also go beyond this single project.

Number	Municipality	Country
1	Bremerhaven	Germany
2	Elva	Estonia
3	Gdynia	Poland
4	Gulbene	Latvia
5	Kaliningrad	Russia
6	Mönsterås	Sweden
7	**Sievi**	**Finland**
8	Šilutė	Lithuania
9	Sønderborg	Denmark

Table 1 Overview of Act Now! feasibility studies.

Source: Own compilation.

Therefore, this report is not a typical "feasibility study" of a concrete, single project. "Feasibility study" may mean different things: It may consider technical, legal, financial feasibility or marketability, come as project appraisal (e.g. cost-benefit analysis), investment planning or environmental impact analysis. Depending on the type of investment project that *Act Now!* partners have been developing, the nine feasibility studies include many of these aspects or methods to some part. As the focus of the *Act Now!* project is on capacity building in small and medium-sized municipalities, however, we concentrate on procedural aspects and organisational setups of the respective future investment projects in our nine municipalities, including Sievi. We summarize the basic data of Sievi in Table 2.

Empirical findings in this study mainly rely on the following sources:

- Questionnaire on future investment in Sievi;
- Internal project reports on the status quo in Sievi Municipality and Ylieveska Sub-Region, including report on Local Energy Efficiency Groups (LEEGs);
- E-mail exchange and online discussions with Finnish project partners and discussion during Kalmar project meeting in March 2020;
- Calculation of energy flows, costs and revenues for the future investment by project partners.

Category	Values
Population	4,910 (2020)
GDP per capita	€ 31,300 (2018)*
Unemployment rate	8.8%
Local authorities system	Single-tier system in a unitary state (after reforms: two-tier system)
Reporting	National system of energy efficiency agreements & audits Double-entry bookkeeping accounting for changes in property values
Financial situation	Stable, but growing pressure on budget
Financial system	Predominantly market-based system Highly concentrated, regionally integrated (Nordic) banking sector LGFA: MuniFin

Table 2 Basic Data for Sievi.

* Available at sub-regional level; GDP: Gross Domestic Product, LGFA: Local Government Funding Agency

Source: Own compilation based on Statistics Finland (2020).

2. Background

2.1. Geography, Socio-Economics and Governance

Sievi is a municipality in northwestern Finland in the coastal hinterland of North Ostrobothnia, around 150 km away from both Oulu and Vaasa. It formed part of Ylivieska economic region until the end of 2020. Ylivieska sub-region, partner in the *Act Now*! consortium, will be dissolved at the end of 2020.

The Finnish political system has known intermediate levels between municipality [kunta/kunnat] and state, namely sub-regions [seutukunta/seutukunnat] and regions [maakunta/maakunnat]. However, the intermediate levels were relatively weak, which is why the Finnish system was usually described as a single-tier local government system. Regional levels included state's regional level authorities and inter-municipal cooperation as in the case of regional councils formed as mandatory cooperation of municipalities (K. Andersson & Sjöblom, 2013; Anttiroiko & Valkama, 2017). They lacked democratic legitimacy – with the exception of Åland – and constitutional powers. The situation is supposed to change with regional government reform in 2021 with the introduction of an independent county or regional level (Sjöblom, 2020; Valkama & Oulasvirta, 2021).

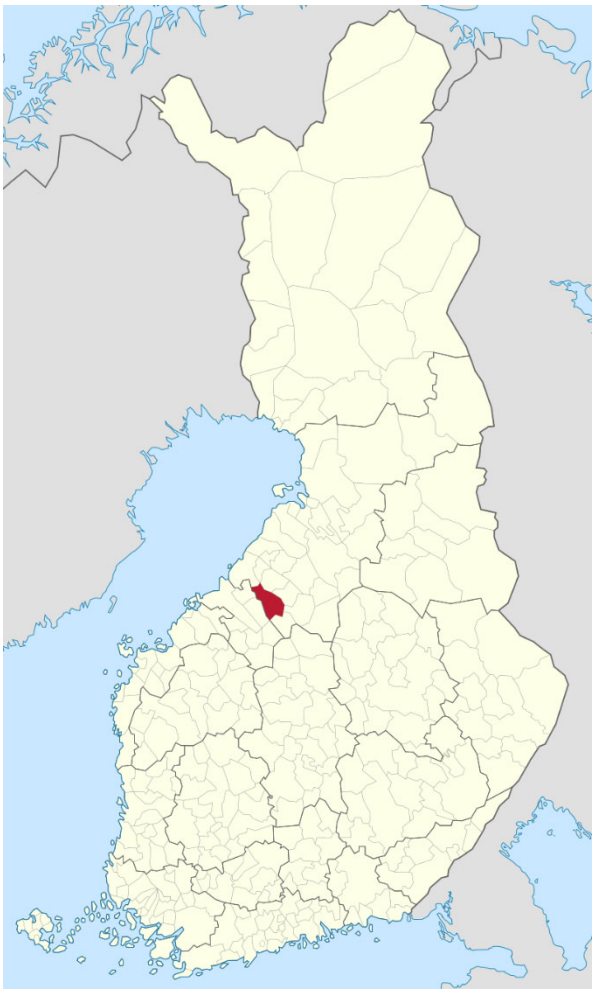

Figure 1 Location of Sievi in Finland.

Source: Wikipedia, https://fi.wikipedia.org/wiki/Sievi

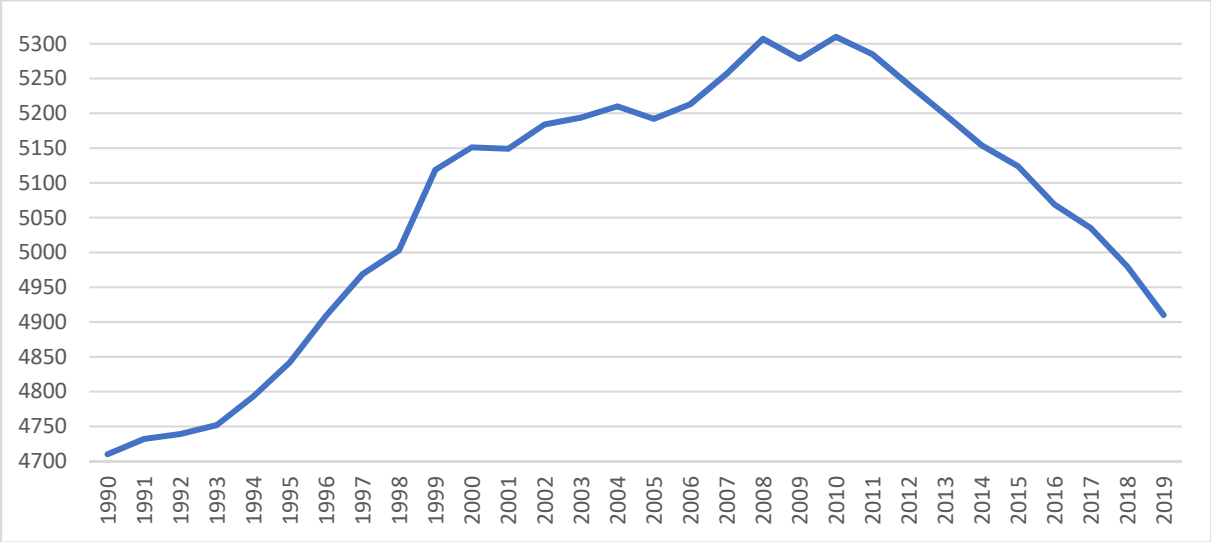

Figure 2 Development of the Population in Sievi, 1990-2019.

Source: Data from Statistics Finland (2020)

With less than 5,000 inhabitants, Sievi is one of the smallest municipalities considered in the *Act Now!* project. However, this number is only slightly below the Finnish average (median) of around 6,100 (Eythórsson, Kettunen, Klausen, & Sandberg, 2018; Valkama & Oulasvirta, 2021). Since 2010, the number of inhabitants in Sievi has been declining constantly from around 5,300 to 4,910 in 2019 (see Figure 2). Pirhonen, Lolich, Tuominen, Jolanki, and Timonen (2020) characterise Finland as the "fastest-ageing society in Europe." Moreover, urbanisation and migration to growth centres pose challenges to the other regions (Pekkala, 2002; Valkama & Oulasvirta, 2021). Overall, these demographics result in financial pressures. In addition, small sizes of municipalities imply lower personal capacities in municipalities.

Economically, the region is less well developed than the south of Finland. Gross Domestic Product (GDP) per capita was around € 31,000 in 2018, which is well below the national average of € 42,365 (Statistics Finland, 2020). Similarly, the unemployment rate in Sievi (8.8%, 2018) is above that at national level (7.4%; Statistics Finland, 2020).

In Finland, the municipal council [kunnanvaltuusto], which the population directly elects every four years, chooses the members of its board [kunnanhallitus]. A municipal manager [kunnanjohtaja] or a mayor [pormestari], elected by the council, steers the municipal government. Guiding laws are the 1999 Constitution, Chapter 11 Section 121, and the Local Government Act of 2015.

The municipal government proposes actions or operations and the municipal council accepts (or rejects) climate change issues. The council has voted on the Sustainable Energy Action Plan (SEAP), for instance, initiated by the Local Energy Efficiency Group (LEEG). Finland has had a well-established system of energy efficiency agreements [energiatehokkuussopimukset] for public and private sectors for a long time (Lilja, 2009; Rezessy & Bertoldi, 2011; Sairinen & Teittinen, 1999). The new programme has been set up for the period 2017-2025 (Energy Efficiency Agreements 2017-2025, n.d.), including agreements of municipalities (Municipalities' Energy Efficiency Agreement, 2016). Attached to these voluntary agreements is a programme for supporting energy audits in municipalities and small and medium-sized enterprises (SMEs; see e.g. Gynther & Suomi, 2018). Sievi participated in the 2009-2017 programme.

With regard to energy use in buildings, the technical director proposes actions or operations to the technical board, which can then decide on actions considering the budget available. Larger investments have to be handled in the municipal government, possibly also in the municipal council. In Finland, municipalities are generally responsible for local environmental matters and energy efficiency measures in their buildings. Moreover, Sievi can promote energy efficiency actions concerning heating and electricity as (co-)owner of the municipal company Korpelan Voima Oy (see below).

Due to the small sizes of municipalities, inter-municipal cooperation is generally common in Finland, especially where it is enforced directly or through legal requirements that have to be met in service delivery (Eythórsson et al., 2018). Common forms of cooperation between Finnish municipalities are (Eythórsson et al., 2018; Valkama, Asenova, & Bailey, 2016; Valkama & Oulasvirta, 2021):

- Mandatory cooperation as in regional councils or for special health care, care of disabled persons and regional planning;
- Voluntary cooperation for shared services through joint municipal authorities [kuntayhtym], the creation of single-purpose agencies, structured as companies, foundations or associations, or hosted by one of the municipalities.

Voluntary joint municipal boards are common for the delivery of local public utilities, for instance. Overall, cooperation for specific single purposes still dominates, even though in the early 2000s forms have changed to more informal, networked types and spread to other areas of service delivery such as consulting services for municipalities (Haveri & Airaksinen, 2007; Hulst, van Montfort, Haveri, Airaksinen, & Kelly, 2009; Meklin, Koski, Pekola-Sjöblom, & Airaksinen, 2020).

Sievi is, among others, member of the Association of Finnish Local and Regional Authorities (AFLRA), which has a similar position as its Danish or Swedish counterparts. It is also active in local energy policy. Moreover, Sievi is a member of the municipal association Korpela Voima kuntayhtymä (Korpela, 2020). Other members are Kalajoki (Ylivieska sub-region), Halsua, Kaustinen, Lestijärvi and Toholampi (Kaustinen sub-region) and Kannus (Kokkola sub-region), the latter also hosting the headquarters. Thus, the cooperation spreads beyond sub-regional and regional borders. The group [kuntayhtymäkonserni] includes the association and three subsidiaries, Korpelan Energia Oy for electricity supply, Lämpö Korpela Oy as district heating company and Verkko Korpela Oy as distribution system operator (DSO). According to the European Union (EU) SME definition (European Union, 2015), Korpela Group is a medium-sized enterprise (Korpela, 2020).

2.2. Financial Situation

Sievi has a relatively strong and diversified industrial base. Revenues are stable. In Finland, revenues for local authorities mainly come from taxes, mostly income tax, and, to a lesser amount, from general state grants (Valkama & Oulasvirta, 2021). Municipalities are free to set income tax rates. There is a ceiling on municipal deficits. In general, Finnish municipalities exhibit a relatively high degree of fiscal autonomy. At the same time, social welfare expenses are high and have led to rising debt levels (Valkama & Oulasvirta, 2021).

Finland has changed from a bank-based to a more market-based financial system since the 1990s (Allard & Blavy, 2011; Hyytinen, Kuosa, & Takalo, 2003; Lahti, 2011). Nevertheless, intermediaries still play a significant role, especially in SME finance (Hyytinen & Väänänen, 2006; Ylhäinen, 2017). The banking market is highly concentrated and integrated, forming a Nordic banking market (Savolainen & Tölö, 2017).

Municipality Finance Plc. (MuniFin) [Kuntarahoitus Oyj] finances a large share of local public debt: around 80% according to André and García (2014). MuniFin was created in 1990. It is an example of a local government funding agency (LGFA; L. M. Andersson, n.d., 2014). Three groups of shareholders own the shares in the company (MuniFin, 2020a): municipalities, municipal associations and municipal companies (53%), the local public sector pension fund Keva (31%) and the Republic of Finland (16%). MuniFin refinances a part of its loans through green bonds on international markets (MuniFin, n.d., 2020b), since recently also through social bonds (MuniFin, 2021). Other important funding sources include state agencies such as Business Finland (see below).

3. Planned Investment

3.1. Overview

Partners in Sievi have prioritised specific projects in the municipality's SEAP and discussed these priorities in the LEEG. They selected an air ventilation and cooling project as their priority future investment. Basic characteristics of the project are summarised in Table 3 and detailed in the following sub-sections.

Dimension	Value
Number of buildings	Single
Type of buildings	Municipality Hall
Ownership	Public (municipality)
Type of investment	Air ventilation and cooling
Investment volume	Option A: € 0.130m Option B: € 0.150m
Financing	Municipal budget and loan/leasing (MuniFin, refinanced through green bonds)
Organisation	Municipality

Table 3 Financial and Organisational Characteristics of Investment Planned in Sievi – 'Renewal of air ventilation' project.

We classify the project according to a group of

- Building-related indicators: the number of buildings – here: single as opposed to a pool of several buildings –, use of the building ("type") – a municipality hall – and ownership – here: public, specifically: held by the municipality directly;
- Investment characteristics: technology and amount to be invested;
- Descriptions of financing & organisational structure, which both still have to be determined.

3.2. Assets

The Finnish partners proposed improvements of air ventilation and cooling in the Municipality Hall building as their future investment project. Two different alternatives were planned: one with cooling / a heat well (Option B) and one without (Option A). The amount of investment needed in the latter case would be slightly lower (€ 0.130m) than indicated for the environmentally more ambitious version in Table 3.

The energetic and financial calculations analyse energetic flows, costs and savings or revenues of these two options against the baseline scenario for an average year, i.e. in a static analysis. Annual savings vis-à-vis the baseline is given with € 12,136.63 (Option A) and € 13,181.58 (Option B), respectively. In a static setting, this would mean a payoff period of 10.71 years (Option A) and 11.38 years (Option B), respectively. In addition to energy savings, Option B increases work efficiency, which saves another € 6,900 annually. Including this into project calculations, improves the economics of Option B significantly, as indicated in Figure 3. Here, cash flows are discounted with a calculated rate of 0.45%, which equates the costs of the loan. The static payoff period for Option B decreases to 7.47 years.

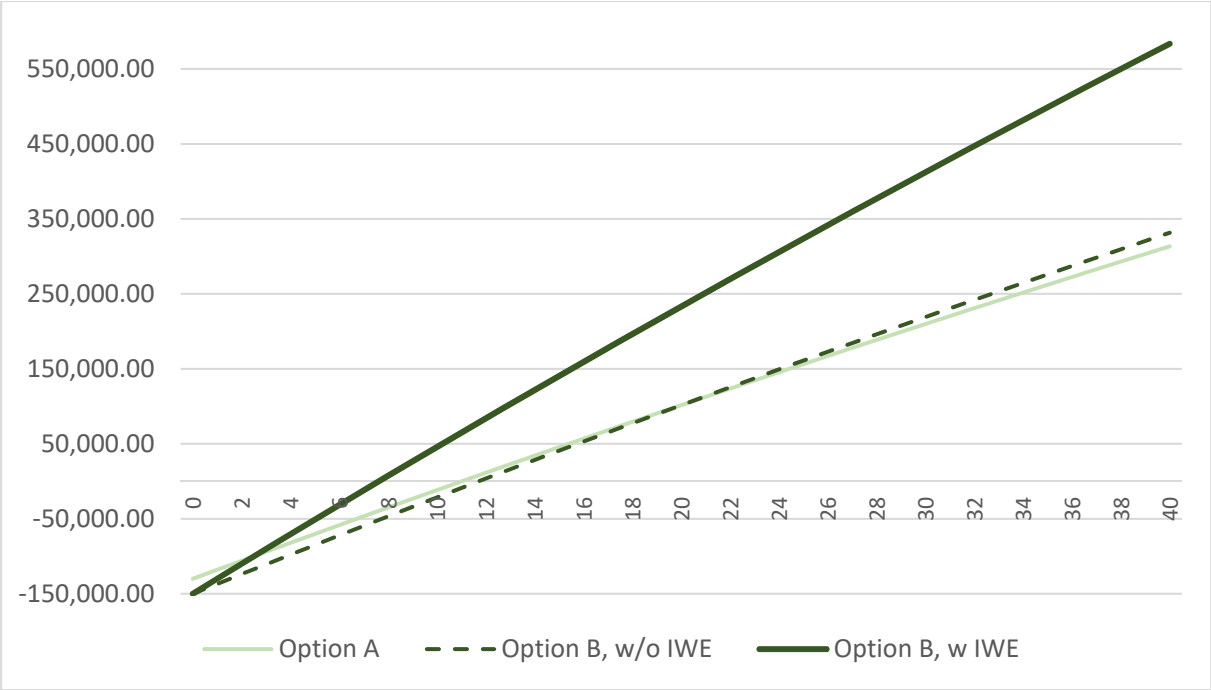

Figure 3 Discounted Cash Flows over the Lifetime (40 Years) for Option A & B, with & without Increased Working Efficiency.
IWE = increased working efficiency, w = with, w/o = without

As the useful life of the new ventilation systems is relatively long, both options are economically feasible even without any grants. The longer the investment horizon, the more profitable is Option B in relation to Option A. Naturally, economic feasibility is reached earlier with grants. In that case, Option B would become preferable to Option A earlier (see intersections of straight vs. dotted lines in Figure 4).

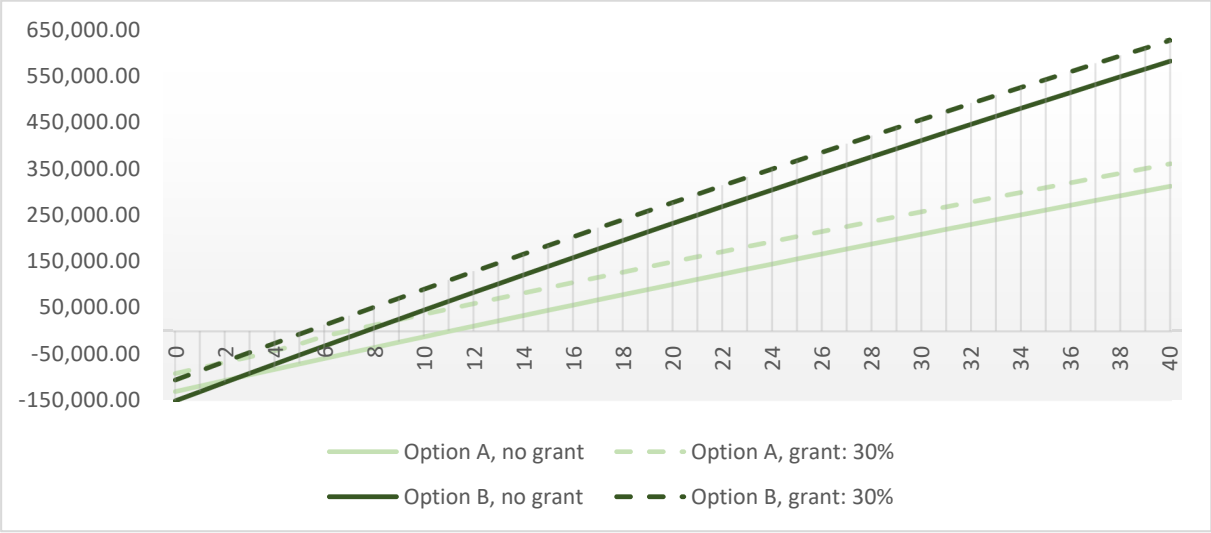

Figure 4 Discounted Cash Flows over the Lifetime (40 Years) for Option A & B, without & with grant (30%).

Economic feasibility of both options increases the lower the discount rate (see Figure 5 for Option B).

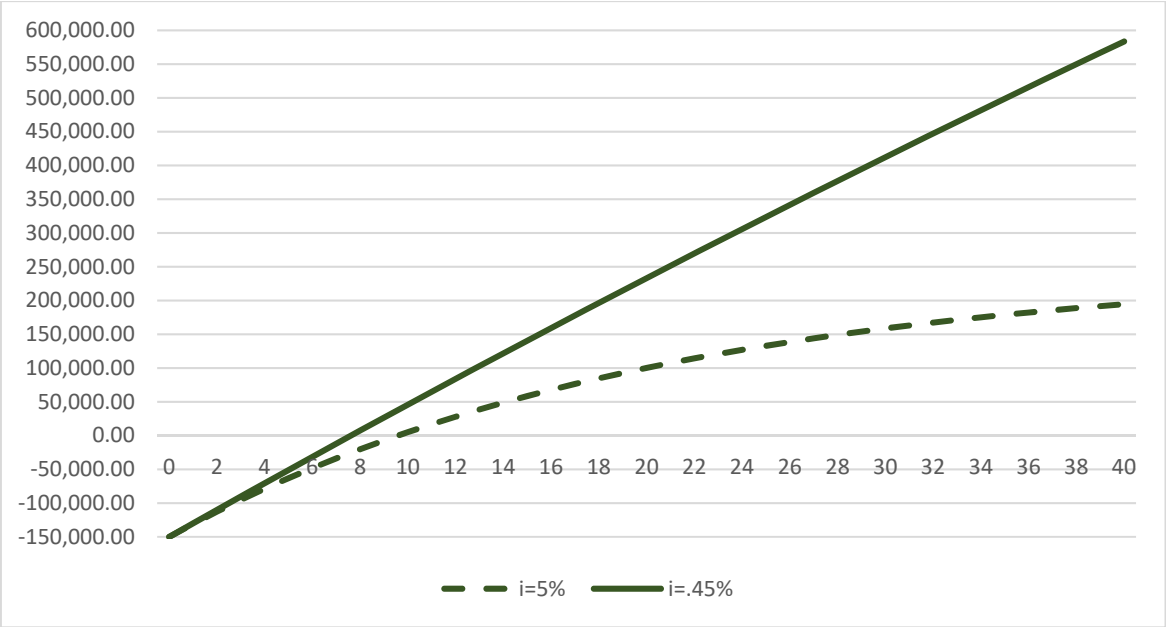

Figure 5 Discounted Cash Flows over the Lifetime (40 Years) for Option A & B, discount rates of 5% vs. 0.45%.

Savings of carbon dioxide emissions are calculated at 43.982 t (Option A) and 54.966 t (Option B), respectively. Therefore, including benefits from CO_2 savings Option B gains over Option A. Including carbon savings in project appraisal reduces payoff periods and economic feasibility significantly. The higher the price for carbon, the earlier the project becomes economically feasible in both technical options, but earlier in Option B. Social cost of carbon is varied here between 24.71 €/tCO_2 (carbon price used in calculations, 2019), 62.18 €/tCO_2 (carbon tax in Finland) and 132.75 €/tCO_2 (average social cost of capital according to studies reviewed by Tol, 2011). The respective discounted cash flow lines are depicted in Figure 6.

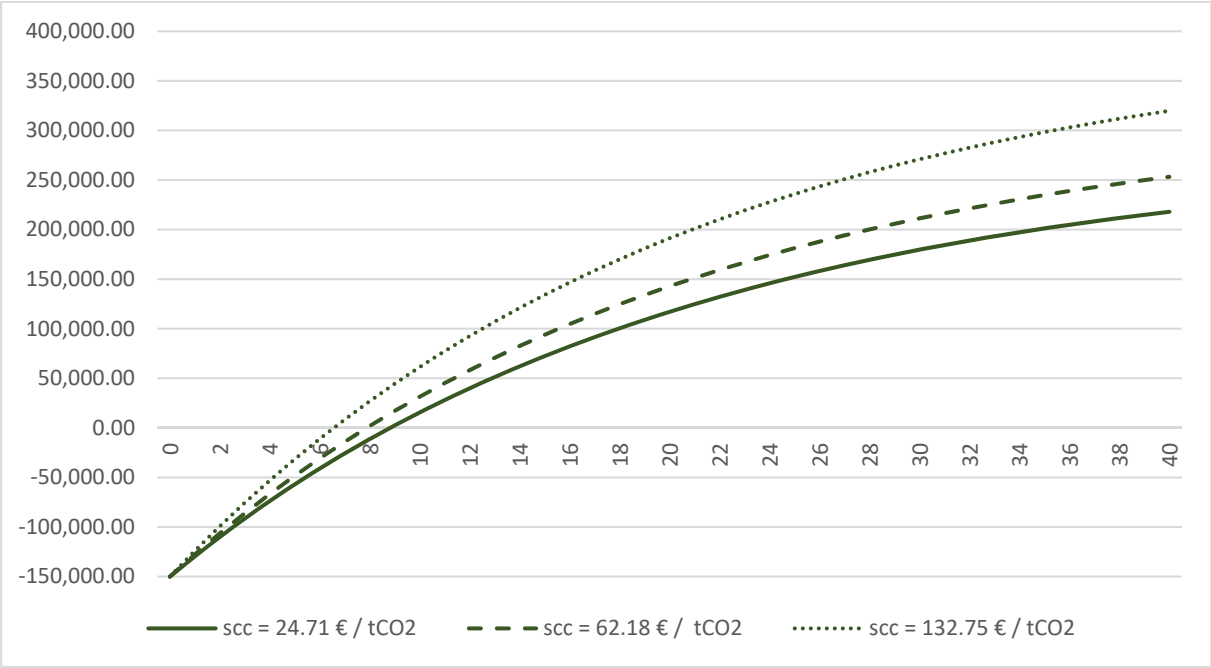

Figure 6 Discounted Cash Flows over the Lifetime (40 Years) for Option B, Changing Social Costs of Capital (SCC).

3.3. Financial and Organisational Structure

The project will be implemented by Sievi Municipality, which also owns the building. The financing structure has not been determined yet, but three different forms of financing are considered:

- Some part of the money needed will most probably come from the municipality's budget.
- Green municipality money, in the form of either a loan or a leasing structure.
- Business Finland has a grant programme; Sievi may apply for funding there for its future investment project.

MuniFin has been raising capital through bonds since 2016. According to its "Green Framework", MuniFin divides projects into seven categories, including energy efficiency as one category (MuniFin, n.d.). It assesses the impacts and relates them to the Sustainable Development Goals (SDGs) as globally agreed policy catalogue. Overall, the structure is very similar to that used by KommunInvest in Sweden (Kommuninvest, 2018).

Business Finland is a national public organisation for funding, trade, travel and investment promotion directed by the Ministry of Economic Affairs and Employment [Työ- ja elinkeinoministeriö, TEM]. It offers grants for renewable energy installations and energy efficiency projects in the business sector and by local authorities. The level of grant financing depends on the type of project and ranges – in the case of investment projects – from 15% for energy efficiency projects or heat pumps to 20-40% for new technologies. The share of grants is higher for companies and municipalities that have entered into voluntary energy efficiency agreements.

As in some other cases, the single-building project is too small to apply other types of financing and organisation such as energy performance contracting (EPC) with an energy service company (ESCo). For these models to be economically feasible, Sievi would have to pool several buildings in a portfolio on its own or through cooperation with neighbouring municipalities. Moreover, municipally owned organisations such as Korpela Voima could work as service provider. Due to its closeness, trust between partners is presumably higher, making also smaller projects viable for both parties.

4. Issues Raised

Project partners identified the lack of resources on municipality level as main challenge. Resources include:

- A person who can concentrate on energy efficiency projects;
- Time that can be invested into these projects; and
- Financial means to invest.

All over the Baltic Sea Region, municipality partners reported this problem. While socio-economic conditions in Finland are much more conducive than in some other countries, the small size of the municipality certainly is the main reason for this in the specific case of Sievi. Hence, personal capacities are limited and specialisation among municipality employees is much more difficult than in larger municipalities.

Principally, financing should not be a challenge since grant programmes are available and MuniFin as a specialised financing institute offers appropriate loans to Finnish municipalities. However, changing rules for grant applications or application for other types of financing make it difficult for small municipalities to

apply – again probably mostly a consequence of lacking resources as experienced and trained persons with enough time resources could, of course, follow up on changing application rules.

As calculations from Sweden illustrate, additional savings through improved work by specialised staff could principally outweigh increased costs for salaries (*see Mösterås feasibility study*). However, this depends on the size of building stock. This is why Finnish partners in their LEEG discussions have emphasised the need for regional cooperation as a potential solution to the problem. In this respect, Sievi can build on former cooperation – formal such as in the municipal association of Korpela Voima or informal such as in the LEEG of Ylivieska sub-region. There still seems to be a "strong localism" (Anttiroiko & Valkama, 2017) among Finnish municipalities that may serve as an explanation for the fragmentary and asymmetric landscape of regional cooperation (Valkama & Oulasvirta, 2021).

Against this background, existing collaborations can function as "platforms" for further inter-municipal co-operation to (a) make use of personnel together according to established models, i.e. through a jointly owned single- or multi-purpose organisation or a contractual agreement to share resources of one municipality and (b) pool projects together in order to create a larger portfolio that attracts more funding or allows for other types of financing. Moreover, jointly owned companies such as those of Korpela Group could provide services in public-public partnerships. Lastly, stronger links to the local industry related to energy efficiency projects could help to build public-private partnerships in this area.

5. Conclusions: Lessons Learnt

The case of Sievi generally exhibits a relatively favourable environment with MuniFin as financial intermediary, which functions as a municipal pool to access international financial markets and new types of financing. This form of LGFA is part of the "Nordic model" (Kommunekredit, MuniFin, Kommuninvest, & Monday Morning, 2012).

However, the small size of the municipality poses challenges also found elsewhere in the Baltic Sea Region, especially the lack of resources that prevent a timely implementation of adequate energy efficiency projects. Cooperation with neighbouring municipalities seems to be a feasible solution to this challenge. While inter-municipal cooperation is well known and established in Finland and Sievi could principally make use of existing models to be adapted to the specific context, it seems that cooperation in the area of energy efficiency has not been sufficiently developed yet.

Lastly, two further conclusions can be drawn from the future investment case: The renewal of air ventilation is a project type that is only feasible if the municipality takes a longer-term perspective. And calculations illustrate that a purely financial calculation could lead to an environmentally less desirable choice as the inclusion of social benefits – or rather: savings of social costs of carbon emissions – makes the option with higher emission savings preferable at an earlier point in time.

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