GREENFOOT

Green Power and Energy Efficiency Investments Community-Financed for Football Buildings

Deliverable 1.3:

Report on GREENFOOT buildings

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1 Introduction

The success of the European Energy Union and the transition to a more efficient, low-carbon energy system can only be accomplished with active participation from a substantial portion of Europeans and financing for the myriad of necessary improvement projects. The central goal of GREENFOOT is to support and foster this process by packaging individual participation and financing of the energy transition in the fun, friendly, and well-known context that is European sports, starting with the most popular sport: professional football. To accomplish this goal, GREENFOOT aims at implementing crowdfunding schemes for renovating stadiums, practice facilities, and related buildings with energy efficiency (EE) and renewable energy (RES) measures.

Crowdfunding is part of the worldwide progress towards a global and digital society and also plays an increasingly important role in the energy transition. In addition, sustainable crowdfunding engages citizens to be actively involved in the energy transition. In particular, citizens who do not have the opportunity to install RES solutions themselves can be involved in the production of sustainable energy through crowdfunding.

Crowdfunding has shown significant growth rates in recent years but is not yet fully developed in Europe. Differences are particularly pronounced between countries, with France and Germany having a very established market with high crowdfunding volumes and many crowdfunding campaigns, while other countries, such as Ireland or Azerbaijan, have less developed markets.[1] The potential of crowdfunding to finance sustainable projects has been recognized by practitioners and academics alike. However, the integration of crowdfunding in the world of football to finance sustainable projects represents a novel solution.

The GREENFOOT consortium includes the national football associations of Azerbaijan, Ireland and France, and is supported by the Swedish club Malmö FF. Its key ambition is to demonstrate how crowdfunding can be used in the football world, by national teams, larger clubs and smaller clubs, to make football more sustainable and optimize resource use.

To reach this ambition, GREENFOOT aims at demonstrating crowdfunding campaigns to finance significant EE and RES investments in sports buildings of the three Football Associations and Malmö FF. In the following, these buildings are presented and the project's key actions relating to them are presented. In addition, the crowdfunding market, its development and future prospects for the respective countries are described. All of these four buildings are large, high profile and visible in their respective communities and were selected by the FAs according to several factors: among them that the project concept is feasible on that building (e.g. create profits, not have any major legal hurdles), and that the renovated buildings have a positive social and environmental impact. Each building was the subject of a substantial technical and economic assessment for making an informed decision about the best possible path forward. This report starts with a brief introduction to crowdfunding and the role that sustainability plays in making crowdfunding campaigns successful. It then presents the GREENFOOT buildings, provides background information on the potential for crowdfunding campaigns in the four countries, and outlines the possible paths forward in the GREENFOOT project.

[1] See https://bit.ly/3JKU0G0 for recent data on the international crowdfunding markets.

2 The potential for crowdfunding in GREENFOOT's demonstration projects

Sustainable entrepreneurs aim to address environmental and social problems by producing innovative products, services or technologies that benefit the environment. However, the literature on sustainable crowdfunding shows that one of the key obstacles that keeps the potential of sustainable entrepreneurship from being unleashed is the difficulty to receive funding from traditional banks.[2] Crowdfunding has become a valuable source of funding for these businesses and projects. However, as a rather new financial instrument, crowdfunding is not yet fully established in the main financial markets. One of the potential barriers to crowdfunding is unfamiliarity with the concept and an associated lack of trust. Trust is built through knowledge and experience, but the average population has accumulated relatively little experience and knowledge, for instance through participating in campaigns. Moreover, a certain level of financial literacy is necessary to assess the potential risk and benefits of crowdfunding.

The aim of the GREENFOOT project is to understand the potential of crowdfunding investment for football organizations to leverage their large fan base to fund building renovations. Therefore, a representative survey was conducted in Azerbaijan, France, Ireland and Sweden to collect statistical data that identifies barriers and target groups that would directly influence the success of crowdfunding campaigns for football building renovations. The results of this survey show that the majority of people use traditional savings accounts, which require less financial knowledge than more advanced financial instruments (e.g. stocks, or bonds), which are used by only a few percentage. Regarding crowdfunding literacy less than half of the participants state that they have at least heard of crowdfunding (see figure below).

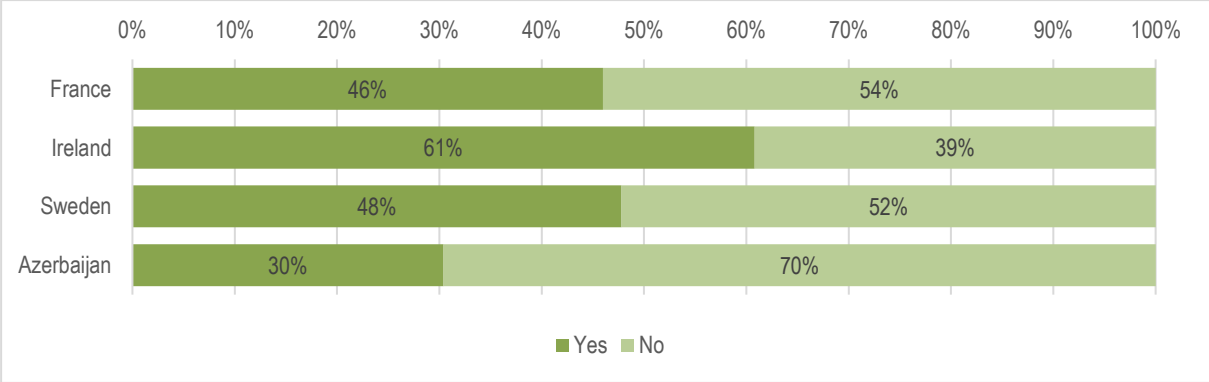

Figure 2-1: 'Q: Before today, were you familiar with the idea of crowdfunding?' Number of answers: France: 1,043, Ireland: 1,005, Sweden: 1,018, Azerbaijan: 510)

The evaluation of risks is directly related to experience and a lack of financial- and/or crowdfunding literacy could prevent citizens from engaging in crowdfunding schemes. This is also reflected in the survey analysis, which highlights a positive relationship between crowdfunding literacy and the likelihood to participate in crowdfunding.

GREENFOOT aims to provide transparent crowdfunding campaigns that are as inclusive as possible to engage as many people as possible in the energy transition. By engaging citizens via sustainable crowdfunding, GREENFOOT could help to reduce the perceived barriers and offset perceived risk by collaborating with local partners and has the potential to further support the development of the crowdfunding market.

From a global perspective the crowdfunding market is still growing at a very fast pace and has not yet entered a process of maturity or saturation in most countries. Crowdfunding is still in its infancy in Azerbaijan, while Ireland

[2] Compare e.g. Calic, G. and Mosakowski, E. (2016) Kicking Off Social Entrepreneurship: How A Sustainability Orientation Influences Crowdfunding Success. Journal of Management Studies, Vol. 53 (5), pp738-767.

and Sweden have slightly more developed markets and France has the most advanced crowdfunding market, among the countries represented in GREENFOOT. However, the overall market volume, the number of crowdfunding projects and the average amount collected are growing in all countries, which highlights the importance of crowdfunding as a financing tool in the future. According to the French professional association FPF, crowdfunding volume was €402 million in 2018, €629 million in 2019 and will reach more than €1880 million in 2021.

Due to the large market growth, crowdfunding is becoming an important financing tool and the public interest has also increased over the last decade. The following figure compares the google trends for the keyword "crowdfunding" between France and the average of all other countries from the survey and shows that the interest was rather low before 2013 but increased afterwards.

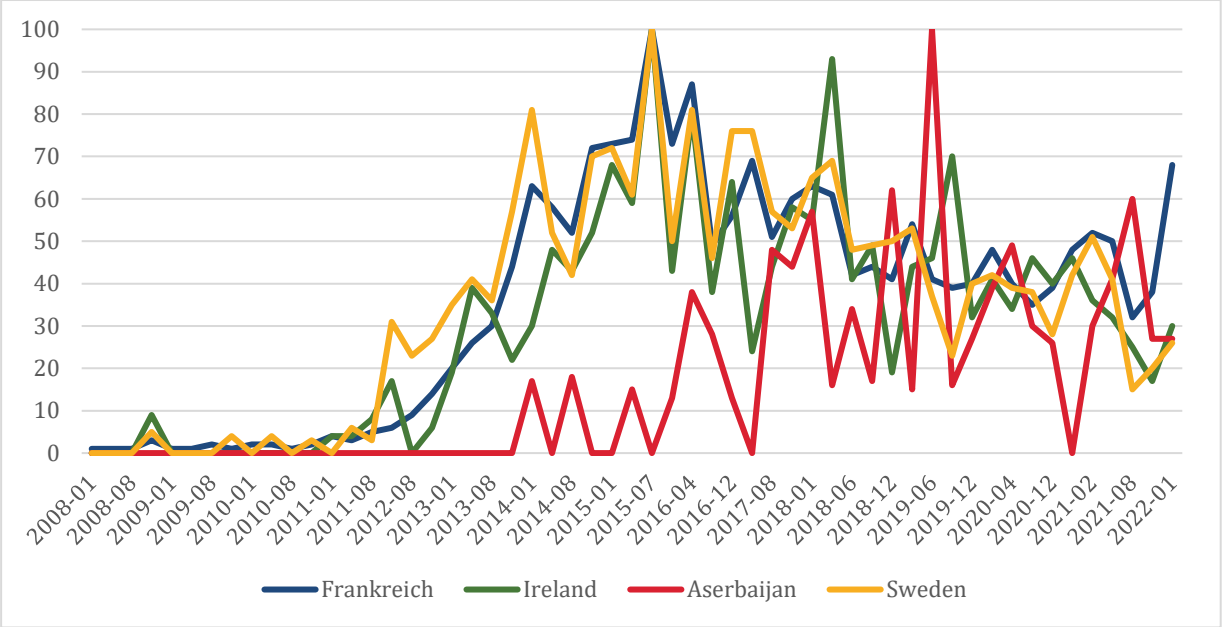

Figure 2-2: Average google trends per year across all countries (source: google trends website). Note: The values indicate the search interest relative to the highest point in the chart for the selected region in the specified period. The value 100 represents the highest popularity of this search term. The value 50 means that the term is half as popular and the value 0 means that there was not enough data for this term.

3 The Demonstration Building in Ireland - FAI Headquarters

GREENFOOT partner, the Football Association of Ireland (FAI, Irish: Cumann Peile na hÉireann) is located in Dublin, Ireland. Their headquarter is a public building of about 3,500m² that was built in the mid-1960s and was originally used as a laboratory. In 2007, it was renovated and converted into the new FAI headquarter. Today, the building is owned by Sport Ireland and is leased to the FAI along with the premises under a long-term lease agreement. The building is located within the National Sports Campus, near Dublin City and provides office space, meeting and service rooms for the FAI staff. The building is a single storey blockwork building, formed around a square courtyard, landscaped in Breedon gravel, stone slabs and olive trees. The campus as a whole is a Government-owned sports facility that provides a home to all National Governing Bodies of Sport in Ireland.

The FAI Headquarters is characterised by the following energy supplies:

- electrical services to power lighting system, office equipment, cooling system, mechanical ventilation system, supporting also the heating and DHW production (providing electricity to auxiliary systems);
- supply of methane gas to power the condensing boilers for central heating and DHW production of the building;
- pellets can be used to power the wood pellet boiler for central heating and DHW production of the building. (currently not used).

The FAI HQ was chosen due to the age profile of the building and its reputation as the home of the National Governing Body for Football in Ireland. In addition, the FAI HQ hosts all international squads at our National Training Centre which sees a large amount of football activity each year. The combination of these factors, among others, made the FAI HQ an ideal building to promote GREENFOOT and bring awareness to energy efficiency through the platform of football in Ireland.

3.1 Potential interventions for the FAI Headquarter

As part of the work done in the GREENFOOT project, the technical and functional characteristics of the FAI headquarter were analysed to derive the most beneficial interventions. Of all the possible interventions that could be useful to improve the energy performance of the building, three were chosen for further investigation due to their potential to provide significant energy savings and GHG emissions reduction as well as their potentially positive cost-benefit ratio. They are:

- lighting system upgrade,
- installation of a small photovoltaic system, and
- windows replacement.

3.1.1 Lightning

The techno-economic analysis showed that lighting is a source of high energy consumption in the building and thus offers potential for efficiency improvements. Switching to energy-efficient LED lamps could reduce the building's carbon emissions, lead to significant energy savings and improve working conditions at the same time. Replacing the approx. 1,000 lamps currently installed with less than 200 LED lamps would reduce energy consumption to 35% and could result in 65% monetary savings. Translated into terms of avoided CO_2 emissions (and considering a standard emission factor for Ireland of 0.732 tCO_2/MWh_e), this intervention could result in an annual reduction of about 70 t/CO_2.

Figure 3-1: Reception area at FAI headquarters

The installation of energy-efficient LED lamps costs around 40,000 € but would result in significant monetary savings due to the lower energy consumption as well as the reduced number of lamps and associated maintenance cost. The lifespan of LED is around 6 times longer than that of the currently installed lamps. This leads to expected annual savings in operating costs of 20,000 € and expected savings in maintenance of 6,500 €. Considering the high savings in maintenance and energy consumption as well as emissions, investing in efficient luminaires is an attractive proposition that is worthwhile from both an economic and an ecological point of view.

3.1.2 PV system

The installation of LED lamps would lead to an increase in efficiency, but the switch to a more sustainable energy supply is also essential and could be achieved by installing photovoltaic (PV) on the roof of the headquarter, which would reduce carbon emissions and make total energy consumption more sustainable. Photovoltaic power generation is one of the cleanest sources for producing renewable energy, however, the economic feasibility highly depends on climate conditions. Ireland has relatively low solar radiation for electricity production. However, the area near Dublin is characterized by a high potential for photovoltaic power generation compared to other areas in Ireland. Considering the specific area of the FAI Headquarters, PV generation is estimated to range from 900 to 1,100 kWh/kWp. The result from the technical analysis shows that the specific photovoltaic power output (defined as the average value of photovoltaic electricity delivered by a PV system and normalized to 1 kWp of installed capacity) for the FAI Headquarters is about 950 kWh/kWp per year. Given the size of the building, different PV solutions can be considered.

Figure 3-2: Specific photovoltaic power map of Ireland Source: (Source: Global Solar Atlas)

- Smaller size: 10 kWp (required space on roof: about 100 m²)
- Medium size: 20 kWp (required space on roof: about 200 m²)
- Larger size: 40 kWp (required space on roof: about 400 m²)

A 10 kWp PV system installed in the FAI building is expected to produce about 9,000 kWh/year. The potential electricity that can be generated by the other PV solutions increases almost linearly and reaches almost 37,000

kWh for the large size PV. The PV solution could supply at least 30% (December) and at most 100% (May) of the required energy throughout the year, assuming that the energy demand for efficient lighting (LED) is constant over the year. Without the installation of energy-efficient lights, only 10-30% of the required energy could be generated directly from PV. Compared to the total monthly energy consumption, the large PV system would provide at least 4% and at most 21% of the total electricity consumption.

Figure 3-3: FAI HQ main entrance

From a technical point of view, the results of the building's assessment show that the combination of LED lighting and the installation of a PV system can lead to significant positive effects and represents a strong combination regarding both environmental savings and the economic gains that can be achieved.

3.1.3 Windows

Figure 3-4: FAI HQ external facades

The third intervention analysed in the technical assessment is the replacement of the windows. The building is characterized by a high percentage of glazing and the results of the techno-economic analysis show that replacing the existing windows with new high-performance windows would result in a significant reduction of energy consumption (here: natural gas) and avoids around 8-12t/CO_2. From an economic point of view, however, the investment costs are too high, which makes this intervention not cost-efficient at current (December 2021) fuel prices. Therefore, this intervention is currently not prioritized, yet might be revisited at a later stage of the project if market conditions change.

In summary, the extensive techno-economic assessment done for the FAI headquarters showed three interventions with the potential of achieving significant energy savings and GHG emissions reductions. Two of these, the lightning upgrade and the installation of a PV system are also cost-efficient, both if done individually and even more so when done in combination.

3.2 Crowdfunding in Ireland – some key results of the GREENFOOT survey

As described in the introduction, the core concept of GREENFOOT is to demonstrate real-world innovative crowdfunding schemes and leverage their high potential to onboard citizens in the Energy and Sustainability Transition. As a first step in the project, the international GREENFOOT survey was designed to gain a better understanding of people's perception of crowdfunding in general and crowdfunding in football in particular.

In Ireland, 1,005 individuals took part in the survey. The majority of them indicated to be interested in football. Overall, 48% are either very interested or interested and 24% indicate to be a little bit interested; only 28% are not interested in football at all (see Figure 3-5). Among those interested in football, 33% indicate to follow a big foreign club, 30% place their main support on the Irish national team and 13% said that they are most likely to follow their regional club.

The high popularity of football in Ireland means that there is potentially a wide range of people who are willing to engage in a crowdfunding campaign. Stadiums or training facilities, such as the FAI headquarters could leverage the emotional connection that many fans have to their favourite team or club in addition to the promise of financial and non-monetary returns.

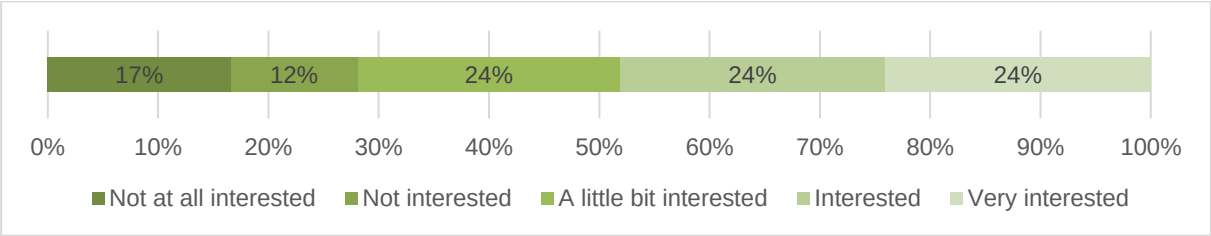

Figure 3-5: Interest in football, results of the GREENFOOT survey in Ireland, n = 1,005

The results from the survey also indicate that in addition to interest in supporting (local) football teams, respondents' opinions, intentions, and actions towards climate change influence their decision to participate and fund sustainable crowdfunding campaigns in football. The design of the crowdfunding campaign should therefore also have a focus on the reduction of carbon emissions to maximize its success. Moreover, a positive relationship between crowdfunding literacy and willingness to fund was identified. This is reflected in the relatively high crowdfunding literacy in Ireland. Overall, 61% indicate that they have at least heard from crowdfunding, which is a high number in comparison with other countries, yet only 13% have actively participated in a campaign.

The increasing perception and recognition of anthropogenic climate change are also evident in Ireland, with around 23% of Irish people expressing extreme concerns about climate change and 32% saying that they are very concerned. On the other hand, less than 20% of the people are only slightly or not at all concerned (see Figure 3-6).

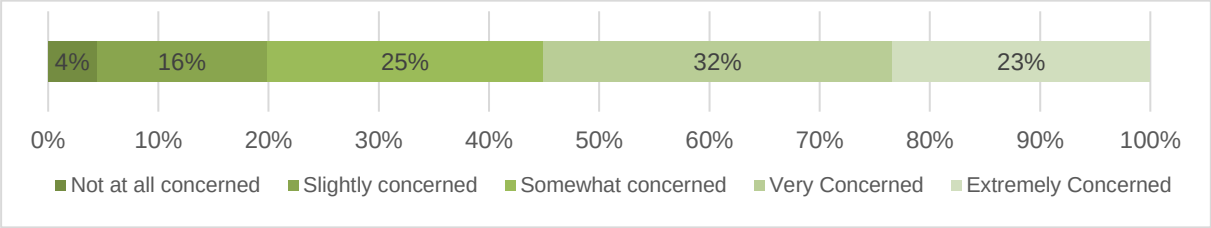

Figure 3-6: Environmental concerns (Q: 'How concerned are you about climate change?'), results of the GREENFOOT survey in Ireland, n = 1,005

Concerns about energy-related decisions related to sustainability, however, are less pronounced. Only 16% consider their energy consumption to be extremely relevant in the fight against climate change and 35% as very relevant. Demonstrating energy efficiency projects in the context of football buildings can therefore go hand in hand with raising public awareness of the energy transition issue.

As part of the survey, participants were presented with a hypothetical crowdfunding opportunity. The objective was to identify which rewards participants want when taking part in a national crowdfunding campaign, their likelihood of actually participating and their willingness to pay, e.g. the amount of money that someone would contribute, among others. The Irish participants were presented with the (hypothetical) opportunity to participate in a

crowdfunding campaign that targets energy efficiency measures in the AVIVA Stadium in Dublin. The results of the survey show that the national crowdfunding campaign for EE and RES measures for this stadium meets a high interest. Overall, 42% said that are either interested (31%) or very interested (11%) in participating, while only 17% indicate that they are very unlikely to participate in such a campaign.

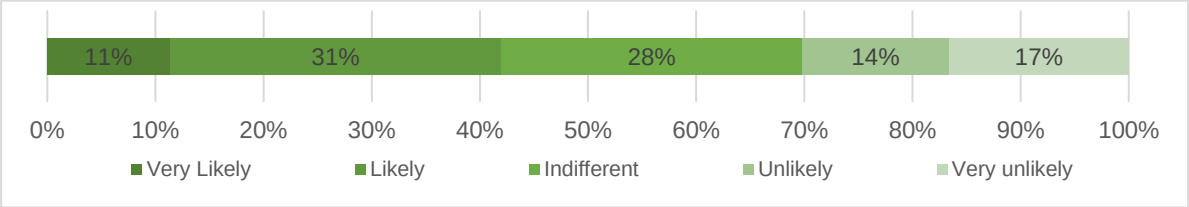

Figure 3-7: Participation in hypothetical crowdfunding (Q: 'How likely are you to participate in this crowdfunding campaign for AVIVA stadium?'), results of the GREENFOOT survey in Ireland, n = 1,005

This is reflected in the amount that people would be willing to contribute. We find that 85% are willing to contribute financially to such a campaign. The overall funding of the hypothetical crowdfunding campaign in Ireland was around 400,000 € based upon the participants' replies in the survey.

The following figure shows the individual contributions among fans and non-fans and highlights that interest in football is also associated with a higher willingness to contribute. Most people decided to invest rather small amounts and the overall median contribution was €80, for fans it is 200 € and for non-fans 30 €.

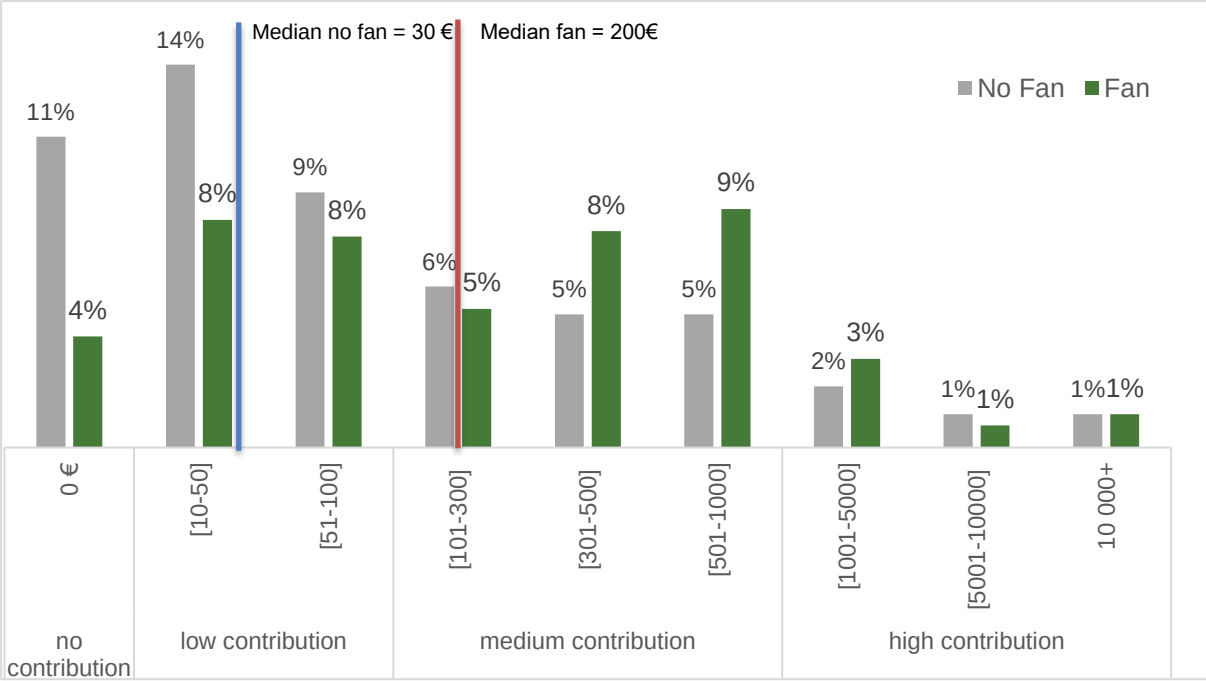

Figure 3-8: Individual contributions from the national crowdfunding campaign for Irish fans and non-fans.

The results of the Irish survey highlight that football fans represent the key target group for a campaign as they have the highest likelihood to participate in crowdfunding and are willing to invest higher amounts.

3.3 Some key design parameters of a potential crowdfunding scheme in Ireland

Combining the extensive findings from the survey, literature research and technical evaluation of the FAI headquarter building, the key parameters of a potential crowdfunding campaign for the FAI headquarters were designed. Based on the proposed interventions (see above), their capital requirements and crowdfunding

preferences in Ireland derived from the survey results, a crowdlending scheme is proposed, combined with rewards, perks and raffles. Crowdlending is similar to any typical lending scenario, whereby individuals lend money to a company with the expectation that the money will be repaid with a financial interest.

The aim of such a crowdlending campaign done as part of the GREENFOOT project could be to raise the funding for the renovation of the lighting, which has a very short payback period (1 year), and the installation of a photovoltaic system, which has a payback period of about 14 years through a single crowdfunding campaign. A 4-year crowdfunding campaign is proposed to finance both measures and collect the CAPEX expenditure of approx. 120,000 €. The implementation of efficient lighting reduces the annual costs and leads to yearly savings of around 25,000 €, the savings from PV are around 6,000 €. The capital requirement would be covered by the annual savings of approximately 31,000 € already after 4 years and all further savings would result in profits. Given the small global amount of CAPEX needed, fans should be the main target, with a minimum individual contribution of 20 € to be as inclusive as possible. The interest rate should not be higher than 3%. Around 500 participants represent the ideal crowd size for this campaign, yet a maximum contribution could be introduced to bring even more citizens onboard. The goals of the campaign should be to introduce the energy transition to some of the football fans and make a first attempt toward the maturity of crowdfunding by using the combination of lending with rewards, perks and raffles to being able to include the learnings

4 The Demonstration Building in Azerbaijan – Dalga Arena

Dalga Arena is a football stadium located in Baku, the capital of Azerbaijan. The stadium was built in 2011 and has a capacity of 6,700 seats. In addition to normal spectator seats, the stadium also offers disabled seating, around 600 VIP seats and 12 skyboxes, with one dedicated to media. The stadium is currently used for football matches only and hosts national, international and friendly games and is the venue for the matches of the Azerbaijani national team. Dalga Arena is a public building owned by the Association of Football Federations of Azerbaijan (AFFA; Azerbaijani: Azərbaycan Futbol Federasiyaları Assosiasiyası) covering an area of about 25,000 m² (including adjacent outdoor areas). During the season, in addition to the Azerbaijani national team, 2-3 clubs make requests to play matches in Dalga. According to the FIFA/UEFA calendar, the national team comes to the base camp and trains in Dalga and the local clubs play in the first division in May. Due to its size and utilization pattern, Dalga Arena is highly representative of the majority of stadiums. 80% of all arenas are small - and medium-sized (5,000-20,000 spectators).

Figure 4-1: Dalga Arena in Baku

Dalga Arena is chosen due to its location and being the biggest training centre of Association of Football Federations of Azerbaijan (AFFA). Stadium is located at the seaside and it is very appropriate to have alternative energy resources due to the weather condition especially in the summer creates good opportunity and considering energy prices low Furthermore, he infrastructure of Dalga Arena allows us to implement GREENFOOT project.

4.1 Potential Interventions for the Dalga Arena

The currently infrequent use of the stadium affects the stadium's general energy consumption, which is comparably low. Moreover, the mild climate of Baku eliminates the need to heat the turf, which is a significant source of energy consumption in stadiums in colder climates. Another relevant factor for the assessment of interventions in Azerbaijan is that energy is subject to price regulation and currently, energy subsidies keep energy prices below the level of world market prices. While these subsidies allow households to access affordable energy, they also make investments in sustainable energy projects economically less interesting.

Figure 4-2: DALGA Arena in Baku

Nevertheless, the techno-economic feasibility study identified two interventions, which could enhance the stadium's energy efficiency and result in GHG emission reductions, as potentially beneficial.

These interventions are:

- upgrading of the lighting system (floodlights in particular).
- installation of a small photovoltaic system;

4.1.1 Floodlight

The arena is equipped with 4 floodlight towers each with 50x2000 W lamps and additional under-roof installations including 8 large projectors and 42 small lamps. The techno-economic analysis proposes to replace 200 lamps of

the 4 floodlights towers (50 lamps each tower) with new efficient LED lamps. LED lamps have higher luminous efficacy than the currently installed lamps and therefore it is possible to install LED lamps with lower power and save about 50-75% energy. However, the absolute savings depend on the number of games and the hours the floodlights are used. Currently, a switch to efficient lights would save ~19,000kWh and ~14 **t/CO_2** emissions. The electricity demand of the floodlights would therefore be halved which corresponds to ~30% of the total electricity demand of the stadium.

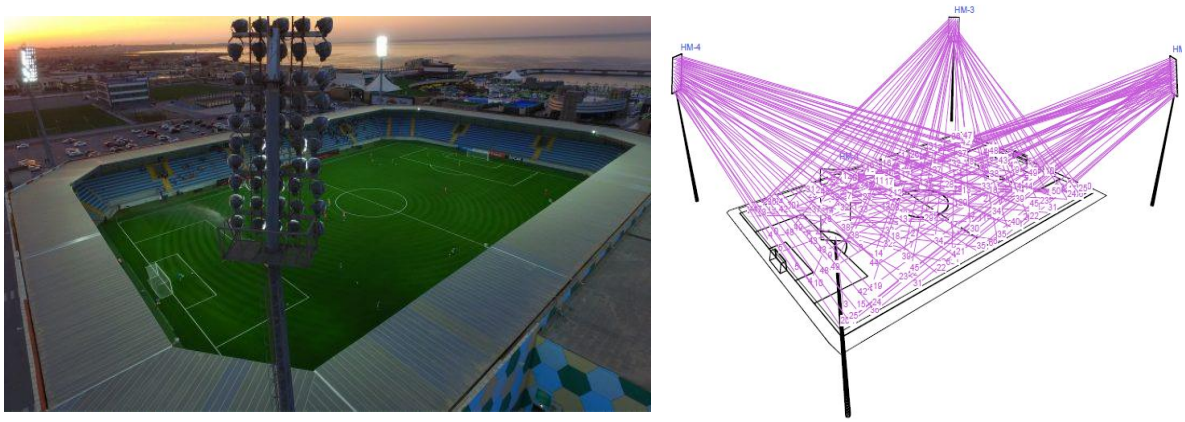

Figure 4-3: Dalga arena and lighting

To replace floodlights with new more efficient LED lamps a total initial investment of approx. 100,000 € is needed. Due to the longer life expectancy of the new lamps, savings would be achieved not only in energy consumption but also in maintenance costs. The techno-economic analysis estimates annual savings in operating costs of ~1000 € and 240 € in maintenance costs. The low energy cost of electricity (0.05 €/kWh) combined with the high cost of installing new LED lamps (100,000 €) does not allow for sufficient savings, and the proposed measure to upgrade the lighting system appears economically disadvantageous. However, the economic feasibility depends heavily on the current subsidies for fossil fuels. Considering the increasing efforts in the fight against climate change, a reduction of fossil fuel subsidies could occur in the near future and innovative interventions like this could become more interesting.

4.1.2 PV system

Dalga Arena is characterized by a predominant consumption of electricity and, due to its climatic conditions, Azerbaijan has a great availability of solar power. For this reason, the installation of a photovoltaic system on the roof of the Dalga Arena appears quite interesting and promising to increase the energy efficiency of the building. Baku is influenced by the local steppe climate, where rainfall is low throughout the year.

Rainy days (d)	6	5	4	4	2	1	1	1	3	6	7	6
avg. Sun hours (hours)	4.5	5.0	7.2	9.9	11.9	13.1	13.0	12.1	10.0	7.0	5.4	4.6

Figure 4-4: Climate data (average) for Baku

Considering the peculiarities of the building, especially the flat roof without shading and completely free, on which a photovoltaic (PV) system could be easily installed, and the electricity demand, the availability of solar radiation for electricity generation was analyzed in detail. The area around Baku is characterized by photovoltaic electricity generation potential that ranges from 1300 to 1400 kWh/kWp. The analysis shows that the specific photovoltaic electricity yield (defined as the average value of photovoltaic electricity delivered by a PV system, normalized to 1 kWp of installed capacity) for Dalga Arena is 1,372.8 kWh/kWp per year. However, the analysis showed that the

roof is not designed to bear the additional weight from panels, without reinforcements. Currently, PV could only be installed on the skyboxes, an area of about 550 m².

Based on this information two possible PV solutions were proposed:

- Small-sized PV system (15 kWp required space on roof: about 150 m²)
- Medium-sized (25 kWp required space on roof: about 250 m²)

The small PV system (15 kWp) installed is expected to produce ~20,000 kWh/year. The medium-sized system is expected to produce 32,196 kWh/year and would avoid ~23tCO_2. The initial investment cost for the small PV system is 26,000 € and for the medium-sized system it is 43,000 €. However, due to low electricity prices, the savings over time are not able to cover the initial investment cost. PV panels in Azerbaijan would be possible if additional funds were available to support the initial investment costs (e.g. subsidies) or if the electricity price were to increase significantly.

4.2 Crowdfunding in Azerbaijan – some key results of the GREENFOOT survey

As described in the introduction, the core concept of GREENFOOT is to demonstrate real-world innovative crowdfunding schemes and leverage their high potential to onboard citizens in the Energy and Sustainability Transition. As a first step in the project, the international GREENFOOT survey was designed to gain a better understanding of people's perception of crowdfunding in general and of crowdfunding in football in particular.

In Azerbaijan, 510 individuals took part in the survey. Football is not the national sport in Azerbaijan, yet the country has witnessed increasing interest in football in recent years: the European Games in 2015, the Europa League final in 2019 and some games of the European Championship among other events took place in the country. Nonetheless, the level of interest in football is less pronounced than in other countries in the GREENFOOT survey, and only 29% of participants said that they are either very or interested in football, while 41% indicated to be rather uninterested (see Figure 4-5).

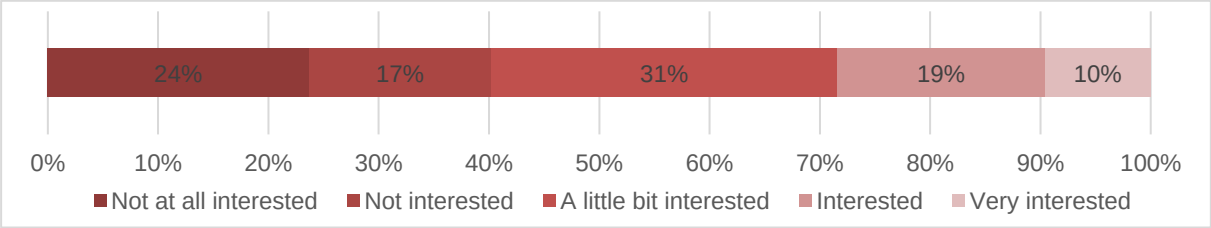

Figure 4-5: Interest in professional football, results of the GREENFOOT survey in Azerbaijan, n = 510

Azerbaijan has a higher willingness to fund, even though the crowdfunding market less developed than in other countries. Currently the market volume for crowdfunding is relatively low ($1.0m) and rather few campaigns are launched. However, the volume, as well as the number of campaigns launched, is increasing over time. The market is expected to grow at an annual rate of ~6.4% resulting in a transaction volume of $1.4m by 2025.[3] The novelty of crowdfunding is also present in the survey and only 30% indicate to have at least heard from crowdfunding. Crowdfunding literacy is however a key determinant for crowdfunding success as it helps to assess the corresponding risks. This relationship is also reflected in the econometric analysis, which shows that participants who are familiar with crowdfunding are more likely to participate and fund campaigns.

[3] See https://bit.ly/3N44OkC

The increasing perception and recognition of anthropogenic climate change is also evident in Azerbaijan, with around 15% of people expressing extreme concerns about climate change and 26% saying that they are very concerned.

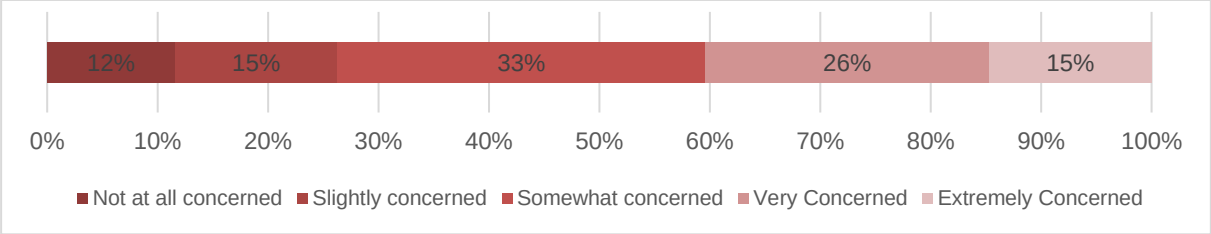

Figure 4-6: Environmental concerns (Q: 'How concerned are you about climate change?'), results of the GREENFOOT survey in Azerbaijan, n = 510

Regarding the motives and expected benefits from crowdfunding, a similar relationship as in the other countries emerges and willingness to participate in crowdfunding is driven by a mixture of altruistic and financial motives. The main reason to participate is to help protect the environment followed by a good financial return and the desire to help the community. Regarding financial returns, the most preferred reward was a fixed reduction on the monthly electricity bill (see Figure 4-7). The results also highlight that many participants are rather unsure what incentive they would prefer, which might be correlated with the relatively low crowdfunding literacy.

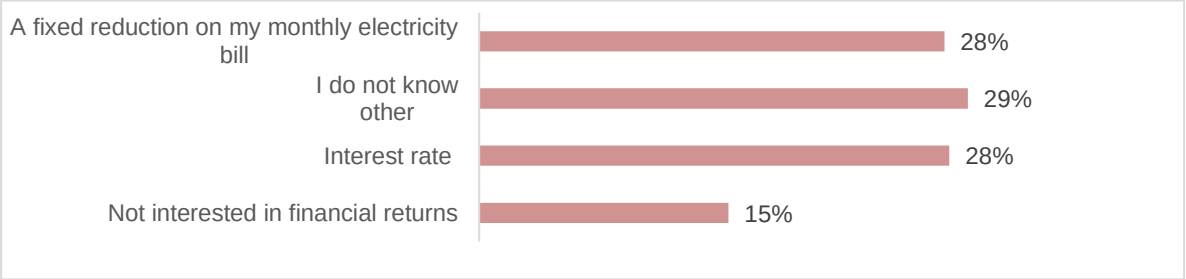

Figure 4-7: Preferred rewards for participating in a crowdfunding campaign, results of the GREENFOOT survey in Azerbaijan

As part of the survey, participants were presented with a hypothetical crowdfunding opportunity. The objective was to identify which rewards participants want when taking part in a national crowdfunding campaign, their likelihood of actually participating and their willingness to pay, e.g. the amount of money that someone would contribute, among others. The participants were presented with the (hypothetical) opportunity to participate in a crowdfunding campaign that targets energy efficiency measures in the Dalga arena in Baku.

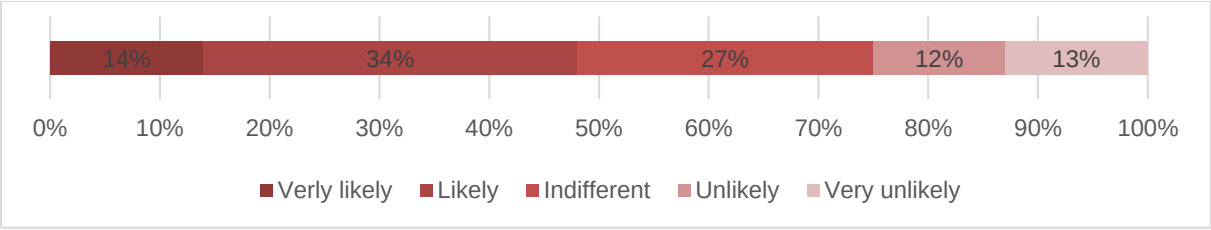

Figure 4-8: Participation in hypothetical crowdfunding (Q: 'How likely are you to participate in a crowdfunding campaign for the Dalga arena?'), results of the GREENFOOT survey in Azerbaijan

The results show that there is a high potential for sustainable crowdfunding in Azerbaijan and highlights some specific traits, as well as socio-demographic and economic factors that influence the likelihood to participate and

willingness to fund. Around 34 % of respondents are likely to participate and 14% very likely (see Figure 4-8), which translates to a relatively high median contribution of 80 €, while fans have a higher median contribution than non-fans. The overall potential of the hypothetical campaign was € 360,000. The following graph shows the distribution of the individual contributions for fans and non-fans.

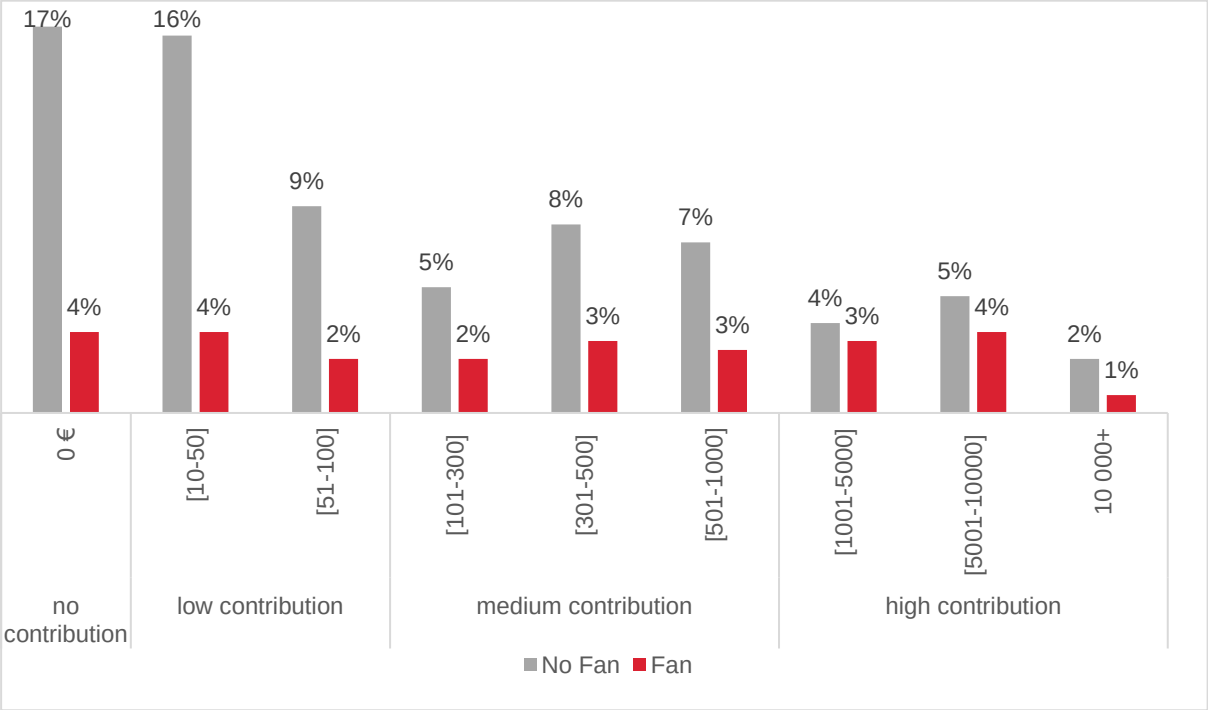

Figure 4-9: Distribution of individual contributions among fans and non-fans – Azerbaijan, n=250

The results of the survey highlight the potential for the crowdfunding market in Azerbaijan. GREENFOOT's collaboration with government-approved and trusted partners could contribute to a general reduction of perceived risks in crowdfunding. Another spill over effect could be to strengthen the public interest in sustainability, especially the use of renewable energy, by involving citizens in sustainable projects.

4.3 Some key design parameters of a potential crowdfunding scheme in Azerbaijan

The implementation and design of a crowdfunding scheme is more difficult in Azerbaijan compared to the other countries. Crowdfunding is still a novel concept and the market is far from being developed. Secondly, and even more important are low energy prices that pose an economic burden by reducing potential savings from EE and RE. Regarding these circumstances and the fact that the net present value of all proposed measures is negative, a donation based or reward based crowdfunding scheme is proposed to install a small quantity of PV panels.

Donation-based as well as reward-based crowdfunding are typically used for small scale renewable energy projects and for projects during their inception and prototype stages. A literature review done in GREENFOOT, which analyzed 39 projects, shows that reward campaigns alone amount to 41% of the total number of projects, but combine for only 1% of the money raised. This highlights the importance of well-chosen rewards, perks and raffles. Therefore, the next proposed step should be the collection of possible rewards, perks and raffles from the AFFA, its national players, the City of Baku, as well as the search for public or private donors.

The total initial CAPEX expenditure is supposed to be 25,000 €. The goals of the campaign should be to make the target audience more familiar with crowdfunding, spread knowledge about energy transition (electricity prices in Azerbaijan are comparably low, but the CO_2 footprint could be significantly reduced) and explore engagement opportunities with donors. Therefore, around 1000 backers should be reached. To be as inclusive as possible the minimum amount should be around 5 € and the maximum amount, if necessary, should be 50 €. In case of a successful campaign, the second round of more structured interventions could be planned.

5 The Swedish Demonstration Building – Eleda Stadium

GREENFOOT partner, Allsvenskan club Malmö Fotbollförening (Malmö FF) is located in Malmö, Sweden. The Eleda Stadium is the home stadium of the club and was built between 2007 and 2009. The stadium has a capacity of 22,500 during domestic matches, of which 18,000 are seated, and 4,500 are standing. The lower tier has 10,000 seats, and the upper tier has 8,000 seats, while the Northern Stand has a capacity of 4,500 standing supporters, which can be transformed into an all-seated section with a capacity of 3,000 as required for European matches. All the tiers are covered by a sloped roof. The building is located about 3 km south of Malmö city centre, in the Stadium Area, immediately adjacent to the classic Malmö Stadium, built-in 1958. Eleda Stadium has a restaurant for 2,000 sitting guests, shops, conference facilities, and offices. The Eleda Stadion is characterised by the following energy supplies:

Figure 5-1: Eleda Stadium

- electrical services to power lighting system, equipment, supporting the HVAC systems and DHW production (providing electricity to auxiliary systems);
- district heating to provide thermal heat for the HVAC systems and DHW production.

5.1 Potential interventions for the Eleda Stadium

As part of the work done in the GREENFOOT project, the technical and functional characteristics of the Eleda Stadium were analysed to derive the most beneficial interventions. The techno-economic report, which analyzed the state of the building, shows that the envelope and the HVAC systems are in very good condition and energy efficiency measures are not required. Moreover, the heat generation comes from district heating which represents an energy-efficient solution. Thus, no other RES heating technologies such as solar radiation or geothermal heat were evaluated. Yet, currently, there is no on-site production of electricity from renewable sources technologies. The technical analysis showed that the wind energy potential of the site is not sufficient for the installation of micro-wind turbines. For this reason, the installation of a PV system is the most appropriate solution from a technical perspective. Of all the possible interventions that could be useful to improve the energy performance of the building, the following intervention was therefore chosen for further investigation due to its potential to provide significant energy savings and GHG emissions reduction as well as its potentially positive cost-benefit ratio:

- installation of a photovoltaic system

5.1.1 PV system

A more sustainable energy supply is essential and could be achieved by installing photovoltaic (PV), which would reduce carbon emissions. Photovoltaic power generation is one of the cleanest sources for producing renewable energy, however, the economic feasibility highly depends on climate conditions. Overall, Sweden is characterized by low power output but Malmö has a relatively higher PV power potential making PV an attractive solution.

The specific photovoltaic power output (defined as the average value of photovoltaic electricity delivered by a PV system and normalized to 1 kWp of installed capacity) for the Eleda Stadion is ~1100 kWh per year. The following map shows the PV power for Malmö. Based on these insights, three different solutions have been proposed based on different sizes of the PV system:

- Smaller size: 20 kWp (required space on roof: about 200 m^2)
- Medium size: 50 kWp (required space on roof: about 500 m^2)
- Larger size: 100 kWp (required space on roof: about 1000 m^2)

The cost of a solar PV system depends on many factors including the hardware chosen, size of the system, monitoring equipment and the structure and type of roof or site. According to the technical analysis, the installation of PV would require an initial investment of approx. €30,000 to 130,000 € depending on the actual size chosen. The investments in RE leads also to a reduction in operating costs. In addition, the current legislation benefits PV installations, which further reduces costs. Depending on the size of the PV solution between €3,000 and €16,000 could be saved in energy costs annually. In addition, the installation of RE would reduce taxes. According to the current Swedish legislation on energy tax for self-consumption, PV systems with a total capacity of less than 500 kWp do not have to pay energy tax for self-consumed electricity. Due to the high savings and relatively low maintenance costs (~1% of the initial investment), the installations would break even after approximately 9 to 12 years. The payback time, however, depends on the assumption about future energy prices and discount rates. Comparing the payback time of the investment with the lifespan of PV (25-30 years) it becomes apparent that all three solutions are economically advantageous. Due to the economies of scale, larger systems are comparatively cheaper to install as some costs are fixed and almost independent of the number of installed panels.

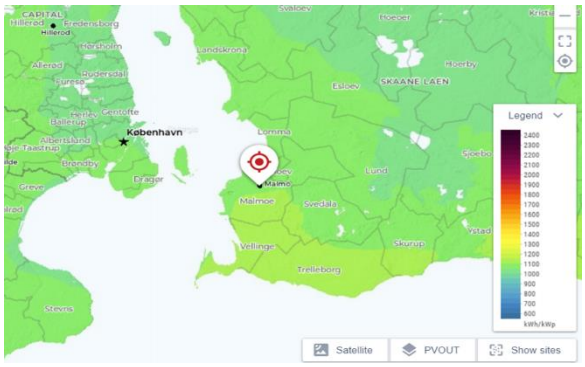

Figure 5-2: Specific photovoltaic power map of Sweden Source: (Source: Global Solar Atlas)

5.2 Crowdfunding in Sweden – some key results of the GREENFOOT survey

As described in the introduction, the core concept of GREENFOOT is to demonstrate real-world innovative crowdfunding schemes and leverage their high potential to onboard citizens in the Energy and Sustainability Transition. As a first step in the project, the international GREENFOOT survey was designed to gain a better understanding of people's perception of crowdfunding in general and crowdfunding in football in particular.

In Sweden, 1,018 individuals took part in the survey. The majority of them indicated to be interested in football. Overall, 41% are either very interested or interested and 25% indicate to be a little bit interested. Around one-third of the people are rather not interested (see Figure 3-5). Among those interested in football, 42% indicate to follow the Swedish national team and 13% said that they are most likely to follow a large regional club.

The popularity of football in Sweden means that there is potentially a wide range of people who are willing to engage in a crowdfunding campaign. Stadiums or training facilities, such as the Eleda Stadium could leverage the emotional connection that many fans have with their favourite team or club in addition to the promise of financial and non-monetary returns.

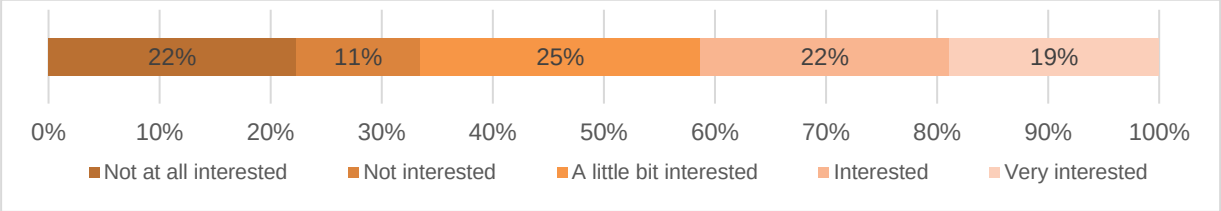

Figure 5-3: Interest in football, results of the GREENFOOT survey in Sweden, n = 1,018

The results from the survey also indicate that in addition to interest in supporting (local) football teams, respondents' opinions, intentions, and actions towards climate change influence their decision to participate and fund sustainable crowdfunding campaigns in football. The design of the crowdfunding campaign should therefore also have a focus on the reduction of carbon emissions to maximize its success. Moreover, a positive relationship between crowdfunding literacy and willingness to fund was identified. Knowledge of crowdfunding types is important for assessing potential risks and making funding decisions. However, the survey results indicate that knowledge of crowdfunding is rather high in Sweden. 48% indicate that they have at least heard of crowdfunding, which is a high number in comparison with other countries, yet only 10% have actively participated in a campaign.

Concerns about the environment are also correlated with willingness to participate in the national campaign and in Sweden a very high amount of people indicate to be concerned about the environment (see Figure 3-6). Moreover, almost every second person indicates that their own energy-related choices are important in the context of climate change.

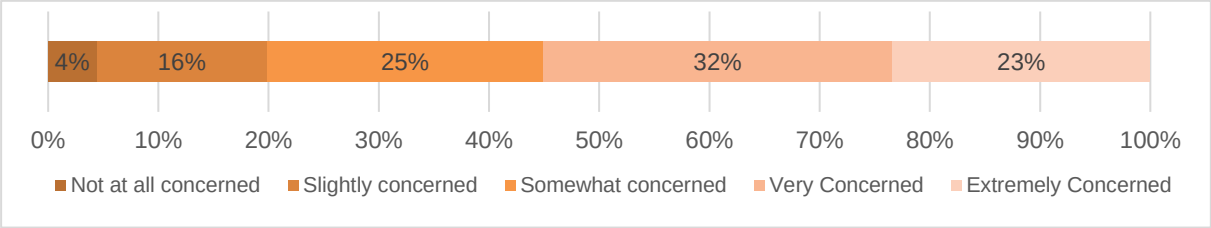

Figure 5-4: Environmental concerns (Q: 'How concerned are you about climate change?'), results of the GREENFOOT survey in Sweden, n = 1,018

Demonstrating energy efficiency projects in the context of football buildings can therefore go hand in hand with raising public awareness of the energy transition issue. As part of the survey, participants were presented with a hypothetical crowdfunding opportunity. The objective was to identify which rewards participants want when taking part in a national crowdfunding campaign, their likelihood of actually participating and their willingness to pay, e.g. the amount of money that someone would contribute, among others. The Swedish participants were presented with the (hypothetical) opportunity to participate in a crowdfunding campaign that targets energy efficiency measures in the Eleda Stadium in Malmö. The results of the survey show that the national crowdfunding campaign for EE and RES measures for this stadium meets a high interest. Overall, 6% are very likely and 22% are likely to participate, however, a high amount (27%) is very unlikely to participate.

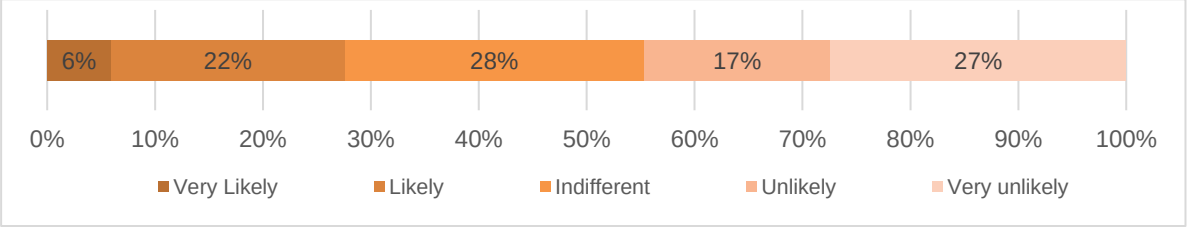

Figure 5-5: Participation in hypothetical crowdfunding (Q: 'How likely are you to participate in this crowdfunding campaign for AVIVA stadium?'), results of the GREENFOOT survey in Sweden, n = 500

The lower interest in the campaign is, however, only reflected in the participation likelihood but does not affect the amount that participants are willing to invest. Around 30% of the participants indicated to be either likely or very likely to join the crowdfunding campaign, which is lower than in the other countries (Azerbaijan, Ireland, France) but the amount that participants would be willing to invest shows a different picture. Around ⅓ are willing to invest a low amount or a medium amount and 13% a very high amount. Overall, Sweden shows the highest median contribution (€200) in the country comparison. Similar to the other countries fans invest more and have a higher median contribution than non-fans. The total amount of individual contributions (~500) yields a crowdfunding potential of approx. €700,000. The following graph shows the individual contributions between fans and non-fans.

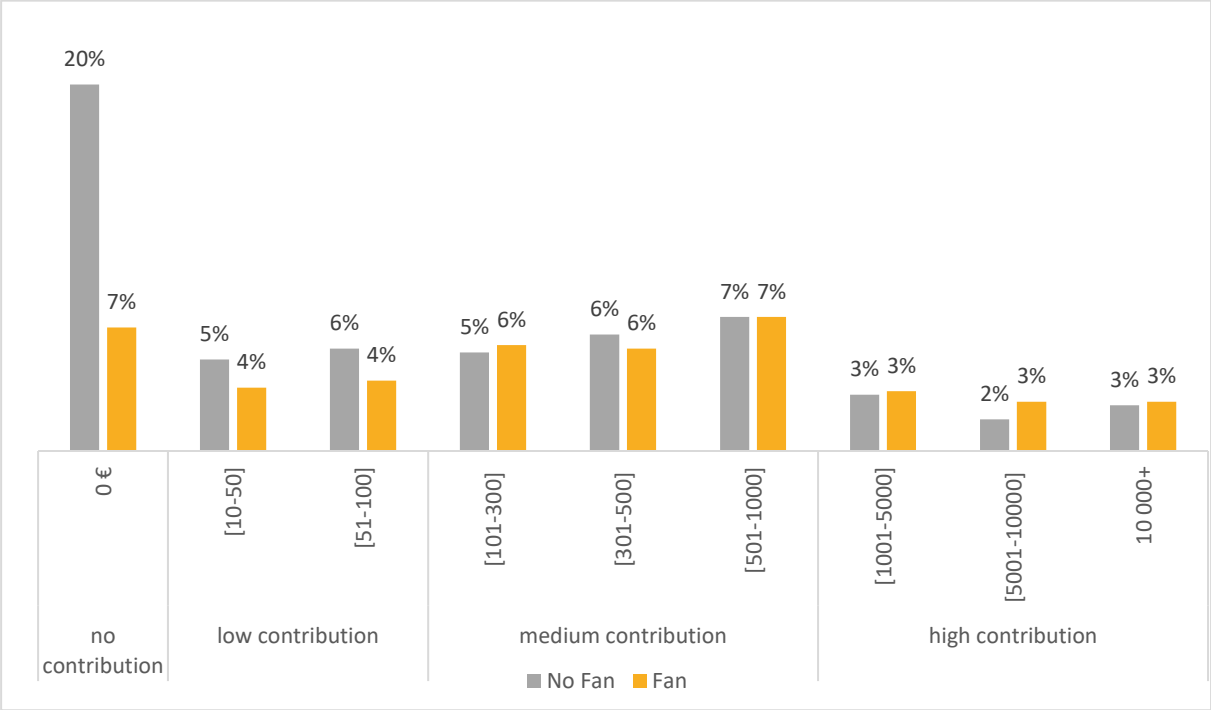

Figure 5-6: Individual contributions from the national crowdfunding campaign for Swedish fans and non-fans.

The results of the Sweden survey highlight that football fans represent the key target group for a campaign as they have the highest likelihood to participate in crowdfunding and are willing to invest higher amounts.

5.3 Some key design parameters of a potential crowdfunding scheme in Sweden

Combining the extensive findings from the survey, literature research and technical evaluation of the Eleda Stadium, the key parameters of a potential crowdfunding campaign were designed. Based on the proposed interventions (see above), their capital requirements and crowdfunding preferences in Sweden derived from the survey results, a crowdlending scheme is proposed, combined with rewards, perks and raffles. Crowdlending is similar to any typical lending scenario, whereby individuals lend money to a company with the expectation that the money will be repaid with a financial interest. Moreover, literature shows that equity crowdfunding and crowdlending in particular have been identified as especially promising types of crowdfunding for energy projects, with reward systems as a valuable alternative for smaller, more socially-oriented campaigns. In terms of volumes in Europe, crowdlending is the leading model and the average amount raised by single projects ranges between €50,000 and €2.5 million.

The aim of such a crowdlending campaign done as part of the GREENFOOT project could be to raise the funding for the renovation of the installation of a photovoltaic system, which, depending on its size - has a payback period 9 and 12 years through a single crowdfunding campaign. A crowdfunding campaign over 7 years is proposed to

cover the initial investment. As the technical report suggests, the repayment will be partially covered by the savings. The portion not immediately generated by ongoing savings in energy costs and taxes could be covered by the project proponent and generate gains at the end of the crowdfunding campaign. At the end of the crowdfunding campaign, these expenses would be covered by the remaining savings. The lifespan of PV systems is 25-30 years, while the proposed campaign would only run for 7 years. Given the global amount of CAPEX needed, fans should be the main target group. To allow the general public to participate and to be as inclusive as possible the minimum amount should not be set too high (~€20) and a maximum contribution could be introduced to bring more citizens onboard. In total, the proposed campaign aims to attract around 1,000 participants, compared with the survey results, a realistic goal and the interest rate should not be higher than 3%. In order to increase the attractiveness of the campaign and especially to use the emotional attachment of the football fans, a possible next step could be the collection of possible rewards, perks and raffles from FC Malmö, its famous players, the city of Malmö or the strategic partners of the club.

6 The Demonstration Building in France – Clairefontaine

The Centre Technique National Fernand Sastre, better known as Clairefontaine, is located in the north of France in the forests of Clairefontaine-en-Yvelines, about 1 hour away from Paris. Established in 1988, Clairefontaine has grown into one of the world's most renowned training centres, offering a wide spectrum of activities and events to meet the high-performance demands. The training and coaching camps occupy an area of 56 hectares plus an extension of 5 hectares across the road, including 66,000 m² of green space. Clairefontaine owes its reputation mainly to its state-of-the-art facilities: there are 11 football pitches in total, made up of both artificial and natural grass and varying in size. The pitches also include the main pitch with a grandstand that seats about 500 spectators. The arsenal also includes gyms for indoor sports, athletics tracks and weight rooms, changing rooms and massage rooms, as well as a medical centre (Medical Centre of Excellence).

Figure 6-1: Clairefontaine Training Center

To develop and nurture the talent and potential of each player, more than 55 training sessions are held each season. But also off the field, training is carried out and investments are made in research and development, for example in the medical centre or in seminars and training schools, to maintain and pass on the accumulated know-how. The training centre offers accommodation for more than 300 people in 7 dormitories, resulting in around 40,000 overnight stays and more than twice as many meals are prepared per year. As the most famous talent factory in the country, Clairefontaine has also become an appealing tourist destination with about 600,000 visitors coming every year.

6.1 Potential Interventions in Clairefontaine

The techno-economic analysis of Clairefontaine led to the evaluation of eight potential interventions[4], three of which being prioritized in the first phase, the others being further assessed. The first phase is about:

- Replacement of an oil boiler
- Installation of EV chargers
- Photovoltaic panels

6.1.1 Oil boiler replacement

Clairefontaine provides high-quality facilities for the world's leading athletes. Thus, a major source of energy consumption is located at the medical centre, which (among other equipment) has a pool and Jacuzzi, for which heating is currently supplied with an oil-fired boiler. Replacing this boiler with either a heat pump or a biomass-based heating system has the potential of significantly reducing GHG emissions as well as fuel and maintenance costs. As part of the techno-economic assessment, the performance of two heat pump technologies (water/water, air/water) and two biomass technologies (pellets, woodchips) were compared with the current situation. This analysis indicated that a water/water heat pump with geothermal energy is the most beneficial option, resulting in

[4] Other interventions target water preparation, lightning, rainwater harvesting and optimisations in the restaurant located in Clairefontaine.

both a significant reduction in yearly fuel and maintenance costs as well as in a massive reduction of GHG emissions of up to 90% compared with the status-quo. Furthermore, such an installation has a comparably high lifetime of up to (at least) 30 years, which makes it a long-lasting, sustainable investment, especially considering the high oil prices. The detailed technical planning of a large scale water/water heat pump is complex (e.g. geothermal drilling is necessary) and the associated investment costs are high. Thus, in the next step of the analysis, actual investment costs will be assessed.

6.1.2 PV generation

Clairefontaine has several roofed buildings, including covered football pitches, which provide the opportunity to install a large-sized photovoltaic system. Additionally, the climate analysis shows good results concerning the specific photovoltaic power output (defined as the average value of photovoltaic electricity delivered by a PV system and normalized to 1 kWp of installed capacity) for the FFF Training Center, which is 1,130 kWh/kWp per year. The generated electricity could either be completely fed back to the grid at a current feed-in tariff of 9.8 Cent/kWh or self-consumed, which is a sustainable option to become more independent of external price fluctuations. Historic consumption data of Clairefontaine indicate that a very high level of self-sufficiency of more than 90% could be achieved. Furthermore, while the initial investment costs of a large size PV system are significant, initial calculations show that amortisation can be achieved in less than half the lifetime of the installation (at 2021 electricity prices).

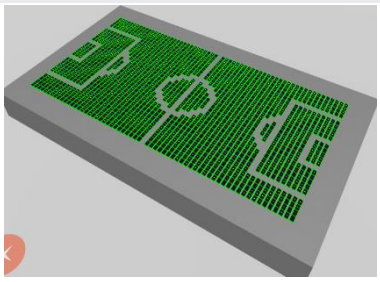

Figure 6-2: The PV plants could be arranged in the shape of a football

6.1.3 Installation of Electric Vehicle (EV) chargers

The Clairefontaine Training Centre is already equipped with several charging points for electric cars (at the three-star locations on the map below):

- 10 existing single terminals (unit power 3 kW): for the administrative FFF staff and golf cars in a basement car park with 37 spaces;
- 10 existing single terminals (unit power 3 kW): a golf cars outdoor parking;
- 4 double terminals, in the next future (unit power 3 kW): on the extension of the centre.

Figure 6-3: Location of the electric mobility terminals

So far, there is no recharging points for external visitors. The idea is to equip the site in this direction for which it is necessary to provide an identification and payment system. Visitors generally come from the Ile-de-France region and above all stay at least half a day on-site, with a minimum of 3 hours, which allows them to recharge sufficiently with more moderate power terminals. Employees will continue to charge their electric cars free of charge, a point validated by Human Resources. There are several requests from employees for additional charging points. The FFF would like to equip two new locations with charging stations at the places marked on the map by the two yellow rectangles:

- towards the medical centre for employees only, 4 places to be installed soon and a total of 12 places in the long term;
- in the visitors' car park, places to be installed soon and a total of 12 places in the long term.

6.2 Crowdfunding in France – some key results of the GREENFOOT survey

As described in the introduction, the core concept of GREENFOOT is to demonstrate real-world innovative crowdfunding schemes and leverage their high potential to onboard citizens in the Energy and Sustainability Transition. As a first step in the project, the international GREENFOOT survey was designed to gain a better understanding of people's perception of crowdfunding in general and of crowdfunding in football in particular.

In France, 1,043 individuals took part in the survey. GREENFOOT's main target group – football fans - is very large in France: around 47% of the survey participants indicated to be interested in football. Moreover, most people support the national team or a big local club.

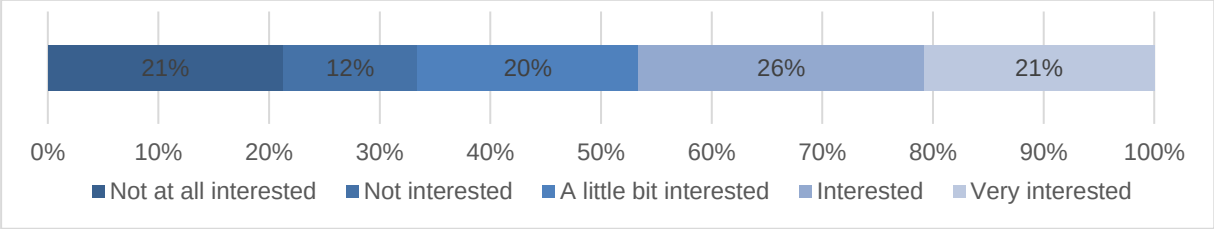

Figure 6-4: Interest in football, results of the GREENFOOT survey in France, n = 1,043

In addition to interest in supporting local football teams, respondents' opinions, intentions, and actions towards climate change also influence their likelihood to participate in a crowdfunding project. Around 32% indicate to very and 20% are extremely concerned about climate change. The relevance of energy choices in this regard is perceived as less important. Only 15% consider their own energy choices as extremely relevant and 32% as very relevant.

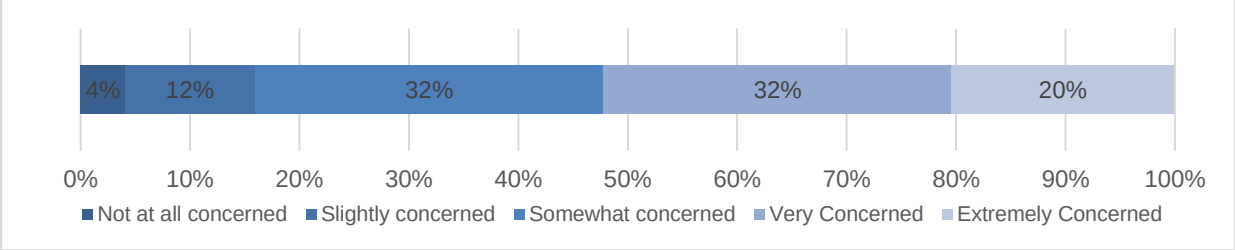

Figure 6-5: Environmental concerns (Q: 'How concerned are you about climate change?'), results of the GREENFOOT survey in France, n = 1,043

Further results of the survey show that the crowdfunding potential in France is very high although the median contribution is comparatively low. Around 500 participants were asked how much they would invest in a hypothetical

crowdfunding campaign to increase the energy efficiency of the Clairefontaine National Training center, which resulted in a crowdfunding potential of ~€ 277,00.00€.

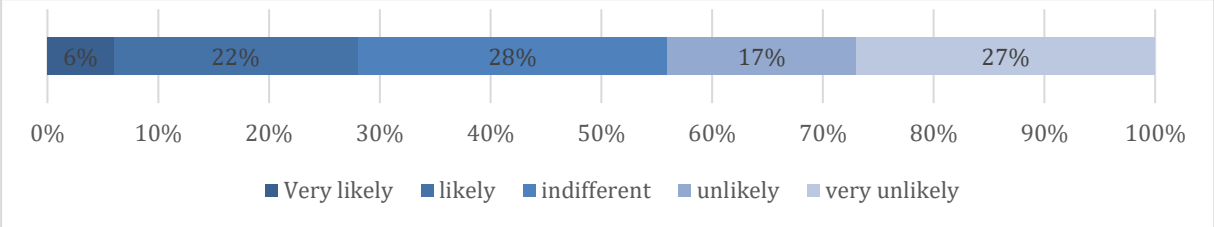

Figure 6-6: Participation in hypothetical crowdfunding (Q: 'How likely are you to participate in this crowdfunding campaign for Clairefontaine?'), results of the GREENFOOT survey in France, n = 1,043

The success of crowdfunding depends on several factors and tapping the right crowd is one the essential determinants. The results from the survey show that interest in football, environmental concerns as well as crowdfunding literacy are the main factors that influence the likelihood to participate in crowdfunding and it´s monetary potential among socio economic variables, like age and income. Indeed, the success of a sport related campaign seems more to be linked with the sense of belonging to the sport community, and the emotional commitment. The following graph shows the investments for football fans and non-fans.

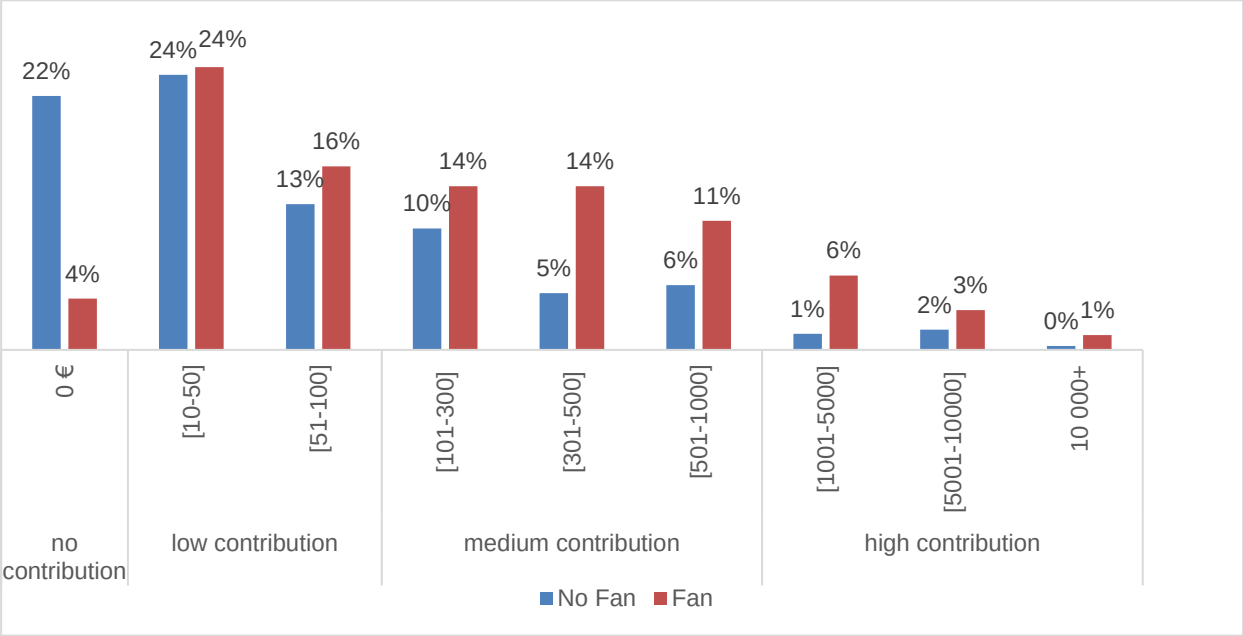

Figure 6-7: Individual contributions from the national crowdfunding campaign for French fans and non-fans.

Thereby, it becomes evident that football fans are more likely to invest and only 4% of the people that are interested in football would not invest at all. Moreover, only fans are willing to invest high amounts. This result shows that football fans are also keen to invest in sustainable campaigns that help to reduce football's carbon footprint.

Another determinant that is directly related to crowdfunding success is crowdfunding literacy. Even though, crowdfunding is relatively developed in France, around 50% of the people have not heard of crowdfunding and only 13% have already participated.

In order to select the optimal crowdfunding scheme, the preferences and motivation of the participants to take part in crowdfunding were gathered. The results show that the main motive to engage in crowdfunding is to help protect

the environment or to achieve a financial return. GREENFOOT combines both aspects and covers most of the expressed preferences. In terms of financial returns, it appears that participants perceive both classic investment mechanisms (repayment plus interest) and a reduction in energy bills as attractive. Moreover, around 10% of the people would participate in crowdfunding if they receive a unique product not available elsewhere.

6.3 Some key design parameters of a potential crowdfunding scheme in France

Combining the extensive findings from the survey, literature research and technical evaluation of Clairefontaine training center, the key parameters of a potential crowdfunding campaign for the realization of the large-scale PV system was designed. Based on this proposed intervention (see above), its estimated capital requirements and crowdfunding preferences in France derived from the survey results, a crowdlending scheme is proposed, combined with rewards, perks and raffles. As mentioned before, crowdlending is similar to any typical lending scenario, whereby individuals lend money to a company with the expectation that the money will be repaid with a financial interest.

In this proposed scheme, it is assumed that one single crowdfunding campaign is performed for the first phase works: replacement of the oil boiler, EV chargers and PV installation. Regarding the latter, the pay-back time is not the selling point of the project, but coverage against a strong increase in electricity prices by increasing or establishing a high level of self-consumption might be of significant interest. The total initial CAPEX expenditure is supposed to be around 1000 k€. Accordingly, we propose a crowdfunding campaign of 5 years for 100 % of the CAPEX. The repayment will be partially covered by the savings and partially covered by the Project Proponent, which will have the benefits for over two decades after the end of the crowdfunding campaign. Given the moderated global amount of CAPEX needed (1000 k€), also here the fans should be the main target, with a minimum individual contribution of 20 € to be as inclusive as possible. A maximum contribution might be introduced to bring more citizens onboard. The goals of the campaign should be to introduce the energy transition to some of the football fans and make a second and stronger attempt toward the maturity of crowdfunding (diminution of the overall cost of capital for the CAPEX seen from the angle of the project developer or infrastructure owner) by using the combination of lending with rewards / perks / raffles. Again, the project can start after the Project Proponent has decided on the interventions and then collects possible rewards / perks / raffles from stake-and shareholders.