

## **SUCCESS AND FAIL FACTORS IN SUSTAINABLE REAL ESTATE RENOVATION PROJECTS**

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### **Abstract**

*Sustainability remains an important issue for the construction industry. Yet, sustainable real estate developments are still considered as highly ambitious projects. To find out how and why sustainable renovation projects actually became sustainable we systematically evaluated 21 leading Dutch real estate renovation projects. In each project we interviewed the client, consultant, architect and contractor. Based on the results it was concluded that it is not necessary to have a pre-defined (sustainability) ambition in order to realize a project that can be considered sustainable in practice. Most of the respondents indicated that the ambition developed throughout the project, mainly because of the potential sustainable reputation or the parties involved in the project. Ambitions were not set as highly as expected: about half of the respondents consider preservation of the building and recycling as sustainable solutions already. The composition, management and collaboration of the construction team were found to be very important during the process. In this sense sustainable projects do not appear to be any different than regular projects, so then the only question is: Why not sustainable?*

**Keywords:** ambition; sustainability; real estate renovation, project management, process management

## **INTRODUCTION**

What we build, maintain and renovate today, has much influence on the achievement of our sustainability objectives for tomorrow. According to the Brundtlandt report (1987) a sustainable development is a development that meets the needs of the present generation without compromising future generations with the potential to jeopardize in their needs. Resulting from the agreements reached in 1997 in Kyoto, the Netherlands needs to reduce the emission of greenhouse gases by 6% in the period 2008-2012. The built environment is responsible for more than 25% of the total use of energy (Jeeninga et al, 2006). In addition, 35% of the national amount of waste is caused by the construction (Hails, 2008). The built environment therefore has a significant impact on the achievement of a sustainable society. Reports of the Ministry of VROM (2002), Atriensis/Vabi (2009) and van Oel et al (2010) show that the biggest potential for CO<sub>2</sub>-reduction is to be obtained of the attached row houses from before 1975. 3.6 million homes in Netherlands is built before 1976 (of a total of 7 million houses). Of this stock 40% (approximately 1.5 million homes) is weak from architectural and energetic point of view. Offices are of course also important energy users. The total office stock in the Netherlands consists of 46 million m<sup>2</sup> usable floor area, of which 27 million m<sup>2</sup> (= 61%) in the rental market. 7 million m<sup>2</sup> (= 13%) of this stock is permanently vacant, including hidden vacancy this is currently even approximately 25% (DTZ Zadelhoff, 2010). About 20% of all office buildings is in use by national government

and local authorities. The majority of buildings do not currently meet the sustainable purchase agreements of the Government, which is based on a minimum energy label C.

In 2007 the Government (Ministry of VROM, 2007) stated in its working programme "Schoon en Zuinig – nieuwe energie voor het klimaat" (Clean and economical - new energy for climate) three ambitions: 1) to reduce the emission of greenhouse gases, particularly CO<sub>2</sub> for 30% by 2020; 2) to double the pace of energy saving in the coming years; and 3) to increase the share of renewable energy of total energy use from around three percent to 20 percent by 2020. From this perspective the Netherlands should therefore strive for 'net zero' buildings and planning districts which are at the same time as healthy, comfortable and productive as possible and have positive impact on the environment. Energy neutral means in this sense that the total balance of energy consumption for a dwelling or for a district is equal to the energy supply. The three-step strategy of Trias Energetica (reducing consumption, commitment to renewable energy and efficient use of fossil sources) can help to realize this ambition.

For the Dutch construction industry the theme of sustainable is almost inevitable. Yet the Dutch construction sector is unfortunately still mostly project-oriented. Integrated approaches are often lacking, both in thinking and in the process, and knowledge is often not retained and sufficiently deployed in future projects. There is a growing social pressure on the construction sector regarding a contribution to innovation, sustainability and the environment. This means that will also be in the construction industry more and more knowledge sharing needed in order to achieve those goals. At the same time construction projects are a perfect means to achieve objectives in the area of sustainability because they are set up to achieve common goals (Emmitt, 2010; Tryggstad et al., 2010). More and more research is available about sustainable building processes (e.g. Häkkinen & Belloni, 2011; Horman, Lapinski, & Riley, 2005; Pitt, Tucker, Riley, & Longden, 2009; Stenberg, 2006). However, practice still seems to make the same mistakes. Next to that most of the research focused on new building projects instead of renovation. In the Netherlands several buildings and districts have been realized which can be set as exemplary projects in Netherlands, but these examples are (still) not commonplace. The 'Building Brains - Smart Building and District: Energy Neutral' initiative provided an excellent opportunity to make the knowledge about sustainable renovation projects explicit. Building Brains' is a Dutch research programme that has arisen from a series of crisis measures of the Dutch Ministry of Economic Affairs in 2009 to ensure that critical knowledge about construction is maintained for the industry. For the period of one year a diversity of companies from the total supply chain got together under the supervision of a few knowledge institutions to do research on the theme of sustainability in construction. One of the projects from Building Brains research program consisted of an analysis of the construction process of a 21 sustainable renovation projects. The main objective of this analysis was to close of the construction cycle of initiation, design, construction and transfer lessons learnt to future projects. The author of this paper participated as one of the team members in this evaluative research project.

## RESEARCH METHODS

Through desk research a long list was generated of sustainable projects that were realized in the Netherlands in the last 2 decades. The list consisted of 80 newly constructed projects and 40 renovation projects in the housing industry, 10 new and 10 renovation projects from the private construction industry and 20 projects from urban developments. In the end 21 projects were chosen to be included in the analysis for this project: 12 housing renovation projects, 5 sustainable commercial buildings and 4 urban area developments. The selection was based on

the criteria of information accessibility (are actors prepared to cooperate and is sufficient information available), use of energy sufficient and sustainable supply measures (e.g. double-glazed windows, solar panels, thermal storage), a fair distribution across sectors (housing, utility buildings), type of projects (cultivation, construction, building and area), types of clients (individuals, housing corporations, private organisations) and approach (innovation, integral approach and representativeness).

We developed a structured interview around a number of predetermined research topics: ambition, actors, measures taken, construction process and context of costs, policies & regulations. By approaching a topic from the perspectives of the various actors involved, it was possible to achieve a thorough way of understanding the success and fail factors in achieving sustainability. For each at least two other members of the project team were interviewed, such as the architect, contractor, sustainability advisor and/or a representative of the municipality. In some projects we also interviewed an external party, such as the energy supplying company or an additional sustainability engineer. In total we collected 73 interviews, which means an average of 3 to 4 interviews per project. Each interview was conducted by two researchers, recorded and written out. The interviews lasted between 45 minutes and three hours. The open answers were then categorized and analyzed with SPSS, together with the answers to the Likert scale questions. This paper discusses the results into the success and fail factors that relate to the cooperation and ambitions of the projects. It is based on the 'Inspiratieboek Duurzame renovatie (Building brains, 2010) in which the results are recorded from the analysis of all 21 projects.

## **RESULTS**

### **Ambition**

Literature (e.g. Van Bueren and de Jong, 2007; de Bruijn et al, 2002) suggests that the ambition of a project plays an important role in successfully realize a project. Our findings indicate that most actors agree on this because it supports the collaboration by developing integral sustainability ambitions, or as stated by one the developers: "Measures that the parties have embraced collectively influence the cohesion of the project positively." Quite a few respondents state that attention and time spend on the provision of a 'SMART' ambition in the initial stage of a project would therefore be beneficial for the further process. In this way, there is a shared frame between the project team members that can be evaluated at regular intervals to show the progress of the project. This is however easier said than done. The results of the interviews show that the concept of sustainability has different meanings among the various actors, but also within the same group of actors (see table 1). Most interviewees indicate that sustainability is about 'long term', 'integral' and 'the conscious use of materials'. Within the actor groups there are differences between the contractors that especially value the use of material (50%) and holistic approach (40%), and the architects who generally think in terms of integral approach and long term thinking (60%) in combination with the use of material (45%). According to the respondents the societal trend of sustainability doesn't necessarily go hand in hand with additional costs; 20% of the actors and 10% of the principals says that in principle there is no additional cost to sustainable construction. To the question of whether additional costs were made in their project, 50% indicated that the high level of sustainable ambition has led to additional construction costs which can be recovered over a longer period of time.

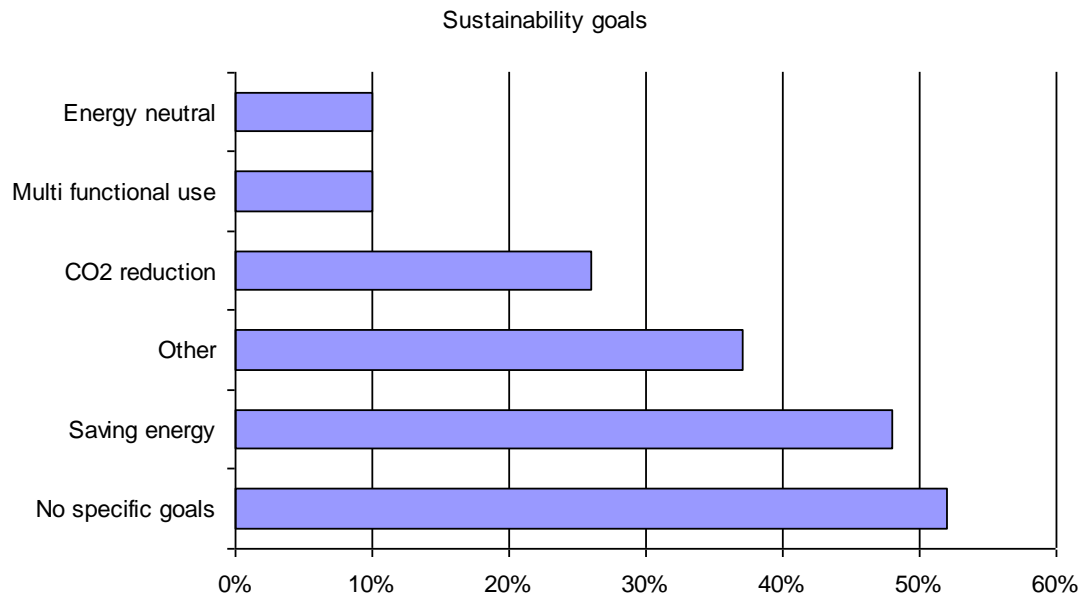
**Table 1:** Understanding sustainability according to the different actors

	<b>Integral and long term</b>	<b>Holistic approach</b>	<b>Conscious use of materials</b>	<b>Trias energetica</b>	<b>Social sustainability</b>
<b>Client/principal</b>	45%	20%	35%	10%	20%
<b>Architect</b>	60%	30%	45%	15%	15%
<b>Contractor</b>	35%	40%	50%	15%	15%
<b>Sustainability advisor</b>	45%	25%	45%	25%	20%
<b>Municipality</b>	40%	20%	40%	20%	15%

70% of the clients indicated that no clear sustainability ambition was established at the beginning of the project. For 10% of the respondents the ambition was too vague and for nearly 20% of respondents the ambition should have been more specific, measurable, acceptable, realistic and time-bound (SMART). Despite the fact that no real ambition was stated, about 40% of the respondents did indicate that maintenance, upgrading and/or renovation of the buildings was necessary, and almost 50% indicated that energy saving was the main goal of the renovation. Considering the fact that renovation is a sustainable option, sustainability became a central theme in these projects. So in many of these projects the ambition had grown in the course of the design and construction process because the opportunities arose. The respondents also indicated that when a higher ambition had been pursued from the beginning, probably even a higher level of sustainability could have been achieved.

According to the interviewees image and elaboration of the corporate social responsibility were a great motivator for the development of sustainable projects. Almost all the interviewees see that the importance of sustainability quickly increases, and that therefore alone they often consider the issue of sustainability. Many of the projects examined became known, often accidentally, as pilot projects and were considered exemplary for others. We have asked, in line with the Elkington's 3 P's of People Planet Profit, to indicate on a scale of 1 to 5 how much interest they have shown in the social, economical, spatial and ecological impact of construction (1 = no; 5 = very much). The actors gave most priority to the social importance (4.3) and spatial interest (3.8). The ecological interest (3.5) and the economic interest (3.5) have relatively the least importance, but in total all interests are quite important and well balanced. In these results the social pressure on sustainability also speaks. Yet, this outcome could have been influenced by the population chosen in this research because many projects were developed by housing associations, partly to increase the quality of the built environments in certain neighbourhoods.

During an analysis of the ambitions of the various parties, it appears that not one of the 75 respondents indicated to have the same ambitions as the client. Within the projects an overlap above 60% in aims could not be found. This indicates that if a project ambition exists, it is not to say that everyone is aware of this. One of the causes seems to lay in the fact that there is a lack of communication about the desired ambitions. As a result, the various actors act from their own experiences which could sometimes be against the expectations from other team members. If all parties are well aware of everyone's ambitions they could take this into account for further elaboration and realization of the plans.



**Figure 1:** Pre-defined sustainability goals

Both for the projects in which a sustainability ambition existed at the start of the project and for the projects in which the ambition developed throughout the project, in 65% of the cases these ambitions translated that ambition into obtaining a (reduced) EPC standard and/or energy label. Figure 1 shows which goals were set in the context of sustainability. Saving energy and CO2 reduction appear to be the most used goals. However, the majority of the respondents indicated to have no predefined goals.

It seems obvious that if an ambition exists, the development is monitored during the project and evaluated in the end. In 30% of cases the actors however indicated that no monitoring of the goals and/or the ambition had occurred. A little over 30% of the respondents said that the energy meter was monitored after use, while 10% said that ‘there were things monitored’, but didn't know how and what. Almost 50% percent of respondents indicated not to know who was involved in monitoring of the ambitions, 20% says that it was the energy supplier, 10% indicator the client and 10% the consultant. In line with Häkkinen & Belloni (2011) the lack of monitoring also applied to the costs during the projects. In one of the projects the budget needed to be adjusted halfway because of the high ambitions, and another project proved to be over budget afterwards. One of the respondents recommended implementing a good monitoring of real-time costs throughout the construction process. Then the ensuing effects on the costs on the overall budget can be shown at every change of plan and the ambition can be fine tuned consequently. It is striking that most actors assume that monitoring had taken place, but that they can say little to nothing about the actual results thereof. This seems to be caused by the fact that there is little to no aftercare in the post-delivery and user phase of projects; nobody appears to feel responsible when the final payments have been made. This blocks the learning effect in construction. A good monitoring and feedback of the results to all actors could ensure that the actual impact and usefulness of sustainable measures becomes clear to all actors and experiences are not only based on personal perceptions.

### **The project team**

The results also show that the composition of the project team and the level of enthusiasm are of great importance in realizing sustainable renovation projects. This is in line with the findings of Häkkinen & Belloni (2011) about Finnish sustainable building processes. The client of one the projects stressed that "the success of our project can definitely partly be

attributed to the involvement and collaboration of the team members; all actors have taken their responsibility". Consciously or not, the composition of the team also appeared to have an effect on the achieved sustainable results. If you opt for a sustainable architect or a sustainability consultant, it can be assumed that the level of sustainability of the project will be higher. However, it was also indicated that especially the client and the sustainability expert/advisor influence the development of an ambition in the direction of sustainability. 45% of interviewees indicated that their previous experience with the client has played an important role in their involvement in the project. This means that at the moment previous collaborations and familiarity with parties still play an important role in realizing sustainability.

Next to the composition of the team, the functioning of the team members is also important. In virtually all projects it was indicated that a motivated and enthusiastic leader that keeps addressing the sustainability theme is very important. In a number of projects the client took on this role, but in others the architect, consultant, contractor or a supplier was the most enthusiastic actor on the area of sustainability. Personal motivation was usually the main source of this kind of enthusiasm and it was also indicated that this choice was influenced by the fact that the role "wasn't claimed by others". This means that in principle any actor could play this part.

Too many personnel changes within the team can be a stumbling block for the project and for the monitoring of a particular ambition. A project manager indicates that "it is very inefficient to constantly figure out how the original setting was. If none of the original setting is involved, the collective memory disappears. It is not known what the objectives and working methods were exactly." Although it is difficult to manage a long-term project from start to finish with the same team, a constant core of actors does seem to have a positive effect on the success of the project because the goals and ambitions are clear and shared. In this respect some of the interviewees mention that it is important that members of the team are selected based on their personality and competences instead of the firms they belong to.

Ang, Groosman & Scholten (2005) emphasised the importance of the project leaders. This was also found in this research. The respondents indicated that the project leader should in any case insist that the ambition is developed on a detailed level and surveyed throughout the process. This usually concerns someone with good decision-making skills. According to an adviser of a housing project many sustainable options should be explored and matched to the ambitions, "but this should not continue for ever and get out of control. At a given moment choices should be made and the package of measures should be finalized." In one of the projects the open mind of the project leader was mentioned as one of the success factors. This openness gave much space in exploring the many possibilities for the package of measures. In the end the indecisiveness however changed into a fail factor: "a success became a failure. If not thought in a single, fixed direction, taking decisions became hard. Always examining everything, we had many sessions and many opinions of experts have been won. This created certain unintelligibility." An open mind should therefore also be accompanied by a pragmatic approach in order to keep things going.

Despite the positive effects of involving a diversity of actors, the respondents indicated the way how parties were involved could have been improved. This does not only have to do with the timing (82% felt they got involved at the right time, 56% was involved from the start) but parties must be concerned with the role they play in the team and should be thought along in creating integral solutions. As a principal of a housing project stated: "the installation engineer has the responsibility to apply an integrated design approach and should not focus on the individual identities." A hotly debated topic in the area of construction management is whether or not to involve a contractor in the initiative stage and/or design phase. The perception still exists (50% of the interviewees) that contractors are mainly involved to build

and that they do not have impact on the ambition level. In 8 projects the contractor was involved from the beginning on during the initial phase and/or design phase. The other actors indicated that they appreciated the early involvement of the contractor and so thought that he was involved on time. "A contractor should be taken in to consider the appropriate project-specific sustainable solutions," said a client of a housing project. A number of contractors also indicated themselves that they wanted to be involved earlier in order to improve the supply chain to deliver an optimal product and minimize failure costs. "The knowledge of contractors is currently too little exploited. We think that collaboration, plan development, and building relationships are more important than a one-time quick job. Long term vision and thinking of the contractor contributes to success".

Another success factor that was indentified in the research is the presence of sufficient knowledge within the project team. Especially for innovations project team members should be aware of the current sustainability options within their field. According to one of the advisors, consultants usually have short lines to keep up with experts and therefore have added value in implementing sustainable measures. In the same line of thinking one of the architects said that "Sustainability is not a layer on a building, but a part of the entire process." According to interviewees sustainability does not only occur in topics such as energy and fossil fuel but also in social and functional value of real estate. "Sustainability is also in the quality of the use: the living comfort and the environment. The building industry should think in values for the consumer/end user" as stated by one of sustainability advisors. Therefore "you first need to examine what these values are exactly." This means that input from the user is desperately needed (see e.g. Rohracher, 2001). In 9 of the 21 projects, the clients indicated to have successfully involved the users in the initiative stage, in one project they became involved slightly later, namely in the design phase. A large number of interviewees (38%) indicated that the end users were of positive influence on the project. Related to that, only 5% thought that users had negatively influenced the project outcomes. In one of the projects a targeted market research was performed because the users were unknown. This led to a good estimation of the living requirements and a smart solution for the diversity of the user needs. Remarkable was that even in projects where the need for the involvement of users was clear, interviewees indicate that the users could have been involved better and earlier. Further analysis showed that in 50% of the projects, communication only went into one direction: the users were only informed about the future changes or the use of the sustainable measures. Most of the time the users were not involved in the choice of options, while they have to deal with the buildings in the end. An important issue that contributes to the positive response of the user's appeared to be the understanding of their energy consumption. Because their energy usage was made transparent and they were able to track their own savings, a greater understanding of the necessary renovation was perceived. The residents got the legitimate feeling that the renovation had a clear advantage for them. In one specific housing project in the North of the country the users were so proud that they decided to change the name of the residential block: before the renovation they called the building a flat and after the renovation a full-fledged apartment complex.

### **Success factors**

After the various components of the research were discussed in detail, we also asked about the general success factors of the project (see Figure 2).



**Figure 2:** Success factors as indicated by the respondents

These factors can be divided into two themes: collaboration during the process and establishing goals. The collaboration factors related to the organization form and composition of the project team. Most of the projects were realized in construction team. Working in a construction team means that all parties are involved as early as possible. This means that collaboration and knowledge exchange can start from the early start. All team members (contractor, architect, advisor etc) think along from the beginning about the completion of the design and they know from the beginning what they have to each other. This makes it also easier to make adjustments and decision during the process. A successful construction team does require consciously selected partners that can complement each other as well. "It is all about the right people in the right places" according to a sustainability consultant. Several respondents emphasized the importance of good teams moving in perfect synchronicity with each other, and who know and each other. The atmosphere within the team also played a large role in many projects. In cases where the team members were very excited about the project, this enthusiasm turned out to have a positive effect on the commitment and the will to innovate. According to a project developer "an optimal package of measures was developed by this collaborative involvement. The main motivator for the innovation was not our own business interests, but the interest of end users. The team collaboratively sought to find a way to get the best return for the user." The results also indicate that good project and process management and process management are important factors to ensure a good cooperation. The project leader plays an important role in this. Except that he or she is supposed to be able to assess and monitor the goals or ambition, he or she must also be open to the possibilities around sustainable measures. In one project the 'open mind' of the project leader was highly praised. This project leader did not think in a single and fixed direction, but thought it was important to look at all the options available.

Good cooperation is also positively influenced by the presence of a sustainability ambition. As indicated earlier, in many of the projects insufficient attention was given to formulating and adopting the sustainability ambition. It is remarkable that in most of the projects the ambition to create a sustainable project was developed throughout the process; the project eventually grew into their sustainable ambition. Most of the actors consider the determination and monitoring of their ambition an important factor for improvement for future projects. Most of them even preferred a SMART defined one that could be adopted by all members of



the project team. However, it must be realized that recognized methods such as BREAM, GreenCalc + or other kinds of energy certificates is no guarantee for a sustainable, functional and beloved building. It is the art of a design to apply an integral approach and not just tick of a list of boxes in order to earn points.

Another remarkable success factor is the positive effect of applying for a grant. First of all because of the feeling of victory when obtaining a grant after energy and paper work costly process – this really boosts the project. Secondly because to obtain subsidies clear demands and conditions must be fulfilled. The rules and regulations of these kinds of arrangements ensured that the team members had a clear goal and discussed their preferences before or during the start of the project. Applying for a grant motivated, stimulated, and also increased the will to innovate. This is not to say that all projects have to apply for grants to have a targeted sustainability ambition but it does indicate the effect of having quantifiably and unambiguous directives and measurable ambitions. So even though there is no money allocated a grant still works as a motivator. The other side of the medal is that “whole books and budgets should be submitted. This was so slow and bureaucratic. It is not worth a few thousand Euros”.

## **DISCUSSION AND CONCLUSION**

It is very difficult to get a clear perspective on the concept of sustainability that exceeds the level of the standard systems in practice. We found definitions in the range from long term perspective and conscious use of materials to active housing and feeling comfortable. The level of sustainability of the measures however also depends on the situation. In new buildings for example, double glazing or a HR combination boiler is not seen as a specific sustainable intervention because it is considered a default value due to the laws and regulations in Netherlands. In renovation projects these measures are often mentioned as first because characteristics of the existing situation have to be taken into account. As previously noted in literature (e.g. van Bueren and de Jong, 2007; Tryggstad et al, 2010), we found two ways to achieve a sustainable ambition and realize a renovation project in a sustainable manner: establish a shared ambition at the start of a project or develop an ambition during the project. In relation to the realization process of a sustainable renovation project we found four main success factors:

- 1) elaborating an ambition helps in the beginning helps but you can also develop it on the way;
- 2) having an enthusiastic leader has a positive effect on the project;
- 3) a construction team with an active contractor could improve the holistic design approach;
- 4) use the input from end users by communicating in two directions.

These factors do not seem to be very different from factors that contribute to the success of any building project or sustainable building processes in other countries (e.g. Häkkinen & Belloni, 2011; Horman, et al., 2006; Sodagar & Fieldson, 2008). Media attention is an effect that occurred in almost every project, but that only a very limited number of project members had actually been kept in mind. Some projects received a lot of publicity for the way how they realized their high level ambitions; others received it for the innovative way of working, for example on how they participated with the residents. Because of the media attention these projects are now used as PR resources by the different actors and their firms. This is beneficial for their reputation and is usually an elaboration on their objectives in the field as social responsible corporations. While the findings indicate there is no reason not to develop sustainable projects, these findings also show that sustainable renovation is not yet a habit in the Dutch construction industry. In line with Häkkinen & Belloni (2011) we could conclude

that normative regulations are needed because the voluntary approach did not cause a significant change. However, this is not easy (van Bueren & de Jong, 2007) and comprehends a lot of bureaucracy and public money. We therefore hope that the 21 projects as examined in this project are examples of ambitious renovation projects in which sustainability became a general value instead of a single inspirational action. If that is the case, one question remains: Why not sustainable?

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