The majority of human activities, including consumption, take place in urban areas. These activities are possible through the input and output of streams like energy, water, materials, goods and waste. Due to human activities citizens are often confronted with local environmental problems like air pollution, disturbing noise and odours and soil contamination. These experiences and influential reports such as "The limits to growth" (1972), "A World Conservation Strategy" (1980), "A Strategy for Sustainable Living" (1991) and the "Rio declaration on Environment and Development" (1992) have strengthened the idea that urban metabolism is growing out of proportion. In an attempt to focus the attention on the need to reduce global environmental pollution, the World Commission on Environment and Development (WCED) introduced the strategic concept of 'sustainable development'. The WCED describes sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. Considering the amount of attention in the international literature, sustainable development is a successful concept. However, all this attention did not result in unanimous answers to questions such as: At what degree of pollution should limits be set in order to avoid irreversible degradation of the environment; which desires and aspirations are important; and, who decides these matters. More important is that countries that committed themselves to sustainable development have paid attention to the question: How can we realise a substantial improvement of the environment? In the search for answers attention is also paid to the physical design of urban areas. At the start of this research it became clear that the majority of environmental efforts are taken during the development of new neighbourhoods. However most households live and work in urban areas designed in a period when environmental aspects, which today are considered as important, hardly received attention. To reduce the environmental load, it is also useful to analyse the possibilities, which arise in these urban areas.

Urban renewal projects are often an answer to social and/or economic problems. Until recently, environmental issues were hardly considered important. Considering the many opposing interests and the high costs involved with changing the existing physical environment, it is unlikely that renewal processes will be initiated from a solely environmental perspective. Replacement of the existing physical structures through more environmentally friendly design options seems only to make a difference if these options are placed in a broader social framework. For this reason, this research focuses on the question of how municipalities in the Netherlands have involved environmental considerations in neighbourhood renewal projects. In this research 'sustainable city renewal' or 'sustainable renewal' means: Using an area-oriented approach to solving current
problems and foreseeable future problems, while at the same time improving local environmental quality and reducing environmental pollution at higher scale levels (for example regional or global level). The term ‘area specific approach’ is used to indicate that the specific characteristics of an area are taken into account, from an integrated point of view, and a connected package of measures is used to prepare an area for a better future. Post-war neighbourhoods in the Netherlands are often characterised by the threat of losing ground in terms of social and economic aspects. Investments in the housing stock and the living environment are often seen as important solution strategies to break through the negative spiral in which these neighbourhoods are trapped. This offers an excellent opportunity to look in a rational way to the possibilities of realising the necessary measures in an environmentally friendly way.

The aim of this research is twofold. First, it strives to get more knowledge about obstacles, which make it difficult to implement environmentally friendly measures in neighbourhood renewal projects. Second, it tries looking at these obstacles to offer a first concept for a methodology that improves the integration of environmental measures in neighbourhood renewal projects. This study makes a distinction between first order problems and second order problems. Reasons responsible for not paying attention to environmental issues in neighbourhood renewal projects are defined here as first order problems. Second order problems arise in neighbourhood renewal projects that clearly have the intention to improve the environmental quality but where this intention cannot be realised due to problems that arise during the implementation process. This study focuses on second order problems and ways to deal with them. The projects studied in this book are selected for their explicit intention to improve environmental quality aspects during the renewal process. The analysed cases give an overview of problems that can occur in neighbourhood renewal processes.

Aiming for sustainable renewal in post-war neighbourhoods is a challenging planning issue, because consideration must be paid to a number of complex processes. Planning processes can be subdivided into a substantive component and a process component. To deal with planning issues in a proper way, two sorts of information are needed: Substantive and procedural knowledge. Substantive knowledge focuses on the question: What is sustainable? Procedural knowledge focuses on the question: how can this sustainability be reached? Due to the subjective character of sustainable renewal, the decision process that structures answering the ‘what’ question is of great importance. Decisions about neighbourhood renewal processes are taken in local neighbourhood renewal networks. Simply stated, a network is formed by two or more actors who work together on a regular base to solve a common problem. The underlying relationships between actors create the foundation for a network. Characteristic for a local neighbourhood renewal network is that they consist of actors who are dependent on the means of others for realising their goals.
Collaboration is necessary but that does not prevent that every actor from this local network still strives to reach as much of his own goals as possible. The presence or absence of certain actors during key decisions can be of great consequence to the results of those decisions, and the results of the entire process.

For sustainable neighbourhood renewal, two networks are important: A network around housing and spatial planning issues and a network around environmental issues. How the actors of these two networks work together strongly influences the end results. Neighbourhood renewal processes can be analysed in two ways. First by the results laid down in several decision moments and second through the way these decisions are made. A decision reconstruction method is used to research how decision-making in the cases studied took its course. This also offers an opportunity to see if, in relation to sustainable neighbourhood renewal, current steering instruments from spatial planning, housing, environmental affairs and other relevant policy fields support each other sufficiently. Decision-making in local neighbourhood renewal networks is not only influenced by the reactions of actors to each other's decisions and the rules in operation within the networks but also by the surrounding context in which the network operates. The perceptions and goals, and with them the choices of actors in decision-making processes, can be influenced by characteristics from the surrounding context. This is explained in this study.

To reduce the environmental loads at the level of a neighbourhood within the frames mentioned before, it is of course necessary to have insight into the existing environmental situation. This raises the question: What are important environmental aspects at a neighbourhood level? It is up to the local actors to answer this question. To look at given answers in a rational way a framework is useful. Table 1 shows the substantive frame that is used in this research to analyse neighbourhood renewal processes for environmental aspects. In the study, this framework is explained further.

The environmental pollution generated at a neighbourhood level can be reduced or prevented in several ways. This study focuses on two levels of action: The scale of the dwelling and the scale of public space. Strictly speaking, the structure of the housing stock belongs to the level of public space, but considering the important position of the housing stock in post-war neighbourhoods this object merits special attention. A distinction can be made at both levels between care-taking measures and development measures. Care-taking measures are primarily focused on actual problems that do not in general need big changes of the existing physical structures and often have the intention to improve the liveability for the present inhabitants. Development measures often have a more strategic character. Attention is paid to future inhabitants and to the neighbourhood's relationship to the city and its surroundings. Development
measures are in general more expensive than management measures, which means that in practice the latter are seen as more attractive.

Table 1 Typology of environmental measures at the neighbourhood level: Horizontally divided into a dwelling level and a public space level. Both can be subdivided into maintenance and development measures. Vertically, the measures are divided in three categories of measures that impact on the environment.

<table>
<thead>
<tr>
<th>Dwelling level</th>
<th>Public space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical maintenance</td>
<td>Development</td>
</tr>
<tr>
<td>Physical maintenance</td>
<td>Development</td>
</tr>
</tbody>
</table>

Indirect
Neighbourhood quality

Local
Internal environment
External safety
Water pollution
Soil contamination
Air pollution
Noise hindrance
Odour hindrance
Dust hindrance
Street dirt

Above local
Water
Energy
Raw materials
Waste products
Space
Ecology & green

The studied cases show that for local environmental aspects, attention is focused on those aspects for which regular environmental targets exist. Much attention goes to external safety, soil contamination, disturbing noise, and to a lesser degree water pollution. Regarding the ‘above local’ environmental aspects, water, ecology and green and traffic received a lot of interest. Sustainable building also received some attention. However, in all the cases this attention is directed to new houses were the ‘measuring rod of Tommel’ is used as the point of departure. Surprisingly, there is relatively little attention for energy, while this aspect is one of the most important structural aspects. The explanation is that the energy saving measures are internalised, which becomes clear that the aspects for which attention is emphasised are such that at the local level, the requirements will be met.

Within the studied cases, the importance of the involvement of all parties was high. However, the cases also show the difficulty during a realisation that all parties take their responsibilities and that this means that energy is a priority. Moreover, there is an absence of standardisation. According to the cases, the processes are focused on solutions instead of standards.

The cases show that thinking during the realisation of corporations is not always clear that energy is a priority for corporations. Through the involvement of the department of environmental attention. In all the cases, environmental policy took the initiative and succeeded with the introduction of environmental programmes or institutions. Thus, the involvement of departments and other environmental institutions.

In all the cases, the civil servants tried to enhance the external aspects.
aspect is often central in studies about sustainability. This probably can partly be explained by the fact that energy is an aspect treated under sustainable building, which is already incorporated in three of the four cases. Another possible explanation is that in the Dutch building regulations energy performance standards for new houses, in combination with many subsidies for energy saving measures, has worked so well that this aspect in a large degree is internalised and the need to name it explicitly is gone. From the studied cases it becomes obvious that attention is mainly focussed on those environmental aspects for which the national government has formulated policy. This emphasises that for the implementation of environmental measures at a local level, the national government plays an important role.

Within the ‘Local Agenda 21’ movement, public participation is considered as an important strategy to achieve a more sustainable society. Such a bottom up approach calls for explicit attention to be paid to creating an open policy style. However, the cases show that as soon as the interest in the environment grows during a renewal process, inhabitants, private companies and local political parties take actions to counter this movement, often with success. This could mean that the environment for many citizens and organisation is not a high priority. Most inhabitants show little attention for environmental problems. The absence of active local environmental organisations also points in this direction. According to the findings of this study, participation in neighbourhood renewal processes seems to discourage the implementation of sustainable measures instead of supporting it.

The cases prove that actors can contribute to the integration of sustainable thinking during renewal processes. In the two smaller cases, the housing corporations took the initiative of starting the renewal process, and also made it clear that environmental issues would receive attention. In both cases the corporations made use of external advisers specialised in environmental affairs. Through the activities of these persons and support from the environmental department of the municipalities, environmental aspects received a lot of attention. In the two larger cases, the municipalities promoted interest in environmental issues. In both cases, public servants in the field of environmental policy took the initiative to put the environment explicitly on the agenda. They succeeded with this ambition because they were able to realise a connection with environmental projects which were already initiated by higher governmental institutions. This again stresses the important position of higher governmental departments in realising good preconditions for the implementation of environmentally friendly measures at lower scale levels.

In all the cases external environmental specialists played an important role. Since civil servants were already mostly responsible for local environmental aspects, the external specialists main concern was how to integrate the ‘above local’
environmental aspects in the plans. Environmental civil servants took care about local environmental aspects. In the two larger cases the activated environmental networks had more power to influence the renewal process. Besides knowledge and personal experience the environmental specialists from the smaller cases had no other means to optimise the integration of environmental interests within the renewal process. Especially the lack of financial means seems a limiting factor. The most important second order problems were: Uncertainty about environmental targets, underestimating the complexity of solving environmental problems, lack of direct usable environmental data and fear of additional costs. Within all the projects and during all the different phases, uncertainty about environmental goals exists. To handle these uncertainties all the cases activated environmental networks. An important target for the persons representing these environmental networks was to make more environmental knowledge available within the project group and to give more priority to the environment so that it received an equal position with other issues. In every case there were tensions between the wished targets and what could be achieved. It is remarkable that no concrete environmental conditions were formulated in any of the projects' design phases. For this they refer to the plan development and plan execution phases. The consequence of this choice is that many uncertainties are put forward and to a large extent are handed to other institutions and departments. A negative aspect of this approach is that the closer a project comes to its end, the more actors were inclined to favour their own job responsibilities. As a result of this attitude, priority for environmental aspects often declines. Without strong and clear environmental preconditions there is little that can be done to change this.

The need for information becomes clear at moments when physical changes are suggested to improve a neighbourhood. For many environmental aspects the desired information was not yet available. Present information was inadequate to reduce uncertainties especially for environmental issues with broader than local impact. Research requires time and money and if it is not well arranged can slow down the progress of a renewal process. On the other hand, with the required information it is possible to take decisions with more expertise, which can avoid problems in the future. Management of environmental investigations and the exchange of environmental information is in all cases organised through one key actor. It is therefore important to recognise that departure of these persons during the process can result in an important lost of on-hand environmental data at key decision moments.

Fear of additional costs due to the integration of environmental targets during planning was present in all cases. These costs consist partly of hiring environmental specialists and partly of implementing environmentally friendly measures. For the latter, the idea is often that these measures ask for higher investments than the normal measures. Another point is that if there are no specific environmental targets in place, it is difficult to estimate in advance the
possible additional costs due to environmental measures. At this stage it is, after all, not clear which environmental measures will be taken. Before making an investment it is normal to answer the questions: What will it cost; and, what does it yield? These questions are difficult to answer for relatively new developments and measures. Reasons for this is deficient knowledge of investment costs, environmental effects, environmental efficiency and consequences to other functions. This often results in conservative behaviour of actors towards creating environmentally friendly measures.

Neighbourhood renewal plans can only be realised if there is a clear vision for the future. Since municipalities are often the only local actors which have an environmental network, it is logical that they take the initiative of incorporating the interest for the environment in strategic plans. This pioneering work does not, however, mean that other actors don’t have responsibilities for the environment. It can be expected that housing corporations will shoulder their responsibilities with respect to solving environmental problems. To prevent that the environmental goals in a strategic plan should become loosened or weakened during plan implementation, it is preferable to have a person from an environmental network be a member of the central neighbourhood renewal team. This person can give both solicited and unsolicited advice. It is important to avoid that the central neighbourhood renewal network can easily neglect recommendations from local environmental networks. This is a responsibility for the national government, which can require implementation of environmental standards and at the same time offer the means to reach these standards. Besides these standards, much value should be attached to the evaluation of environmental results reached in renewal plans. This is not only to check if the environmental network related to the central renewal network was able to safeguard the interest of the environment, but also to determine if the realised environmentally friendly measures had the desired effect and if they were realised in an efficient way.