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Use case Renor

Verspillingsanalyse

Authors	Dave Baas, Werner Vink
Workpackage(s)	WP1 (subtask 'management level')
Results	Result 1, Result 2
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Deliverable Status	Final

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Summary

Before you do a deep dive on the performance of building components, you want to know how well your building is performing in general. To assess the performance of a building on management level we have developed the ‘Verspillingsanalyse’.

Based on just very little information and effort we give building owners, managers and other stakeholders direct insight in the current energy fitness of their building, where possible inefficiencies take place and concrete tips on how the efficiency can easily be improved.

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1. Introduction (1/3)

Our role in the project

Renor participates in the B4B project as one of the partners in workpackage 1 (WP1). Within WP1, we are part of the subtask group ‘management level’. This subtask group focuses on:

1. developing insights and information on management level
2. evaluating business opportunities and business cases with user groups

The main focus of Renor in the subtask group is on subject 1: developing insights and information on management level. To create the insights that we seek for on management level, we develop a solution called ‘verspillingsanalyse’. Besides our main focus on this part, we also contribute to subject 2 by delivering input (e.g. workshops).

1. Introduction (2/3)

Approach of advanced FDD can be expensive and complex

On average buildings tend to consume about 20-30% more energy than is needed. For some buildings it's less, for some buildings it's way more. This energy waste can often be eliminated relatively easy, by optimizing system settings and repairing defects. However, current methodologies to find and eliminate inefficiencies (FDD solutions) can be time consuming and expensive to implement. This is because they focus on data from building management systems (BMS), which can be hard to retrieve. Besides that, most of the current utility buildings in the Netherlands don't have a BMS with remote control.

This doesn't mean that advanced FDD is no good solution or should not be ~~development~~. However, advanced FDD does not offer a proper solution for low-tech buildings and may come with high entry barriers.

In addition to advanced FDD, a more simple and high-level analysis based on standard data from utility meters may fill this gap.

Initial findings from case study buildings

During several test projects, significant inefficiencies were detected and diagnosed based on meter readings. By analysing hourly meter readings from the main gas meter and electricity meter, potential energy savings of 15-20% were found across different buildings. In-depth analysis on the hourly data lead to direct and concrete optimization measures, such as adjusting system settings and operating times.

Problem statement

Apart from detailed fault detection methodologies, there is a need for a more high-level performance analysis, which:

- helps to quickly identify which buildings have a poor energy performance, so these can be focussed on;
- can be used for all buildings, also if there is no BMS;
- is easily scalable across the whole building stock;
- gives a simple assessment on management level, which helps to convince managers for detailed FDD.

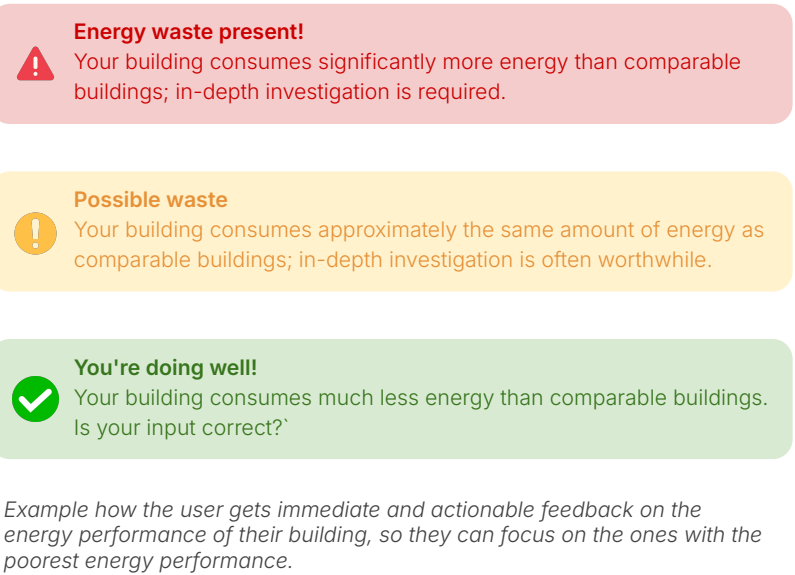
1. Introduction (3/3)

Proposed solution

A high-level performance assessment is build and developed as part of the project. The tool is online available and only runs on basic energy meter readings (annual or hourly readings from main energy meters) and aggregated building data (address, building year, floor area and energylabel).

In the tool, the user gets a high-level assessment of the current energy-fitness of the building, giving management level a direct indication on how well the building and its systems are performing compared to how they could perform.

In case there is a significant amount of inefficiency detected, we suggest a deeper analysis (step 2). In this step we perform an in depth analysis based on hourly meter readings of the building. ~~This~~ outcome of this analysis, a PDF report, gives a more concrete indication of the amount of inefficiency, but also comes with direct suggestions on how to improve the efficiency of the building.



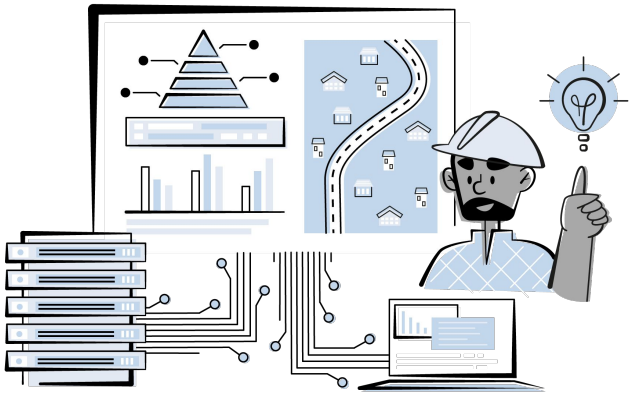
Example how the user gets immediate and actionable feedback on the energy performance of their building, so they can focus on the ones with the poorest energy performance.

2. Executed activities

Executed activities

In order to come to the product of Verspillingsanalyse we took the following steps:

- Develop proposition
- Develop framework of the product
- Set-up concept designs in mock-up and evaluate with potential customers
- Gather case study data for tests
- Performing manual analysis on case study buildings
- Development MVP for assessment part 1
  - literature review on existing assessments
  - test integration of 3rd party API's to increase user experience
  - development of assessment algorithms based on existing assessment
- Development MVP for assessment part 2
  - analysis of case study data and results with standard plots
  - drafting and testing algorithms for automatic analysis
  - standardization of plots and analysis in a report
- Testing and validation of the MVP
- Software development of the tool online
- Testing and validation of the tool online
- Launch live tool at www.verspillingsanalyse.nl



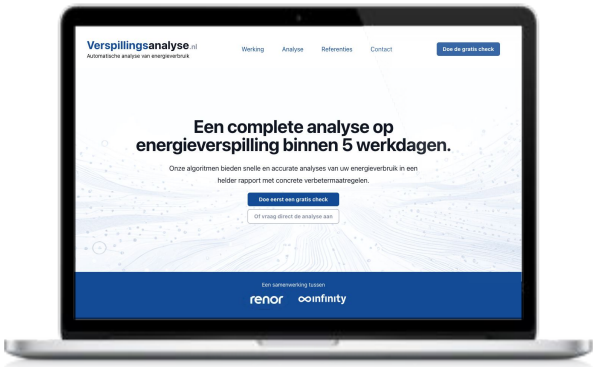
3. Outcomes of the activities (1/3)

Our activities within the Brains4Buildings project have a very concrete outcome: the tool Verspillingsanalyse, online available at www.verspillingsanalyse.nl.

The tool Verspillingsanalyse gives the user a direct indication on the energy fitness of their building. This helps building owners, building managers and other stakeholders to very quickly review the true performance of their buildings, and focus their time on the buildings with the poorest performance on energy efficiency.

In that case that we detect significant inefficiencies in the building, we perform an in-depth analysis. In the analysis, algorithms are used which are fed by domain knowledge of experts and findings from previous studies. Results of the analysis gives the user a better understanding on where the inefficiencies take place and suggestions on how the performance can easily be improved. The suggested measures can directly be executed by the building manager or contractor, leading to efficiency improvements of 20-30% by just minimal effort.

A more detailed description on how the user gets to these results can be found on the next pages.



3. Outcomes of the activities (2/3)

Step 1: check the energy fitness (free to use)

The first step in verspillingsanalyse gives direct insight in the current energy-fitness of the building. In this process the user has the following steps:

1. fill in basic information of the building
2. automatically retrieve floor area, building year and energylabel
3. fill in the (measured) annual energy consumption of the building
4. get direct feedback on the energy-fitness of your building, based on benchmarking and the Energiekompas of DGBC*.

Feedback on the first check with Energiekompas

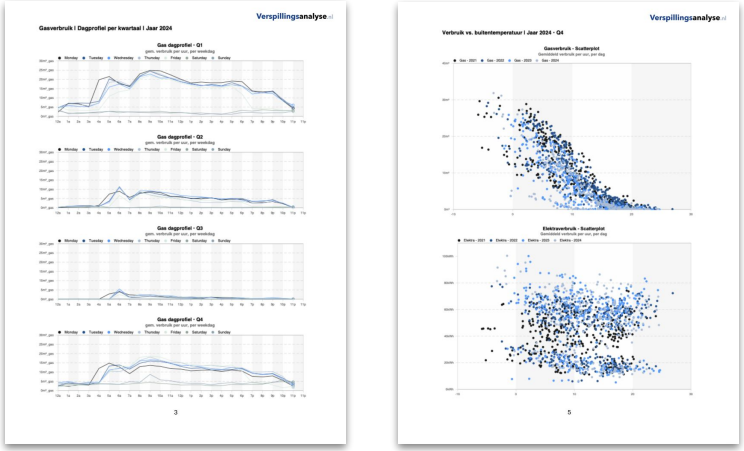
*Dutch Green Building Council

3. Outcomes of the activities (3/3)

Step 2: in-depth analysis on how to improve

In the case that step 1 implies significant inefficiencies in the building, you might want to have a better understanding on where the inefficiencies are and how you can eliminate them. This brings the user to step 2:

1. upload your hourly energy data in a simple spreadsheet
2. our team runs advanced algorithms on your data
3. receive a PDF report with in-depth analysis and concrete tips on how to improve the efficiency of your building, for example by specific settings in the building management system.



Impressions from the pdf report with in-depth analysis

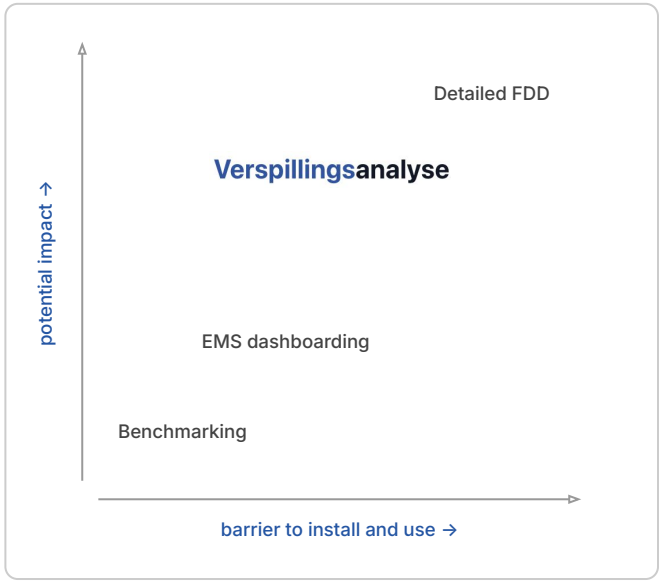
4. Result and conclusions

With the tool verspillingsanalyse we have developed a very effective tool for performance analysis with a low entry barrier to use for potential customers. The tool can easily be reached online and gives valuable feedback and tips on energy efficiency based on very little information.

The verspillingsanalyse uses very little information on energy main meters (hourly meter readings) and aggregated building data (address, building year, floor area and energylabel). Based on address, all information could potentially be retrieved online. This makes it a very scalable solution.

Testing on case study buildings has shown promising results, leading to potential energy savings of 15 to 20%.

The low entry barriers, high scalability and potential impact make the verspillingsanalyse a unique trade-off between benchmarking and detailed FDD algorithms. A good solution for most buildings and potential first step in fault diagnosis for complex buildings.



The verspillingsanalyse compared to other market solutions

5. Discussion

With the development of the tool, also potential weaknesses are identified. Those will be further investigated during follow-up development. The most important ones are:

- Due to the fact that the tool uses very little information, the analysis might sometimes lead to generic outcomes. We want to overcome this by continuously enriching and improving our algorithms based on the buildings that are analysed.
- Although the tool is easily accessible online and works with very little information, you still might want to have it even more ‘plug and play’. Therefore we will investigate opportunities to integrate the tool in other existing software applications we already have.

6. Follow up: use of outcomes in the company's market activities

How we use the outcomes in market activities

At Renor we help building owners in their transition of making their real estate more sustainable. We do this with a combination of services and software. The best example of our approach is how we connect a large amount of buildings in our online software application called Routekaartmanager.

By integrating the Verspillingsanalyse in our existing services and software applications, we are able to automatically evaluate and manage the energy fitness of a lot of buildings at the same time.

From 2025 on, we are also expanding the use of our solutions with other partners. On this way we can generate even more impact on the way to Paris Proof real estate.