DG ENERGY

Host, maintain and improve the De-risking Energy Efficiency Platform (DEEP)

REQUEST FOR SERVICES N° ENER/C3/FV2018-556/3/FWC2018-464/06 IN THE CONTEXT OF FRAMEWORK CONTRACT N° ENER/C3/2018-464

FINAL REPORT

APRIL 2020

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CONTENTS

1 Background

The De-risking Energy Efficiency Platform (DEEP) was launched in November 2016 by EEFIG, with the support of the European Commission. It is the largest pan-EU open-source database containing detailed technical and financial performance data of over 10,000 industrial and buildings related energy efficiency projects.

DEEP provides better understanding of the real risks and benefits of energy efficiency investments. By disclosing the real performance of thousands of projects, the DEEP platform is a new source of operational risk management information, which helps project developers, financiers, and investors better assess the risks and benefits of energy efficiency investments across Europe.

In accordance with the TOR and the Inception Report, the key objectives of the EEFIG3 assignment "Host, maintain and improve the De-risking Energy Efficiency Platform (DEEP)" are to increase the number of projects in the database; make the DEEP more user-friendly; and increase its added value for Financial Institutions and project promoters.

The present Draft Final Report presents the results of the hosting, maintenance and improvement of the DEEP, for the period up to April 2020 (end of the present assignment). This is structured in the following sections (in accordance with the TOR):

- **Section 2 - Improvements made to DEEP**, which includes a description of the improvements made to DEEP – in terms of improved functionality, additional features developed, data providers engaged, and additional data received and included in DEEP;

- **Section 3 – Insight from new data included in DEEP**, which includes an overview of new findings resulting from the new data included in DEEP, including key outcomes achieved and conclusions;

- **Section 4 – Links and synergies with other databases**, which includes a description of the potential links and synergies between DEEP and other databases as well as a description of the link between DEEP and the work of the working group on financial risk, and how the data collected in DEEP

could further support the development of new models for financial risk assessment;

- **Section 5 - Recommendations for further developing DEEP**, which includes such recommendations;
- **Appendix A – Executive summary**, a separate executive summary of the results of the assignment;
- **Appendix B – Presentation of main results**, a PowerPoint presentation of the main results, conclusions and recommendations; and
- **Appendix C – Description of the new data added**, a description of the data (sources, project types, number of projects, level of detail) on which the analysis in section 2 is based.

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2 Improvements made to DEEP

The present section includes a description of the improvements made to DEEP – in terms of improved functionality, additional features developed, new data providers engaged, and additional data received and included.

2.1 Improved functionality

2.1.1 Hosting and maintain the DEEP platform (Task 1)

The objective of this task is the hosting and maintenance of the DEEP platform including technical maintenance, security updates and compliance to the GDPR.

Technical specifications for hosting and maintenance

This activity concerns the upgrading and improving the DEEP platform framework. No major changes in the overall framework are foreseen.

During the second period (interim reporting in august 2019 to February 2020) the following tasks have been completed:

- Continuous upgrade of the Heroku to the latest stack version and base technology (Heroku-18+) that replaced cedar-14.
- Resolved compatibility issues with the new Django version used by DEEP platform 1.9.6 by addressing compatibility issues with upgrading the Django framework to its latest version (current compatibility issues with Django-allauth, psycopg2) as well as implementing new features of the latest version (app namespaces, url patterns, changes in User Object, etc, custom expressions, finding replacement packages with legacy libraries).
- Maintenance and upgrade of all Django components and plugins to ensure compatibility with latest Django version.
- Maintenance and upgrade of database technology (postgresql) to its latest version.
- Monitoring and analysis of application and database performance through log monitor and performance monitoring toolkits.
- Scalability and performance testing.
- Security – Addressing all security patches and updates related to all the layers of the platform; Database, Cloud-hosting environment, and Web framework (Django).

Security specifications and data protection

This activity concerns the maintenance and reinforce of the legal and security policies and mechanisms employed (authentication, authorization, auditing, policy-based management, and data encryption).

During this period the following technical activities were performed:

- All security updates have been applied for the current web framework and database versions.
- SSL certification has been updated (Expedited SSL) before January 2020. The next renewal is expected on SSL certificate expires on February 05, 2022.
- Sensitive information on the platform has been removed (names and emails of contact points).
- Continuous application of security updates on web framework and database.
- Provision of a description of DEEP Data protection policies description have been updated on the website.
- Installation of newest version of New Relic for event management, logging analysis and vulnerability testing.

Compliance to the GDPR

This activity ensures the validation of DEEP's compliance to the GDPR (user data stored, export data stored, right to be forgotten).

During this period the following technical activities were performed:

- Google Analytics has been removed from the website to be in alignment with GDPR as well as the EC policies.
- Matomo (a GDPR compliant analytics platform) has been used to track all web traffic that is based on Piwik – currently used as basis from Europa analytics).

2.1.2 Monitoring and analysing past and current use of DEEP (Task 3)

This task involves the monitoring and analysis of the past and current use of DEEP in order to gather information about the use of the DEEP platform and draw insights on how the DEEP platform can be further improved in all aspects.

Analysis of the DEEP usage

The activity involves the implementation of a GDPR compliant tool (see alternatives in Task 1) to be used to analyze past and current use of the DEEP.

During the first period (inception in April 2019 to interim reporting in august 2019) and after request from the EC the use of the Google Analytics has been discontinued.

During the second period Matomo analytics has been installed and used along with New Relic for monitoring and analysis of application and database performance. These tools will provide detailed statistics on visits, geographic, platform and interaction data (i.e. user data, how they arrive at the DEEP, how users navigate the website and what are the search preferences). The analytics data will be used to steer actions to increase reach (more user arrive at the DEEP), enhance usability (improvement of the visitors' experience during their

time on the platform) and determine the success of the DEEP's functionalities. Data from these analytics will allow us to make improvements to the platform and make it easier for the audience to reach their destination or find what they were looking for.

Figure 2-1 DEEP visits over time

Since the installation of the Matomo Analytics (end of December) the daily visitors of the DEEP platform are 421 ranging from 69 to 113 visitors per week, with 1,420 pageviews .The average visit duration was 4 min and 46 seconds.

The visitors per country are presented in the chart below

Country

COUNTRY	VISITS	ACTIONS	ACTIONS PER VISIT	AVG. TIME ON WEBSITE	BOUNCE RATE
Greece	24.7%	38.6%	5.8	10 min 54s	36%
Belgium	9.5%	8.1%	3.2	3 min 4s	45%
Denmark	7.1%	13%	6.8	10 min 25s	17%
Germany	6.4%	6.6%	3.9	1 min 43s	44%
Italy	6.4%	5.6%	3.3	4 min 15s	33%
France	4.5%	2.9%	2.4	36s	58%
United St...	3.8%	1.6%	1.6	1 min 8s	63%
Netherlan...	3.3%	1.4%	1.6	23s	79%
Spain	3.3%	3.3%	3.7	6 min 52s	29%
United Ki...	3.3%	3.6%	4.1	3 min 39s	43%
Finland	1.9%	0.9%	1.8	1 min 11s	63%

Figure 2-2 DEEP visits per country

The majority of the users were using a desktop / laptop device to access the platform as indicated in the following chart.

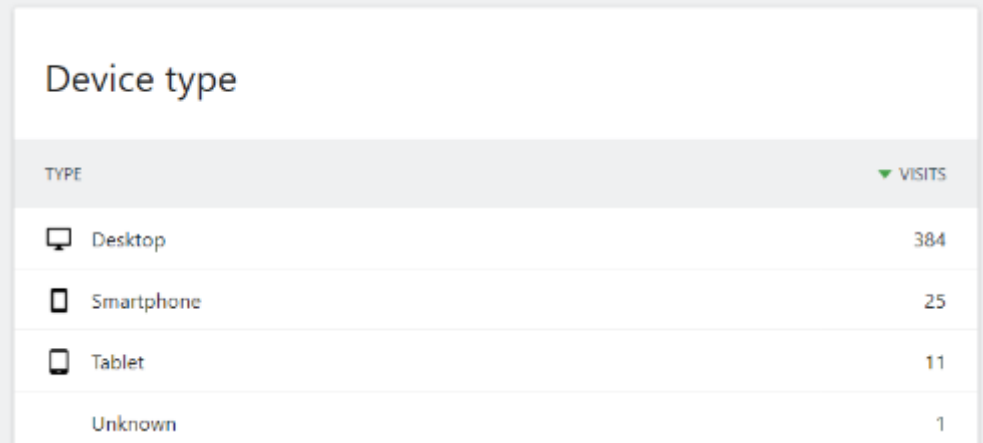


Figure 2-3 Deep visits per device type

Regarding the most popular pages visited, the following chart reveals that the View Charts functionality is the most popular followed by the toolbox and the factsheets functionality. Whereas the benchmark functionality is not yet utilized by many users.

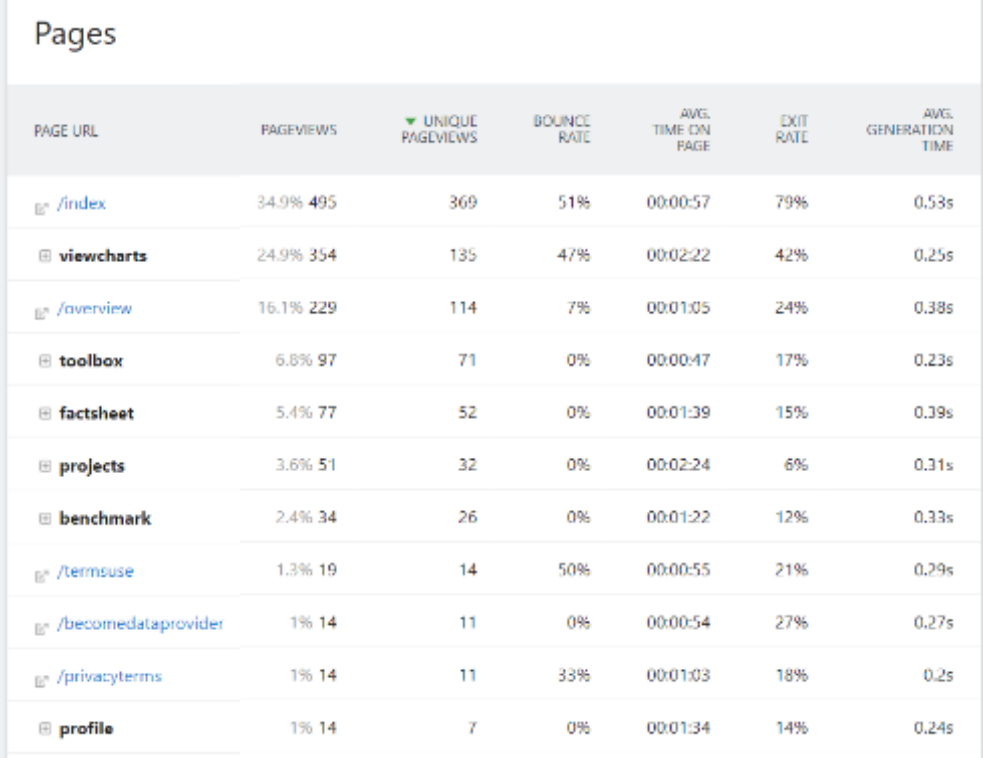


Figure 2-4 Deep statistics per page

The following figure presents the most popular user flows of the users in the website where it confirms that the majority of the users flow between the most popular functionalities of the platform (viewcharts, factsheet, toolbox)

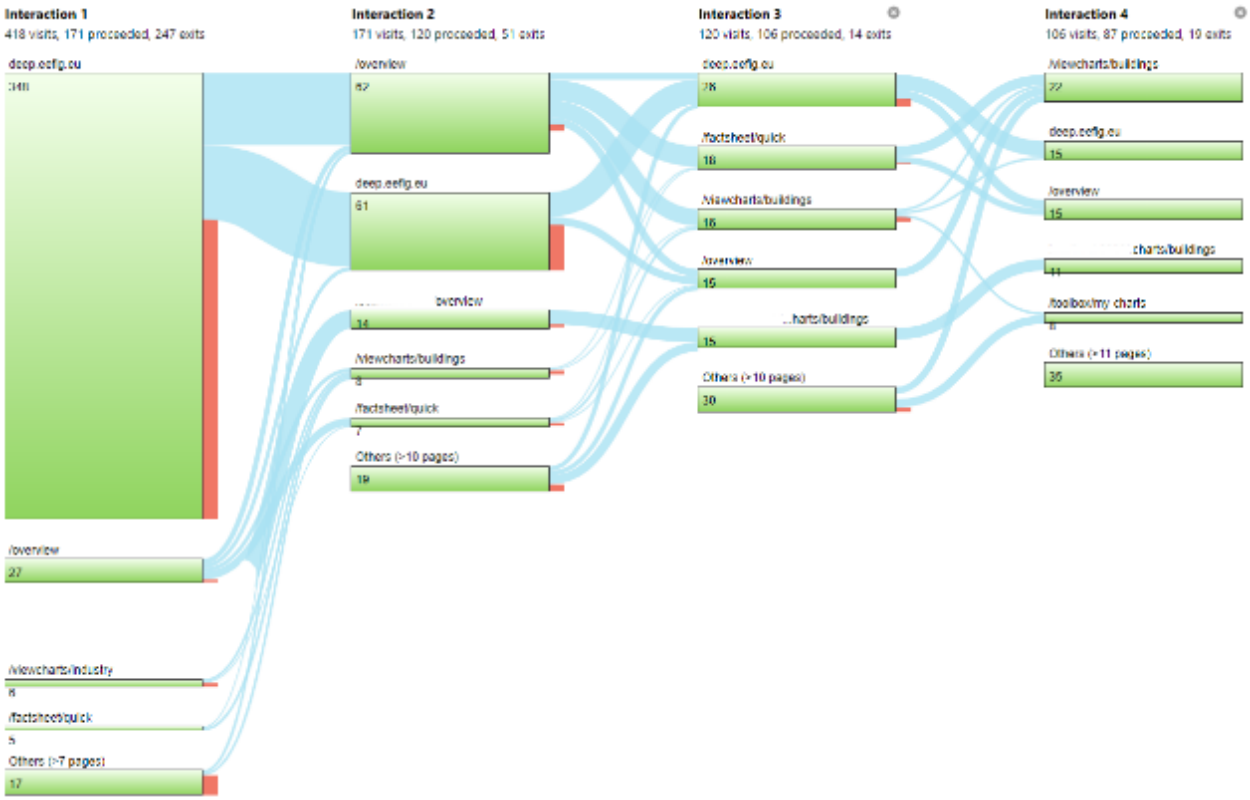


Figure 2-5 DEEP User flow

As described in Task 1 the usage of the analytics tools are aligned with the GDPR. The DEEP platform is GDPR compliant by performing a set of actions including IP anonymization, use of only pseudonymous identifiers, updating the privacy policy of the DEEP platform to explain about the data processing involved in Analytics Tools and gain consent from the users.

User characteristics and clustering

In order to ensure the effectiveness of the DEEP platform, for the remaining period (April 2020) a clustering will be considered focusing on the profile of the users themselves. This information will also allow us to match current user/visitors with defined DEEP target groups.

- The first level of classification will be made based on the user's background (policy, academia, finance, etc.). Figure 2 provides an indicative classification (same as the one used during the consultation by the HLEG on sustainable finance), based on the background of existing users.
- The second level of classification will be made based on the time the user spends in the platform. Such categories might be 'regular user', 'visitor', etc.
- In the case of 'regular users', further classification (third level) will become available considering the functionalities of the platform.

The diversity between the created clusters will be tested. Different clustering and classification methods will be considered in that direction, such as K-mean and decision trees techniques.

Search Engine Optimization (SEO)

Additionally, we performed a Search Engine Optimization (SEO) analysis and updated the metadata of the website, improved linking (e.g. descriptive links) and use of "alt" tags on the html pages of the platform.

2.2 Additional features developed

2.2.1 Opportunities for improving DEEP functionalities (Task 4)

The objective of this task is to explore ways to improve DEEP, including assessing possibilities for synergies with other databases, user needs and possibilities for improved functionality including in relation to data upload and download.

Engagement with selected FIs on possible additional functionalities

In close cooperation with UNEP FI, a virtual feedback workshop with selected financial institutions was held on March 25, 2020 with the participation of Societe Generale, OP Financial, Allianz and VIPA.

The participants were provided with a walkthrough of the DEEP as a tool for FIs with focus on the new functionality on IRR/NPV and Taxonomy related KPIs.

The participants provided the following feedback and suggestions:

- The new features on IRR and NPV are relevant for FIs and should be available as analysis in the portfolio benchmarking, but as FIs are particularly concerned with risks, the team is encouraged to explore ways to allow the data in DEEP to be used by FIs to assess risks in their debt exposures (through showing additional risk metrics such as e.g. standard deviation along with the probability distributions already shown)

- The new Taxonomy related KPIs are relevant from a FI perspective and the portfolio benchmarking option could allow comparison of private portfolios with benchmarking portfolios (limited by lack of date on the KPIs in the current database) as well as possibly with fixed benchmarks.

- The FIs promised to continue their engagement with the database.

Survey of DEEP users on possible additional functionalities

To support the ongoing development of the DEEP database during 2020-2021 and to further refine the strategy for data acquisition we propose to send out a short questionnaire to all registered users of the DEEP database.

The questionnaire will:

- inform them about the recent improvements in functionality
- allow them to confirm or decline continued user registration (in a GDPR compliant manner)
- assess whether the requirement for user registration is in itself a barrier to the wider use of DEEP (e.g. due to data security concerns or the nuisance related to remembering passwords)
- assess how their data needs could be addressed by the tool with existing and new functionalities
- assess what could be improved during the data migration process
- understand their main motivation to use the DEEP and or provide data.

The questionnaire will be set up with Surveymonkey or a comparable online Tool and is proposed to be rolled out during April-May 2020 to form a basis for the further development of the DEEP database in 2020-2021.

Proposed new functionalities in terms of data and algorithms

Synergies with other databases

To increase the number of datasets as well as the potential functionalities we have conducted a desk research to identify databases, which might provide useful information to improve the DEEP in various ways.

Project data

In Sweden a project has been initiated with data from industrial projects and in Switzerland a (non-public) database with > 1000 EE-projects from the voluntary agreements exists.

A first contact with the Swedish project showed some hesitance to share data, as the project has a commercial background. Further negotiations are needed. Regarding the Swiss data, to our current knowledge, economic data is lacking, which would limit the usefulness of this data.

Another example could be an integration with the data from the Industrial Assessment Center from the US. Their database contains data relevant for the DEEP (>100 projects have previously been integrated). This data link could in principle be automated. However, the use of US data might raise concerns from the users about the representativeness of the data. This will be addressed in the survey as described above.

Performance data over time

Although DEEP in principle could be further developed to collect (or enable access to third party databases containing) actual performance data over time, the experiences with the past data collection activities shows, that only limited data on performance of projects over time exists, as most programs in the EU do not include verification schemes of the savings, but mainly rely on ex-ante evaluations.

The upcoming market for energy efficiency contracting and the widespread implementation of energy management systems could be a source for this data, however, access to this data is limited, as this is usually confidential information.

Supporting/Auxiliary data

To establish the new functionalities, additional default reference data (energy prices, energy mix for power generation etc.) will be necessary. Within our analysis, we have checked which data can be used for our purpose.

Electricity and gas price data is available via Eurostat (nrg_price). Eurostat differentiates the prices for the different customer segments:

- household consumers (3 different consumption bands)
- non-household consumers (5 different consumption bands)

Prices for other energy carriers are not available from Eurostat. For the underlying technological options in the DEEP database, electricity and gas are the most important energy carriers.

The energy mix and the specific CO2 emissions for electricity generation can be derived from Eurostat data. The specific CO2 emission for fuels are independent of the power mix and will be included on default values for the emission reporting.

Formats of data input

Based on prioritized functionality improvements in DEEP, it was evaluated, what changes will be necessary in the data collection template, to ensure that the desired output parameters of DEEP can be produced and that the Simple Data Entry template contains the fields necessary to produce prioritized metrics.

The new metrics are mainly built on default and user defined data. On the other hand, some items could be omitted, as it has become clear in the previous data collection activates, that no statistically significant number of projects covering these indicators will be collected. However, any change in the Detailed Data Entry template will require tests to ensure that functionality is unaffected.

The following minor changes in the Simple Data Entry (which will not affect the underlying data structure in the Detailed Data Entry template) have been made:

- Inclusion of three additional fields from the Detailed Data Entry:
  - Value of grant/subsidy (if any)
  - Additional benefits triggered by the project
  - Rating of actual financial performance compared with expectation
- Removing one field (ZIP code)
- Small text changes (in three fields to emphasize Actual vs. Predicted)

Formats of data output

Based on prioritized functionality improvements in DEEP, it is proposed to continue to ensure that the desired output functionalities/metrics can be achieved as outputs. Furthermore, it is proposed to develop further standard reports and outputs that will enable easy access to the new data and KPIs.

Cooperation with related projects

In light of the confidentiality issues, cooperation with related projects may take the form of:

- Seeking agreements for data provision to DEEP (e.g. with additional national energy efficiency investment programs and with Financial Institutions engaging in energy efficiency).

- Sharing aggregated DEEP data in easily accessible formats (e.g. with the Revised building stock observatory).

Aligning DEEP with the EU Taxonomy on Sustainable Finance
Aligning the DEEP taxonomy with the EU Taxonomy on Sustainable Finance, can help to engage more financial institutions and increase their interest in DEEP 2.0. Being aligned with the EU Taxonomy is a benefit for the data providers, as it can help them prepare for ensuring compliance over the long-term and promote their investments as green / sustainable.

Ensuring alignment for new buildings projects within DEEP 2.0 can be implemented without increasing the complexity of the data collection approach. While we recognise that the draft Taxonomy (final TEG report) is not yet integrated in legislation, we have implemented three changes in the fields of the data collection template which will ensure alignment based on the information known as of March 2020:

1 Three new fields entries requesting the following metrics have been added:

   - Operational primary energy metric: The annual net primary energy demand during the operational phase of the building life-cycle, i.e. "Phase B6" according to CEN T350, calculated ex-ante according to the national methodologies for asset design assessment as defined in EN 52000, expressed as kWh/m2 per year

   - Operational GHG emissions metric: The annual net carbon-equivalent emission rate (Global Warming Potential – GWP100) arising from energy consumption during the operational phase of the building life-cycle, i.e. "Phase B6" according to CEN/TC350, calculated ex-ante for the building "as designed", and expressed as kgCO2eq/m2 per year

   - Embodied GHG emissions metric: GHG emissions embodied into building materials during production, transportation and construction (modules A1-A5) and end of life (modules C1- C4 and D) according to CEN/TC350, expressed as kgCO2eq/m2.

2 Added a new field indicating whether the calculation methodology for the measurement of floor area (m2) with clear definition of what is within boundary can be disclosed.

2.2.2 Action plan for improving the DEEP functionalities (Task 6)

The objective of this task is in continuation of Task 4 to implement measures to improve DEEP and make it more user-friendly.

Improve user-experience of the DEEP platform

The current front-end framework will be upgraded to the latest version (Bootstrap framework) to ensure optimal performance, browser compatibility and responsiveness. Moreover, the graphics, layout and website appearance will be improved, throughout different parts of the website including front and main pages and layout of the visualizations.

Additionally, this activity will include testing and bug-fixing front-end issues related to different browsing environments. In the context of this activity, the extend of browser support and backward compatibility will be decided based also on the data coming from Task 3 – and the analysis of data coming from google analytics.

Lastly an ad-hoc user feedback window will be implemented in order to provide a convenient way for users to provide feedback back to the users.

Integration of new functionalities

Better upload and data check-in mechanism

Currently no plausibility checks of uploaded data are performed. The database already comprises a large number of projects. They can be used as a benchmark for the uploaded data. If values are outside the 10% and 90% percentile range of the existing data, the uploader will automatically get a report of the data points in question.

It is important to tell the users, that the data might still be right (as 20% of the projects in the database are in this range), but a double check is recommended.

API to make use of the data in other applications

To allow third party users a better integration of the DEEP data, we have opened the database for an API access. The technical implementation considers the specific requirements of confidentiality. Thus, the API access follows the same strict confidentiality rules as the website access. This also means that only aggregated statistical properties can be accessed through the API, whereas individual project data is not accessible.

We will continue to discuss with stakeholders and explore internally, how the integration of an API can best create added value for the users.

Definitions of new parameters

One major shortcoming of the current DEEP implementation is the lack of financial indicators. In a first step, we have implemented NPV and IRR as a new analytical function for the projects. In a second step, we will continue to explore ways to include risk metrics in the database. This will be explored with financial institutions during the ongoing dialogue process. One potential indicator could be the standard deviation of returns for projects within each portfolio.

The indicators will be calculated based on the existing project data and newly added financial information. One core financial information - the energy prices - can be provided in two ways:

1. **The use of energy prices from Eurostat.** Eurostat provides energy price data for industrial and private users per member state. The energy

prices are differentiated for various company sizes. Those energy prices will be used as the default for the assessment.

2. **The use of user defined energy prices.** The users will be given the opportunity to define own set of energy prices to give the freedom to calculate financial indicators based on own energy price situation.

With the integration of energy price data and the lifetimes already in the DEEP will be able to calculate NPV, IRR and payback time for all projects with energy savings and investment data. Although payback times are already in the database for many projects, until now, this data is based on the individual economic properties of the projects. With our extended approach, DEEP will have a harmonized set of financial indicators, which are useful for most analyses. The existing payback times will not be useless, as they reflect the decision-making process of the actual project.

The discount rate is the second financial information necessary for the calculation of NPV. As discount rates are extremely dependent on the individual situation of a project (risk of project, sponsor and country, available financing options, etc.), they cannot in general be provided as default values. However, it could be considered to provide general guidance on typical levels of interest rates used for economic and financial analysis.

NPV and IRR are related indicators. The net present value is determined by calculating the costs (negative cash flows) and benefits (positive cash flows) for each period of an investment. The net present value is the sum of all future cash flows. The internal rate of return is the discount rate for a net present value of 0 in a defined time.

$$\mathrm{NPV}(i,N) = \sum_{t=0}^{N} \frac{R_t}{(1+i)^t}$$

t – the time of the cash flow

i – the discount rate

R_t – the net cash flow

In addition to the financial indicators, some new technical parameters for building projects will be included. They are based on the Green Metrics developed in the context of the sustainable finance taxonomy activities of the EC. Two major indicators have been identified to be of importance:

1. The carbon performance $CO_2e/(m^2*yr)$
2. In-use energy performance $kWh/(m^2*yr)$ (primary or final)

Both indicators require the floor area of the building as well as the energy use after the intervention. The two indicators are not available for all building projects (combined, only 400 projects have the required data now). As these metrics will gain importance in the future, the data collection activities will have to focus on these values.

Furthermore, we have included the new metrics explained in Chapter 5 to ensure compatibility with the EU taxonomy:

- Operational primary energy metric
- Operational GHG emissions metric

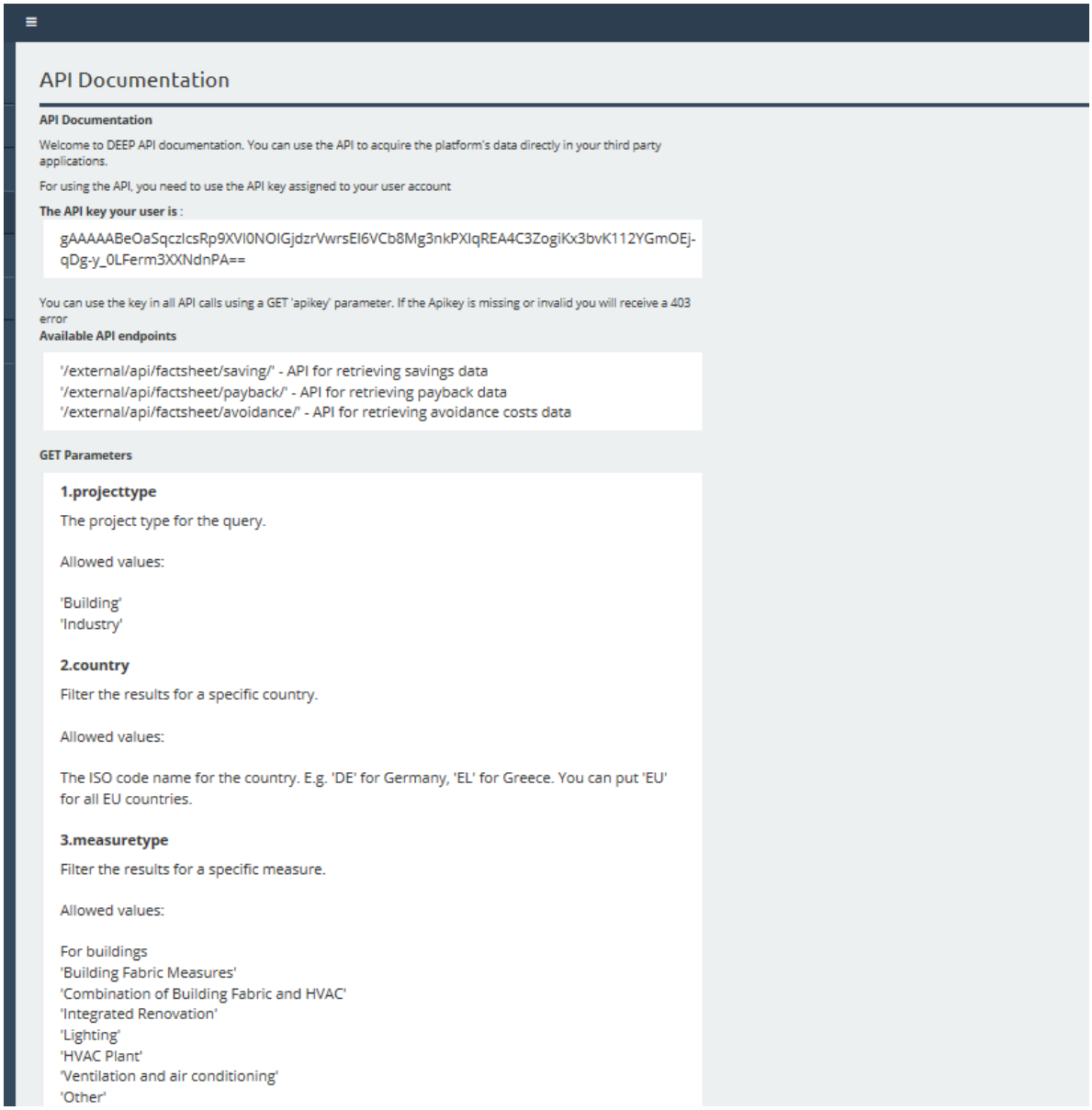
- Embodied GHG emissions metric

Those metrics are specific in their definition and are additional to the more general carbon and in-use energy performance, which does not follow the strict definitions of the TEG. Those three metrics are not be calculated from existing data but must be entered explicitly by the data provider. Hence, they will only be available for new projects entered in the database after inclusion of the new metrics. The included metrics are currently absolute (Specific energy demand before and after investment, CO2 emissions before and after investment). It is proposed to supplement this by relative KPIs in future updates (e.g. percentage change in CO2 emissions due to investment).

For the conversion form final to primary energy, as well as for the calculation of the carbon emissions, default conversion factors are included in the DEEP. Those values will be based on Eurostat data, where possible. As for the other values the user can use his own values.

The implementation of the new functionality is shown in the pictures below. Please note that these are intended only to illustrate the new functionality and not to demonstrate a particular conclusion and that individual number which are easy to see in the DEEP are not readable in the illustrations below.

Picture 2-1 Implementation of API



API Documentation

API Documentation

Welcome to DEEP API documentation. You can use the API to acquire the platform's data directly in your third party applications.

For using the API, you need to use the API key assigned to your user account

The API key your user is :

gAAAAABeOaSqczIcsRp9XVl0NOlGjdzrVwrsEl6VCb8Mg3nkPXlqREA4C3ZogiKx3bvK112YGmOEj-qDg-y_0LFerm3XXNdnPA==

You can use the key in all API calls using a GET 'apikey' parameter. If the Apikey is missing or invalid you will receive a 403 error

Available API endpoints

'/external/api/factsheet/saving/' - API for retrieving savings data
'/external/api/factsheet/payback/' - API for retrieving payback data
'/external/api/factsheet/avoidance/' - API for retrieving avoidance costs data

GET Parameters

1.projecttype

The project type for the query.

Allowed values:

'Building'
'Industry'

2.country

Filter the results for a specific country.

Allowed values:

The ISO code name for the country. E.g. 'DE' for Germany, 'EL' for Greece. You can put 'EU' for all EU countries.

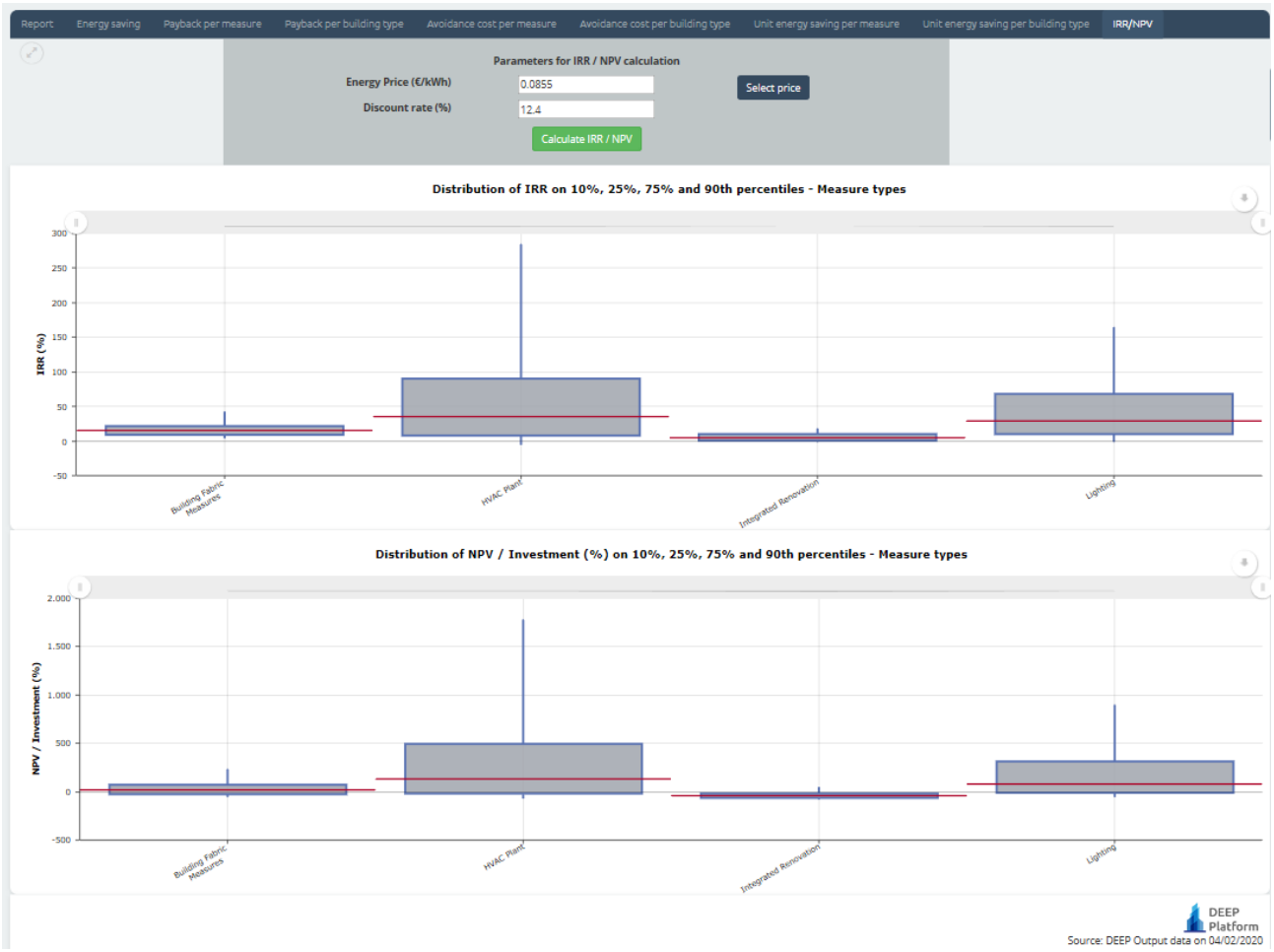
3.measuretype

Filter the results for a specific measure.

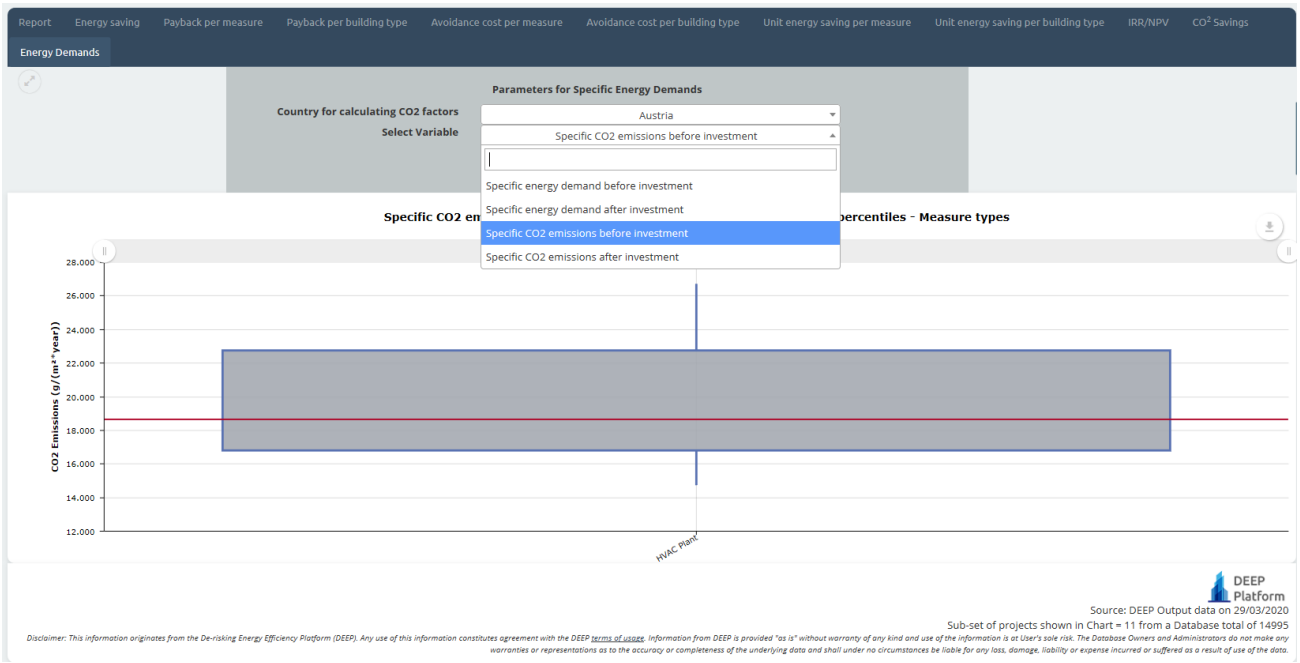
Allowed values:

For buildings
'Building Fabric Measures'
'Combination of Building Fabric and HVAC'
'Integrated Renovation'
'Lighting'
'HVAC Plant'
'Ventilation and air conditioning'
'Other'

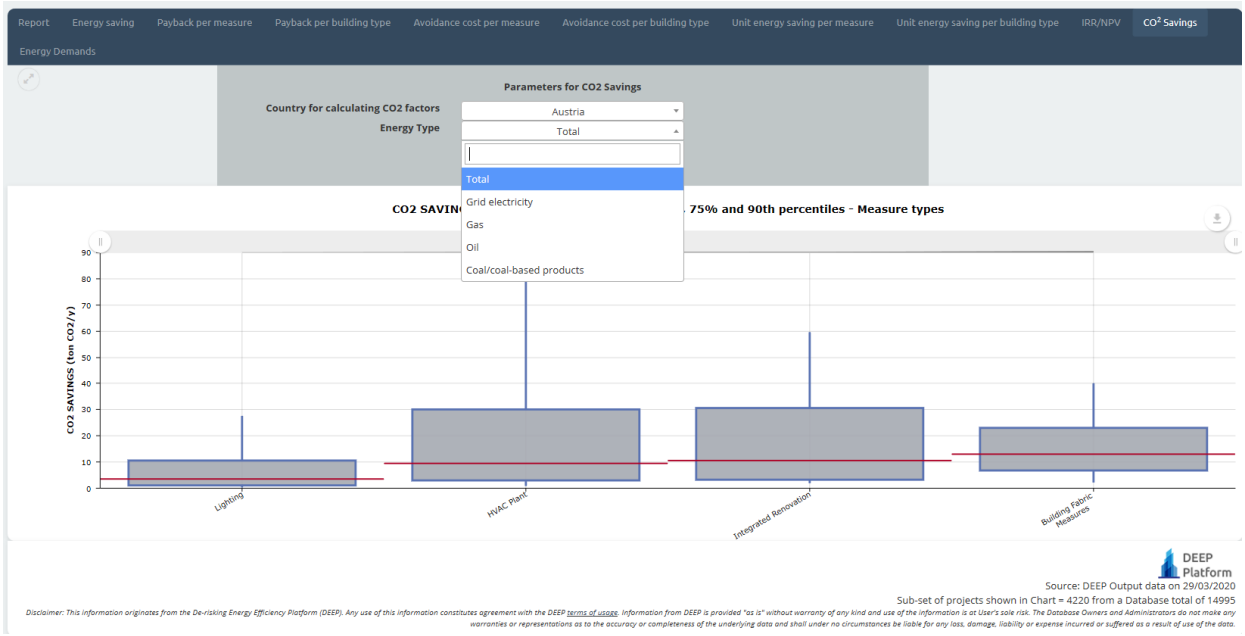
Picture 2-2 Implementation of NPV and IRR



Picture 2-3 Implementation of metrics aligning with the EU Taxonomy (Specific CO2 emissions before investment, shown as example)



Picture 2-4 Implementation of metrics aligning with the EU Taxonomy (CO2 savings)



2.3 Data providers engaged

As part of our strategy to reach out to data providers, we have in total engaged with 100+ organizations, which could provide data to DEEP. Those are summarized below.

Table 2-5 Overview of approached potential data providers approached

Name	Organisation	Country
Peter Wouters	(INIVE, BBRI)	EU level
Rui Fragoso	Adene	Portugal
Nuno Baptista	Adene	Portugal
Bogdan Potlogia	AE3R - Agentia pentru eficienta energeticasi energii regen erabile Ploiesti-Prahova asociatie	Romania
Naghmeh Altmann	AEA - Austrian Energy Agency	Austria
Nicolas Dyèvre	Agence de l'Environnement et de la Maîtrise de l'Énergie, ADEME (Environment and Energy Management Agency)	France
Roberta Boniotti	Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile (ENEA, Italian National Agency for New Technologies, Energy and Sustainable Economic Development)	Italy
Antonio Balmon Arévalo	AMB's Executive Vice-President (Barcelona Metropole area)	Spain
Liyana Adjavora	Association of Bulgarina Energy agency	Bulgaria

Ralf-Roman Schmidt	Austrian Institute of Technology	Austria
Irina Birlica	Autoritatea Naţională de Reglementare în domeniul Energiei (ANRE, Romanian Energy Regulatory Authority)	Romania
Edwin van Veenhuizen	BNG	The Netherlands
Dimitar Doukov	Bulgarian Energy Efficiency and Renewable Resources Fund	Bulgaria
Davide Colaccino	Cassa depositi e prestiti (CDP)	Italy
Lena Lampropoulou	Centre of Renewable Energy Sources	Greece
Petr Holub	Chance for Buildings	Czech Republic
Mircea Hava	City Alba Lulia	Romania
Herbert Brüning	City Norderstedt	Germany
Nicola Ferioli	City Parma	Italy
Katarina Machackova	City Prievidza	Slovakia
Petra de Groene	City Rotterdam	The Netherlands
Sean Kidney	Climate Bonds Initiative	UK
Jesper Kragh	Danish National Building Research Institute (SBi)	Denmark
Birger Laursen or Nina Detlefsen	Danish District Heating Association	Denmark
Elpida Polychroni	Department of Buildings, CRES	Greece
Pia Dorfinger	Deutsche Energie-Agentur (dena)	Germany
Pär Dalin	devcco	Sweden
Karlis Goldstein	DG Ener	EU level
Kerstin Schilcher	Die Österreichische Energieagentur (Austrian Energy Agency)	Austria
Karytsas	Director of RES Division of CRES	Greece
Cecília Gyalog	Director, EU Coordination Directorate, MFB Hungarian Development Bank	Hungary
Lazar Petrov	Director, Head of Unit Financial Instruments and EU Operational Programmes, Fund Manager of Financial Instruments in Bulgaria	Bulgaria
Thomas Nowak	EHPA	EU level
Reinhard Six	EIB	EU level
Desmond Gardner	EIB, Advisory services, financial instruments	EU level
Louise White	EIB, ELENA	EU level
Gatis Žogla	Ekodoma, Lead energy auditor Project manager	Latvia

Adrienn Buday-Malik	ÉMI Non-Profit LLC, Head of Strategic Developments	Hungary
Koen Gommers	Eneco	The Netherlands
Ana Abramović	Energetskog instituta Hrvoje Požar (EIHP, Energy Institute Hrvoje Pozar)	Croatia
Lisa Lundmark	Energimyndigheten (Swedish Energy Agency)	Sweden
Vlasis Oikonomou	Energy efficiency Policy support - Publenef project	EU level
Mauro Mallone	Energy Efficiency unit, Ministry of Economic Development	Slovenia
Emilie Carmichael	Energy Saving Trust	UK
Lukas Lundström	Eskilstuna Kommunfastigheter AB	Sweden
Alain Nadeau	EU Investment Bank - Head of Office - Budapest	Hungary
Susanna Longo	European Project Management and Policy Officer, Finpiemonte, Italy	Italy
Stefania Stea	Finlombarda, in-house financial institution of Lombardy region	Italy
Renate Schindlbeck	GIZ	Germany
Stephan Heieck	GIZ DKTI Energy Efficiency in Public Buildings in Serbia Program Leader	Germany / Serbia
Eefje SCHMID	Head of office EU Invesment bank Germany	Germany
Jukka LUUKKANEN	Head of office Finland EIB	Finland
Andreas Androutsopoulos	Head of the Energy Measurements Laboratory	Greece
Sorcha Edwards	Housing Europe	Belgium
Dina Ferreira	IFRRU (Instrumento Financiero Reabiltacao e Rivalitizao Urbanas) (Urban development Fund Portugal with an EE agency/component)	Portugal
Lucas van den Boogard	inenergie	The Netherlands
Silvia Díez	Instituto de Crédito Oficial (ICO), Head of International Financing.	Spain
Marisa Olano	Instituto para la Diversificación y Ahorro de la Energía (IDAE, Institute for Diversification and Saving of Energy)	Spain
Andrzej Guła	Instytut Ekonomii Środowiska (Institute of Environment Economy) - manager	Poland
Philippe Bernard-Treille	Investment Officer, European Investment Fund	EU level
Bettina Dorendorf	KfW	Germany
Arne Gooss	KfW Belgrade	Serbia

Antanas Katinas	Klaipedos Energija	Lithuania
Ondrej Sramek	Knauff	Czech Republic
Joanna Ogrodniczuk	Krajowa Agencja Poszanowania Energii (KAPE, The Polish National Energy Conservation Agency)	Poland
Bostjan Krajnc	KSSENA - Energy Agency of Savinjska, Šaleška and Koroška Region	Slovenia
Peter Rathje	Large-scale solar thermal and storages	EU level
Zane BILZĒNA	Latvian Environmental Investment Fund	Latvia
Valdas Lukoševičius	Lithuanian District Heating Association	Lithuania
Peter Jorsal	Logstor A/S	Denmark
Kenroy Quellenec-Reid	MEEF (Mayor of London EE Fund), managed by Amber, Financial Engineering Manager, European Programmes Unit, Greater London Authority, United Kingdom	UK
Madis Reinup	Member of the Management Board, Rural Development Foundation in Estonia	Estonia
Madis Laaniste	Ministry of Economic Affairs and Communications – KREDEX	Estonia
Pentti Puhakka	Ministry of Economic Affairs and Employment (MEAE)	Finland
Inesis Kiškis	Ministry of Environment LT	Lithuania
Irmeli Mikkonen	Motiva	Finland
Päivi Laitila	Motiva Oy	Finland
Fenn Faber	MyEnergy	Luxembourg
Valentina Petrus	Nadacia Habitat for Humanity International	Slovakia
Christiane Egger	OO Energiesparverband	Austria
Martin Brolin	Open district heating spot market for excess input to grid	EU level
Claudiu Georgescu	President of APMCR	Romania
Anders Dyrelund	Rambøll	Denmark
Tamara Lišnjić-Lang	REGEA	Croatia
László Szabo	Regional Centre for Energy Policy Research	Hungary
Elodie Denizart	representing the Regional Council of Hauts de France	EU level
Aleksandar Macura	RES Foundation in Belgrade	Serbia
Axel Lauterborn	Rheinenergie	Germany
Timurs Safiulins	Riga city council	Latvia
Marija Kruglova	Riga ENergy agency	Latvia

Morten Hofmeister	Savosolar	Denmark, Finland, Germany
Marian Minarovic	Secretary General Union of Towns and Cities of Slovakia	Slovakia
Kati Ruohomäki	Senior Adviser, Climate and Energy, Confederation of Finnish Industries EK	Finland
Mats Olausson	Senior Advisor Climate & Sustainable Financial Solutions, SEB	Sweden
Sven-Olof Ryding	Swedish Environmental Research Institute	Sweden
David Berman	Veolia	Belgium
Inga Kreicmane	Zrea	Latvia
Louiza Papamikrouli	Κέντρο Ανανεώσιμων Πηγών και Εξοικονόμησης Ενέργειας (ΚΑΠΕ/CRES, Centre for Renewable Energy Sources and Saving)	Greece
Mirela Plesca		Romania

The consortium has conducted two rounds of contacting to existing and new data providers whom have either been involved in the DEEP project in earlier, or who are aware of the DEEP database. The initial round of emails went out to 120 contacts from BPIE's list in November 2019 and received no response. We assume this is due to the impersonal email system and propose that a more personalized and interactive approach will be applied in the future.

Thus, as a follow up in December 2019, 100 contacts were personally emailed. The email included the EC letter of support and the excel file for data entry. From the second round of emails, we received 16 responses, two of which contained data (Bulgaria and Austria). Most responses indicated that they were interested in the project but did not have relevant data to provide at the moment. One respondent indicated they are not able to provide data for free, and several were concerned about privacy right of the data and were unsure what they were able to share.

From the responses, we are currently following up with the organizations who said they might be able to provide information in 2020, or who provided additional contacts to follow up with. For example, one contact from KfW said it would be difficult to share data as the data owners are the on-lending institutions, and that they are not obliged to track energy performance data, but that perhaps the development of the EU taxonomy provides great motivation for tracking. Therefore, data collection efforts are ongoing, and we plan to contact more data providers, including energy service companies (ESCOs), who may be able to supply a significant amount of data for DEEP.

The consortium is currently focusing on supporting the data providers which have responded positively to the request for contribution to DEEP. In addition, the consortium will in close cooperation with UNEP FI separately approach financial institutions engaged in green tagging. Based on previous interest in green tagging, the following institutions could be engaged in green tagging already:

Table 2-2 Potential additional data sources: FIs engaged in green tagging

Source	*Contact person*	*Country*
ABN AMRO	Through UNEP FI	TBD
BBVA	Through UNEP FI	TBD
Berlin Hyp	Through UNEP FI	TBD
HSBC	Through UNEP FI	TBD
ING	Through UNEP FI	TBD
Lloyds	Through UNEP FI	TBD
SEB	Through UNEP FI	TBD
Suedtiroler Volksbank	Through UNEP FI	TBD
Triodos	Through UNEP FI	TBD
UniCredit	Through UNEP FI	TBD
Natixis/AEM	Through UNEP FI	TBD
KfW	Through UNEP FI	TBD
Swedbank (initial tagging exercise completed)	Through UNEP FI	TBD
Societe Generale	Through UNEP FI	TBD

Table 2-3 below provides a summary overview of the additional data already received and included in the DEEP (in total 4,769 new projects).

Table 2-3 Overview of data already received

Data provider	Country	Sector	Number of projects
EERSF	Bulgaria	Buildings	19 additional projects
Danish Energy Agency **(Voluntary agreement scheme)**	Denmark	Industry	650 projects
German Ministry of Economy / Federal office for energy efficiency **(Funding scheme for crosscutting technologies)**	Germany	Industry	3400 projects
German Ministry of Economy / KfW **(Funding scheme for waste heat utilization)**	Germany	Industry	700 projects

A more detailed description of the data sources, project types, number of projects, level of detail on which the analysis in section 3 is based is included in Appendix C – Description of the new data added.

The table below provides a summary overview of potential additional data for which access is under negotiation with the data owner.

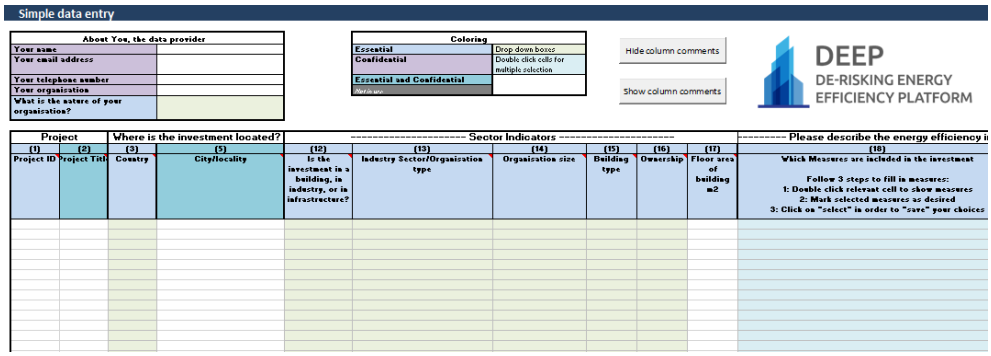
Table 2-4 Overview of potential additional data under negotiation

Data provider	Country	Sector	Number of projects
CIMNE (International Centre for Numerical Methods in Engineering)	Spain	Buildings	2-3,000
EIB ELENA (European Local Energy Assistance)	Multiple	Buildings	TBD
ADENE (Agência para a Energia)	Portugal	Buildings/Industry	TBD
ICO (Instituto de Credito Oficial)	Spain	Buildings	TBD
Energies-demain	France	Buildings	2000

To facilitate the data collection process, the data collection template has been updated as follows:

- In the sheet "Simplified Data Entry" one field (zip code) has been removed, three field names have been improved, and three fields from the Detailed Data Entry sheet have been included (as agreed in earlier communication with DG ENER).
- In the sheet "Detailed Data Entry" five new data fields have been added to ensure that the DEEP taxonomy is aligned with the EU Taxonomy on Sustainable Finance. Moreover, fields after field number (71) have been hidden, as it is only a very limited number of the current projects in the database that have been able to provide this information.
- Finally, the layout of the template has been modified in terms of colouring of cells, consistency in field description, addition of two rows at the top have been added and a new column, addition of DEEP logo, adjustment of macros to the changes in the row and column numbers.

A screenshot of the updated data collection template is illustrated below.



Despite the existence of a good letter of support from DG ENER, strong confidentiality provisions and the proof of concept of an existing database with 10,000 projects it has been challenging and time consuming to close new data delivery agreements. Based on the specific interaction with data providers over the last year, this often reflects a combination of factors:

- Lack of clarity of data ownership
- Inability to determine who has a mandate to share data or approve that third-party aggregator share data they manage
- Increased concern over GDPR and risk of violation of (often unclear) rights
- Need for internal legal assessment before management approval
- Lack of internal resources to extract, anonymize or otherwise prepare data

This has necessitated lengthy communications with the successful new data providers, repeated presentations of the DEEP, clarifications around the objective of the database and the data security, as well as assistance for formatting of data received in a raw format (not complying with the standard input format) and quality assurance of received data.

Further, to this it has become clear that many publicly financed support schemes have not been sufficiently concerned with structured data collection on supported projects for later evaluation and that the minimum data necessary for inclusion in DEEP (type of measure, investment, energy saving) is often not collected in a structured way.

Finally, there is a fundamental trade-off between quantity of data and quality of data. In principle a larger number of projects could have been included, but only data of reasonable quality and provided from credible sources has been included.

3 Insight from new data included in DEEP

The present section includes an overview of new findings resulting from the new data added in DEEP, including key outcomes achieved and conclusions.

A more detailed analysis is included in Appendix C – Description of the new data added.

Table 3-1 Overview of insight from new data

Data set added	Contribution to general conclusions	Contribution to diversity in data	Specific insight
EERSF	Validates existing insight from DEEP	Complements existing Bulgarian data	These were benchmarked against existing Bulgarian building projects in the database and found to have a higher payback time. This is partly explained by the new projects being mainly building fabric measures. But the new Bulgarian building projects are fully consistent with the broader DEEP portfolio, indicating that the original Bulgarian dataset has relatively lower payback times than the rest of the portfolio.
Danish Energy Agency (Voluntary agreement scheme)	Validates existing insight from DEEP	Provides a new country in DEEP	The Danish industry projects have a similar distribution of payback times as the broader DEEP database, however, slightly higher payback times. The average simple payback time is about one year higher for the Danish projects than for the existing projects in the DEEP database. This can be explained by the Danish projects being part of a voluntary agreement scheme where the industry commits to identify, implement and report energy efficiency projects with a payback time of up to 5 years.
German Ministry of Economy / Federal office for energy efficiency (Funding scheme for crosscutting technologies)	The payback time of the new projects is about 4 years compared to 2 years of the existing industrial projects.	Complements existing German data	Higher payback time and avoidance costs due to subsidies compared to the existing projects (projects are subsidized by 30% by the funding scheme).
German Ministry of Economy / KfW (Funding scheme for waste heat utilization)	The median payback time is 8 years for the new projects compared to 3 years for the existing projects.	Complements existing German data	The new projects have significantly higher avoidance costs as well as payback times than the existing projects. This effect can partly be explained by the origin of the data. The projects are part of a funding scheme with subsidies up to 50%.

The new German and Danish data integrated in DEEP changes the average payback time and avoidance cost for industry projects in DEEP whereas the data for buildings remains unchanged (see charts below).

Figure 3-2 Average payback time - Industry

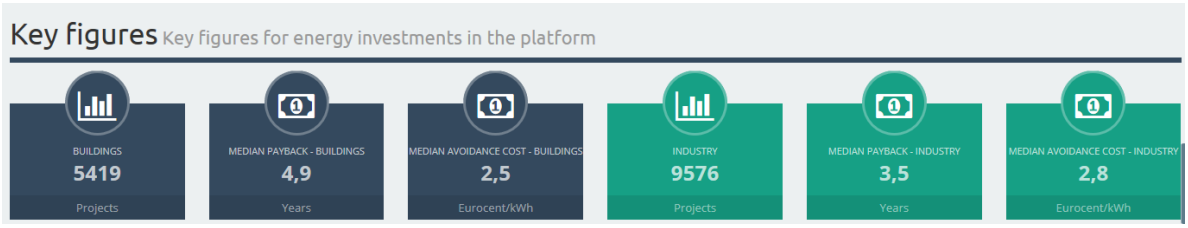


Figure 3-3 Average payback time - Industry

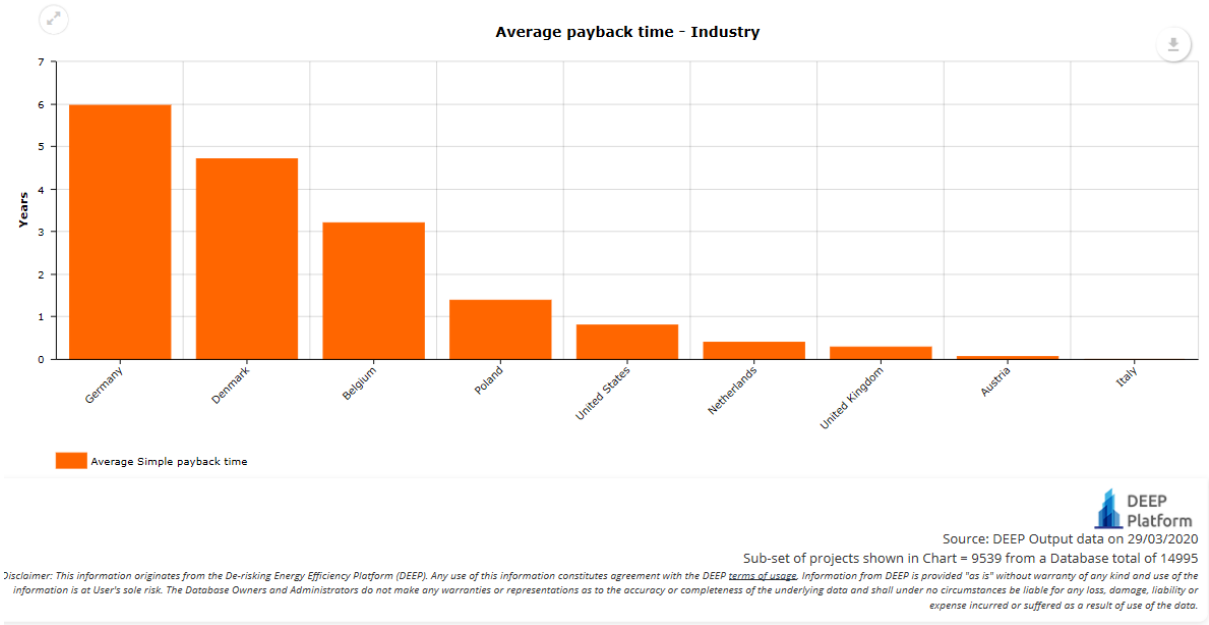
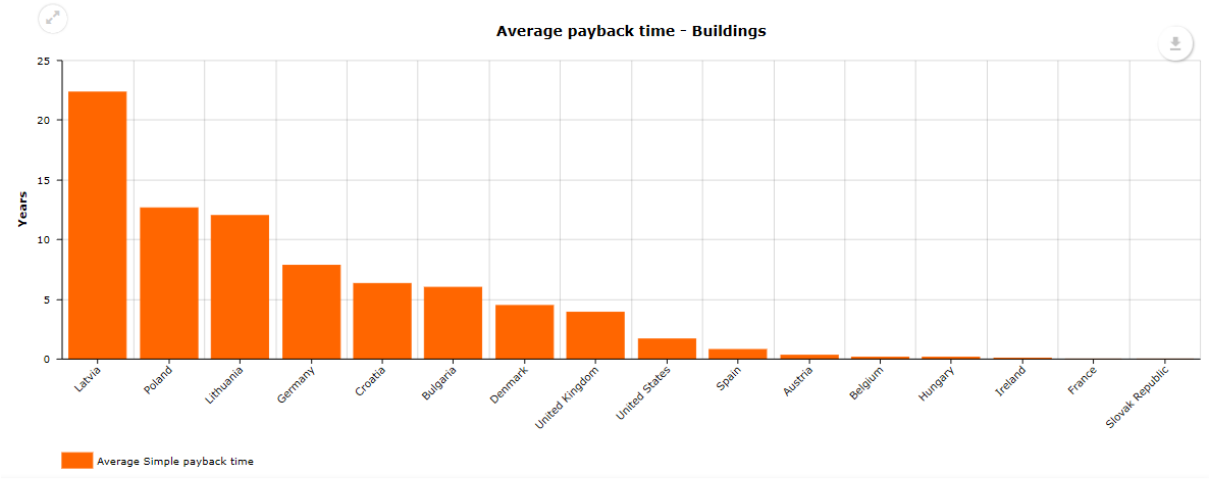


Figure 3-4 Average payback time - Buildings



DEEP Platform

Source: DEEP Output data on 29/03/2020

Sub-set of projects shown in Chart = 5371 from a Database total of 14995

Disclaimer: This information originates from the De-risking Energy Efficiency Platform (DEEP). Any use of this information constitutes agreement with the DEEP terms of usage. Information from DEEP is provided "as is" without warranty of any kind and use of the information is at User's sole risk. The Database Owners and Administrators do not make any warranties or representations as to the accuracy or completeness of the underlying data and shall under no circumstances be liable for any loss, damage, liability or expense incurred or suffered as a result of use of the data.

4 Links and synergies with other databases

The present section includes a description of the potential links and synergies between DEEP and other databases - as well as a description of the link between DEEP and the work of the working group on financial risk, and how the data collected in DEEP could further support the development of new models for financial risk assessment.

4.1 Alignment of data structure

Several other databases and projects have shown interest in aligning their data structure with the DEEP data structure:

- EIB ELENA (for new data collection)
- CIMNE
- TiersFi database

4.2 Sharing of data

Due to the confidentiality provisions of the DEEP, it is not possible to share individual project data from DEEP.

However, the same confidentiality provisions could enable longer term agreements on data access from preferred data providers to DEEP.

4.3 Links with the WG on financial risks

The data structure of the DEEP is snapshots of energy renovation projects rather than multi-year timeseries of financial performance data for individual financial assets used to finance projects.

Nevertheless, the evidence of the DEEP provides an important contribution to understanding statistical aspects of the risk/reward of energy renovations as an asset class and may therefore complement the timeseries based analysis compiled in the WG on financial risks.

5 Recommendations for further developing the DEEP

The present section includes recommendations on further developing the DEEP.

The following ideas for improvement and expansion of DEEP in the future were shared with the EC on 31 October 2019:

Technical improvements

1. Improve general layout of DEEP including the UX and design and making the diagrams simpler.

2. Define all parameters/indicators in DEEP.

3. Improve the usability of the Analysis Toolbox.

4. Review for bugs and update the platform to address them.

5. Improve the automatic import process, so data providers can supply their data with minimum assistance.

6. Assess whether it is possible to simplify the user interface to reach to a wider audience.

7. Assess the usability and layout of the automatic reports (Data Overview) and update as needed to better match user needs.

8. Assess the order in which charts are presented in View Charts, should another chart be prioritized as the default (top) view.

Quality control of data

9. Implement a quality control framework for new data that are integrated in the platform.

The quality control needs to be done both from a technical perspective (error in formats/values/units due to human input errors, etc.), from a data consistency perspective (do the resulting indicators make any sense compared to existing benchmarking data in DEEP, is there a need to double check with the data provider) and from a communications perspective (is there a need to communicate changes in indicators in relation to the added data).

User engagement

10. Survey DEEP users and assess how their data needs could be addressed by the tool with new functionalities.

11. Analyze the geographic usage of the tool and assess whether translation into other EU languages will unlock additional usage potential.

12. Analyze the applications of the DEEP and prepare 3-5 short case studies (e.g. one per organization type - financial institution, industry/SMEs, public/governmental bodies, academia/research etc.) which can be used to promote the tool and engage a wider usage across the EU or specific Member States.

Data acquisition

13. Survey DEEP data providers and assess what could be improved during the data migration process and understand better what were their main motivations to provide data (thus update the value proposition for the data providers and target more data providers accordingly).

14. Identify and develop partnerships with key data providers who could commit to provide relevant project data for additional projects on a quarterly basis, thus supporting a momentum for the expansion of the tool over the coming years.

15. Identify other online tools which could feed data into DEEP.

Data analysis

16. Conduct ongoing analysis of the DEEP dataset to discover new interesting insight which may generate policy input or infographics for social media posts or press releases.

17. Revisit existing data set to identify extreme outliers, assess their impact on indicators (if any) and possible need to seek validation with original data provider.

18. Assess possibility for developing new functionality/ indicators to support risk analysis (e.g. add standard deviation to all presentations of distributional data; and assess whether implicit distribution functions on measures level can be used for simulation of risk on financial returns).

Appendix A Executive Summary

The De-risking Energy Efficiency Platform (DEEP) was launched in November 2016 by EEFIG, with the support of the European Commission. It is the largest pan-EU open-source database containing detailed technical and financial performance data for almost 15,000 industrial and buildings related energy efficiency projects.

DEEP provides better understanding of the real risks and benefits of energy efficiency investments. By disclosing the real performance of thousands of projects, the DEEP platform is a new source of operational risk management information, which helps project developers, financiers, and investors better assess the risks and benefits of energy efficiency investments across Europe.

The present assignment has increased the number of projects in the database (from 10,000 to almost 15,000); maintained the platform framework (regular hosting and maintenance, security updates and validation of GDPR compliance); made the DEEP more user-friendly (through better upload and data check-in mechanism and API for use of aggregated data in other applications); and increase its added value for Financial Institutions and project promoters (through new functionality on IRR/NPV and Taxonomy aligned KPIs).

The added projects are mainly industrial projects from two new German support schemes for cross cutting technologies and waste heat utilization and the Danish voluntary agreement scheme. These include more ambitious measures than the average project in the existing database and therefore in general have longer payback times and higher avoidance costs. Due to the large number of additional projects (almost a doubling of the existing number of industry projects) this affects the KPIs for the total portfolio of projects as shown in the table below.

Sector	KPI	Before	Now
Buildings	Number of projects	5152	5419
	Median payback time (years)	5,0	4,9
	Avoidance cost (Eurocent/kWh)	2,5	2,5
Industry	Number of projects	5014	9576
	Median payback time (years)	2,0	3,5
	Avoidance cost (Eurocent/kWh)	1,2	2,8

Appendix B Presentation of main results

(a separate PowerPoint presentation of the main results, conclusions and recommendations – awaiting public launch of the new data and functionality)

Appendix C Description of the new data added

Item	Comment
Data provider	**Bulgarian Energy Efficiency and Renewable Sources Fund - EERSF Bulgaria**
New or existing	Existing
Country	Bulgaria
Sector	Buildings
Number of projects	19 new projects to complement projects delivered earlier
Completeness of data	Descriptive name, measure, building type, floor area, energy consumption before and after, investment, saving in EUR, saving in kWh, verification status, date of investment, rated financial performance
Quality of data	High
Key insight	These were benchmarked against existing Bulgarian building projects in the database and found to have a higher payback time. This is partly explained by the new projects being mainly building fabric measures. But the new Bulgarian building projects are fully consistent with the broader DEEP portfolio, indicating that the original Bulgarian dataset has relatively lower payback times than the rest of the portfolio.

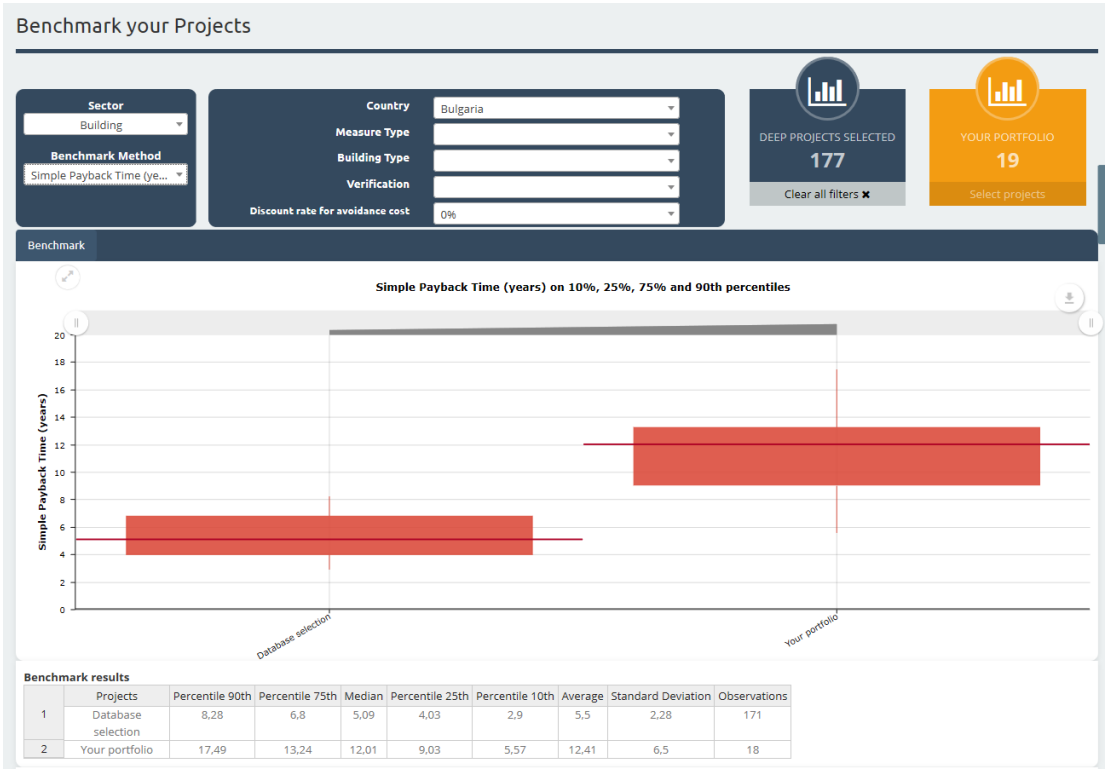
Item	Comment
Data provider	**Danish Energy Agency** **Voluntary agreement scheme for industry, implemented measures 2015-2018**
New or existing	New
Country	Denmark
Sector	Industry and Buildings
Number of projects	650
Completeness of data	Descriptive name, measure, energy type, energy saving kWh, investment, payback time, energy saving EUR (implicit from payback time), project year, lifetime of measure
Quality of data	High
Key insight	The Danish projects are fully consistent with the broader DEEP portfolio with median simple payback time more or less the same. There is less variation in the simple payback time of the Danish projects than the broader DEEP portfolio. The Danish industry projects have a similar distribution of payback times as the broader DEEP database, however, slightly higher payback times. The average simple payback time is about one year higher for the Danish projects than for the existing projects in the DEEP database. This can be explained by the Danish projects being part of a voluntary agreement scheme where the industry commits to identify, implement and report energy efficiency projects with a payback time of up to 5 years. This results in projects with higher payback times than strictly commercial projects which usually have a shorter time horizon.

Item	Comment
Data provider	**German Ministry of Economy / Federal office for energy efficiency** **Funding scheme for crosscutting technologies**
New or existing	New
Country	Germany
Sector	Industry
Number of projects	3400
Completeness of data	Measure ID, measure, energy type, energy saving kWh (electricity and gas), investment, subsidy, energy saving EUR, project year
Quality of data	High for included data; major parts of the dataset have been omitted
Key insight	The projects are benchmarked against the whole set of industrial projects in the broader DEEP database. The payback time of the new projects is about 4 years compared to 2 years of the existing industrial projects. In addition, that variance of the existing projects is lower. It has to be considered, that the projects are subsidized by 30% by the funding scheme. Higher payback time and avoidance costs due to subsidies compared to the existing projects

Item	Comment
Data provider	**German Ministry of Economy / KfW** **Funding scheme for waste heat utilization**
New or existing	New
Country	Germany
Sector	Industry
Number of projects	700
Completeness of data	Measure ID, measure, energy type, energy saving kWh (electricity and gas), investment, subsidy, energy saving EUR, project year
Quality of data	High for included data; major parts of the dataset have been omitted
Key insight	The new projects have significantly higher avoidance costs as well as payback times than the existing projects; also, the variation of the indicators is higher than in the existing data. Whereas the median payback time is 3 years for the existing projects, it is 8 years for the new projects. This effect can partly be explained by the origin of the data. The projects are part of a funding scheme with subsidies up to 50% (regular rate is 30%, but bonuses can apply). Considering these subsidies for the decision-making routines, the indicators from the investor's perspective much closer to the existing projects (payback time down to 5.6 years in case of 30% funding). In addition, decision-making routines can be different, if companies get public funding; higher payback times can be accepted. This results in projects with higher avoidance costs and longer payback times than strictly commercial projects, which usually have a shorter time horizon.

Analysis of new Bulgarian data

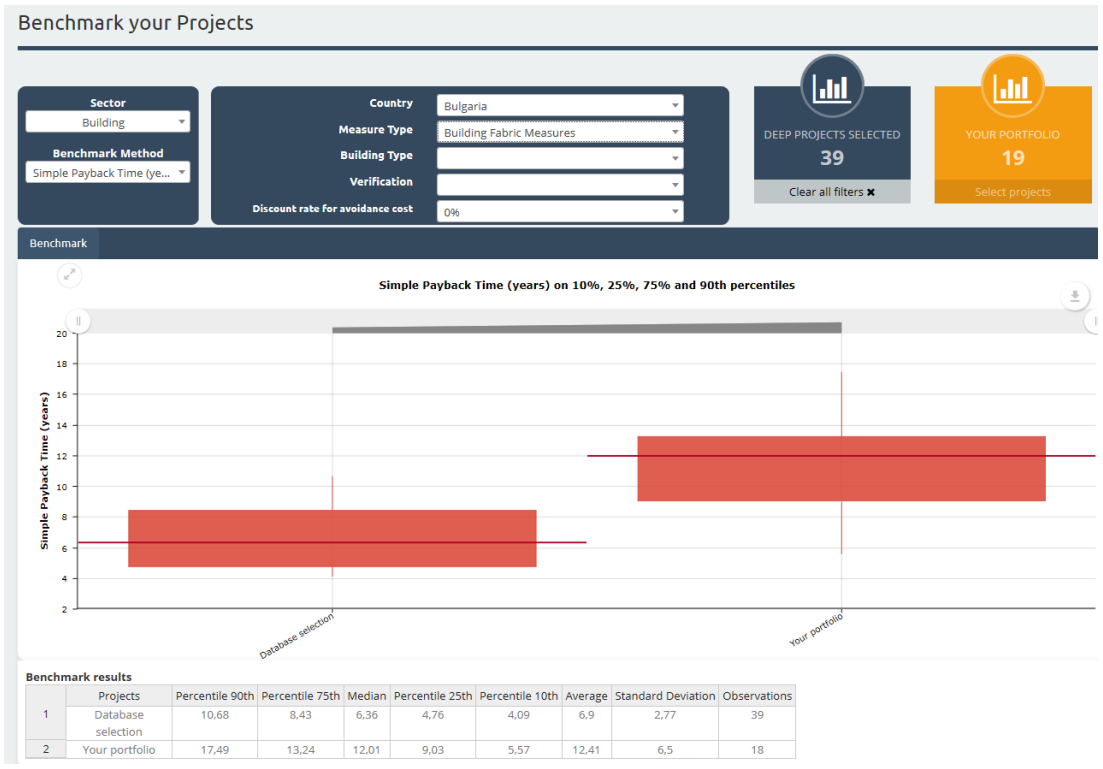
19 new Bulgarian building projects were added to the database. These were benchmarked against existing Bulgarian building projects in the database and found to have a higher payback time.



Benchmark results

	Projects	Percentile 90th	Percentile 75th	Median	Percentile 25th	Percentile 10th	Average	Standard Deviation	Observations
1	Database selection	8,28	6,8	5,09	4,03	2,9	5,5	2,28	171
2	Your portfolio	17,49	13,24	12,01	9,03	5,57	12,41	6,5	18

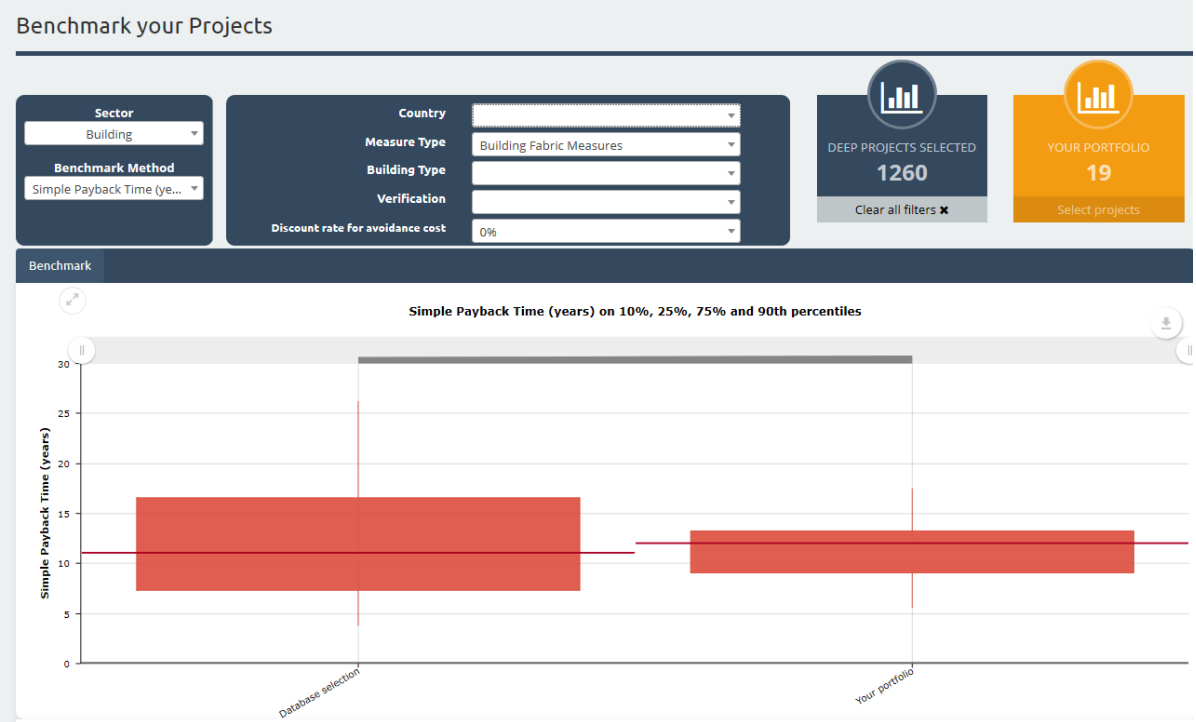
This is partly explained by the new projects being mainly building fabric measures.



Benchmark results

	Projects	Percentile 90th	Percentile 75th	Median	Percentile 25th	Percentile 10th	Average	Standard Deviation	Observations
1	Database selection	10,68	8,43	6,36	4,76	4,09	6,9	2,77	39
2	Your portfolio	17,49	13,24	12,01	9,03	5,57	12,41	6,5	18

But the new Bulgarian building projects are fully consistent with the broader DEEP portfolio, indicating that the original Bulgarian dataset has relatively lower payback times than the rest of the portfolio:



Benchmark results

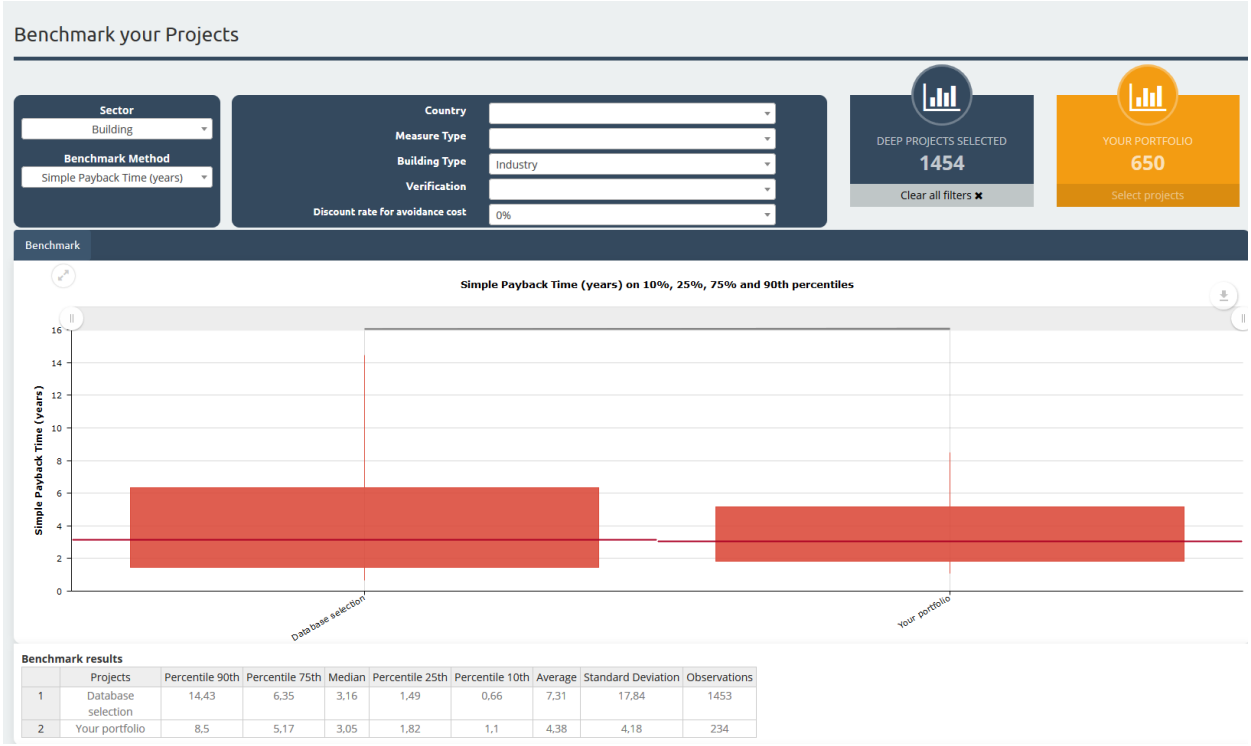
	Projects	Percentile 90th	Percentile 75th	Median	Percentile 25th	Percentile 10th	Average	Standard Deviation	Observations
1	Database selection	26,25	16,57	11,08	7,32	3,72	15,06	20,06	1055
2	Your portfolio	17,49	13,24	12,01	9,03	5,57	12,41	6,5	18

Analysis of new Danish data

650 new Danish EE project were added to the database; 238 building projects (37%) and 412 industry projects (63%). The Danish projects are all from the voluntary agreement scheme under the Danish Energy Agency.

Buildings – industry building

The 238 Danish building projects are all within industrial buildings. The projects are benchmarked against existing projects in the broader DEEP database.



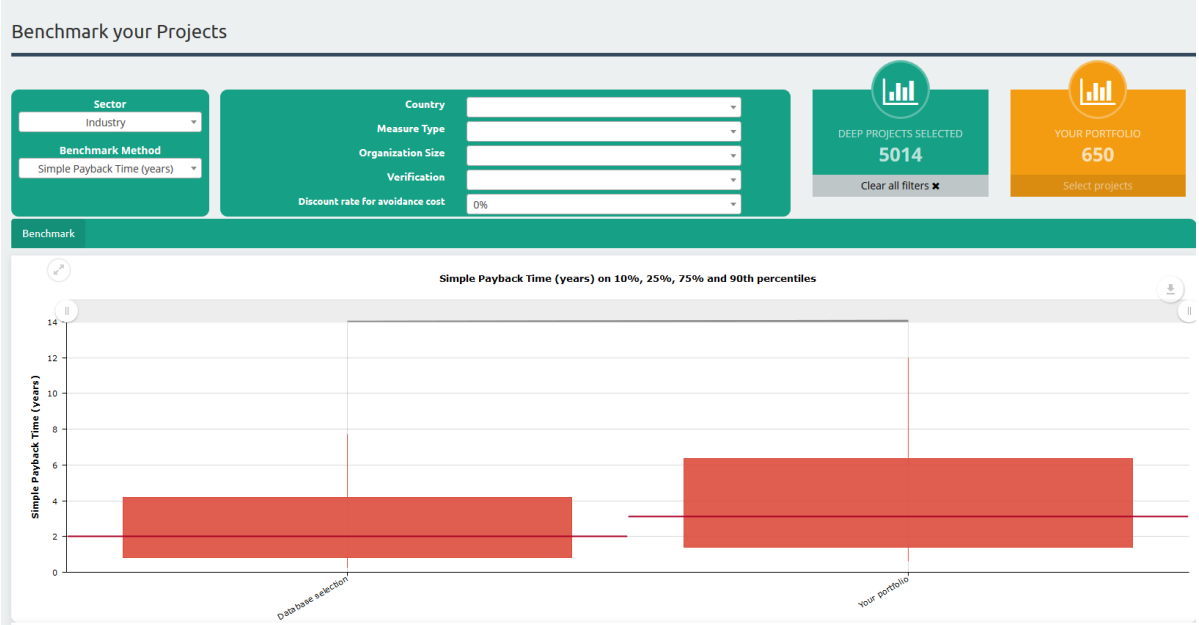
Benchmark results

	Projects	Percentile 90th	Percentile 75th	Median	Percentile 25th	Percentile 10th	Average	Standard Deviation	Observations
1	Database selection	14,43	6,35	3,16	1,49	0,66	7,31	17,84	1453
2	Your portfolio	8,5	5,17	3,05	1,82	1,1	4,38	4,18	234

The Danish projects are fully consistent with the broader DEEP portfolio with median simple payback time more or less the same. There is less variation in the simple payback time of the Danish projects than the broader DEEP portfolio.

Industry

The 412 industry projects are benchmarked against existing projects in the broader DEEP database.



Benchmark results

	Projects	Percentile 90th	Percentile 75th	Median	Percentile 25th	Percentile 10th	Average	Standard Deviation	Observations
1	Database selection	7,7	4,17	2,02	0,81	0,26	3,98	14,18	2738
2	Your portfolio	12	6,35	3,1	1,4	0,61	5	5,33	392

The Danish industry projects have a similar distribution of payback times as the broader DEEP database, however, slightly higher payback times. The average simple payback time is about one year higher for the Danish projects than for the existing projects in the DEEP database. This can be explained by the Danish projects being part of a voluntary agreement scheme where the industry commits to identify, implement and report energy efficiency projects with a payback time of up to 5 years. This results in projects with higher payback times than strictly commercial projects which usually have a shorter time horizon.

Analysis of new German data

In total, 4150 new projects from Germany have been added. The whole dataset used for this update was significantly larger, but a majority of projects had to be omitted due to data gaps or implausibility.

Cross-cutting technology projects

3476 new German projects covering industrial crosscutting technologies have been included in the database. These projects originate from the German funding scheme for crosscutting technologies, which is operated by the German Federal Office for Energy Efficiency. The measure type of these projects covers:

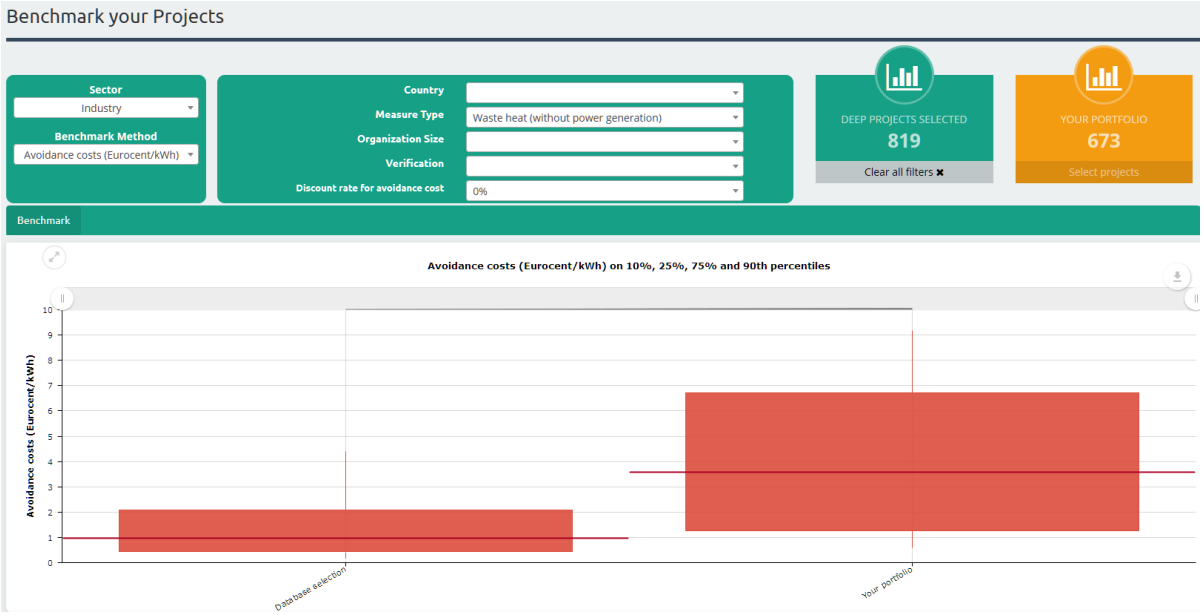
- Compressed air (85%)
- Ventilation (8%)
- Motors (3%)
- Pumps (2%)
- Waste heat (2%)

The projects are benchmarked against the whole set of industrial projects in the broader DEEP database.

The payback time of the new projects is about 4 years compared to 2 years of the existing industrial projects. In addition, that variance of the existing projects is lower. It has to be considered, that the projects are subsidized by 30% by the funding scheme. The payback time from the investor's perspective, which considers the subsidy, is only 2.8 years.

Waste heat projects

673 new German industrial waste heat projects were added to the database. These waste heat projects are all from the waste-heat funding scheme operated by KfW. The projects are benchmarked against existing waste heat projects in the broader DEEP database.



The new projects have significantly higher avoidance costs as well as payback times than the existing projects; also, the variation of the indicators is higher than in the existing data. Whereas the median payback time is 3 years for the existing projects, it is 8 years for the new projects. This effect can partly be explained by the origin of the data. The projects are part of a funding scheme with subsidies up to 50% (regular rate is 30%, but bonuses can apply). Considering these subsidies for the decision-making routines, the indicators from the investor's perspective much closer to the existing projects (payback time down to 5.6 years in case of 30% funding). In addition, decision-making routines can be different, if companies get public funding; higher payback times can be accepted. This results in projects with higher avoidance costs and longer payback times than strictly commercial projects, which usually have a shorter time horizon.

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