



Enhancing at an Early Stage the Investment Value Chain of Energy Efficiency Projects

Deliverable 3.4 Web-Based Database on Energy Efficiency Financing and Supporting Documentation

June 2020



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Preface





Triple-A has a very practical result-oriented approach, seeking to answer three questions:

- How to **assess** the financing instruments and risks at an early stage?
- How to **agree** on the Triple-A investments, based on selected key performance indicators?
- How to **assign** the identified investment ideas with possible financing schemes?

The Triple-A scheme comprises three critical steps:

- **Step 1 - Assess:** Based on Member States (MS) risk profiles and mitigation policies, including a Web based database, enabling national and sectoral comparability, market maturity identification, good practices experiences exchange, reducing thus uncertainty for investors.
- **Step 2 - Agree:** Based on standardised Triple-A tools, efficient benchmarks, and guidelines, translated in consortium partners' languages, accelerating and scaling up investments.
- **Step 3 - Assign:** Based on in-country demonstrations, replicability and overall exploitation, including recommendations on realistic and feasible investments in the national and sectoral context, as well as on short and medium term financing.

Who We Are

| | Participant Name | Short Name | Country Code | Logo |
|----|--|------------|--------------|---|
| 1 | National Technical University of Athens | NTUA | GR |  |
| 2 | ABN AMRO Bank N.V. | ABN AMRO | NL |  |
| 3 | Institute for European Energy and Climate Policy Stichting | IEECP | NL |  |
| 4 | JRC Capital Management Consultancy & Research GmbH | JRC | DE |  |
| 5 | GFT Italy srl | GFT Italy | IT |  |
| 6 | CREARA Consulting SL | CREARA | ES |  |
| 7 | Adelphi Research Gemeinnützige GMBH | adelphi | DE |  |
| 8 | Piraeus Bank SA | PB | GR |  |
| 9 | University of Piraeus Research Center | UPRC | GR |  |
| 10 | SEVEEn, The Energy Efficiency Center | SEVEEn | CZ |  |
| 11 | Public Investment Development Agency | VIPA | LT |  |
| 12 | National Trust Ecofund | NTEF | BG |  |



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Executive Summary

Appropriate knowledge on Energy Efficiency (EE) investment risks and their mitigation strategies are crucial, not only for project developers aiming at realising a project idea, but also for investors' and financing institutions' decision-making. In EE financing, a wide variety of risks and barriers underlie that tend to make EE project ideas funding quite unattractive. The identification of these risks and their nature, along with the deployment of a quantification methodology to assess an aggregated risk, is a major aspect of the Triple-A scheme, under the effort to mainstream EE efficiency financing.

Valuable information requires proper dissemination, in order to be accessible and useful to key stakeholders, since financiers, investors and project developers tend not to allocate any time for searching available input, reading long reports and extracting relevant data.

In the context of Triple-A project and as a supplementary element to the Triple-A Standardised Tools, a user-friendly Web-based Database on EE financing is being designed and developed. The Triple-A Web-based Database presents in an interactive way the key findings of the Triple-A's risk assessment in each of the case study countries.

This deliverable documents the outcome of "Task 3.3: Interactive Web-Based Database on Triple-A Investment". The aim of the present report is to explain in detail the design and content of this knowledge database, while providing descriptions on how to navigate the database interface. The functionalities, data provided and structure of this knowledge database' components are also defined in this context.

The Triple-A Interactive Web-Based Database, which is presented in this document, is expected to be refined during the project, as more user requirements will be gathered and incorporated, and any other technical details will be further defined.

1 Introduction

Knowledge base on risks and mitigation strategies regarding Energy Efficiency (EE) projects is critical to stakeholders. On one hand, it enables project developers to deliver attractive EE investment proposals to investors. In detail, information on country specific financial risk and project specific technical barriers facilitates them to strategically plan economically feasible and technically secure (over the energy savings) project ideas. On the other hand, financiers, banks and investors could easily get access information on EE risks and barriers, in order to facilitate their decision-making regarding risk related to the implementation of EE projects.

The Triple-A Web-based Database on EE financing is an online interactive application that incorporates the results from the status quo analysis and the elaboration / categorization of the financing instruments and risk mitigation strategies per case-study country within the framework of Triple-A project. Thus, with this knowledge database Triple-A offers a cross-country analysis through an interactive and Web-based Database, including interactive maps and graphs.

Particularly, the database includes data on risks and uncertainty factors that might reduce profitability of investments and endanger EE projects debt repayment, as they have been identified and categorized in the Triple-A risk assessment methodology (under Task 3.1: Triple-A Risks and Mitigation Strategies). The range of risks considered covers the general and practically relevant factors common to EE projects. The categorisation and structure of the data is in line with the risk categories and project sectors identified within Triple-A implementation (Task 3.1, Deliverable 3.1: Draft Report on Risks of Energy Efficiency Financing and Mitigation Strategies Typology).

The database has been developed using the Visme¹ designing environment, enriched with interactive graphs, figures and infographic maps. In its initial phase, the database includes the risk categories and values that were identified under the framework of the Triple-A Assess methodology and assessed under the Triple-A Assess Tool. All the data are presented in interactive maps and graphs.

The Triple-A Web-based Database is hosted in Triple-A website homepage and under the dedicated webpage “Triple-A Tools”².

This knowledge database is expected to be refined during the project, as additional user requirements will be incorporated and any other technical details will be further defined. Updates pertaining to the knowledge database elements (interactive maps, graphs, etc.), architectural design, components and data will be reported in a future deliverable, namely D3.5: Updated Web-Based Database on Energy Efficiency Financing and Supporting Documentation.

Apart from this introductory section, the rest of the report is structured as follows: The second chapter provides all the necessary background information about the Web-based database, as well as navigation instructions for the users. The third chapter highlights the next steps of the database's deployment upon finalization.

¹ Link to Visme creation tool: www.visme.com

² Database address: www.aaa-h2020.eu/database

2 Managing the Triple-A Web-Based Database

2.1 Background information

The 1st version of the Web-based Database is created with the online tool Visme. Visme is a visual design-oriented platform that facilitates the creation of stylish graphics along with interactive content. The Visme platform was selected for the implementation of the 1st version of the database, as it simplifies the creation of fully presentable data structures, enabling essential features as interactivity, security and straightforward publication of the content.

2.2 Accessibility

The Web-Based Database can be found in the Triple-A's Website under the "Tools" section of the main navigation pane (<https://aaa-h2020.eu/database>). Also, the user can easily navigate to the Web-Based Database from the Triple-A website home page. The database does not require any registration or log-in to be accessed.

2.3 Data collection and harvesting

The database includes the quantification of the following risk factors that are related with the final energy savings and financial performance of EE investments:

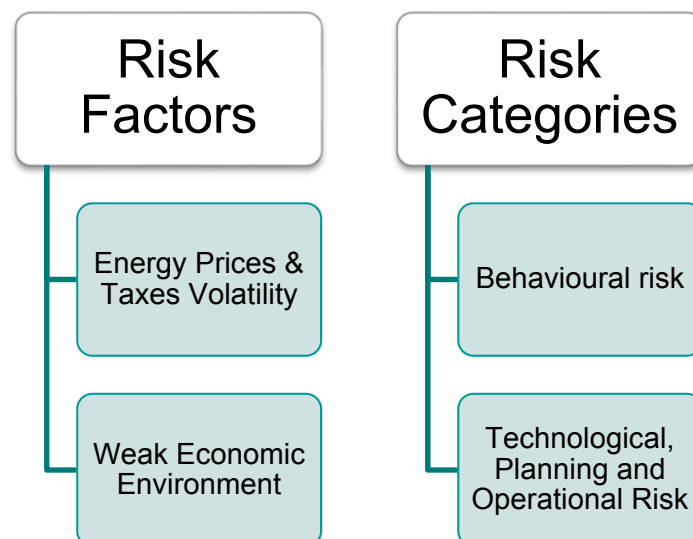


Figure 1 Data Incorporated in the 1st Version of the Web-based Database

The following Table summarizes the type of data that each risk factor and risk category consist of.

Table 1 Type of Data Included in the Web-based Database

| | Data | Type | Values |
|------------------------|--|------------------|--------------------------------|
| Risk Factors | Energy Prices & Taxes Volatility | Country specific | Predefined quantitative values |
| | Weak Economic Environment | Country specific | Predefined quantitative values |
| Risk Categories | Behavioural risk | Project Specific | Predefined qualitative values |
| | Technological, Planning and Operational Risk | Project Specific | Range of quantitative values |

At this development stage, the risk data is collected and inserted to the database manually, as the risk assessment is still evolving. The database will be expanding with new data generated by the risk assessment and the Triple-A Assess Tool in the course of the project. More data is expected to emerge from the stakeholder consultation process. As a result, the complete dataset with values for all the Triple-A risk categories will be available. The overall data collected will act as a guideline and will make possible the establishment of a data collection harvester that enables the automated data collection and updating of the database. This feature will be implemented and presented in a future deliverable D3.5: Updated Web-Based Database on Energy Efficiency Financing and Supporting Documentation (M20).

The version of the database that is delivered along with the present document includes the following data:

Risk Factors

The Risk Factors consist of the Energy Prices & Taxes Volatility and the Weak Economic Environment. These are country specific, meaning that they are common for all Triple-A project categories and sectors and they differ for each country. They are presented in a dedicated interactive map for the Triple-A case study countries and they are displayed in percentage (0%-100%), where lower values reflect lower risk and higher values reflect higher risk.

In detail:

Energy Prices & Taxes Volatility

The Energy Prices & Taxes Volatility risk factor reflects the uncertainty of energy prices, which are charged to end users. It affects the decision for an EE investment, as it may have an effect on monetary savings and, therefore, the return of the EE investment may differ from the initial estimation. The risk factor differentiates from country to country, as it is based on regional data analysis of energy prices and relative taxes.

Weak Economic Environment

The Weak Economic Environment risk factor is related to poor economic conditions that may exist in the country's economy where the EE investment is implemented. It is linked to, among other indicators, interest rates, inflation, availability of finance etc. Weak economic environment could negatively influence the EE investments in many ways, such as affecting the investment's profitability through inflation or the performance indicators through increased interest rates.

Risk Categories

The Risk Categories include the Behavioural Risk as well as the Technological and the Planning & Operational Risk. The Risk Categories are project specific, which means that they are common for all Triple-A case study countries but change for each Triple-A project sector and category. They are displayed in graphs for each one of the sectors and categories, in percentage units (0%-100%), Lower values reflect lower risk while higher values reflect higher risk.

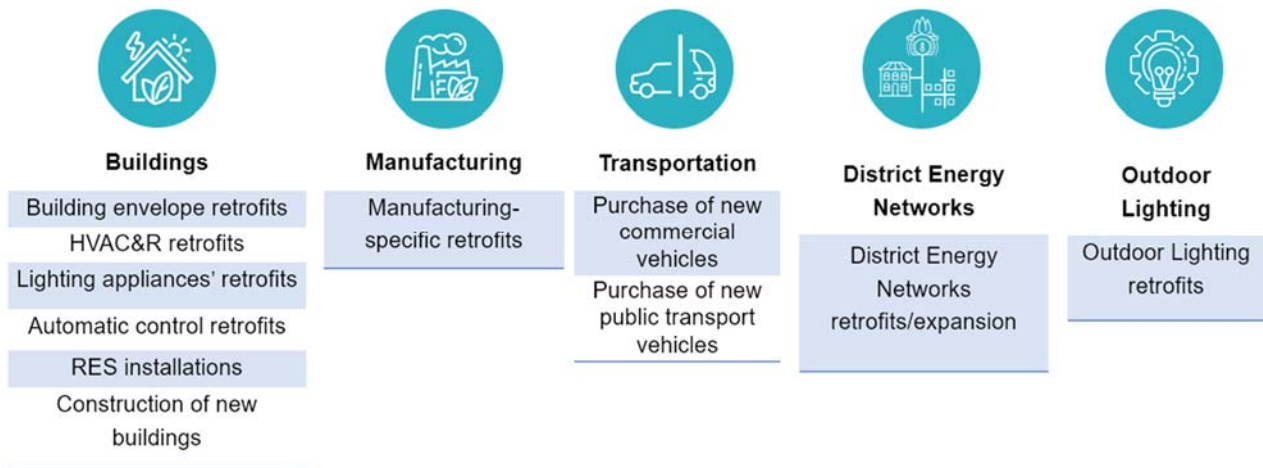


Figure 2 Triple-A Project Sectors and Project Categories

Behavioural Risk

The Behavioural Risk is directly linked to the rebound effect, which is generally expressed as the ratio of the lost benefit compared to the expected environmental benefit, when holding consumption constant. As a result, it leads to energy savings being significantly lower than the ones initially anticipated. In the tables presented in the database, the values of the Behavioural Risk for each project sector are displayed, as they have emerged from the Triple-A risk assessment. The risk is expressed in percentage, where lower values reflect lower risk while higher values reflect higher risk.

Technological, Planning & Operational Risk

The Technological, Planning and Operational Risk represents the risk that is related to the technical complexity of the Energy Efficiency Measures implemented, the quality of initial savings assessment, the quality of the equipment implemented, the project design and the Operation & Maintenance (O&M) of the project. It incorporates and represents the development, operation and maintenance risk. In the graphs included in the database, the maximum and minimum values that the Technological, Planning and Operational Risk can range are displayed, based on the Triple-A risk assessment. The risk is expressed in percentage, where lower values reflect lower risk while higher values reflect higher risk.

In the graphs included in the database

Case study countries

The eight Triple - A case study countries were selected to promote diversity across a number of factors, including: a leading European economy (**Germany**), an innovation front-runner in energy (**The Netherlands**), a weak economy that went through one of the longest and most severe recessions (**Greece**), an economy with slow economic recovery (**Italy**), a diversified economy with a strategic geographical location having some of the largest European firms (**Spain**), a country that has experienced one of the fastest economic recoveries in Europe (**Lithuania**), a progressing country slightly moving towards low-carbon development (**Czech Republic**), and a country, recovering from a slow transition to a market economy, with growing regional strategic role and significant ambition towards EU processes (**Republic of Bulgaria**).

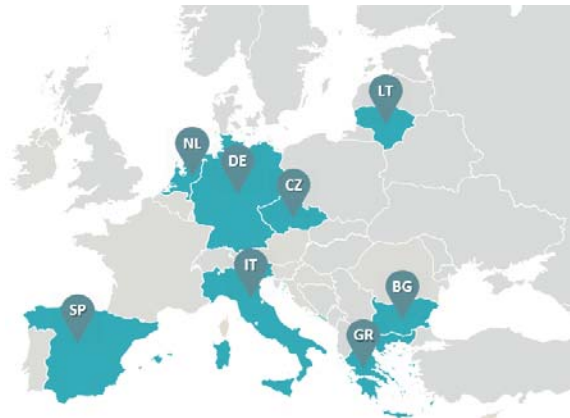


Figure 3 Triple-A Case Study Countries

2.4 Interoperability, data sharing and consumption services

The database is fully harmonized with the Triple-A project sectors and risk categories. The final version of the database will be able to automatically update the risk values, as they change due to legislation updates, increases in energy prices and lessons learned from the Triple-A Tools testing and deployment. The database is shared with the Triple-A Tools, as the risk values are essential for the risk assessment of the Triple-A Assess Tool. The final version of the database will provide an API that users can utilize in order to transfer data to 3rd party platforms. In addition, the user will be able to download the data in various filetypes, such Excel filetype (.xlsx), comma separated values (.csv) and PDF (.pdf).

2.5 Storage and management module

The database is saved on the Decision and Support Laboratory (NTUA) servers, along with the Triple-A Website. Regarding the first version of the database, the visualized data are integrated into the HTML code. Regarding the risk database used by the Triple-A Assess tool, the data are saved in PostgreSQL database. PostgreSQL database is a powerful, open source object-relational database system, with over 30 years of active development that has earned a strong reputation for reliability, feature robustness, and performance.

2.6 Functionalities and structure

Homepage

The Triple-A Web-based Database homepage contains initial information about the content of the database. Entering the database, the user is able to access and navigate themselves into the homepage without any additional subscription. The user has also the opportunity to navigate easily to the country specific risk factors and risk categories, by clicking on the according title on the right.

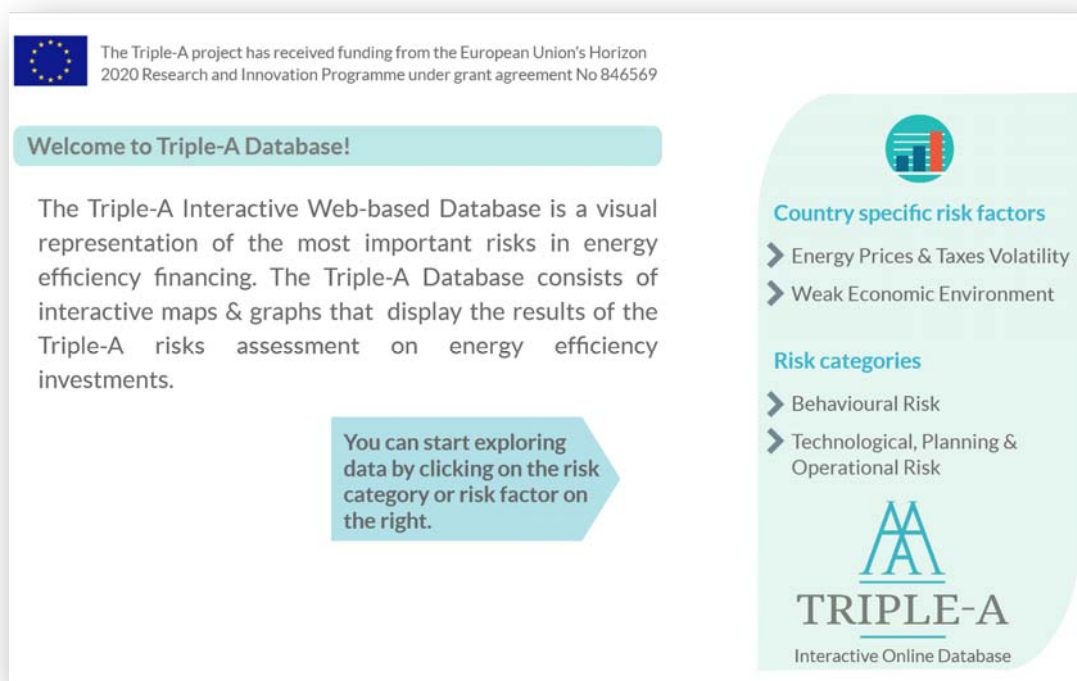


Figure 3 Triple-A Web-based Database Welcome Screen

Country specific Risk Factors explanatory pages

By clicking one of the country specific risk factors, the user is navigated to an explanatory page, where introductory information about the risk factors is displayed.



Figure 4 Country Specific Risk Factors Introductory Pages

Country specific Risk Factors maps

From the introductory page, users can navigate themselves into the interactive maps, where the country specific risk percentage values are displayed by hovering over the countries. Each subcategory (Energy Prices & Taxes Volatility and Weak Economic Environment) is presented in a dedicated map, in which the case study countries are coloured based on the risk values they have, from dark blue (very high risk) to light blue (very low risk).

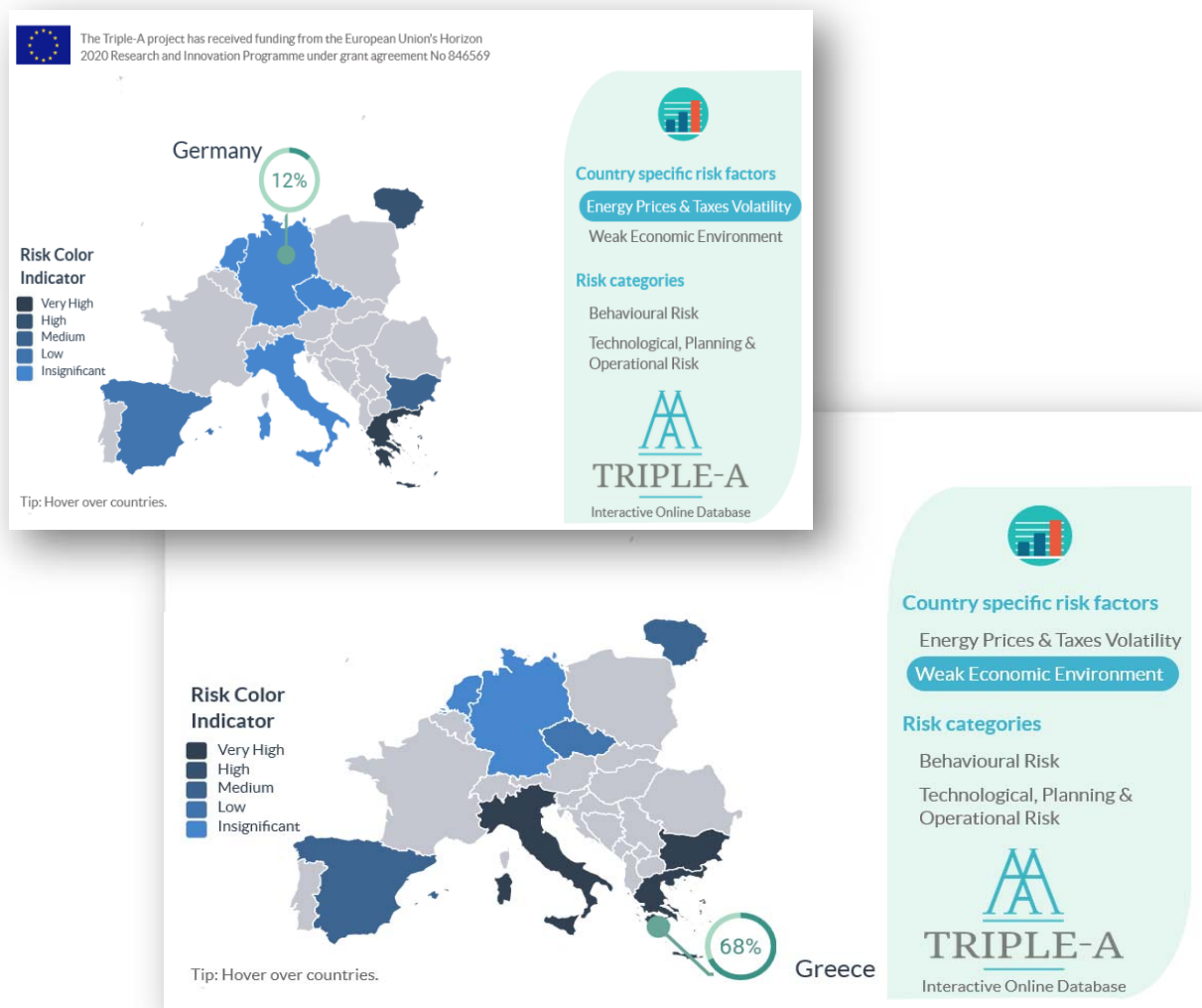


Figure 5 Interactive Maps Feature

Risk Categories explanatory pages

By clicking on one of the Risk Categories, the user is landed on the Risk Categories introductory pages. On these pages, apart from the explanatory text, a toolbar appears from which the user can navigate to the Triple-A project sectors and view the relative risk values.

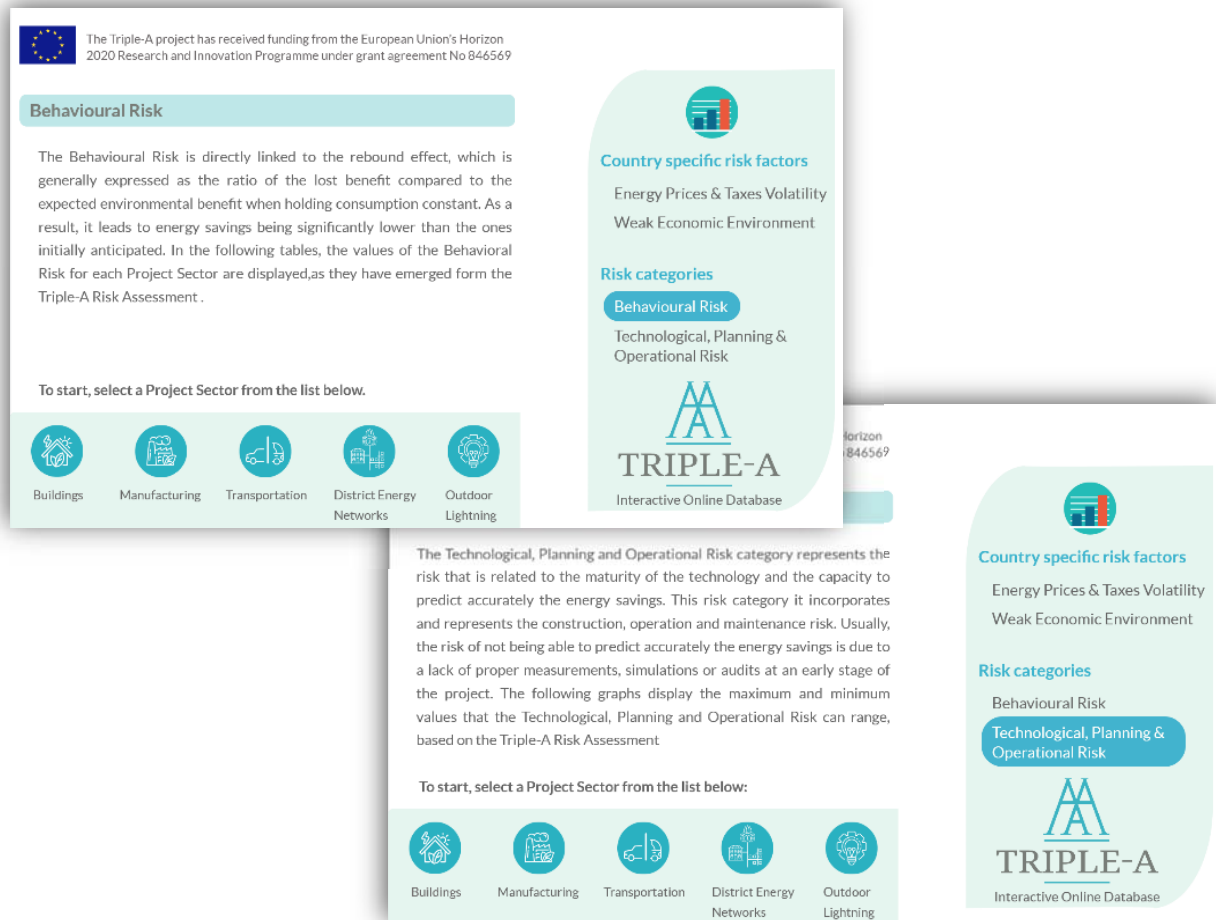


Figure 6 Risk Categories Explanatory texts & Project Sector toolbar

Behavioural Risk Category tables

By navigating along project sectors, under the Behavioural Risk Category, the risk data are displayed to the user in the form of tables (Figure 7). The tables include the risk estimation for each project sector in categorical values (Low, Medium, High). In addition, comments and explanations of the estimations are presented.

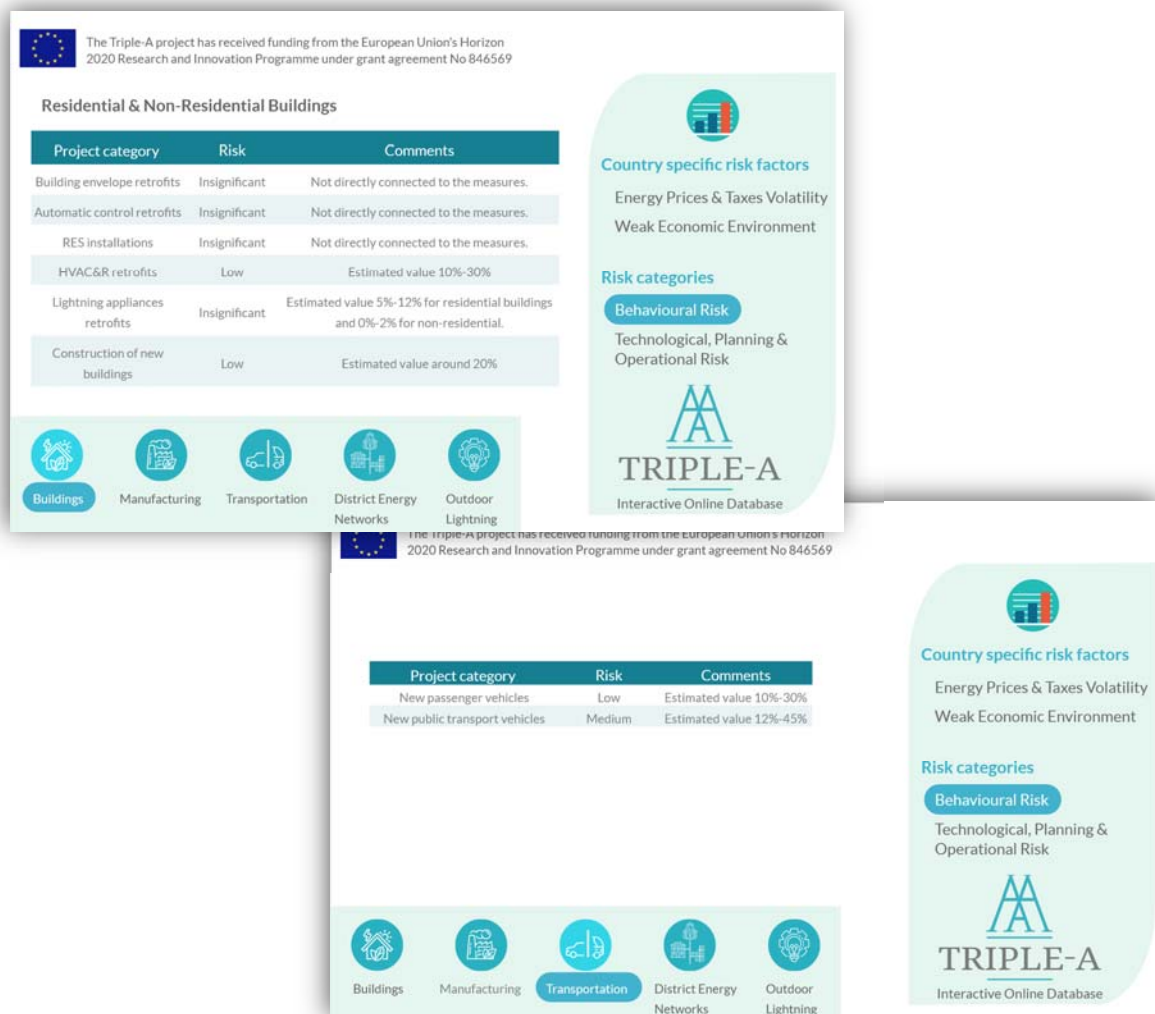


Figure 7 Behavioural Risk

Technological, Planning & Operational Risk graphs

From the Project Sector toolbar, under the Technological, Planning & Operational Risk Category, the user can navigate to the graphs and data for each Risk Category and Triple-A Project Sector. The values presented in this risk category are grouped in minimum and maximum percentages that the Technological, Planning and Operational Risk can, as the specific values have not been defined yet.

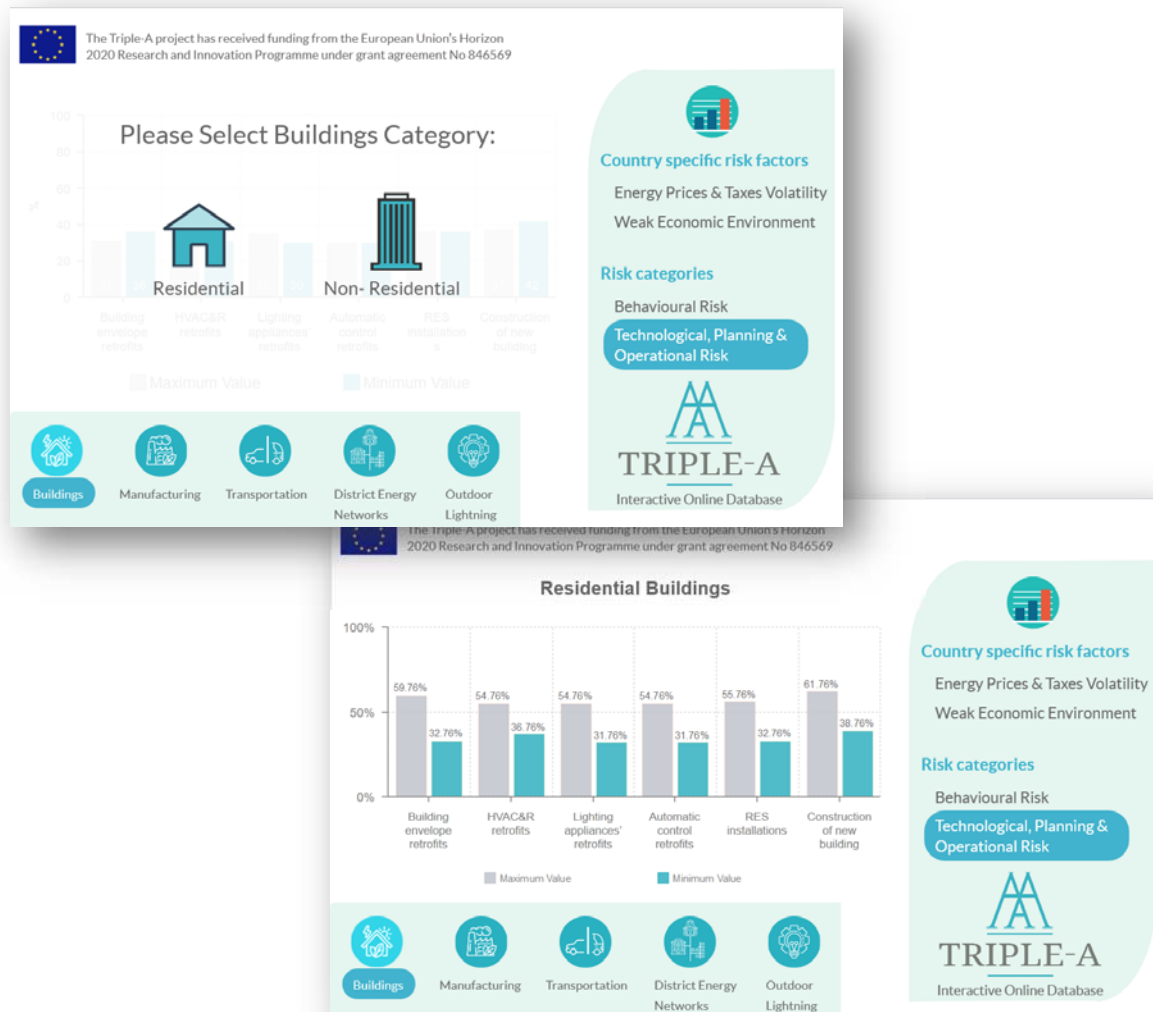


Figure 8 Technological, Planning & Operational Risk - Building Sector

3 Next Steps

The Triple-A Web-Based Database is expected to be constantly updated throughout the project duration, as the user requirements will be enriched, and any other technical details will be further defined. Updates pertaining the knowledge database elements (interactive maps, graphs, etc.), architectural design, components and data will be reported in future deliverable, in particular in the D3.5: Updated Web-Based Database on Energy Efficiency Financing and Supporting Documentation (M20).

Thus, the final version of the Web-Based Database will be delivered by April 2021 and will include the complete set of risk categories and factors of the Triple-A risk assessment. The latter will be thoroughly explained and presented in the D3.2: Final Report on Risks of Energy Efficiency Financing and Mitigation Strategies Typology, that will be published in August 2020. It will contain updates of risks and risk mitigation strategies, as well as the creation of financing instruments' and schemes' vectors. Also, the D3.3: Report on the Cost of Capital Estimation of Energy Efficiency Projects across Member State Countries (February 2022), is expected to provide more info on country risks, which could also be accommodated in the database.

By that time, the latter will be fully quantified by the data analysis of the input that will emerge from stakeholder consultation process and the Triple-A Standardized Tools database. In addition, as more data will be included in the Web-Based Database, the complexity will be increased and the need of more sophisticated graphs and graph-maps combinations will arise. Consequently, the database will be migrated to a more advanced framework.

In short, the next steps include the following activities:

- ▲ The incorporation of all identified risk categories and data, as an outcome from the Triple-A risk assessment activities (stakeholder consultation process, benchmarks & risk assessments from the Triple-A Tools).
- ▲ The incorporation of risk mitigation strategies, such as the selection of the financing instrument or the structuring of dedicated instruments, possible loan or performance guarantees, insurance contracts or hedging of fluctuating energy prices.
- ▲ The update of the Database to a framework that will support a broader variety of graphs and maps in order to achieve the proper visualization of the additional data that will emerge.
- ▲ Consolidation of the Triple-A Assess database and the Web-Bases database, incorporating auto-updates of values, API functionalities and data collection harvester.