Chapter 2

Financial Considerations in Green Retrofitting for Optimal Energy Performance

Andreea Curmei-Semenescu
The Bucharest University of Economic Studies, Romania

Cătălin Valeriu Curmei
The Bucharest University of Economic Studies, Romania

ABSTRACT

This chapter focuses on how to correctly assess the financial feasibility of a retrofitting project using different indicators and methods. It also emphasizes the advantages and limits of each method offering the reader the ability to choose the most appropriate method(s) for each retrofitting project. In its last part, the chapter explains how the financial feasibility can be integrated in a broader set of criteria considered for retrofitting the capital budgeting decision-making process. The chapter also includes examples of computing the financial indicators for green retrofitting evaluation. It thus provides the readers with the opportunity to understand how the capital budgeting evaluation methods can be used in practice and correctly interpret their results.

INTRODUCTION

Green retrofitting is one of the big challenges of the next few decades, especially in Europe. With the objective of the European Union to reduce significantly energy consumption and by this means the global carbon footprint, green retrofitting became an important issue. Statistics suggest that more than one third of the energy consumption in the European Union is related to insuring space comfort within office and residential buildings (Trotta, 2018; Christersson, Vimpani & Jumnila, 2015, Lizana, Barrios-Padura, Molina-Huelva & Chacartegui, 2016). In most important cities in Europe, the real estate stock is relatively old and does not correspond to modern times requirements in terms of energy efficiency. The extent of the work to be done in this sense and the complexity of the stakeholders’ behavior regarding this aspect require further investigations.

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The motivations of implementing green retrofitting projects are different and have a complex nature, ranging from the interest in maximizing the value of the building to the incentive of the users to improve their comfort or to associate their image to an environment-friendly project. The type and state of the building subject to retrofitting, its location, the motivation behind the project, the time horizon for the exploitation of the building, the regulatory framework and even moral and cultural values of the society have a role to play in choosing between different retrofitting solutions. In most cases, the financial objectives are interrelated to non-monetary objectives and the decision between several available technical solutions becomes a very complex one.

Though not the only motivation of a retrofitting project, the financial incentive is a very important one and a correct assessment of the feasibility of the available retrofitting solutions is mandatory for making the good choice between them and ultimately for the success of the project. The purpose of the present chapter is to explain and exemplify the methods that can be used in order to assess the financial feasibility of the retrofitting project or of its alternative solutions. It is concerned with providing the reader with the theoretical background needed to establish the feasibility of a retrofitting project from a financial point of view, but also with the practical expertise throughout the examples presented.

A retrofitting solution must be thoroughly analyzed from the point of view of its technical feasibility and compliance with the regulation in force, before assessing its financial feasibility. However, once this stage accomplished, the financial constraints have to be taken into consideration in making the final decision about the opportunity of a certain solution or even of the project itself.

The objective of the present chapter is to present the basic financial concepts necessary in retrofitting project investment decisions and to put in evidence various methods and techniques used to assess the feasibility of a retrofitting project, explaining their advantages and limits and their functioning. The reader will thus be familiarized with the theoretical concepts pertaining to the financial analysis and valuation of a retrofitting project, but also with the stages of its application in practice. The information included will also allow the reader to make the best decision regarding the specific indicators to be used in a particular analysis according to the specifics of the project and to the type of stakeholders benefitting from the results of the analysis. The chapter is equally useful for engineers and other persons interested in acquiring the basic concepts and methods used in assessing the financial feasibility of the project in order to better respond to different stakeholders regarding financial matters related to a retrofitting project, but also to economists who will find within its pages the particularities of the application of a financial feasibility analysis on the particular case of a retrofitting project.

The rest of the chapter will be conducted as follows. The first sub-chapter presents the main theoretical principles and concepts regarding the financial feasibility of retrofitting projects. The second sub-chapter is concerned with explaining the indicators and methods used to assess the feasibility of retrofitting projects, as well as the manner to correctly forecast the financial results of such investments. Also, it will briefly present how the monetary and non-monetary objectives of retrofitting projects can be taken into consideration jointly in the choice among alternative solutions. A practical analysis is provided in guise of example in the following subchapter. The future research directions and the main conclusions are presented in the end of the chapter.
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