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Energy Efficiency in Urban Context: An Overview of European-Funded Projects with the Analysis of an ELENA Case Study

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Abstract: According to the European Union, buildings are responsible for around 40% of CO_2 emissions in the EU area. For this reason, the new regulatory framework Clean Energy for All European Package (2019) supports policies to reduce emissions by increasing energy efficiency in buildings. This is the prosecution of a long-standing policy, which in the past has mainly influenced public authorities, but also aggregations of private bodies and the realization (or renovation) of large strategic investments that impacted and changed the fruition of buildings and relevant infrastructures. The paper aims to offer an overview of the European funds dedicated to the Energy Efficiency initiatives in the past few years, distinguishing funds for financing the project itself and funds for the financing of technical assistance. The overview introduces the analysis of a case study related to technical assistance projects in the Energy Efficiency field, i.e., the European Local Energy assistance (ELENA) Fund; findings connected to the case studies are the main contribution of this paper. The analysis helps to interpret the performance of the funds and to detect the gap between the financing procedures and the subsequent operational implementation of the projects. The case study highlighted critical aspects regarding the potential mismatch between the purpose of the fund and operational barriers in the realization of the initiatives. Such evidence can contribute to helping policy makers redesign and correct funding schemes and, moreover, in evaluating them with a complete information set.

Keywords: energy transition; energy efficiency; European funds; EEEF; ELENA fund

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1. Introduction

Energy efficiency is one of the topics to be given most attention by the European Union in the Energy Transition process [1]. Energy efficiency can be searched in several fields of studies and with many applications, but it is undeniable that the urban context, where the vast majority of human activities are concentrated, represents a very interesting laboratory for energy efficiency project applications [2]. The presence of funding for this purpose has the power to re-shape our cities, as it implies the renovation of buildings, public lighting systems and public transports.

The European Union set the targets for its future development, aiming at reaching high levels of energy efficiency and improving the use of renewable energies. The presence of dedicated policies is needed to increase energy efficiency [3,4], and the EU has a long history of policies in the energy field, through directives, regulations and decisions [5]. In the Clean Energy for all European Package [6] energy efficiency is strongly present into two directives, one related to the energy performance of buildings and the other related to energy efficiency in general [7]. Since the building sector is one of the most relevant areas in which to reduce CO_2 emissions [8], different types of policies can be put in place, even if the contribution of each instrument is hard to identify [9–11]. The primary role of the public

building stock in implementing energy efficiency measures is well recognized [12] and has been incorporated in the initial use of some of the funds that were dedicated exclusively to public renovations, opening to residential buildings only in a second phase [13].

Regarding energy efficiency in buildings and the normative set of rules for both renovation targets and new constructions, all new buildings must be nearly zero-energy buildings (NZEB) from 31 December 2020. Since 31 December 2018 all new public buildings have already needed to be NZEB. Some relevant aspects stated in the Directive are related to the possibility of combining energy efficiency interventions with other renovations (such as anti-seismic measures) and the necessity of monitoring. Public-private partnerships (PPP) [14,15], financing opportunities and technical assistance for investment programs are indicated as enabling factors for the development of the renovation program: the target is to improve the efficiency of the European building stock by 32.5% by 2050 [16].

European funds have always played a very relevant role in the promotion of energy efficiency studies, pilots and investment programs. Policy interventions are frequent in this sector, especially for the industrial programs [17].

A systematic review of European policy on energy efficiency for buildings can be found in [18], where the authors identified the most relevant steps in the boosting of energy efficiency programs, and in particular the Energy Performance of Buildings Directive—EPBD (2002), the Ecodesign (2005) and the Energy Services Directive—ESD (2006), with the EPBD recast (2010) and the Energy Efficiency Directive—EED (2012).

Recent literature partly explores the use of EU funds for the energy efficiency sector with an application to the role of cities. Melica et al. (2018) [19] explored the experience of the Covenant of Majors, an initiative that shows the commitment of municipalities in undertaking investments in energy efficiency: the commitment is also quantified in a specific document that needs to be approved by the coordinator of the initiative to be considered valid. Di Leo and Salvia (2017) [20] analyzed data of the RE-SEEties project and compared the results gained in different cities in the development of the program. Lombardi et al. (2016) [21] analyzed the European Local Energy Assistance Fund (ELENA Fund), which is also the funding scheme for the case study later shown in this paper: they approached the topic by analyzing the role of Energy Service Companies (ESCos), applying it to the case of the project developed in Foggia.

Despite the long life of the Fund (more than 10 years) and the huge amount of resources allocated, there is only little literature discussing the impact of ELENA Fund: beyond the discussion provided in [21], to the author's knowledge only [22] discussed the use of the ELENA fund for technical assistance—with an institutional perspective. In a previous analysis [23] I suggested the need for many partnerships to be established to develop investment programs that include many stakeholders and huge investments' amount, scattered among many intervention targets. The interaction among many stakeholders and relevant local subjects has a huge impact on the realization of energy efficiency programs in urban areas, and this makes the topic particularly interesting from an economic point of view.

The aim of this work is to provide an overview of the funding programs set by the European Union to foster investments in energy efficiency, with particular attention to the funds dedicated to projects to be developed in the urban context, looking at their practical realizations. The overview is a preparatory step for the analysis of a specific case study that can be considered representative of many of the issues that are encountered during the development of energy efficiency projects for cities.

The analysis provided by this work can help policy makers consider operational aspects while designing new funding schemes for energy efficiency projects. With the same information set, corrections to actual funds can be applied, especially when the funding process seems to be delayed by operational issues, which affect the performance of the funds. Improvements in the use of energy efficiency funds will benefit several stakeholders, from local authorities and policy makers to European citizens. Benefits will come from the activation of more projects; faster and more efficient project activation has both local

and general positive effects: the efficient use of funds is, indeed, a goal shared by the entire Union.

The methodology of the case study involves analyzing specific phenomena and identifying their main features, on which new findings can be based and new theories might be developed [24]. The case study analyzed in this article regards a technical assistance project: technical assistance projects differ from investment projects because the financing is related to the preparatory and supporting actions needed to later develop the investment project ("Technical Assistance is the process of providing targeted support to an organization with a development need or problem, which is typically delivered over an extended period of time" source: https://www.cdc.gov/healthyschools/professional_development/videos/pd101/05-technical_assistance.pdf, accessed on 14 June 2022). These kinds of programs are particularly valuable for the promoters, as they can help to unlock economic resources already locally present, and vice versa, their poor performances could lock valuable projects that suffer from miscoordination. Given this characteristic, the case study presented in this work can be useful for analyzing the performance of programs with the same structure.

The analysis of the case study is the major contribution of this paper. Providing the description of a specific application of European funding program, the article offers a deeper understanding of the operational process underlying the realization of an EU-funded project, including possible disadvantages, such as coordination problems, due diligence needs, or procedure delays. By increasing the knowledge of the implementation process it is possible to give a more aware interpretation of the data relating to the performance of the European funds themselves.

The remainder of the paper is organized as follows: Section 2 reports Materials and Methods used for the paper; Section 3 summarizes the main results; Section 4 gives a conclusion. All the sections report separate paragraphs regarding the case study.

2. Materials and Methods

2.1. European Funds for Energy Efficiency

The analysis of the evolution of funding schemes dedicated to the development of energy efficiency and renewable energy projects has recently become a topic of interest for economists [25–28]. The analysis of the development of different subsidies and assistance programs for developing energy-related projects in Europe also have a national nature: some examples of country-based analysis can be found in [29,30], where the Spanish perspective is presented along with an analysis of the impact of such measures on the country.

The analysis of specific countries would allow further features of the evolution of such assistance programs (e.g., temporality, authority, and tension in financing pathways) to be identified, as highlighted in [31].

In this paper, the analysis of European funds for energy efficiency is based on information and data reported by official EU websites dedicated to project funding. European funding opportunities are described, referring to the framework of the European energy policy. Data regarding specific projects' typologies—such as applied research projects financed to enhance European energy efficiency in the urban areas—were collected and re-worked to highlight—through simple descriptive statistics—the main results obtained by the European funding actions.

Descriptive analysis of the results of the various financing programs, however, risks giving an aseptic result that precludes the possibility of fully understanding what it means for a beneficiary to obtain the disbursement of funds for the realization of the project. For this reason, this article delves into the analysis with a case study on a technical assistance project.

2.1.1. Funding Opportunities for Energy Efficiency Projects: An Overview

As briefly illustrated in the Introduction, the European Union, in its targets for future development, aimed at reaching high levels of energy efficiency and improving the use

of renewable energies: efforts in these directions are taken together with efforts towards better governance and the "revolution" of energy markets, having at the center of the system active consumers. The process should also lead to job creation and to an increase in Europe's competitiveness in relevant fields [6].

To put this strategy in place, the Union established different funding opportunities to which candidates from member states (but not restricted to members) could apply: it is worth pointing out that in the field of energy the Union has begun to work since the very beginning of its constitution, in the forms of association that preceded the actual European Union. However, since the focus of the article concerns energy efficiency in an urban context, we can reduce the analysis to the last 15 years of planning, during which this need has received more attention.

Possible funding opportunities for energy efficiency can be found under the following funds:

- the Cohesion Fund, which supports the realization of projects in the trans-European transport networks and in the field of the environment, where projects that support energy efficiency and use of renewable energy are financed. Referring to the urban environment, it can be relevant for its contribution to inter-modality and to strengthening public transport. After the 2014–2020 period, the Fund was renewed for the 2020–2027 period and it has maintained the focus on mobility and related infrastructures [32];
- the Connecting Europe Facility, linked to the above-mentioned Cohesion Fund, interests the urban environment since it finances infrastructures for transport, energy and telecommunications. Even if the project size is expected to be much larger than those developed at a local level, their realization directly impacts on urban performances. The facility can also provide guarantees and project bonds, trying to foster the use of private funds for the development of the projects. The program started in 2014, and financed both studies and works [33];
- European Regional Development Fund—ERDF deserves to be mentioned since it is explicitly focused on the local development of EU areas (regions, in this specific case), thus including small size projects to be developed in the cities. Again, among key priority areas of the Fund we can find the "development of a low carbon economy" [34];
- Currently, the main source to finance research and innovation projects is Horizon Europe, which followed the previous Horizon 2020 program. Horizons came after the development of 7 Framework programs (begun in 1984). Projects developed using funds dedicated to applied research are summarized in the following paragraph [35].

The development of energy efficiency benefits from different mechanisms designed by the EU. The initiatives are often interconnected and partially overlapping. Concepts synthetized in the "Just Transition" principle [36] and in the "Smart Finance for Smart Buildings Initiatives" [37] can find practical realizations through different funding strategies.

The concept of "Just Transition" is used to guarantee that the Transition towards a carbon neutral economy and society will be put in place without creating disparities among citizens, workers and sectors. To ensure this fair result, for the time span 2021–2027, the mechanism will be financed through three different funding schemes: a Just Transition Fund that is expected to have impacts on SMEs; a dedicated Just Transition scheme under InvestEU to foster private investments in the sustainable projects; a public sector loan facility with the European Investment Bank backed by the EU budget, which is expected to have the most relevant impact if we consider the urban ecosystem, as it will be dedicated to the realization of district heating networks and buildings renovation [38].

The EU is committed to realizing a more effective use of public funds through dedicated chapters included in the European Structural and Investment Funds (ESIF) ([39]) and the InvestEU fund ([40]) (that takes over the European Fund for Strategic Investments, ended in December 2020).

Public funds are not sufficient to realize the Energy Transition process, and that's why private funds shall be called into the market, especially for a wide building renovation action. The strategy of the European Union can be synthetized by the "Smart Finance

for Smart Buildings" initiatives. The initiative foresees the use of financial instruments to mobilize investments in the sector.

The European Investment Bank (EIB, [41]) is one of the most relevant entities for the for operational management of loans. For example, to realize the principles of the smart finance for smart buildings initiatives the Commission develops with the EIB flexible models for guarantees that will help the renovation of buildings by means of commercial banks funding.

The EIB activities in this sense are wide: aiming at reviewing most relevant experiences for local development, it is worth looking at the European Energy Efficiency Fund (EEEF), developed under the European Energy Programme for Recovery ([42]). The EEEF is an initiative that promotes public-private partnerships for the realization of small-scale energy efficiency and sustainable mobility investments.

Currently (Last access: 27 February 2022) the EEEF registers 15 active projects (2 projects already reached maturity) in nine of the member states: comparing the website infographics and the 2020 annual report [43] there is a difference in the number of projects, probably due to the suspension of one of the formerly active projects ("Smart Hospitals and Universities"). Investments were realized by cooperating with 43 public authorities since the fund's inception. Cumulatively, 150 million euros have been invested by the fund, of which 140 are still committed: the presence of the EEEF in the projects may have different forms, e.g., equity or senior debt.

Table 1 reports a synthesis of EEEF projects, and is based on the information presented in the latest annual report. Projects typologies, total investment amount and EEEF participation quotas vary widely from one project to the other, making it difficult to make comparisons or to define a specific strategy of the fund.

Table 1. Projects realized through the EEEF, 2009–2019.

	Country	Beneficiary	Title/Typology	Investment (M€)	EEEF Effort (M€)
1	France	City of Orleans	Combined heat and power (CHP) plant	36.0	5.1
2	France	City of Rennes	Combined heat and power facility	47.6	7.3
3	Germany	Jewush Museum Berlin Foundation	Energy efficiency measures	1.4	0.9
4	Germany	University of Applied Sciences Munich	Optimization of the heating, lighting, metering, building management and pumping systems, as well as the installation of a 49.5 kW combined heat and power (CHP) plant	1.1	0.6
5	Italy	Illuminated Cities	Street lighting	20	16
6	Italy	Smart Hospitals and Universities	A portfolio of investments in public hospitals and universities distributed across Italy (delated)	22	7
7	Italy	University Hospital S. Orsola Malpighi	Improve the energy efficiency of the entire fluid production and distribution system and reduce energy consumption	41	31.8
8	Netherlands	City of Venlo	Energy Efficiency/street lighting	8.6	8.5
9	Portugal	CIMAC	Street lighting	16.6	12.1
10	Portugal	Wattosun	Renewable energy/PV)	10	5.1
11	Portugal	Vila do Conde	Street lighting	7.7	5.1
12	Romania	Banca Transilvania	Energy efficiency/renewable energy/clean urban transport	25	25
13	Lithuania	Dancer Mobility	Clean urban transport	5	4
14	Spain	Universidad Politécnica de Madrid	Energy Efficiency/building retrofit	2.5	2.5
15	Spain	Municipality of Santander	Street lighting	9.2	9.2
16	United Kingdom	Ore Valley Housing Association	Energy efficiency/renewable energy	4.3	2.2
Mature	France	Bolloré	Car-sharing services for electric cars	30	30
Mature	France	SPL-Région Rhone-Alpes	Energy Efficiency/building retrofit	25	5

2.1.2. Two Examples of Technical Assistance Funds

Providing technical assistance to the realization of energy efficiency projects is another way to foster investment in the sector. Among technical assistance activities, we can include: realization of energy audits; feasibility studies; preliminary studies in general; financial, administrative, legal, engineering consultancy for the project design; support to project management, etc. The EIB manages two relevant technical assistance funds: the EEEF Technical Assistance Facility and the ELENA Fund.

In late 2016 the EEEF opened its first technical assistance call. The aim of the facility is to speed up the realization of energy efficiency projects developed by local public authorities. In [43], it is estimated that the presence of the facility reduces the time of implementation from 4.5 years to 1.5–2 years.

Table 2 reports the technical assistance projects provided by the EEEF in the years 2017–2019 (first call published at the end of 2016). The technical assistance activity is far livelier than the facilitated funding activity: faster processes and easier *ex ante* evaluations, together with lower commitment can make the difference with the funding activity.

Table 2. Technical assistance provided by the EEEF, 2017–2019.

Country	Beneficiary	€
Italy	Ferrara Province	389,500
Spain	City of Gijon	400,000
Italy	Italian Ministry of Defense	340,000
Lithuania	Kaunas District Municipality	180,000
Italy	Autonomous Province of Bolzano	400,000
Lithuania	Ukmerg District Municipality	160,000
Lithuania	Silute District Municipality	195,000
Lithuania	Klaip da University Hospital	195,000

Another relevant example of technical assistance fund is the European Local Energy Assistance Fund. The European Local Energy Assistance Fund was established in 2009 to finance the technical expenditure connected with the preparation of energy efficiency investments. Among the expenditures financed by ELENA, we can find energy audits, project management, consultants for tender preparation, etc. ELENA funds are assigned on the basis of the "first come, first served" approach, i.e., projects responding to ELENA parameters are financed following the application order. Investments designed and realized due to the ELENA support shall be higher than a certain threshold (at the time of writing, 30 million euro): the contribution for technical expenditure cannot exceed a certain quota of the investment amount to keep a minimum "leverage effect" of the ELENA contribution with respect to the project.

ELENA has undergone some minor changes over the years, especially regarding the minimum investment size and investment typologies. Initially, the fund made no distinctions among energy efficiency projects: the first project benefitting from ELENA contribution was related to the realization of a smart grid to serve the Greek islands; in the first years of activity of the fund we can recognize the prevalence of projects regarding energy efficiency of street lighting and public lighting measures in general, together with energy efficiency in public buildings; over time, interest in sustainable mobility has increased and a specific chapter has been opened for these projects. At the time of writing, the ELENA fund distinguishes between three different projects' typologies:

- Energy efficiency, where we can find "traditional" ELENA projects (renovation of public buildings, lighting, district heating, etc.);
- Sustainable residential, dedicated to private individuals and homeowner associations for renovations and renewable energy projects in residential buildings (including social housing), which is an interesting novelty for the fund and might allow for a wider set of buildings;

- Urban transport and mobility.

The fund was particularly active, and since it has a relatively "long" history it is possible to appreciate the presence of concluded projects. One of the negative aspects of the information in the EIB database is that it is not possible to compare the planned projects with the projects actually carried out: for this purpose, this paper presents a specific case study on one of the completed projects. Ongoing projects and completed projects are reported in Appendices A and B (Tables A1 and A2), respectively.

2.1.3. Funding Opportunities for Projects with Innovation and Research Scopes

The source used in the analysis of the research projects is the CORDIS database [44]. The website gives the opportunity to search for projects and results awarded with European funds under different programs. Considering the scope of this work, the query used to find relevant projects includes the word "urban" and the expression "energy efficiency".

The first search provides 2489 results coming from the categories "projects", "projects' results in brief", "Synthesis", "Projects' final results" and "Projects' publications". To reduce double counting, and to focus the analysis only on the projects having as a main objective the increase of energy efficiency in the urban environment, the query was re-run only on the categories "projects", "projects' results in brief": the new list includes 416 records that are more representative of the research effort in the field.

Projects regarding "energy efficiency" linked to the concept of "urban" are 332, financed under different calls and programs—also depending on the time of funding (Table 3 provides a summary of the 332 projects).

Table 3. Research projects funded by the EU, with tags "Energy Efficiency" and "Urban".

Program	Short Name	n. of Projects	First Project Start	Last Project End
ENG-ENALT 2C—Programme (EEC) of demonstration projects relating to the exploitation of alternative energy sources and to energy saving and the substitution of hydrocarbons, 1983–1985	ENG-ENALT 2C	1	1983	1987
European cooperation in the field of scientific and technical research (COST), 1971-	IC-COST	1	1987	1990
Thermie program, 1990–1994	ENG-THERMIE 1	7	1990	1998
SAVE I program (1991–1995)	ENG-SAVE 1	22	1991	1995
Third Framework Program	FP3	2	1994	1996
SAVE II program (1996–2000)	ENG-SAVE 2	9	1996	2000
LIFE program	ENV-LIFE 2	2	1996	1999
Fourth Framework Program	FP4	5	1996	2000
Fifth Framework Program	FP5	4	2000	2006
Sixth Framework Program—Sustainable development, global change and Ecosystems	FO6-SUSTDEV	4	2005	2012
Competitiveness and Innovation Framework Program	CIP	9	2008	2016
Seventh Framework Program	FP7	55	2010	2019
Horizon 2020	H2020	211	2014	2026

Energy efficiency projects were firstly funded in early 1980 to explore the use of alternative energy sources. The project funded by ENG-ENALT 2C detected through the research in the CORDIS database is "Performance follow-up and user information service in a low-energy village" and was coordinated by Novelerg (France). The project foresaw the construction of 137 one-family houses, by integrating energy-saving concepts in urbanization. The scope of the project was to analyze possible applications for pursuing the energy efficiency targets set at the time. The project also highlighted the relevance of providing information to users to reach sustainable results.

SAVE I and SAVE II programs were specifically designed to increase energy efficiency in different sectors, with SAVE II introducing more efforts on efficiency in the urban environment and in the use of electricity. Similarly, THERMIE promoted innovative energy technologies by financing innovatory and dissemination projects.

Different grant origins might also reveal a project's approach to the problem: CIP projects, for example, are mainly focused on the use of ICT to improve efficiency in different fields, such as mobility, freight, smart grids, citizens involvement and networks themselves.

Recent programs (the seventh Framework Program and Horizon 2020 in particular) increased the financing of energy efficiency research projects, transponding EU policy indications that became stronger in the promotion of the energy transition process. Programs financed projects under different topics (energy, environment, mobility, ICT, people, etc.), which can be found with a similar pattern in the current Horizon Europe program (2021–2027).

In the next few years, Horizon Europe will collect the vast majority of funding opportunities dedicated to applied research in all the relevant topics identified by the European Union. Progress in energy efficiency, as one of the topics related to the energy transition process, will be developed thanks to this program.

2.2. The European Local Energy Assistance (ELENA) Fund: A Case Study

To better understand the functioning of the ELENA Fund, in this paper I include the results of a case study analysis performed between September 2019 and February 2020 (In February 2020, I was carrying out interviews with relevant actors involved in the development of the project: this activity was interrupted due to the COVID-19 pandemic. The results emerging from the interviews, however, gave a complete and coherent framework of the development of the project).

The methodology followed in this part of the work refers to the single case study analysis [44]. A case-study approach can be used for explorative research aiming at generating literature and not testing it. Using a grounded theory methodology [45,46], it is possible to develop theoretical categories from raw data.

Data used to elaborate the case study come from different sources, and in particular:

- Institutional EU websites;
- Institutional websites of the actors and stakeholders involved in the project analyzed as the case study;
- Web articles and media publications related to the project;
- Brochures, project presentations;
- Tenders' documentation (References for some of the materials cannot be made explicit, in order to keep the case study anonymous);
- Semi-structured interviews with relevant actors involved in the project (managers, consultants, politicians).

Interviews are anonymous, as requested by the methodology, and this guarantees the anonymity of the project itself.

Table 4 summarizes the interviews carried out for the analysis.

Table 4. List of interviews performed during the case study.

N.	Role	Date	Transcription (Pages)
1	Project implementation unit—project manager	13 September2019	9
2	External consultant—financial advisor	31 October 2019	10
3	Municipality	12 November 2019	3.5
4	External consultant—financial advisor	13 November 2019	3
5	Initial promoter	18 November 2019	2.5
6	Municipality	14 February 2020	5
7	External consultant—financial expert	14 February 2020	15

To get access to ELENA funds, applicants present their proposal to the European Investment Bank (EIB), which is the institution in charge of managing the fund. Following

the application form provided by the EIB itself, the applicant describes the investment he/she will put in place: project typology (public lighting renovation, green transports, buildings renovation, green energy production, etc.), expected reduction in greenhouse gases, expected investment amount, total amount of technical expenditure and contribution request.

When the project analyzed as a case study was submitted to the fund, ELENA covered up to 90% of the technical expenditure required to implement the project: the leverage (investment over technical expenditure) had to be at least 20%.

The EIB assigns the fund after an arranged revision process, which helps to align the content of the proposal to the fund scope (Due to past professional experiences, the author has direct experience of the ELENA application phase: on the contrary, the author has no direct experience of the development of the technical assistance itself).

After the technical phase has finished, the EIB publishes a summary of the project containing the indication of the use of ELENA funding, essential elements of the investment program and lessons learnt.

The case study project analyzed in this work was developed in the northeastern part of Italy. At the time of interviews, the project was still ongoing. The application for funding was made by a private company that followed a specific assignment received by a local foundation. The case study was partially described also in [6], with a different research purpose.

The application process for the specific project lasted for about 18 months, as reported by the consultants interviewed in late 2019: in the very first phase, a "roadshow" to invite local municipalities was carried out.

Investment targets were defined following two main directives: the first one regarded the territory on which the final investment was to be developed, i.e., the territory on which the promoting foundation was operating; the second directive concerned investment typology, i.e., public lighting and building renovation. Investment typology was defined following lessons learnt during other ELENA experiences, and especially on the very first ELENA developed in Italy (qualified as pilot project). The consultants had good knowledge of the Italian pilot as they were selected to carry out part of the technical assistance for the financial aspects. Considering the time of submission and comparing it with the subsequent evolution of the fund, it is useful to remember that the ELENA fund was not yet divided into three chapters: there was the single category for energy efficiency project.

After the roadshows, and after having collected major adhesions to the projects, the promoters of the proposal decided to divide the public bodies involved in the elaboration of the proposal into two groups:

- The four main public bodies (two municipalities and two provinces) formed the governance of the initiative. It is worth mentioning that the project was developed before the reform that changed the role of Italian provinces in 2014: during the development, provinces still had a quite relevant local role;
- The other group of participants was, instead, made up by small municipalities scattered on the territory. For reasons of efficiency, they were asked to delegate the four major entities to develop the proposal. The number of municipalities involved in the program was high (about 40) with a limited dimension.

After the roadshow and the municipality engagement process, the project proposal was presented to the EIB, which managed the application process. After the presentation of the first draft, the project proposal was modified and discussed with EIB for about six months. During the consultation process, the governance of the project defined the main beneficiary of the ELENA fund. This choice was due to a specific request formulated by BEI, which asked for a single public body to be the reference point for the project.

BEI responded positively to the fund request and, after a couple of months, the project started with the signature of the partnership agreement. The ELENA fund dedicated to the project was about 2 million euro, with an expected investment of about 60 million euro.

The first expenditure financed by the project was the recruitment of a team of experts, who were hired on a temporary basis by the beneficiary. The team was made up of a project manager, a financial expert, a technical expert and a legal expert. After the selection of the internal team, the beneficiary selected an external team (with economic, legal and technical expertise) through a competitive procedure: the tender was opened to companies or to an aggregation of companies.

The internal team and the consultants had to work together to organize the three tenders planned by the project (a tender for the auditing process, a tender for works in the sector of the public lighting and a tender for building renovation).

Despite the agreement between the beneficiary and all the other legal entities involved in the project, the commitment of some relevant actors was not reliable, and at the first kick-off meeting a big part of the expected investment was canceled from the program.

To keep the project alive, the project team had to re-organize the investment program and to spend a lot of effort to include new municipalities in the project: this was necessary to meet the investment target and the minimum leverage request by the ELENA fund.

The case study shows a lot of dissimilarities between the project presented in the application phase and the investment achievable in the development phase. The differences were mainly concerned with beneficiaries, territory involved, investment typology (a promised district-heating line was canceled from the project immediately after project start) and project timetable.

3. Results

3.1. Funds for Energy Efficiency: From a Broad Approach to the Relevance for the Urban Context

There are several funding schemes dedicated to the implementation or to the study of energy efficiency projects in the EU area. Most of them are the result of the evolution of past schemes that were modified and improved to support the evolution of European policy over the years.

Considering funding opportunities that impact more on the urban context, we can restrict the discussion to three different categories:

1. Research and innovation projects funded by framework programs and Horizons initiatives, which contributed to the development of pilot projects;
2. The Energy Efficiency Fund for the development of investment projects;
3. The Energy Efficiency Fund and the European Local Energy Assistance Fund for Technical Assistance projects.

3.1.1. Research and Innovation Projects

Research and innovation projects were the first energy efficiency project typology financed with the support of a European institution. Their relatively long history shows the evolution of the approach to the topic by the institutions that later implemented broader financing schemes for investment projects.

With regards to the Cordis database, energy efficiency projects highly increased in number during the Seventh Framework program and under Horizon 2020; with Horizon Europe, this trend is expected to be maintained, as the need for increased energy efficiency measure is still high.

Horizon's projects are dedicated to the development of applied research: the program requires different levels of technology readiness to finance the project, depending on the expectations underpinning the topic of the call (research and innovation action, innovation action or coordination and support action, the latter being closer to a technical assistance program rather than to a restricted project). The possibility of replicating pilots tested thanks to the Horizon funds is one of the relevant factors considered during the evaluation phase. Despite this requirement, it is still quite difficult to understand that weather pilot projects developed under Horizon had or have the power to be replicated after their expiration (and if yes, with which kind of extension) (It is worth noting that the first project for improving energy efficiency of quartiers by using alternative energy sources was

started nearly 40 years ago). This aspect shall be further considered and analyzed, to better balance the need for frontier research and its effectiveness. To allow for such studies, *ex post* information contained in project factsheets shall be extended and standardized, keeping a link with financed projects also after the time that financing expires. Horizon projects, indeed, have multiple impacts which also derive from network creation, as mentioned in [47]: enriching follow-up reporting will increase these effects too and increase the chances for replicability.

3.1.2. The EEEF for the Development of Investment Projects

The EEEF has been active for nearly ten years. Considering this time-frame, the 16 projects where the Fund plays or played a role are only a few, especially considering the size of some of them. Looking at the summarizing table (Table 1), it is possible to see that there are big differences in project typologies: lighting renovation has a shorter time to maturity and more profitability if compared to other investment typologies, while other projects (especially at the beginning of the program) were riskier and more innovative. Energy efficiency projects, in fact, present many risks [48] that justify the creation of dedicated funds. Considering the role of facilitated funds, it would be reasonable to expect more efforts towards innovative projects, letting traditional and safer projects be financed through traditional channels. The complexity of projects from the technological point of view, however, seems to be the most relevant barrier to the investment development: time spent in the evaluation of the investment before the funding phase shall be capitalized on, to replicate similar projects in different contexts, with a similar approach requested to Horizon projects.

3.1.3. Technical Assistance Projects

Both the EEEF and the ELENA Fund are dedicated to the development of technical assistance projects. Looking at the number of financed projects, it is possible to argue that this kind of project is easier for the officers to handle. Investments in technical assistance are not negligible, but the promises of the leverage of other investments make them more promising.

The EEEF activated a relatively high number of technical assistance programs (Table 2) in only 2 years. ELENA activated 60 completed projects plus 75 ongoing projects in the past 12 years (complete lists reported in Appendices A and B). As stated by the EEEF, technical assistance reduced time to realization for energy projects—and this is more likely to happen if applicants need to apply to other financing sources to realize the investment.

Speed, however, is not always the case for technical assistance projects: the topic will be further discussed in the findings of the ELENA case study below.

3.2. ELENA Case Study—Findings

The ELENA case study gives us the possibility of going deeper into the analysis of a specific project, as the number and the variety of energy efficiency projects financed by European institutions in very high, and data often lack or suffer from misreporting and biases (e.g., mainly self-reporting results with no standard information included in the factsheets or reports).

As specified in the Section 2, the case study was analyzed relying on publicly available documents and on a set of interviews made between September 2019 and February 2020 (The COVID-19 pandemic affected the possibility to further increase the set of interviews). The interviews gave us the possibility of understanding better specific criticalities connected to both the design and implementation of the specific project—which shows many interesting problems in its development. The list can be used to find a key to read projects' performances and to fix some funds procedures, where possible.

1. **Preparation phase**
   - **Information needs**. During the preparation of the submission, a huge amount of information and assessments were required by EIB: this procedure seems necessary to finance only valuable projects, but demands an expensive preparation process that in some cases is borne by the potential beneficiary, but in other cases calls for a pre-technical expenditure finance (as for our case study). Moreover, in recent years, experts interviewed registered an increasing need for detailed information to present a successful proposal, and this decreases the probability for less endowed potential beneficiaries to be funded. One of the experts also declared that evaluation techniques used to estimate the consumption baseline for the investment program are often not coherent with the following private evaluation carried out by the Energy Service Companies or other investors. In other words, the investment value estimated during the preparation phase might be meaningless in the realization phase.
   - **Coordination**. To reach a sufficiently high investment amount, the proposal required to collect investments needs to come from a huge number of medium and small municipalities (around 40), together with four main local authorities (two provinces and two municipalities). This activity brings with it a lot of coordination costs, including the overcoming of political differences among administrators. In the particular case of interest, four major entities also had to choose the final beneficiary of the funding.
   - **Time.** The preparation phase lasted for several months: on the one hand, this was justified by the need for data collection and to provide sufficient answers for the EIB selection process; on the other hand, this is due to a huge effort in the coordination of municipalities, which exposes the project to a political failure in case of lengthening.
2. **ELENA implementation phase**
   - **Political time inconsistency (as defined in [49])**. Once the beneficiary received the funding, other problems occurred. Coordination efforts in the preparation phase were mostly wasted, as official commitments signed during the preparation phase were considered not binding by the local authorities: this interpretation was also adopted by one of the main municipalities involved. As a consequence, the municipalities involved in the preparation phase were not those included in the final investment. The engagement of new municipalities was an unexpected activity (i.e., an unexpected cost) to be borne. Moreover, a change in the Italian legislation heavily weakened the political role of provinces, with a negative impact of the coordination power of the main beneficiary.
   - **Contracts awareness**. Besides political inconsistencies of the participants, in some relevant cases their scarce knowledge of existing contracts and funding procedures caused an additional reduction of the investment amount. Municipalities that previously declared their commitment in joining the ELENA investment program omitted the existence of management and maintenance contracts signed for the targets of intervention. The presence of incumbent contracts determined the exit of relevant municipalities from the project.
   - **Tenders dimension**. Few operators on the market had the capacity to handle the investment amount: this, on the one hand, reduced competition but, on the other, guaranteed the participation of qualified operators. As often happens, tender procedures were slowed down by appeals.
   - **Financing**. Participants to tenders relied on standard financing. There was the possibility of organizing facilitated funding schemes relying on European revolving funds, but it was not possible to find the collaboration of local operators (e.g., bank) for this purpose.
   - **Contracts**. Contracting at central level lowers administrative costs, but it also lowers the customization of the intervention and this caused unsatisfactory

realizations. Talking to local politicians, then, it was possible to identify some investment distortions that meant that the renewal was not fully satisfactory for the users. Energy Performance contracts also limited the set of possible interventions. Binding contracts impeded the realization of other investments during the time of contracting (e.g., anti-seismic adaptation). After the ELENA assistance, municipalities are left alone with the awarded operator and this might lead to an unbalanced relationship between the two, since the municipality sometimes has few competences to discuss with the operator (whose contract lasts for 10–15 years). Lack of technical competences also impacted the level of awareness in the adhesion process; similarly, in some cases it impeded the political debate, thus helping in keeping the commitment (too hard to oppose).

- **Distortions on evaluation parameters**. The leverage effect—calculated by dividing the total investment value over the technical expenditure—was considered the only relevant factor in the evaluation of the investment program, while investments should be evaluated on the basis of their cost-effectiveness. This also determined a loss in investment efficiency, as there is no interest from the beneficiary in gaining high discounts in the tender procedure.
- **Time (and its consequences)**. The ELENA funds covered 3 + 1 years of project, but private financers funded further years of work that almost doubled the initial project length. Municipalities needed to wait for a long time to see the investments they needed. Moreover, their budget constraints were considerably relaxed during the project (from the Stability Pact to the balance budget) and this meant that the interest of the municipalities in the project was reduced considerably as other opportunities became available.
- **Absence of monitoring**. The ELENA scheme does not include a monitoring period: this problem is connected to the presence of distorted evaluation parameters (only investment amount, no checks on CO_2 savings).

4. Discussion and Conclusions

Energy efficiency appears to be one of the long-lasting targets of the European Union [50], and this is confirmed by the effort put into establishing several funds to foster it. In recent years, this necessity has become even more urgent, and lessons learnt in the past shall be used to speed the process up.

Given the huge amount of resources allocated for European financing programs, it is worth exploring their nature to try to evaluate their performances, considering their impacts on the reduction of emissions, on the mobilization of monetary resources and investments, and on the reshaping of our cities. Another relevant factor for the evolution of the European intervention is the operational approach to the realization of projects financed, an aspect that is often hard to evaluate using at raw data. To overcome this limit, a case study approach might be used.

Financing research projects through the Framework Programs or, nowadays, through Horizons, creates the possibility of externalizing technicalities that might hamper the realization of projects: this is in line with the purpose of the research and innovation projects.

However, the overview provided by the paper, together with the analysis of the case study and the issues that the ELENA technical assistance project pointed out, show that directly financing investments in energy efficiency is still complex. This complexity emerges particularly if we consider traditional energy efficiency projects like building renovations and lightings, which in principle should find liquidity outside of the facilitated framework as well. As the number of projects financed by the EEEF in the past years is quite low, it is necessary to understand whether this is due to:

- an excess of barriers generated by the procedure for obtaining the funding, such as difficulties in understanding the technological processes, or
- other financing opportunities already present on the market and preferred by operators, that avoid the European due diligence process.

In the second case, i.e., projects can be "easily" financed outside the facilitated framework, it is necessary to revise the targets of the Fund and let it to unlock projects which are really challenging. The differences between a lighting renovation financed by the EEEF and a lighting renovation privately funded by an ESCo should in principle differ in terms of complexity and riskiness. If the difference is in terms of investors' patience or initial endowments in terms of technical assistance, this shall be seen as a problem for the purposes of the Fund.

Contributing to the realization of technical assistance programs, on the other hand, is perceived as easier—if we consider the number of projects realized as a proxy for this parameter. After the awarding of the funding, however, many practical problems may occur. In this paper, a case study is represented which embodies a very large set of problems, which is why it can be interesting to analyze it.

As reported by the stakeholders interviewed for the case study, some of the evidence emerged from the case study project has already been incorporated and considered by the EIB in the projects that followed. Among the different issues, the need for signed agreements among partners was considered relevant as conditions for the funding agreement. This aspect should reduce the realization time of the projects: delays, otherwise, will lead to the failure of the programs.

The other relevant aspect of the process is the presence of potentially distortive evaluation parameters, such as the leverage effect, which induces the beneficiary to give a low value to possible savings and—on the contrary—pushes for expenditure that might potentially not be effective. The monitoring of other parameters and, in general, of project coherence should be put in place to avoid a distortive use of the funds and to guarantee that the projects are pursuing European targets.

The most relevant topic to be further studied and considered in the funding process, however, is linked to information and competence. Technical assistance programs are dedicated to entities that need to be supported during the investment phase because they are too complex from the organizational and technical point of view: if the application process requires too many skills, this represents a barrier to the access of funds that needs to be removed, finding a way to guide applicants in the process. Similarly, the reduction of minimum investment size will include more applicants.

The transfer of skills should be one of the purposes of technical assistance facilities, but—as emerged during the interviews—this is not always true: the lack of initial competence on the part of the municipalities could become even more serious after the realization of the investment, as they will have no instruments to discuss with the operators managing their assets. In this sense, the monitoring phase shall be put in place to guarantee the safeguard of public interests.

In conclusion, the analysis of the case study highlighted some critical aspects regarding the potential mismatch between the purpose of the fund (facilitation) and operational barriers in the realization of the initiatives. Further studies shall try to identify what the real advantage is (if any advantage is present) of being a beneficiary of a European fund, weighting for all relevant issues and studying the effect of the relevant factors, such as the technological readiness of the project itself. As it is reasonable to expect that highly innovative projects might meet more barriers in the traditional funding system, then these projects will find comparatively fewer barriers in the European procedure rather than in the traditional market, and the application effort is justified.

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Appendix A

Table A1. ELENA Ongoing Projects.

	ELENA—On-Going Project Factsheets as of 04 March 2022 (Information Available at Project Start)						
	Title/Beneficiary	**Country**	**Signature**		**Title/Beneficiary**	**Country**	**Signature**
1	REFER-CDR—Renewable Energy For Emission Reduction in Central Denmark Region	Denmark	1 May 2017	39	Helsinki Open Charging System (HOCS)	Finland	19 December 2019
2	PROTHEUS—Smart Grid Project for Paks	Hungary	8 May 2017	40	Energy Efficiency for Lithuanian Public Buildings and Street Lighting (LITGOVEN)	Lithuania	20 December 2019
3	SCMC—Smart City Mobility Concept	The Netherlands	12 July 2017	41	ING REF Energy Efficiency in Private Buildings (ING REF EEPB)	The Netherlands	20 December 2019
4	CHESHIRE EAST ENERGY PROGRAMME	United Kingdom	24 August 2017	42	Local Authority Public Lighting Energy Efficiency Project (RMO)	Ireland	23 December 2019
5	DEPO KLAIPEDA—Development of electric public transport for new opportunities	Lithuania	1 September 2017	43	EKO TEAM	Poland	31 March 2020
6	TEBB—Transition to Electric Buses and Boats in Movia	Denmark	30 October 2017	44	Riksenergy	Sweden	3 April 2020
7	RePubLEEc—Zagreb Energy Efficient Reconstruction of Public Lighting	Croatia	6 December 2017	45	Lille DSP Rénovation énergétique	France	20 July 2020
8	GEN-IUS—GENova—Innovative Urban Sustainability	Italy	6 December 2017	46	CMH—Consorci Metropolità de l'Habitatge	Spain	30 July 2020
9	CODESO—Technical support for the implementation of sustainable energy measures in buildings owned by the Regional Government of the Basque Country	Spain	21 December 2017	47	EB&A Platform CMZRB	Czech Republic	30 July 2020
10	D6EEPB—District 6 Energy Efficiency for Public Buildings	Romania	16 February 2018	48	Tilburg Sustainable Real Estate (TSRE)	The Netherlands	3 September 2020
11	INDDHEAT—Improving renewable energy and energy efficiency in North Denmark District HEATing	Denmark	28 June 2018	49	Energy Region Kosice (ENREKO)	Slovakia	23 September 2020
12	RHEIP—The Capital Region Energy Investment Programme	Denmark	9 July 2018	50	Sustainable Homes and Sustainable Heat in Zuid-Holland	The Netherlands	30 September 2020
13	BEM—Efficiency for Berlin Properties	Germany	19 July 2018	51	Heka's Elena energy efficiency activities (HELENA)	Finland	29 September 2020
14	RenoWatt	Belgium	31 August 2018	52	Irish Water Energy Efficiency Programme	Ireland	14 October 2020
15	BIT System for Pomorskie Region	Poland	29 October 2018	53	Klagenfurt Electric Bus Investment Project (KEBIP)	Austria	11 November 2020
16	SWEU—South West Energy Unit	United Kingdom	13 November 2018	54	Jelgava Residential Energy Efficiency (JNIP-EE)	Latvia	26 November 2020
17	ASTER—Access to Sustainability for Tenants through Energy-effective Retrofit	Belgium	26 November 2018	55	Avedore Green City (AGC)	Denmark	26 November 2020
18	Frederikshavn Housing Association—Energy efficiency in social housing	Denmark	11 December 2018	56	Comprehensive Renovation Programme in Governmental Buildings in the Czech Republic (CRPiGB-CR)	Czech Republic	16 December 2020
19	GROWS—Green Revolution of Wealth in Salento	Italy	17 December 2018	57	INTegrated sustainable enERgy ACTions and projects in Crete (INTERACT in Crete)	Greece	16 December 2020

Table A1. *Cont.*

	ELENA—On-Going Project Factsheets as of 04 March 2022 (Information Available at Project Start)						
	Title/Beneficiary	**Country**	**Signature**		**Title/Beneficiary**	**Country**	**Signature**
20	GIEEP—Grant for Implementation of Energy Efficiency Projects	Latvia	17 December 2018	58	Sustainable mobility programme in Slovenia (SMP Slovenia)	Slovenia	18 December 2020
21	KaposGrid—KaposGrid Smart Urban Energy Project	Hungary	27 December 2018	59	Eemland model: Large-scale Zero-energy Renovations	The Netherlands	21 December 2020
22	FLESPI—Flemish Energy Saving Programme Initiative	Belgium	27 December 2018	60	Speed UP Renovation through Accompaniment (SUPRA)	Belgium	5 March 2021
23	ENERGY EFFICIENCY by GETIN	Poland	27 February 2019	61	Sustainable Energy—East Slovenia (SE-ES)	Slovenia	25 March 2021
24	PL-Alior Energy Efficiency Loans in buildings	Poland	27 February 2019	62	Regional Programme of energy efficiency measures and incorporation of renewable energy sources in Navarra residential building stock and their installations (PRIMAVERA)	Spain	26 April 2021
25	EEFFRB—Energy Efficiency Finance Facility for Residential Buildings	Poland	26 March 2019	63	Interdépendances—Consolider l'accompagnement des rénovations énergétiques de l'Ouest de la Normandie	France	11 June 2021
26	Sustainability loans for citizens in Limburg	The Netherlands	29 March 2019	64	PVMax—Maximal PhotoVoltaic for Croatia	Croatia	29 June 2021
27	BME—Développement d'un service clé en main de la rénovation énergétique intégrant le tiers-financement sur Bordeaux Métropole	France	28 May 2019	65	Rénovation Copropriétés Grand Est	France	28 July 2021
28	Improving Energy Efficiency in the Region of South Aegean	Greece	4 June 2019	66	Top Condomini	Italy	13 September 2021
29	OKTAVE	France	28 June 2019	67	Grenoble Alpes Metropole—Residential Energy Efficiency (GAM-REE)	France	1 October 2021
30	Ma Rénov Bordeaux Métropole	France	5 July 2019	68	Fountain Fuel Hydrogen Refuelling Stations	The Netherlands	10 November 2021
31	Parteon renovation and new buildings Programme (PARTEON)	France	19 August 2019	69	Copenhagen Energy Focused Urban Renewal (CEFUR)	Denmark	3 December 2021
32	Smart Central Bohemian Region (Smart CEBOREG)	Czech Republic	18 September 2019	70	South Muntenia Energy Efficiency for Public Buildings Investment Programme	Romania	17 December 2021
33	The National Integrator of Investment Processes in District Heating Companies in Poland (KAPE)	Poland	27 September 2019	71	Integrated Transports Management System in Padova	Italy	23 December 2021
34	FOR CASTRO PRETORIO SMART AND EFFICIENT—4CPS&E	Italy	30 September 2019	72	Prague Energy (PENERGY)	Czech Republic	20 January 2022
35	Sustainable Energy HBOR (SE HBOR)	Croatia	3 October 2019	73	Centre-Val de Loire Energies	France	27 January 2022
36	EEFFCB—Energy Efficiency Finance Facility for Commercial Buildings	Poland	6 December 2019	74	BOS Bank for increase Energy Efficiency in Poland (BOS4EE)	Poland	28 February 2022
37	Service Public Intégré de Rénovation Energétique Occitanie (SPIRE Occitanie)	France	11 December 2019	75	TRANSITION ENERGÉTIQUE DU PATRIMOINE PUBLIC D'IPARRALDE (TEPPI)	France	16 March 2022
38	Belfius Energy Project development unit (Belfius)	Belgium	16 December 2019				

Appendix B

Table A2. ELENA Completed Projects.

ELENA—Completed Project Factsheets as of 04 April 2022 (Information Available at Completed Date)							
	Title/Beneficiary	Country	Completed Date		Title/Beneficiary	Country	Completed Date
1	Purmerend—District Heating 2.0 at Stadsverwarming Purmerend	The Netherlands	14 February 2014	31	InEECo—Energy Performance and Energy Supply Contracting in public buildings (MEPCI)	Germany	6 May 2019
2	MADEV—Madrid Electrical Vehicles	Spain	7 April 2014	32	SOMACYL—Castilla y Léon Energy Efficiency project	Spain	24 July 2019
3	REDIBA—Renewable and Energy Efficiency in Diputació de Barcelona	Spain	13 March 2015	33	Progetto 3L—Less energy, Less cost, Less impact	Italy	9 August 2019
4	DAFNI—Development of smart-grid infrastructure in autonomous island grids of the Aegean	Greece	31 August 2015	34	GREENER-EX—Global Roadmap for Energy Efficiency and New Energy Resources in Extremadura	Spain	23 August 2019
5	ELENA-Modena	Italy	16 November 2015	35	SEPR—Sustainable Energy in Prešov Region	Slovakia	23 August 2019
6	LONDON DE—Decentralised Energy London	United Kingdom	8 December 2015	36	RE:FIT Wales	United Kingdom	14 November 2019
7	Green Net	The Netherlands	16 December 2015	37	FABER—Funding Action in Bergamo for Emission Reduction	Italy	28 November 2019
8	RE:FIT	United Kingdom	18 December 2015	38	AA PLUS—Energy Renovation of the Buildings of Aarhus Municipality	Denmark	2 December 2019
9	CPE-ECOLES—Contrats de performance énegétique des écoles de la ville de Paris	France	22 December 2015	39	Manchester LCDU—Greater Manchester Low Carbon Delivery Unit	United Kingdom	10 February 2020
10	Provincia de Milano—Energy efficiency Milan Covenant of Mayors	Italy	29 December 2015	40	ME-L—Municipal Efficiency—Light	Italy	24 February 2020
11	REEEZ—Renewable energy and energy efficiency in Zealand	Denmark	26 January 2016	41	EERR-VIG—Energy Efficient Reconstruction and Refurbishment of hospitals of VINZENZ Group	Austria	30 April 2020
12	Chieti towards 2020	Italy	3 October 2016	42	Erasmus—Towards a Sustainable 2020 Campus	The Netherlands	13 July 2020
13	Birmingham Energy Savers Pathfinder	United Kingdom	25 October 2016	43	Rotterdam-Leiden Heat Infrastructure	The Netherlands	17 September 2020
14	Electrobus—Energy Efficient Bus Network for Barcelona	Spain	9 March 2017	44	Rotterdam Renovation Fund	The Netherlands	30 October 2020
15	SPIS—Sparvagnar i Skane (Tramways in Skane)	Sweden	4 April 2017	45	AMICA-E	Italy	30 October 2020
16	CEICAD—Common Energy Investment Programme in the Capital Region of Denmark	Denmark	7 April 2017	46	PM4PM—Preparation and Mobilisation of Financing for Sustainable Energy Investments in Primorska Region Municipalities	Slovenia	1 December 2020
17	BRITE—Bristol Retrofitting—Innovative Technology for Everyone	United Kingdom	2 June 2017	47	EE Bratislava—Energy Efficiency Programme for Buildings and Facilities of Bratislava	Slovakia	5 January 2021
18	Aarhus LRT—Aarhus Light Rail Transit project	Denmark	12 June 2017	48	HELLO—High-volume ELectric VehicLe PrOcurement	Germany	12 March 2021
19	EP Southern Denmark—Energy Programme Southern Denmark	Denmark	12 June 2017	49	UEFA—European Union ELENA Foggia Facility Assistance	Italy	29 April 2021
20	ZEB-SN—The Zero Emission Buses in the Netherlands	The Netherlands	15 June 2017	50	ARTEE—Expérimentation du Tiers-financement en Nouvelle-aquitaine	France	21 July 2021
21	EOL—Energetska obnova Ljubljane—Energy retrofit programme of public buildings in Ljubljana	Slovenia	3 July 2017	51	TIPP—Sustainable Tipperary	Ireland	22 July 2021
22	CEDEPI—Central Denmark Energy Planning and Investment	Denmark	17 October 2017	52	Epirus—Efficient Eco-friendly Transportation, Public Lighting and Buildings in the Region of Epirus	Greece	27 July 2021

Table A2. *Cont.*

ELENA—Completed Project Factsheets as of 04 April 2022 (Information Available at Completed Date)							
	Title/Beneficiary	Country	Completed Date		Title/Beneficiary	Country	Completed Date
23	Vila Nova de Gaia Sustainable Energy Programme	Portugal	21 December 2017	53	Warmtenet Noordwest	The Netherlands	5 August 2021
24	VAMOS—Vert.s une Aide à la Maîtrise de l'Ouvrage Sociale	Belgium	10 January 2018	54	Lower Energy Use Via an Extraordinary Network (LEUVEN)	Belgium	25 October 2021
25	FUENSANTA (ARGEM)	Spain	13 March 2018	55	Energy Accelerator (The Accelerator)	United Kingdom	8 November 2021
26	RE:NEW	United Kingdom	3 July 2018	56	EEEF—European Energy Efficiency Fund	Luxembourg	9 December 2021
27	ECO AP—Programma de Efficiencia Energetica na Administracao Publica	Portugal	21 September 2018	57	GCC—Gothenburg Cable Car	Sweden	1 November 2021
28	PICARDIE PASS RENOVATION	France	17 December 2018	58	GovDER—Government Deep Energy Renovation	Slovenia	18 March 2022
29	Newlight	Croatia	21 December 2018	59	ECORENOV METROPOLE DE LYON	France	10 March 2022
30	PROSPER—Province of Savona Pact for Energy Efficiency and Renewables	Italy	3 April 2019	60	EP OVERIJSSEL—Energy Project in Large Cities in Overijssel	The Netherlands	21 February 2022

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