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United Nations Development Programme

PROJECT LESSONS-LEARNED REPORT

Total length of report: 2-3 pages.

Project Title:	Removing Barriers to Increase Investment in Energy Efficiency in Public Buildings in Ukraine through the ESCO Modality in Small and Medium Sized Cities
Country:	Ukraine
Related CPD/UNPF Outcome	Local authorities and communities adopt gender-responsive and sustainable solutions for increased energy efficiency and modern energy access especially of renewable energy
Project Description and Key Lessons-Learned	
Brief description of context	
Brief description of the project	The objective of this project is to accelerate implementation of energy efficiency measures in public buildings in Ukraine through the ESCO modality, utilising EPC contracts, by leveraging over significant private sector investment over its implementation period, including through the launching of a financial support mechanism, as well as by introducing a single nationwide energy management information systems (EMIS) for Ukraine. Over the implementation period, the 10 pilot EPC energy savings projects scheduled for implementation in 10 different municipalities in Ukraine will save 2,346 MWh of thermal energy and 268 MWh of electrical energy. Moving forward, these 10 pilots will annually save 1,870 MWh of thermal energy and 166 MWh of electrical energy until the useful equipment life of 20 years, resulting in a total reduction of 8,893 tons of CO2 over the 20-year equipment lifetime. Indirect post-project emission reduction over the next 10 years after project completion are expected to be 1,440,000 tons of CO2 avoided, which translates into an abatement cost of $ 3.80 of GEF funds per tCO2 reduced. The project will achieve this target by introducing a conducive regulatory framework for the establishment and operation of ESCOs through the EPC modality and by putting in place a financial support mechanism that, together, will facilitate private sector participation in implementing energy efficiency measures in public buildings. This will be combined with a single nationwide energy consumption data base for energy consumption in public buildings and energy management information system (that will operate in at least 20 cities in Ukraine by the end of the project) which will facilitate additional investments in energyefficiency. It is envisaged that this project will enable Ukraine to substantially reduce GHG emissions in the country over the coming years; consistent with its National Communications, total GHG emissions were almost 398 million tCO2 in 2012 and, in the absence of mitigation measures, were forecasted to see a two-fold increase to 790 million tCO2 by 2030. At the end of the project, it will be very important that local banks in Ukraine will understand the ESCO business model and that lending will be available to ESCOs in Ukraine with the commercial financing of local banks.
Key project successes	**Outcome 1: Streamlined and comprehensive legal and regulatory framework to promote energy efficiency in public buildings through strengthening of monitoring and enforcement mechanisms.** As a result of the Project's activities in supporting energy efficiency (EE) and energy management (EM) markets in Ukraine, 698 ESCO contracts were concluded as of 2024. This corresponds to an increase in the number of energy efficiency (EE) and energy management (EM) projects in public buildings by 644%, which exceeded the planned figure of 500%.

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	During its activity, the Project has developed more than 30 legislative acts, six of which were adopted, namely: - two amendments to the procurement procedure aimed at simplifying ESCO (https://zakon.rada.gov.ua/laws/show/621-2023-%D0%BF#n2; https://zakon.rada.gov.ua/laws/show/382-2024-%D0%BF#n2) - amendments to energy management (https://zakon.rada.gov.ua/laws/show/540-2024-%D0%BF#n2) - three draft by-laws to implement the Law of Ukraine "On Energy Efficiency" (https://zakon.rada.gov.ua/laws/show/z2084-23#Text, https://zakon.rada.gov.ua/laws/show/z2144-23#Text, https://zakon.rada.gov.ua/laws/show/z1466-22#Text) In the first years of its activity, the Project worked on the development of national legislation on ESCO, which regulates the improvement of energy efficiency in the municipal public sector. Its adoption in 2018 enabled the development and functioning of the ESCO market in Ukraine. 711 ESCO contracts were concluded in the "Prozorro" system as of the end of 2024 and 138 cities participated in the procurement of energy services. Thanks to the support of the Project in 2023, the ESCO procurement cycle was reduced from 9 to 3 three months, allowing the energy services market to develop rapidly in 2024. The Project held a series of webinars on new opportunities for ESCOs created in accordance with Resolution No. 621 for 946 participants. The webinar recording also gained 300+ views on YouTube. The Project supported the development and adoption of the Resolution of the Cabinet of Ministers of Ukraine No. 382 of April 2, 2024 (amending Resolution No. 1178), which changes the calculation of the baseline energy consumption for ESCO projects, introducing 3 different scenarios and providing more opportunities for comprehensive energy modernization of public buildings where the baseline is affected by war, the consequences of the Covid-19 pandemic, or other factors. In addition to the development of legislative and regulatory acts, the Project also actively supported the State Agency for Energy Efficiency in the analysis of European and current Ukrainian legislation. The Project actively supported partner cities implementing EE projects and EM, as well as ESCOs in accordance with the 37 signed Memoranda of Understanding (including the first and second phases of the Project) with the following cities: Fastiv, Kaniv, Sudova Vyshnia, Chortkiv, Poltava, Khotyn, Dobropillya, Druzhkivka, Selidove, Sloviansk, Mykolaiv, Obukhiv, Melitopol, Dubno, Borodyanka, Savran, Drohobych, Slavutych, Odesa, Korosten, Nizhyn, Yuzhnoukrainsk, Chornomorsk, Pryluky, Zvyahel, Bila Tserkva, Khmelnytskyi, Novovolynsk, Cherkasy, Kryvyi Rih, Vinnytsia, Kamianets-Podilskyi, Kyiv, Pervomayskyi. The project developed Sustainable Energy Action Plans (SEAP) for the cities of Nizhyn and Kaniv, as well as draft sections of the energy balance and energy efficiency measures for the SECAP in the cities of Kozyatyn, Kremenchuk, Kryvyi Rih and Berezhany. After the start of the full-scale invasion, the Project agreed on some changes to the indicators, which allowed for the development of recovery and energy-efficient reconstruction plans as well. As part of this, the project supported 26 cities in developing 68 preliminary feasibility studies for heat and water pumps, as well as solar power plants in hospitals and water utilities. The results of the pre-feasibility studies were published in a report to disseminate information about these technical solutions. More than 11 cities have already implemented SEAP and pre-feasibility measures and have achieved energy savings from the implemented measures. **Outcome 2: Innovative Financing Mechanism is adopted and capacity development is provided for ESCOs to promote investment in support of Energy Efficiency in public buildings.** Since the project's inception, $76 million has been invested in energy efficiency through the Energy Service Mechanism. The project supported the establishment of three Innovative Finance Mechanisms (IFM) to increase investments in energy efficiency of public buildings. 1. The project financially ($350,000) supported the State Agency for Energy Efficiency in establishing the Decarbonization Fund of Ukraine FSM for an effective and practical ESCO financing mechanism. This mechanism provides loans to local ESCO companies on preferential terms as a step towards simplifying ESCO access to financial resources. FSM provides loans at 3% with various collateral options tailored to the company and the project

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	for a period of up to 10 years, while Decarbonization Fund already evaluates loan applications for $280,000.00. 2. The project financially ($350,000) supported the establishment of the ESCO Fund AFF in cooperation with the Entrepreneurship Development Fund. The ESCO Fund will accelerate the development of the ESCO market in Ukraine through the use of banking instruments such as partial compensation of the interest rate, the body of the loan, as well as additional guarantees. It is expected that from 10 to 15 pilot projects in communities will be financed through the financial mechanism. During the three months of the fund's operation, 15 ESCO companies have applied for loans from 30 projects. 15 of them were approved for a total amount of $1.69 million, while 9 of them have already been financed. To facilitate the objectives of the Project, UNDP signed a Memorandum of Understanding with the Ministry of Finance to cooperate on financing energy service companies (ESCOs) through the establishment of an ESCO Fund. 3. ESCO factoring was launched in 2019, and 192 contracts were concluded in 2019-2021, attracting $1.2 million in investments in energy efficiency measures in public buildings. In 2022, the ESCO factoring model was practically non-functional due to the ongoing war in Ukraine. The bank risk departments assessed the risk of non-payment under ESCO contracts by local municipalities as "very high". During 2022-2024 the Project developed an assessment of the current situation regarding ESCO factoring as a lending tool for ESCO companies in Ukraine, identified existing gaps and obstacles, and provided conclusions and recommendations for the implementation and expansion of ESCO factoring or similar tools among Ukrainian commercial banks. Within the framework of ESCO factoring, UNDP signed a memorandum of understanding with Kominbank. To develop the above-mentioned financial mechanisms, the Project conducted a series of consultations with stakeholders, including the following events: - Super-ESCO: a tool for the state and communities to fulfill the exemplary role of authorities in ensuring the energy efficiency of buildings in January 2023 - "ESCO Fund: Models of sustainable financing of energy service projects for large-scale thermal modernization of buildings and energy modernization of community infrastructure in January 2023 - Webinar "Loans for ESCO: Opportunities and Prospects" in March 2023 - Dialogue platform "ESCO - affordable investments for the state and communities" in May 2024 - "ESCO Fund: Energy efficiency for sustainable development" in June 2024. In total, more than 300 energy efficiency projects have been financed in Ukraine thanks to the projects developed by the IFM or through direct support of ESCO pilots. **Outcome 3: Pilot projects in selected public buildings which demonstrate energy and costsaving potential of new energy efficient measures.** 148 ESCO pilot projects were concluded thanks to direct project support. 53 pilots in the first phase of the project attracted $3.7 million in energy efficiency investments and with the support of project, saved more than 24 thousand MWh of energy and reduced CO_2 emissions by more than 69 thousand tons over the past 5 years. Among these 53 pilots; - 15 are still operational; - 26 have been successfully completed; - 2 are not operating due to legal issues; - 10 are not operating due to hostilities. In 2024, 95 pilots attracted more than $24 million in energy efficiency investments. Among these 90 new pilots: - 46 projects for thermal modernization of public buildings for a total amount of UAH 300 million. Expected savings are 17-70%, contract term 10-15 years; - 48 ESCO-Solar Power Plants (SPP) projects in hospitals and water utilities in 29 cities for a total amount of UAH 658 million. Within the framework of these projects, 6.5 MW solar power plants and 1 MW energy storage facilities will be installed; - 1 ESCO street lighting project for the installation of 300 LED lamps for the amount of 59 million hryvnias. Expected savings - 50%, contract term - 15 years. To support communities, the Project conducted 97 energy audits of public buildings, as well as street lighting audits in the cities of Novovolynsk, Cherkasy, Pryluky, Drohobych,

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	as well as pre-feasibility studies for solar power plants and water pumps (see the first component). In addition to the Project pilots, since 2019, cities and municipalities have implemented 304 replication projects thanks to ESCO in public buildings, which used templates and materials developed by the Project. 4,498 certificates were issued based on the results of a series of trainings for energy managers, including: - 1003 in 2018-2019; - 1619 in 2022 in Odesa, Rivne and Kirovohrad regions (56% men / 46% women); - 1055 in 2022 (54% men / 46% women); - 821 in 2023 (46% men / 54% women). The project is also completing the process of creating an online course on energy management in cooperation with GIZ. 95 participants also joined the energy management courses as free students in 2022. As part of the initiative "Creating employment opportunities for veterans/women and women in the energy sector", the project provided free training on installing solar power plants for 33 participants. In 2024, the Project conducted a series of three study tours to successful ESCO pilots. The tours included visits to 10 pilots in 6 cities. 58 participants from 23 communities participated, 6 of which will be tendering for energy services. One new ESCO company, which will invest in SPP in the future, also participated in the visits. **Outcome 4: (a): Institutional basis for supporting energy efficiency in public buildings and implementing a nation-wide Energy Information Management System (EMIS) is in place. (b): Documented, disseminated and institutionalized project results providing a basis for further replication.** The Project deployed the UNDP EMIS pilot, adapted it to the Ukrainian context and transferred it together with the server of the State Energy Efficiency Agency. The Project developed a new brand identity for the State Energy Efficiency Agency. The Project also procured and is currently developing a new website for the State Energy Efficiency Agency, including a register of ESCO companies, as well as the ability to verify the effectiveness of all concluded ESCO contracts. To strengthen digitalization for the main beneficiary State Energy Efficiency Agency of Ukraine, the Project helped to develop web portal and web register, both web products are due to launch in 2025. The Project also supported the capacity of the State Energy Efficiency Agency by transferring computer equipment and software. In the second phase of the project, the Project received a request from the State Energy Efficiency Agency for assistance in creating a National Energy Efficiency Monitoring System. The Project developed a technical specification for this system. The Project conducted trainings for trainers of energy auditors in cooperation with the TEAD project. 64 participants received certificates. During 2017-2019, the Project directly supported the implementation of EM at the municipal level for 54 cities and 25 villages for a total of 784 buildings. In 2022, the Project supported the implementation of EM in Rivne and Kirovohrad regions of Ukraine (66 cities/communities) and in the city of Odesa for 7,020 public buildings. In 2024, the Project also procured online energy monitoring systems for 10 cities and 2 central government offices. The Project also procured automated electricity meters for piloting “EMIS from scratch” in 3 cities: Bakhmach, Kozyatyn, Pervomayskyi. The Project developed and disseminated a number of materials on the website and social networks, as well as via email, including: - Energy Management Implementation Guide; - Analysis of the effectiveness of pilot ESCO projects in partner cities. Successful experience in implementing energy service contracts; - Recommendations on financial incentive programs to support the ESCO market mechanism, in particular, an analysis of all options aimed at supporting the development of the ESCO market; - Review of best practices in ESCO market design and recommendations for Ukraine;

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	- Preliminary feasibility studies for the implementation of a solar power plant model under the energy service mechanism. The Project widely disseminated information and results about the Project on national and international platforms, including: COP27, COP28, COP29. International sustainability Forum, RazomWeStand LinkedIn Event, Razom We Stand EU-Ukraine Energy Workshop, EPBD.Wise: Policy Forum Ukraine Agenda, Event in Kazakhstan, Round table "Requirements for NZEB buildings in Ukraine". More than 2,700 people have visited the project website since 2022. The total reach of posts on social networks was more than 150,000 people. The number of subscribers to the project's email newsletter increased from 80 in 2022 to 800 people. The final conference of the Project was attended by 100 representatives of cities, water utilities, state bodies and other partners.
Project shortcomings and solutions	Project suspension, as well as Pandemic and the full-scale invasion created delays in its timely and efficient implementation. In order to overcome these challenges, the Project had two extensions for 2 years, that allowed project to overachieve all its key targets and deliver fully on the budget in the end. Change in leadership of the main beneficiary and well as reorganization of the Ministry for Communities, Territories and Infrastructure Development of Ukraine created challenges in stakeholder communication, which the Project solved by regular consultations and consistent stakeholder engagement of higher and working levels. Occupation and destruction of some pilot project sights affected the project results. The Project continued to add new partner-cities in other regions in order to deliver on the indicator goals and support more communities in strengthening their energy efficiency.
Lessons learned	1. The requirements of Ukrainian legislation in the field of informatization, data protection and information security should be taken into consideration at the very beginning of any activity or development that to some extent relates to the implementation of software products. There is a well-established practice of planning/development/implementation of initiatives/programs/projects that mostly has a sequence of approval first among the relevant specialized/profile/sectoral management, and then with the related authorities, and somewhere in the end with the agencies in charge of informatization, information security and data protection. In recent years, Ukrainian legislation in the field of informatization has changed significantly and moved to the forefront of the world's best practices in this area. Today, it is already mandatory to involve IT expertise (compliance checks) at the very beginning of any planning, activities or developments that to some extent relate to the implementation of software products. Moreover, failure to engage in such expert coordination and control jeopardizes all developments in the event of failure to comply with the entire range of requirements in the information sector. Large amounts of resources (human, material, financial, time, etc.) may be wasted. As an example, UNDP EMIS, which was implemented in several countries in Europe and Asia through UNDP programs, and was planned (even before the appearance of the specified requirements) to be used by the Project as a National EMIS, currently needs significant revision for implementation in Ukraine in order to bring it into line with the updated requirements of Ukrainian information legislation (which currently differ significantly from the requirements in other countries). Such adjustments require additional costs, both monetary and human, and most importantly, scarce time resources and necessary agreements. Therefore, the question arises about the expediency of using UNDP EMIS, an alternative way is being considered - directing efforts and resources to create a basis for developing specialized software from scratch. This example proves that any future projects aimed at the application of software products in Ukraine must be coordinated with the relevant authorities in the field of informatization at the planning stage, which is mandatory for now. 2. Grid-tied solar stations do not generate electricity during blackouts. As of June 2024, with the support of the UNDP project, 6 EPCs have been signed for the installation of solar energy systems for Water Utilities. Four of them have already been installed and are generating electricity for the Water Utilities. However, during the implementation of the pilots, it was found that grid-tied solar stations cannot generate electricity during blackouts because there must be a constant voltage at the inverter. This problem can be addressed either by using battery storage systems or diesel generators.

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	Both solutions impose significant investment burdens on ESCO companies, so the issue of equipping grid-tied solar stations has not been resolved yet. 3. ESCO Autonomous Heating Pilot Project in Kremenchuk The idea of the ESCO autonomous heating model involved the modernization or replacement of existing boiler equipment owned by a budgetary institution. In our case, public buildings in the city were selected, which have low-quality heat carriers but do not have a gas boiler facility under their management. Therefore, during the study of implementing such an ESCO model, several issues emerged that are currently not legislatively regulated: • Who will act as the client for energy services (public building or municipal heat supply company)? • How to calculate the baseline energy consumption? • Land allocation for the boiler room and heating network. • Obtaining licenses for heat production, transportation, and supply by the ESCO company. • Approval of tariffs for thermal energy by the ESCO company. • Procurement of gas or pellets is also problematic and is at the expense of the client. Therefore, in studying the feasibility of implementing such an ESCO-model, the project concluded that currently, there is no legislative regulation for the construction of a new boiler facility for heat production near a public institution. This would require changes in a series of legislative acts. 4. Miscalculation in the technical solution by the ESCO company After conducting the first verification of the effectiveness of the ESCO pilot projects involving solar power plants at water facilities, certain miscalculations were identified. Specifically, due to electricity savings, the water facilities began shutting down pumping units at ESCO facilities, leading to a halt in electricity consumption during morning hours. As a result, electricity generated by the solar power plant is not being utilized by the water facilities. Such force majeure circumstances lead to a deterioration in the payback of ESCO projects. One solution to these force majeure circumstances could be the application of the net-billing model, where during hours when the ESCO facility is not consuming electricity, the ESCO company could generate electricity into the general power grid and receive payment for it. Currently, the UNDP Project is continuing to study the legislation to enable the application of the net-billing model for EPCs. 5. Adjustment of the EPC price for inflation One of the challenges in scaling the ESCO market in Ukraine during martial law is the application of inflation adjustments to ESCO project contracts. Ukrainian public procurement legislation grants the right to adjust the EPC price for inflation. The law allows ESCO to propose one of four formulas for price adjustment before signing the EPC with the municipalities. Some of these formulas increase EPC price of just 20%, while others can lead to a 100% increase. Most municipalities refuse to sign EPCs with inflation adjustments, leading to the cancellation of contracts that UNDP experts have spent over a year preparing. Example: Vinnytsia city (a partner city of the UNDP project) In August 2023, the UNDP project began supporting the municipality in applying the ESCO mechanism for the thermal modernization of Kindergarten No. 1. Over the course of a year, the UNDP project conducted an energy audit of the kindergarten, identified energy efficiency measures, calculated the project's investment attractiveness, prepared tender documentation, provided consulting support within the Prozorro system, and drafted an EPC. ESCO proposed one of the four price adjustment formulas. Calculations showed that over the contract period, the EPC price could increase by 40%, from UAH 23 million to UAH 57 million (with a consumer price index of 15%). Conclusion:

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	The ESCO solar power plant projects can be implemented without inflation adjustments due to their quick payback period (3 years). However, ESCO thermal modernization projects, where the payback period is 7-8 years, will not be contracted due to the high inflation risks faced by ESCO during the war. 6. Access to affordable financing Ensuring the availability of affordable financing options, such as low-interest loans, green bonds, and grants, is critical for driving investment in energy efficiency measures in Ukraine. Financial institutions, both domestic and international, need to collaborate with the Ukrainian government to create and promote these financing instruments tailored to the specific needs of public buildings. Reducing the cost of capital through affordable financing options can significantly enhance the financial feasibility and attractiveness of energy efficiency projects in public buildings. By making financing more accessible and affordable, it becomes easier for both public institutions and private companies (incl. ESCO-companies) to invest in energy-saving measures, leading to widespread adoption and substantial energy and cost savings. This, in turn, contributes to the country's broader goals of energy independence, economic resilience, and environmental sustainability. Additionally, affordable financing can stimulate the local economy by creating jobs and fostering the development of a green technology market. 7. Financial incentives and subsidies Introducing robust financial incentives, such as tax breaks, direct subsidies, or rebates for energy-efficient upgrades, is vital for accelerating the implementation of energy efficiency measures in Ukraine's public buildings. These incentives should be designed to address the specific financial constraints and needs of public institutions, ensuring they are attractive and accessible. Financial incentives play a crucial role in lowering the initial investment barriers that often hinder the adoption of energy efficiency projects. By reducing the upfront costs, these incentives make it more feasible for public buildings to invest in energy-saving technologies and practices. This not only leads to significant long-term financial savings through reduced energy bills but also promotes environmental sustainability by decreasing overall energy consumption and greenhouse gas emissions. Additionally, widespread adoption of energy efficiency measures can stimulate the local economy by creating demand for green technologies and services, further supporting Ukraine's transition to a more energy-efficient and sustainable future.
Follow-up Actions	

Project Information	
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