Urban Pathways

Factsheet

Implementing energy efficiency through Energy Service Companies (ESCOs)

Wuppertal Institut

UN HABITAT FOR A BETTER URBAN FUTURE

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The Urban Pathways project helps delivering on the Paris Agreement and the NDCs in the context of the New Urban Agenda and the Sustainable Development Goals. It has established a facility in close cooperation with other organisations and networks active in this area to support national and local governments to develop action plans and concrete implementation measures to boost low-carbon urban development. This builds on UN-Habitat's role as "a focal point on sustainable urbanisation and human settlements including in the implementation and follow-up and review of the New Urban Agenda". The project develops national action plans and local implementation concepts in key emerging economies with a high mitigation potential. The local implementation concepts are being developed into bankable projects, focusing on the access to urban basic services to create a direct link between climate change mitigation and sustainable development goals.

Project concept

The project follows a structured approach to boost Low Carbon Plans for urban mobility, energy and waste management services that deliver on the Paris Agreement and the New Urban Agenda. The project works on concrete steps towards a maximum impact with regards to the contribution of urban basic services (mobility, energy and waste management) in cities to global climate change mitigation efforts and sustainable and inclusive urban development. This project makes an active contribution to achieve global climate change targets to a 1.5°C stabilisation pathway by unlocking the global emission reduction potential of urban energy, transport and resource sectors. The project will contribute to a direct emission reduction in the pilot and outreach countries, which will trigger a longer term emission reduction with the aim to replicate this regionally and globally to make a substantial contribution to the overall emission reduction potential.

Project aims

This project implements integrated urban services solutions as proposed in the New Urban Agenda providing access to jobs and public services in urban areas, contributing to equality and social coherence and deliver on the Paris Agreement and the Sustainable Development Goals. This is the first dedicated implementation action oriented project, led by UN-Habitat to deliver on inclusive, low-carbon urban services. Securing sustainability and multiplier effect, the project aims to leverage domestic and international funding for the implementation projects that will follow from this initiative.

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In brief

Energy efficiency holds untapped potential for energy savings and cost savings for cities' budgets. Technical energy efficiency measures, however, often require upfront investments and cannot be implemented due to tight public budgets. Municipalities and public authorities also often lack the technical and financial know-how for designing and implementing energy efficiency projects, especially when it requires considerable infrastructure upgrade, and associated operation and maintenance (O&M). Market based solutions such as Energy Service Companies (ESCOs) bridge this gap by providing wide range of services, such as conducting energy audits, identifying appropriate energy efficiency measures, assessing project's technical and financial feasibility, implementing retrofitting measures, and supervising O&M (Polzin, von Flotow, & Nolden, 2016). ESCOs can be private, public, or non-governmental organisations.

The target sectors for most ESCOs are street lighting; deep energy retrofit of buildings including energy efficiency improvements in building envelope, indoor lighting, boilers, heaters, and chillers, heating, ventilation and air-conditioning systems, domestic hot water systems; and pumping systems and motors etc. (Bertoldi & Boza-Kiss, 2017; Smith, Vines, & The Cadmus Group, Inc., 2016). The ESCO contract models that are discussed in this factsheet are appropriate for municipalities, and also for other public or private entities, to implement energy efficiency measures.

Energy Service Companies (ESCOs) provide specific energy services over a defined period of time. Municipalities that contract an ESCO receive a defined level of performance, e.g. a specified level of energy savings in a public building or street lighting. Common models for designing and implementing energy efficiency projects are Energy Service Agreements (ESAs), Managed Energy Service Agreements (MESA), and Energy Savings Performance Contracts (ESPCs) (Pätäri & Sinkkonen, 2014).

- ***An ESA is a long-term agreement between*** a municipality and an energy efficiency project provider. The provider pre-finances the development and construction of efficiency measures and may offer a savings guarantee. Municipalities pay back these upfront costs over the contract period, using cost savings from reduced energy consumption. The project developer usually assumes the liability for underperformance. Typically, the project developer retains the ownership of any installed energy efficiency equipment during the contract period. After the contract ends the ownership is transferred to the municipality (Kim et al., 2012).
- ***Managed Energy Service Agreements*** (MESAs) are a variation of an ESA. In this case, the ESCO pays the energy costs directly to the energy provider on behalf of the municipality. In exchange, the ESCO receives monthly payments from the municipality. Rates are negotiated based on energy bills prior to the implementation of the energy efficiency measures. The energy cost savings realized through the implementation of energy efficient measures are used for capital repayment, service charges and as a return of investment (Kim et al., 2012).
- ***Energy Savings Performance Contracts*** (ESPCs) is a contractual agreement between a municipality and an Energy Service Company (ESCO). Based on a comprehensive energy audit to assess the project feasibility, ESCOs offer technical and implementation services such as project design, procurement, construction and installation, operation and maintenance, and measurement and verification. The municipality provides the capital investment (see factsheet 'financing measures for energy efficiency') which is then recovered from the energy cost savings, as guaranteed by the ESPC during the contract period. The liability due to underperformance of the implemented energy efficiency measures is entirely borne by the municipality or shared with ESCO as per the terms of the ESPC. Municipalities can mitigate the liability by securing the capital investment, especially raised through credit, with energy efficiency credit risk guarantee programmes.

Examples Measures

Energy service contracts facilitate the implementation of energy efficiency improvements. Reduction in the energy consumption results in energy cost savings, and reduced GHG emissions. Energy efficiency improvements often result in better comfort levels, enhanced operations and improved infrastructure. For example, energy efficient lighting and well-lit streets increase road safety and security of citizens.

Results

Financial Considerations

Financial considerations

- ***Energy cost savings opportunity:*** Municipalities should identify projects with considerable returns on investment. It is important to ensure the repayment on the project's capital costs and service charges are met through energy cost savings resulting through the implementation of energy efficiency measures.
- ***Energy price distortion:*** Energy prices are usually subsidised for municipalities and residential customers, especially in developing countries. When prevailing energy prices do not reflect the actual cost of energy production[1], energy cost savings due to the implementation of energy efficiency measures are often low, negligible or even negative and thus, rendering the implementation of energy efficiency measures infeasible. This price distortion factor and future energy price projections need to be considered and addressed before making an investment decision.
- ***Compliance with existing financial laws:*** The financing models and the agreement strategies such as ESPCs, ESAs, MESAs must be within the ambit of financial laws and regulations of the that govern insurance, commercial banking, capital markets and investment management sectors. Modifications to the existing laws, or enacting new laws may be required to incorporate regulations that specifically encourage financial investments in energy efficiency. For example, measures, such as securing a permit from securities and exchange boards for the issuance and investment in energy efficiency bonds, facilitating a credit risk and default redress mechanism for ESPCs, ESAs etc.

1 For example, when the energy price do not reflect the costs of environmental and social externalities such as GHG emissions, bio-diversity, land use etc. (Samadi, 2017).

Technical Considerations

Technical considerations

- ***Establishing a reliable baseline data*** which includes key aspects such as energy consumption and energy costs, as well as, occupancy, equipment, schedules, and operating parameters is needed to estimate potential energy cost savings. Such an analysis is required for municipalities to select a suitable financing model.
- ***Criteria for ESCO selection:*** The technical and financial competency of the ESCO should be assessed based on their qualifications, experience and accreditation. ESCOs are often professionally accredited for their competence in conducting investment grade energy audits and undertaking ESPCs. Request for Proposals (RFP) from ESCOs should include all eligibility criteria for the ESCOs that are necessary to meet the project requirements. For example, Bureau of Energy Efficiency (BEE) in India empanels and grades ESCOs in terms of their success in implementation of ESPCs, technical manpower, financial strength etc. (BEE, 2015b, 2015a). Further, BEE maintains a public list of empaneled ESCOs with their grades. The grading of ESCOs is carried out by accredited agencies such as the Securities and Exchanges Board of India (SEBI).
- ***Contractual agreements:*** ESPC or ESA contracts should be drafted considering all project specific demands and should legally guarantee the interests of all parties involved. Individual obligations of ESCOs, such as installation, guaranteed savings, O&M, capacity building, etc., and obligations of the cities, such as financing, payment, providing access to the facilities should be specifically outlined within the contract. In addition, the contract should detail out the baseline, targets, measurement and verification protocol, mode and period of payment, savings sharing agreement, veto powers, duration of the contract, risk coverage, and grievance redress mechanisms etc. (energy-cities.eu, 2004).
- ***Measurement and verification protocol:*** Measurement and verification ensures the installation of energy efficiency measures as per the plan and the energy savings are in line with the guaranteed energy savings. The International Performance Measurement and Verification Protocol (IPMVP), published by the Efficiency Valuation Organisation (EVO) allows building owners, energy service companies, and financiers of energy efficiency projects to quantify the energy savings performance of energy conservation measures (Efficiency Valuation Organization, 2018).

Policy Legislation

Policy/legislation

International, national or sub-national climate mitigation strategies should incorporate implementation of energy efficiency through ESCOs as a key policy instrument. Energy policy should facilitate investments in energy efficiency, for example, by eliminating distortions of the energy price, or by providing tax incentives that encourage investments in energy efficiency. Technical and financial regulations and guidelines should be in place for the empanelment of ESCOs and energy auditors to undertake or facilitate ESPCs and ESAs.

A demanding energy efficient policy framework that encompasses sectorial efficiency targets (e.g. for buildings or public lighting) and clearly assigns responsibilities supports investments in energy efficiency measures.

Institutions

Institutions

A competent state authority, such as a national energy agency could provide model guidelines for establishing the baseline, model ESPCs, ESA, MESA, PACE etc., which can be easily adapted by the municipalities to suit project specific requirements. For example, State and Local Solution Center supported by the Office of Energy Efficiency and Renewable Energy of the USA provides model documents for developing ESPC project (RFP), conducting investment grade audit, undertaking energy savings performance contracts, and providing financing solutions (energy.gov, n.d.).

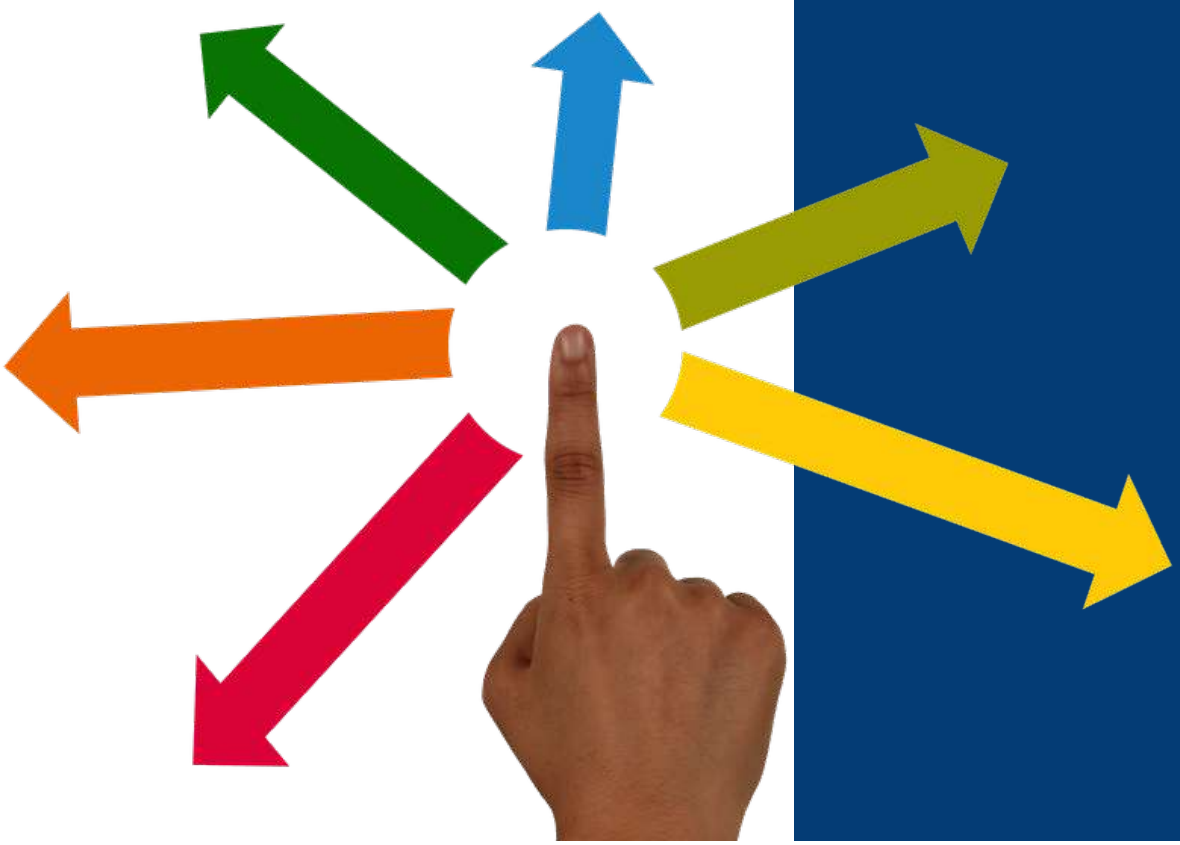
Transferability

Transferability

While most cities offer services such as public lighting, waste management, fresh water supply, some municipalities also own or offer services in public transport and energy supply. Cities can implement measures to improve the energy efficiency in any of these service sectors. The energy service contract models and technical and financial considerations described above offer guidelines for the cities to engage the services of an ESCO for implementing energy efficiency measures..

The process of implementing energy efficiency measures through ESPCs can be broken down into two key phases, pre-audit technical and feasibility analysis phase (including investment grade energy audit), and post-audit contract and implementation phase. Cities could use grant funding to conduct the pre-audit feasibility studies to at least identify the areas and the potential for energy savings in the different sectors. Feasibility reports could then be used to seek non-grant financing for the post-audit contract and implementation phase.

Enabling conditions for the successful implementation for ESCO services, especially through external financing, include moderate to high potential for energy efficiency improvements, easy access to efficient technology, technical expertise to operate and maintain such efficient technology.



Case Study: Bhubaneswar India

Context

Bhubaneswar is the capital and the largest city of the Indian state of Odisha. The city of Bhubaneswar's street lighting infrastructure for some time has been old and outdated. Most of the smaller streets and residential areas have had poor lighting quality, which is well below the national standards. Although, the municipality has no metering system for 75 % of the streetlights, the calculated energy consumption of approximately 20,000 streetlights reveals an extremely inefficient lighting system, which is a strain on the city's finances. As a measure of improvement, Bhubaneswar Municipal Corporation (BMC) – the responsible agency for installation and maintenance of streetlights – opted for an ESPC model for the implementation of energy efficient measures in street lighting system. This was rolled out by engaging the services of an ESCO (BMC, 2013).

In action

The Bhubaneswar Municipal Corporation (BMC), receiving funding from the International Finance Corporation (IFC), has embarked on a project that aims to retrofit, operationalize and manage 19,873 street lights across the city's jurisdiction (World Bank Group, 2013). The International Finance Corporation (IFC) has also assisted BMC in designing and managing the ESPC bidding process..

The ESCO will cover the capital costs for the upgrade and maintenance of the lighting system. It would further implement energy efficiency measures with a minimum guaranteed energy savings of 30% - in at least 70% of the verified points (street lighting fixture). An estimated 10% of energy savings would be retained by the BMC, while 90% of energy savings are claimed by the ESCO. BMC will also pay the ESCO an operation and maintenance annuity of INR 300 (approx. €3,70) per pole per annum (escalating by 5.5% annually) from the resultant energy savings. The project duration is estimated to extend to a 10 year period and is to be revised after every two and half years to assess if the scope of the project needs to be extended to new areas.

Certain risk mitigation measures have been undertaken to increase the ESCOs investment confidence in the project. In this regard, BMC's parent body, Housing and Urban Development Department of the Government of Odisha, has issued a letter of Intent to the ESCO. In addition, BMC has agreed to deposit a monthly advance, equal to the amount of what it used to pay, as one month's electricity bill prior to the commencement of the project and one month of O&M fee for each verified point in the project area. This amount will be placed in an escrow account called the 'trust and retention account agreement' in a reputable bank that is acceptable to the contractor. An expected 75% of the energy savings and O&M fee will be disbursed to the ESCO immediately upon the submission of an invoice and the remaining 25% is paid upon further verification by BMC.

Results

A consortium led by Shah Investments, Financials, Development, and Consultants Private Limited won the bid and an ESCO (ESPC) contract was signed on October 5th 2013. The project has mobilised a private investment of USD 4.5 million. The replacement of 20,000 conventional streetlights with LEDs reduced their energy consumption by 80%. The programme is expected to generate annual savings of approximately USD 100,000 to the BMC and also reduce greenhouse gas (GHG) emissions. In addition, the project has improved the quality of street lighting by making the streets and spaces safe, and by improving business opportunities for street vendors, especially for women working after sunset (IFC, 2017; World Bank Group, 2013).

Results

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