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# How Paris used energy performance contracts to retrofit schools

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The Parisian building sector accounts for 64% of the city's energy consumption.<sup>1</sup> The City of Paris's [Climate Action Plan](#), therefore, aims to reduce the energy consumption of municipal buildings by 60% as part of an overall strategy to achieve carbon neutrality by 2050. Energy performance contracts (EPCs) – a pay-for-performance mechanism for building energy efficiency investments – offer a route for achieving this goal. EPCs allow city governments and other building owners to repay their investments from realised energy savings over a set period of time, helping to overcome the high upfront costs associated with such projects. They also make retrofits more attractive to private investors by making it easier to assess the expected rate of return.

The City of Paris has used EPCs to refurbish 240 schools in two phases, with a third phase now underway. The refurbishments, tailored to each school, include window renovations and the installation of LED lighting, sensors, insulation and new boiler systems.

The 100 schools in the first phase each achieved a 33–38% reduction in energy consumption from 2004 levels, saving around 2,300 tCO<sub>2</sub> annually and exceeding the original 30% goal. The results of the second phase are still being calculated. Because of the programme's success, the City of Paris is now using EPCs to carry out energy efficiency refurbishments of its public swimming pools and is looking to extend the programme even more.

## How does an Energy Performance Contract (EPC) work?

The city government strikes an agreement (the EPC) with an energy service company (ESCO) committing the ESCO to financing an energy-efficiency project and provides a performance guarantee. The government authority repays the investment from its energy savings. If the project underperforms and the agreed energy savings are not achieved, the ESCO pays the difference in cost borne by the government authority.

In addition to financial support, the ESCO provides project services, including project audits, equipment procurement, project design, construction, installation and data monitoring (of energy savings). The ESCO also brings expertise on energy-efficiency projects.

Read more about how to facilitate energy performance contracting in *The supportive programmes your city needs to drive toward zero-carbon buildings.*

## What can cities learn from Paris's experience?

### Begin by setting as precise an energy performance baseline as possible

The Paris programme began in 2008 with a three-year energy performance audit and wider data-collection process. The audit evaluated the energy-reduction potential of 2,500 municipally owned buildings and set baseline energy consumption figures. It identified Paris's 650 schools as having the greatest energy-saving potential – at an estimated 59%, accounting for 38% of the City's total annual energy costs. Among the schools, 300 were deemed to be good candidates for EPCs, based on factors including energy-saving potential, the age of the building and cost-effectiveness of the retrofit measures needed.

It is critical that cities collect good baseline data, as Paris did, before the procurement stage of the EPC. These data inform the procurement process by providing the means to assess the energy efficiency improvements offered by the EPC and enabling the establishment of monitoring systems to quantify its results. Without good baseline data, cities will need to set aside higher contingency reserves for uncertainties and are likely to incur extra costs down the line for studies to measure the results.

Data collection should include, as a priority, energy performance, energy consumption, fuel types and costs, building installations (such as heat, ventilation and air-conditioning), lighting and insulation, factors influencing energy consumption (such as the building's purpose, occupancy rates, hours of operation and internal temperature requirements based on occupants' needs and any local or national regulations) and building data (including internal space, age and prior renovation dates).



For more information on energy audits and other approaches and uses of building energy data – such as green building schemes that help to incentivise and quantify energy reductions by municipal and privately owned buildings – see *How to use reporting and disclosure to drive building energy efficiency*. *Using Data for Policy* offers further guidance on how to use these data for developing and implementing policy on building energy efficiency.

## **Seek expert advice and external funding for the first phase – and do not rush procurement**

Kick-starting project preparation and procurement is expensive and complex. In Paris, the 300 schools prioritised for retrofitting through EPCs were split into groups based on factors such as energy consumption and the age of their heating systems. The EPCs have been undertaken in phases – three so far – enabling lessons learned and processes established in earlier phases to be applied to later projects. In Paris, the procurement process for both the first and second stages took more than a year.

The energy-reduction goals, number of schools included, timeline and contract length (for the maintenance programme and energy-reduction target guarantee) of the EPC in each phase are shown in the following graphic.

### **3 Energy Performance contracts**

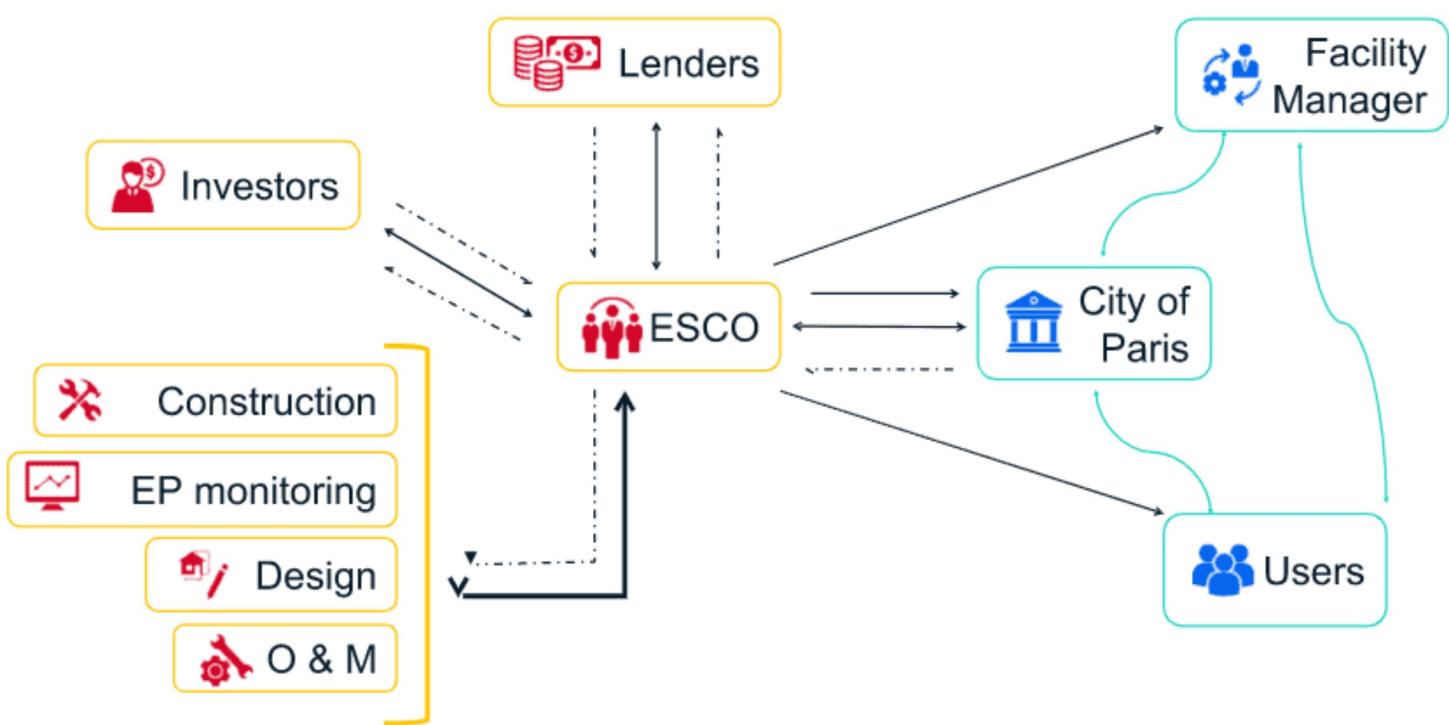


Source: City of Paris (2019)<sup>2</sup>

The first phase of the project was largely financed through lenders. The European Investment Bank, by way of the European Local Energy Assistance (ELENA) programme, covered 90% of the costs of project preparation and follow-up. The EPC signed in 2011 with energy service company (ESCO) Nov'ecoles financed the upfront costs of the retrofit work – an investment of EUR 28 million, paid when the works were completed and project performance verified. The ESCO also provided services including feasibility studies, project conception, implementation of the retrofit works (including building-envelope and

heating-system upgrades), ongoing maintenance and monitoring, and energy consumption training for the building's users. **It is critical that the ESCO, through the EPC, has sole responsibility for energy performance.**

The following graphic shows the partnership arrangement under the first ESCO.



Source: City of Paris (2019)<sup>3</sup>

**The costs of subsequent projects are typically lower.** In the second and third phases, the City of Paris paid the upfront costs of the refurbishments without borrowing or seeking external funding – the ESCOs again provided project conception, implementation, and maintenance, alongside the performance guarantee, but did not finance the retrofit works. With this model, the ESCO secured financial guarantees on behalf of the City of Paris in case of underperformance.

### Be ambitious, but ensure that your goal is achievable

It is the ESCO's responsibility to estimate a realistic timeframe for implementing the retrofit projects in accordance with the budget available. A city's initial high target may need to be modified after the pre-feasibility study. So far, Paris has found the retrofitting of 50 schools per year to be manageable; the first phase of 100 retrofits was implemented over two years.

### Work closely with municipal services and other stakeholders

Paris consulted a range of internal and external stakeholders right from start of the project. The key internal stakeholders were the city's district councils and the departments of finance and education. The key external stakeholders were local ESCOs, the European Investment Bank and school actors (notably

teachers and the Parents and Friends Association).



## Establish guidelines for the internal temperature of municipal buildings

Building energy efficiency investments are not the only way to reduce building energy consumption. The City of Paris also published guidelines early in 2020 to standardise and regulate the internal temperature of municipal buildings. Temperatures are set by sensors rather than users. For schools, the guidelines set a temperature of 19°C during school hours (or when the buildings are otherwise in use), dropping to 16°C when the buildings are not in use. It is too soon to see how the adoption of these guidelines will affect schools' annual energy use, but it should deliver energy savings according to the energy performance audit.

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