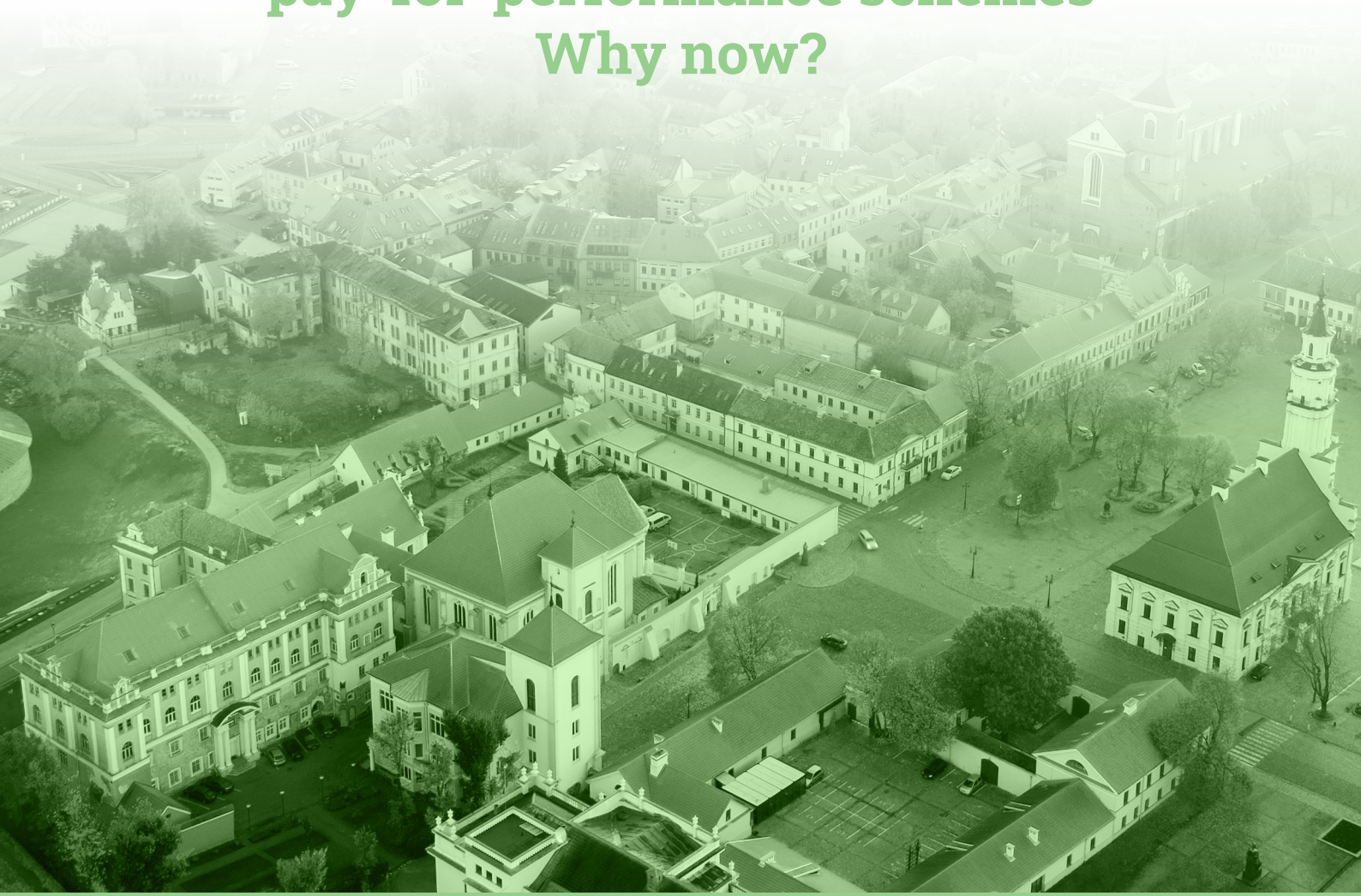
sensei

Metered energy savings and pay-for-performance schemes
Why now?



SENSEI

Smart Energy Services to Improve the Energy Efficiency of the European Building Stock

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1. Why now

1.1 The EU must reduce its energy use in the short and in the long term

In the recent months, governments, citizens, and businesses across the EU have been facing an unprecedented increase in energy prices. The EU has pledged to reduce gas and electricity use this winter, and to further cut electricity use in "peak" periods.

At the same time, EU legislators are considering further decreases in energy consumption by 2030 in the context of the EU Green Deal. Pending legislation would for example require Member States to almost double the annual energy savings delivered through national policy measures.

1.2 Measuring success in the building sector is a prerequisite to effective energy efficiency policies

The European Commission has identified buildings as the sector that should reduce its greenhouse gas emissions the fastest during the 2020s. The Commission foresees a doubling of the building renovation rate (the energy savings delivered by building fabric improvements), driven by a combination of energy pricing, regulation and supporting policy measures.

Many policy measures currently promote the roll out of energy efficient technologies in buildings. However, successful energy savings outcomes are not automatically assured nor easily measured upon the installation of the equipment, because:

- There is often a considerable gap between the measured and the predicted performance of the building. This "performance gap" can for example be linked to installation issues or how the user is interacting with the equipment.
- Energy savings are notoriously difficult to calculate accurately, as they are the absence of energy use compared to a baseline.

In its 'Renovation Wave' communication, the Commission highlighted that Member States can scale up market incentives such as pay-per-performance public support schemes to boost renovation rates. The Commission recently announced that they will examine possible additional measures to trigger further private investments through pay-for-performance schemes in the context of the EU Save Energy plan.

2. Metered savings and P4P schemes

2.1 Metered savings

In most traditional energy efficiency programmes, the amount of energy savings is "deemed", meaning that a fixed amount of savings is associated with the delivery of an energy saving measure.

With "metered" savings approaches, energy consumption is monitored before and after the intervention. In the recent years, software and hardware developments have enriched metered savings methods. These techniques are called "advanced measurement & verification (M&V)", "M&V 2.0" or "automated M&V". They build on the increasing availability of granular energy consumption data stemming from smart meters, and on advanced analytics and automated processing. The SENSEI project has for example developed a next generation energy efficiency meter named "eensight" based on machine learning.

2.2 Pay-for-performance (P4P) schemes

Pay-for-performance (P4P) schemes compensate energy efficiency resources based on a comparison of metered energy consumption and modelled counterfactual energy consumption, i.e., consumption in the absence of the energy efficiency action.

Some of the **payments** are delivered after the energy efficiency improvements have been made and once energy consumption has been tracked during a certain performance period.

Energy consumption is **metered** before and after the project. Ex post estimates of energy savings are used as the indicator for the energy efficiency project's performance.

Aggregators or programme implementers often act as intermediaries between end users and the organisation delivering payments.

3. Added value of P4P schemes

3.1 Transferring the performance risk

Most traditional energy efficiency programmes provide subsidies for the installation of measures, as a one-off payment. Where subsidies are linked to the energy saved, the amount of energy savings is usually "deemed". A fixed amount of savings is associated with the delivery of the measure, regardless of its performance. This provides an incentive for the private sector to install as many measures as cheaply as possible, without necessarily ensuring high quality installation and with no concern over the use and maintenance of equipment. This means that those who pay for the support schemes bear the performance risk of each individual installations. They have no guarantee that the scheme will deliver the amount of energy savings that was anticipated. This means that the risk is ultimately supported by taxpayers for public subsidy schemes, or energy bill payers for energy efficiency obligation schemes.

P4P schemes redirect the incentives to obtaining as many energy savings as possible. This should result in a higher quality of installation and maintenance and a more targeted deployment of measures where they can deliver the largest savings amounts. Consequently, the performance risk is shifted from those who fund the programmes (taxpayers or ratepayers) to the aggregators or programme implementers.

Traditional subsidy scheme

Deemed savings (assumption about impact of measure)

One-off payment (usually upon installation)

Traditional subsidy scheme

Savings established by comparing metered energy consumption to baseline

Payment proportional to energy saved, delivered "as the savings occur"

3.2 Recognising the value of energy efficiency for the energy system

With mass adoption of electric heat pumps and vehicles, and renewable energy sources come to dominate electricity generation, the value of demand-side resources to energy systems will increase substantially.

The resources required to ensure electricity system adequacy will be different, depending on the time of day, the weather, seasonal factors and location. In this environment, energy efficient buildings can play a significant role in reducing electricity system cost.

By building on advanced monitoring & verification methodologies (advanced M&V), P4P schemes can reward energy efficiency for the services it provides to the energy system and distinguish between time- and location- specific savings. It is possible to apply advanced M&V methods to individual projects, typically at commercial and industrial sites, or to an aggregated number of sites like residential buildings. Aggregating many buildings has the potential to stack up the value of these projects and attract private finance.

3.3 Aligning incentives with REPowerEU and Fit for 55 goals

Despite the proliferation of meter data, Member States are not currently using them to calculate their energy savings in the buildings sector. The EU legislation does not provide a premium for certainty in energy savings delivery, while this has been a focus in other parts of the world. In the U.S. for example, several pay-for-performance pilot programmes based on metered data have been set up in the buildings sector, aggregating energy savings from household energy efficiency actions.

In California, the State Legislature requires that real-time energy usage data be made available to consumers and that weather-normalised, meter-based savings be prioritised; and the California Public Utilities Commission requires that energy utilities procure third-party designed and implemented energy efficiency programmes. Rolling out P4P schemes would align incentives in the building sector with the EU's objectives to reduce energy consumption.

4. About SENSEI

The SENSEI Horizon 2020 promotes the pay-for-performance (P4P) concept for designing public programmes that support energy efficiency.

P4P is not meant to completely replace grants and subsidies, since subsidizing the upfront investment costs is a strong driver for energy efficiency upgrades and for deep retrofits. However, linking part of the subsidies to ex post results increases accountability and therefore the cost-effectiveness of public programmes.

Furthermore, P4P can be used to offer a premium to energy efficiency projects when their implementation leads to load shape changes that are beneficial for the power grid's operation. SENSEI has produced results to support the arguments that:

- Energy efficiency is valuable when its impact is aligned with persistent needs of the power grid.
- The design of a programme that compensates energy efficiency for its contribution to the grid can be done using the tools that power system operators already use.

Finally, P4P programmes can incentivize the development of the know-how and infrastructure necessary for the aggregation of energy retrofit projects. Aggregation is necessary to attract private funds, and P4P programmes create a market for aggregation, as well as related governance structures and technical skills. SENSEI argues that the design and roll out of P4P pilots for energy efficiency projects can lay the groundwork for the development of the methods and standards that are necessary for creating large-scale pipelines of projects. P4P pilots constitute an effective use of public finance to discover best practices for the aggregation of many energy efficiency projects into portfolios, and they can act as a workbench for developing financing tools and risk allocation mechanisms.

To guide professionals towards a better understanding of this innovative concept, SENSEI has developed an eLearning platform with tailored information for building owners, ESCOs (Energy Service Companies), energy providers and, policymakers. Please scan the QR code to access the platform.

Information is also available at www.senseih2020.eu, knowledge platform

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