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

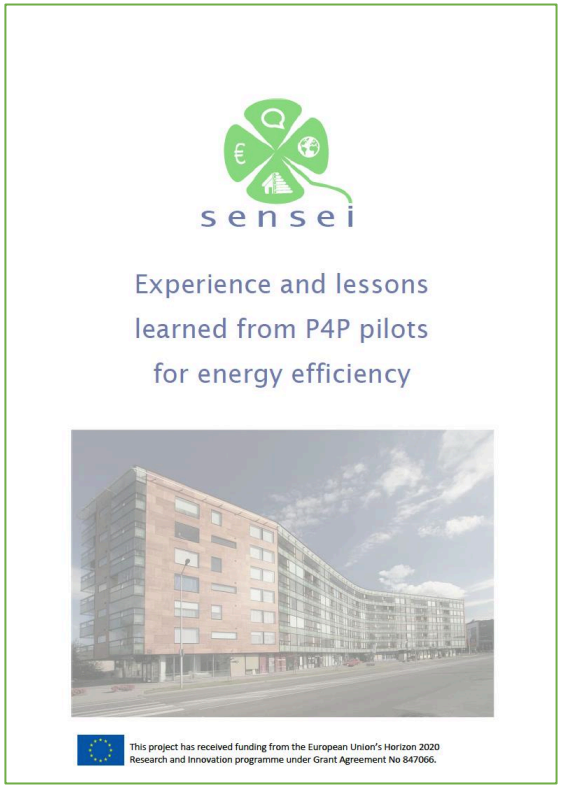
Experience and lessons learnt from buildings sector energy efficiency P4P pilots

Samuel Thomas, The Regulatory Assistance Project

This project has received funding from the **European Union's Horizon 2020 Research** and **Innovation programme** under Grant Agreement No **847066**

SENSEI AND P4P

- SENSEI project explores the potential of Pay-for-Performance (P4P) schemes for financing energy efficiency



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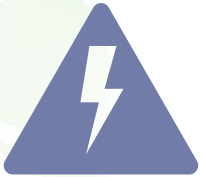
EFFICIENT BUILDINGS IN THE EU's DECARBONISATION

a 3% annual renovation rate
(currently 0.2-0.3% deep renovations)



electrified buildings to serve as a flexible energy system resource

How can we

- increase the impact of buildings energy efficiency policies?
- reward buildings for providing energy system services?

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REVIEW OF INTERNATIONAL EXPERIENCE WITH P4P

Large commercial buildings		
NJBPU	NJ	US
Energy Trust of Oregon	OR	US
DCSEU	DC	US
Seattle City Light	WA	US
Puget Sound	WA	US
Efficiency Vermont	VT	US
IESO	ON	CA
Small commercial buildings		
NYSERDA	NY	US
BayREN	CA	US
Residential buildings		
PG&E	CA	US
Open programmes		
BMWi/BAFA	DE	DE

- Report reviews 11 case studies
- Mainly in North America

- Public authority, system operator or utility
- Often in the context of an energy efficiency obligation

- Large majority target large commercial buildings

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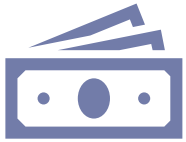
TRADITIONAL SUBSIDY SCHEME

Deemed savings (assumption about impact of measure)



One-off payment (usually upon installation)

PAY-FOR-PERFORMANCE SCHEME

Savings established by comparing metered energy consumption to baseline

Payment proportional to energy saved, delivered “as the savings occur”

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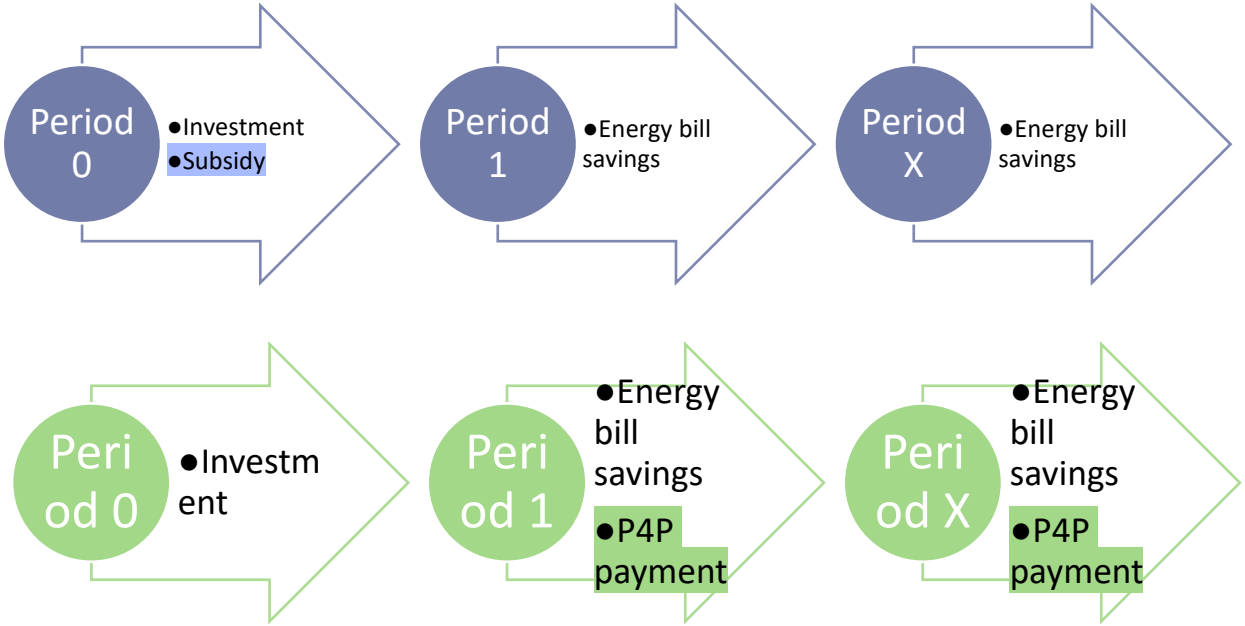
CASH FLOWS: TRADITIONAL SUBSIDY VS. P4P



With P4P:

- Payment delayed
- Performance risk shifted

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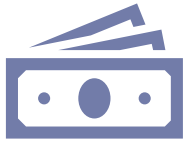
REVIEW OF P4P PERFORMANCE AND PAYMENT STRUCTURES

Performance

- Flexible eligibility rules
- Often using smart meters to collect data before and after measure
- End-beneficiary and/or aggregator rewarded



Payments

- Proportional to energy saved
- Often twinned with grant
- Price set in advance or result of bids
- Often bonus for certain measures
- Over 1 to 5 years

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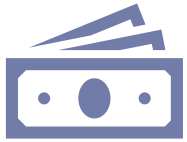
EXAMPLE: PACIFIC GAS AND ELECTRIC (PG&E) RESIDENTIAL P4P

Performance

- Residential sector in California
- Aggregators
- Rewarded based on portfolio performance
- CalTRACK method



Payments

- 100% proportional to energy saved
- Prices per kWh and therm result from bids
- Monthly
- Over 2 years
- Prices based on expected lifetimes of measures

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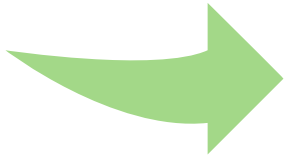
RECOMMENDATIONS FOR EU ROLL OUT (1)

- Begin piloting P4P programmes now
- Start small and build upon experience
- Integrate well with broader climate and energy objectives



RECOMMENDATIONS FOR EU ROLL OUT (2)

- Focus on clear, precise and detailed measurement rules
- Accelerate smart meter rollout

RECOMMENDATIONS FOR EU ROLL OUT (3)

- Adapt payment structures to market conditions
- Involve stakeholders in programme development and communicate clearly to target audiences
- Publish evaluation results and share knowledge

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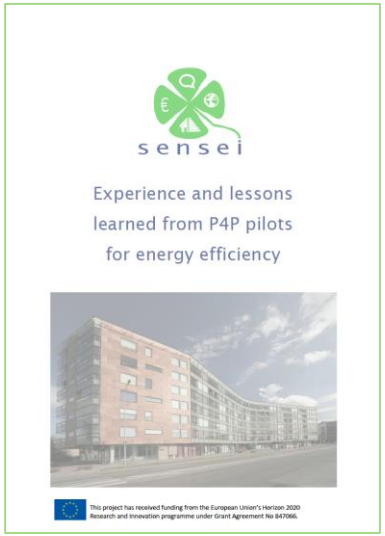

https://senseih2020.eu/

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Thank you!

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Efficiency Valuation Organization

EVO AND THE INTERNATIONAL PERFORMANCE MEASUREMENT AND VERIFICATION PROTOCOL (IPMVP®)

Mark Lister
Chairman, Efficiency Valuation Organization

15 December 2020

THE EFFICIENCY VALUATION ORGANIZATION

EFFICIENCY VALUATION ORGANIZATION

www.evo-world.org

A **non-profit** organization of 25 years standing

Owns/manages the **International Performance Measurement and Verification Protocol (IPMVP®)**

Led by **volunteers** around the world

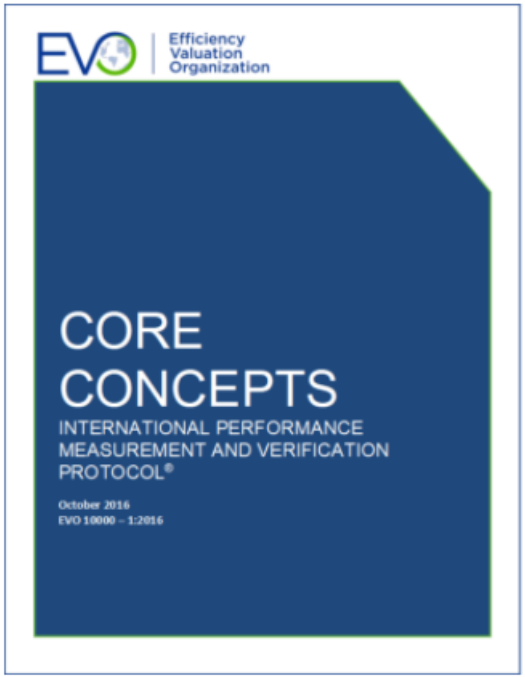
VISION

Create a world that has confidence in energy efficiency as a reliable and sustainable energy resource.

MISSION

Ensure that the savings and impact of energy efficiency and sustainability projects are determined through appropriate measurement and verification.

THE INTERNATIONAL PERFORMANCE MEASUREMENT AND VERIFICATION PROTOCOL (IPMVP®)



IPMVP is a long-standing, globally-recognized document of generally accepted principles applied in M&V plans to measure, verify and calculate the energy savings of EE projects.

EVO provides M&V training and certification programs in over 60 countries to professionals, through local private training entities.

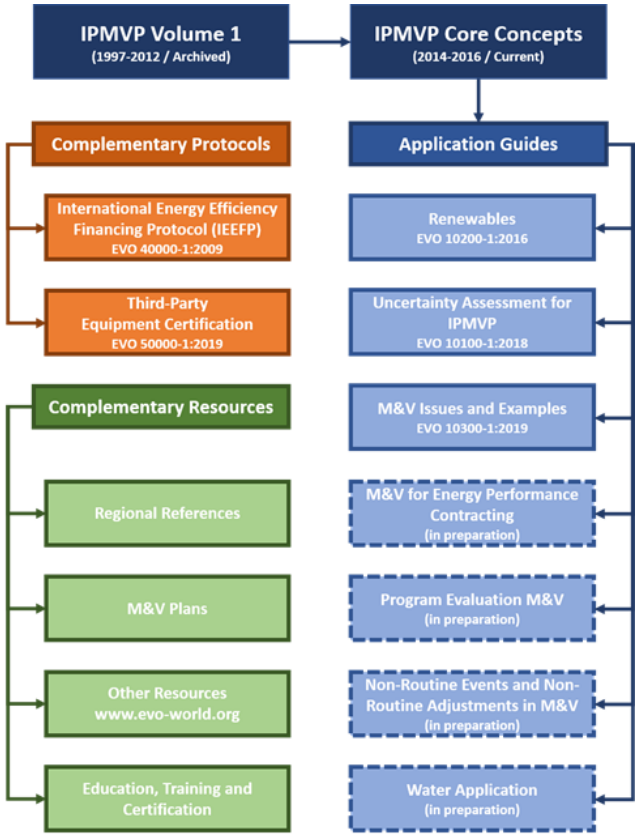
The IPMVP:

- Presents a framework and defines terms used in determining “savings” after implementation of a project
- Specifies the topics to be addressed in an M&V Plan for a specific project
- Allows flexibility in creating M&V Plans while adhering to the principles of accuracy, completeness, conservativeness, consistency, relevance and transparency.

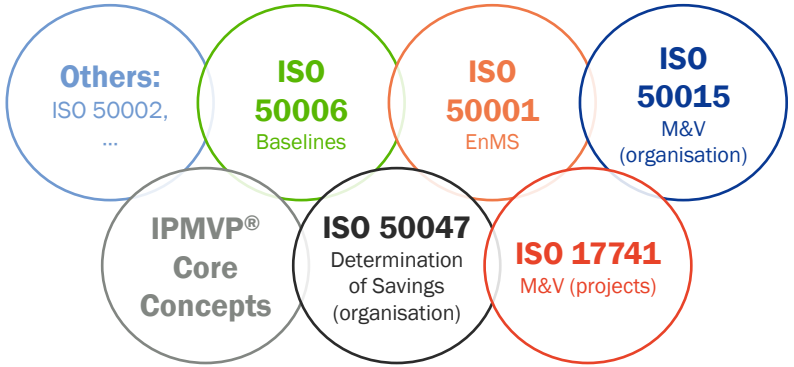
IPMVP – BENEFITS

- Defines the standard approaches to measuring “savings,” to reassure facility owners.
- Legitimizes ESCO projects through recognition of payment through project savings.
- Provides guidance on the trade-off between measurement “accuracy” and measurement cost.
- Helps parties to create transparent, repeatable performance contract terms and emission trades regarding savings settlement.
- Provides general, not specific guidance, and a framework under which specific methodologies are created and used.

EVO'S SUITE OF M&V PROTOTCOLS AND GUIDES

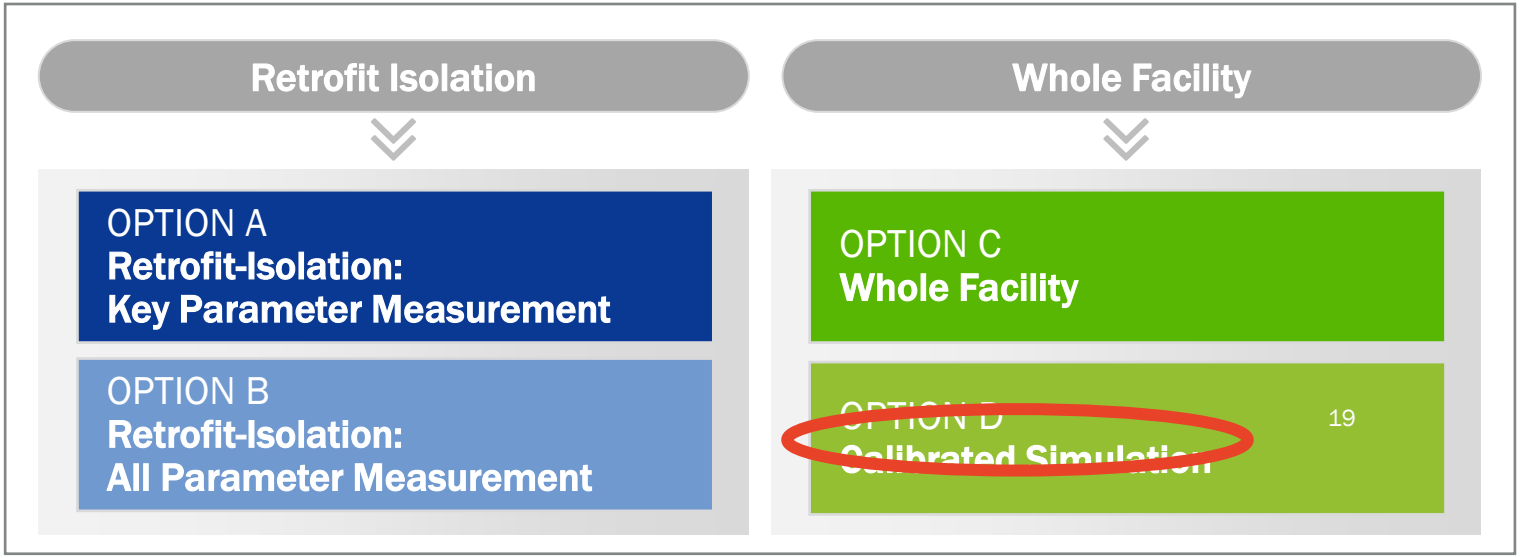


FIT WITH OTHER ISO STANDARDS



Overlap to IPMVP®
ISO 50001 EnMS
ISO 50015 EnMS M&V of Energy Performance of Organisations
ISO 50047 Determination of Energy Savings in Organisations
ISO 50006 EnMS Measuring Energy Performance using Energy Baselines and EnPIs
ISO 17741"M&V of projects" where IPMVP is a normative reference

IPMVP TERMINOLOGY – FOUR KEY METHODS



2 'FLAVOURS' OF EACH METHOD...
... TO ALLOW FLEXIBILITY FOR VARIOUS SITUATIONS!

SUMMARY OF THE FOUR OPTIONS

OPTION A **RETROFIT-ISOLATION: KEY PARAMETER MEASUREMENT**	» Savings are determined by field measurement of the key parameter(s), which define the energy consumption and demand of the ECM's affected system(s) or the success of the project. » Measurement frequency ranges from short-term to continuous, depending on the expected variations in the measured parameter and the length of the reporting period. Parameters not selected for field measurements are estimated values. Estimates can be based on historical data, manufacturer specifications or engineering judgment. » Documentation of the source or justification of the estimated value is required. The plausible saving error arising from estimation rather than measurement is evaluated.
OPTION B **RETROFIT-ISOLATION: ALL PARAMETER MEASUREMENT**	» Savings are determined by field measurement of the energy consumption and demand and/or related independent or proxy variables of the ECM affected system. » Measurement frequency ranges from short-term to continuous, de-pending on the expected variations in savings and length of the re-porting period.
OPTION C **WHOLE FACILITY**	» Savings are determined by measuring energy consumption and demand at the whole facility utility meter level. » Continuous measurements of the entire facility's energy consumption and demand are taken throughout the reporting period.
OPTION D **CALIBRATED SIMULATION**	» Savings are determined through simulation of the energy consumption and demand of the whole facility, or of a sub-facility. » Simulation routines are demonstrated to adequately model actual energy performance in the facility. » This option requires considerable skill in calibrated simulation.

KEY FACTORS AFFECTING M&V COST

- Meter quality
- Number of independent variables to be monitored
- Frequency of measurement and reporting
- Length of the baseline and reporting periods
- Sample size, if all equipment is not measured
- Other uses for meter information, to share costs
- Skill levels required

HOW MUCH M&V IS ENOUGH?

THE COST/ACCURACY TRADEOFF IS MADE FOR **EACH PROJECT**

Annual Costs

<10%

Total annual cost to determine savings should normally be **less than 10%** of the annual savings.

This maximum might be exceeded for special situations.

Expenditure

3-5%

3-5% is a more common expenditure (for ESCO projects)

Deemed savings

0%

0% is often chosen (= "deemed savings")

No measurement means uncertain savings.

This is NOT an IPMVP method.

EVO IN EUROPE

Training partners and organizers

afnor COMPÉTENCES

FIRE FEDERAZIONE ITALIANA PER L'USO RAZIONALE DELL'ENERGIA

ADENE AGÊNCIA PARA A ENERGIA

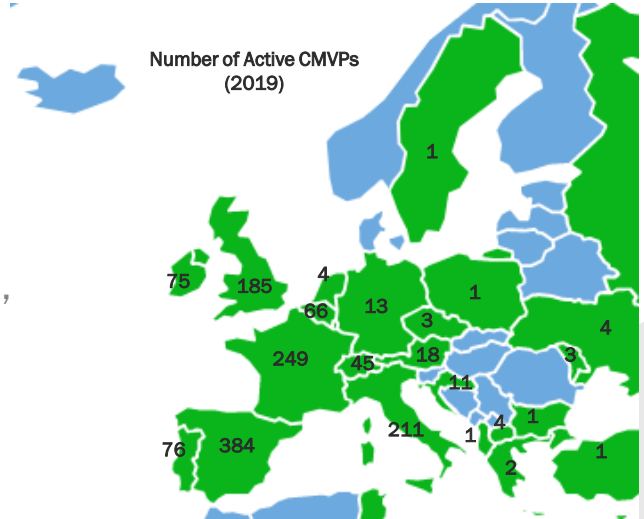
energylab

ESTA

ENVIDATEC

Over 4000 individuals have been trained in M&V across Europe over 12 years

EVO M&V training currently available in Dutch, English, French, German, Italian, Portuguese, Spanish.



2021 OPPORTUNITIES

EFFICIENCY VALUATION ORGANIZATION

www.evo-world.org

Opportunities for **M&V standardization** between countries in Europe, in support of EU-wide directives and policies on commercial and industrial energy efficiency

M&V Fundamentals + Advanced training programs in 2021

- M&V Planning
- IPMVP Option D – Calibrated Simulation
- ISO 50006 /50015 / 50047 and IPMVP
- Energy Efficiency Project Financing (IEEFP) – For financial institutions

Potential for adaptation of courses designed to meet individual country and market needs, reduce M&V costs, and for new country training partners to be appointed – **we welcome your engagement**

Efficiency Valuation Organization

THANK YOU

Mark Lister

Chairman

Efficiency Valuation Organization

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Time to step up performance-based energy efficiency measurement and verification efforts in Europe

December 15, 2020
11h30 – 12h30

Leonardo ENERGY Webinar Channel
j.mp/leonardotube

13th Webinar of the UsersTCP Academy
www.userstcp.org

UsersTCP

Leonardo ENERGY

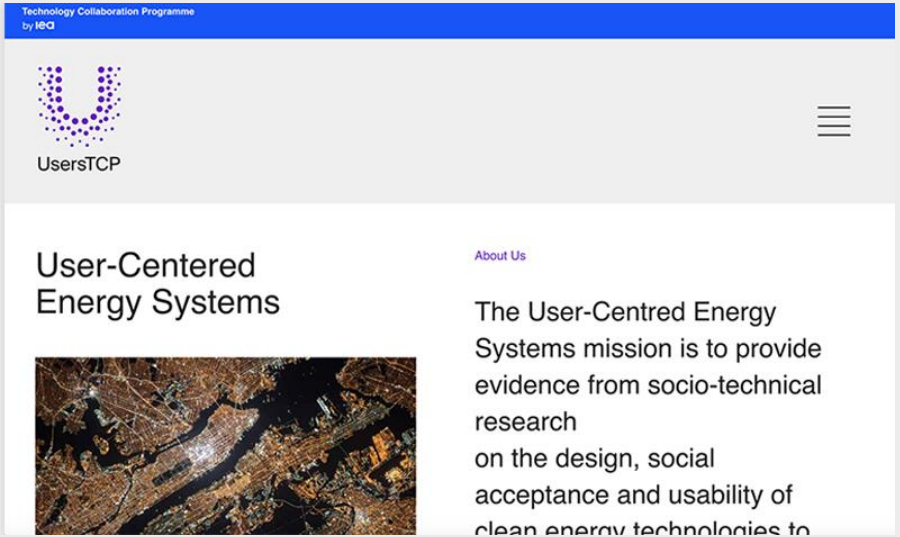
Cu European Copper Institute
Copper Alliance

"Securing energy savings and value for money."

Join Samuel Thomas from the Regulatory Assistance Project, Mark Lister from the Efficiency Valuation Organization and Claudia Canevari from the EU Commission to hear how performance-based energy efficiency measurement and verification can play an important role in the EU's policy framework.

UsersTCP

userstcp.org



Webinars

User-Centred Energy Systems Academy

Annexes

- UsersTCP | Business Models and Systems
- UsersTCP | Peer-to-Peer Energy Trading
- UsersTCP | Social License to Automate
- UsersTCP | Hard-to-Reach Energy Users
- UsersTCP | Behavioural Insights Platform
- UsersTCP | Gender and Energy

User-Centred Energy Systems

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