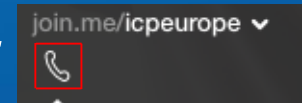


# Technical Forum Webinar - Presentation of Energy Performance Protocols

## Audio instructions:

*After joining the conference you must connect to an audio source by clicking on the telephone symbol at the top of the screen. You will be given two options – phone or via computer.*



*If you choose by phone, you will find your country-specific call-in number (i.e. UK: +44.33.0088.2634) in the drop-down menu provided on your screen. Once connected please enter the ID code (107-099-016).*

**The presentation will start today at 15:05 (CET)**

This presentation will be recorded.



# Investor Confidence Project Europe

*Technical Forum*

*September 24<sup>th</sup>, 2015*

*Luís Castanheira, ICP Europe Technical Director*



# Welcome to the Investor Confidence Project (ICP) Europe 2<sup>nd</sup> Technical Forum



Luís Castanheira  
Technical Director  
ICP Europe

## Agenda:

- ICP Europe – What and Why
- ICP Europe Technical Forum
- Energy Performance Protocols
- European Technical Research
- ICP Europe next steps

# Welcome to the Investor Confidence Project (ICP) Europe 2<sup>nd</sup> Technical Forum

## Outcomes

- Understanding of:
  - ICP Europe's objectives
  - Technical Forum development
  - EPP structure and application
  - Present situation of Technical Research
  - Technical Forum timeline
  - How to comment on the EPP drafts
  - Next steps and how you can participate

# If You Do Have Questions During the Webinar.....

- Please click the “chat” button at the top of the screen, in the Join.me control panel:



- Please address your questions to “@icptechteam”,
- As much as possible questions will be answered during the presentation.

This presentation is being recorded and will be posted at [europe.eepperformance.org](http://europe.eepperformance.org) and emailed to registrants

# ICP Europe

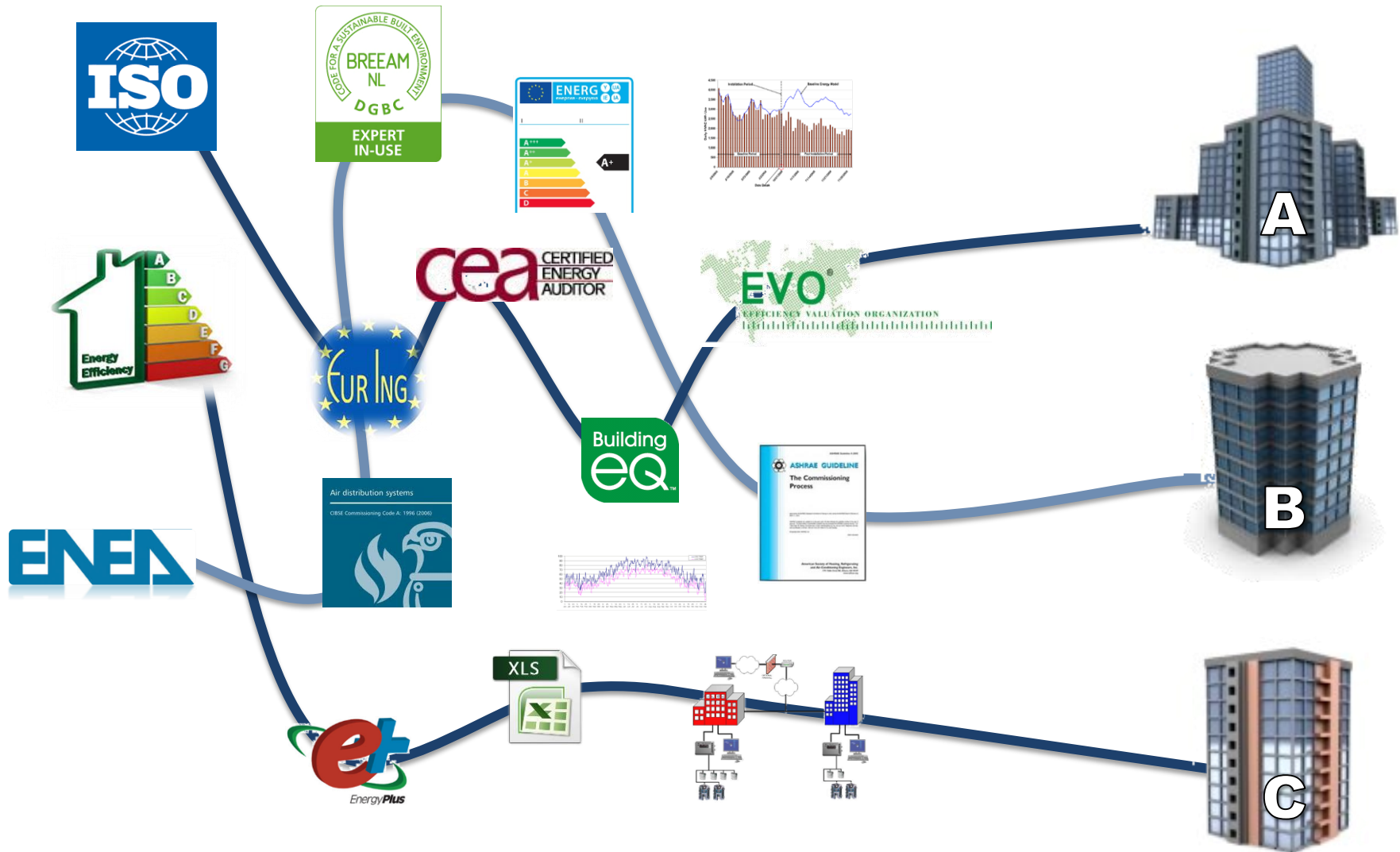
# ICP and ICP Europe

A critical mismatch has been identified locally and globally in the energy efficiency (EE) markets between project promoters and investors.

Relevant financial sector stakeholders and building owners have identified lack of project standardization as the main market barrier supporting this mismatch.

ICP is seeking to bring this STANDARDIZATION to the market, with a suite of products, implementation procedures and partners.

# Lack of Standardisation = Greater Risk







Help **Governments** reduce  
programme process and  
costs



Help **Developers**  
deliver more bankable  
projects



Help **Investors** manage  
risk so they can invest in  
energy efficiency

# ICP Europe Steering Group

ARUP



SIEMENS



CLIMATE & STRATEGY  
PARTNERS



# ICP Europe Funding



European Commission  
Horizon 2020 Programme



Private Foundations

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 649836

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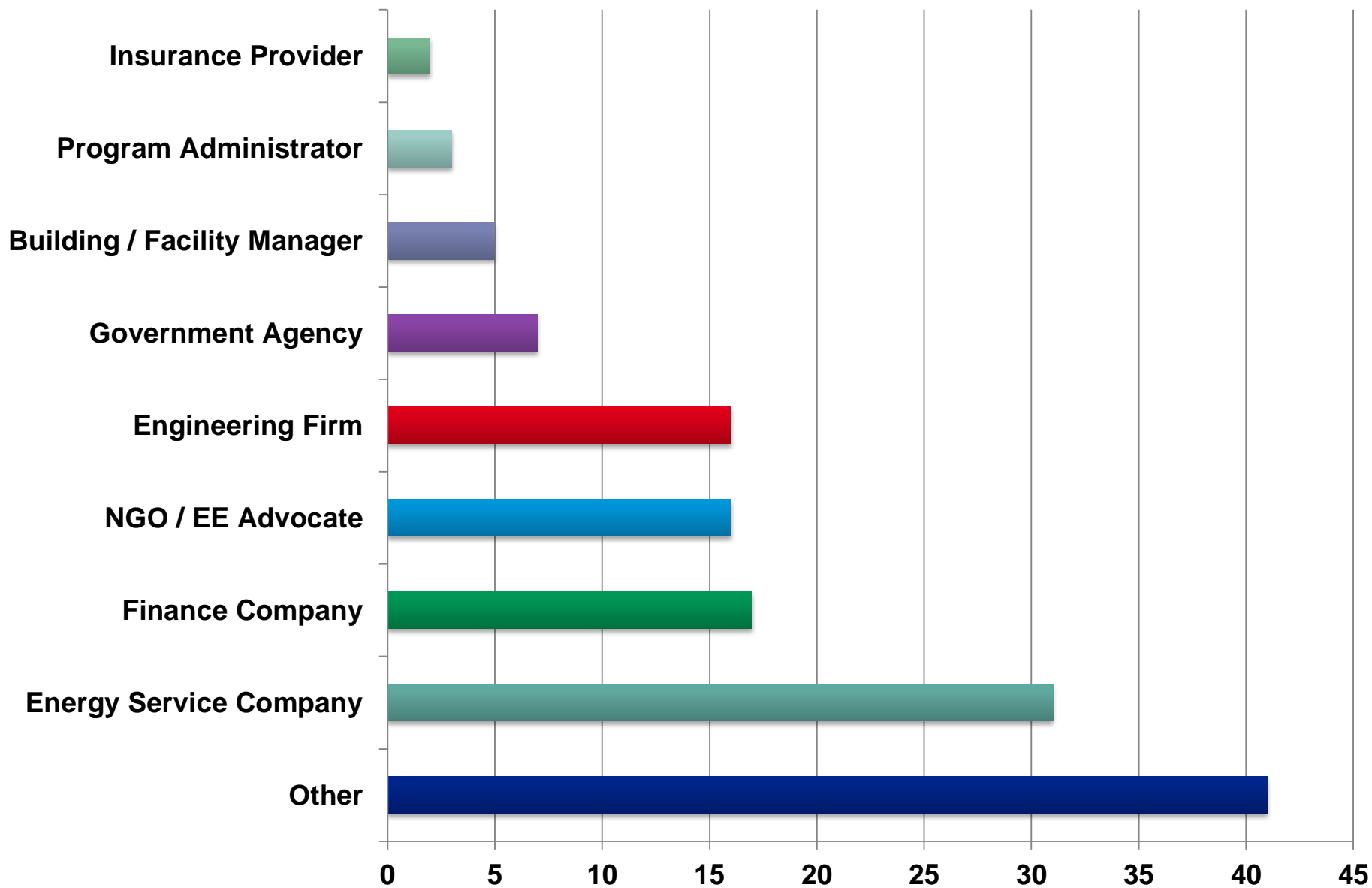
# ICP Europe Technical Forum

# Technical forum - What

Voluntary advisory group that ensures that ICP Europe staff produce relevant products and services for the European renovation markets. The Forum does this through:

1. Providing market insight and feedback on draft products;
2. Providing local, national and European knowledge on relevant standards, best practices and initiatives, and
3. Identifying projects and programmes for piloting of ICP Europe products and services.

UK  
Switzerland  
Netherlands  
Spain Singapore  
France Finland Turkey  
Luxembourg Canada  
Germany Norway Italy Greece  
Denmark Sweden Ireland  
Portugal USA  
Belgium





# Technical forum – Process

- Monthly 1.5-2 hour webinars
- Materials distributed before webinars
- Comments during webinars or informally after
- Edits and suggestions for ICP Europe products will be collected via direct edits to documents and emails





# Technical forum – Participation Benefits

- Members will have the opportunity to shape ICP Europe products to their needs;
- Among the first market actors to have full knowledge about the system;
- Participate with a network of other industry leaders
- Learn about investors and government programmes that are adopting ICP tools first



# Energy Performance Protocols



# Investor Ready Energy Efficiency™ Roadmap to Investor Confidence



## ORIGINATION

Energy efficiency projects will come from a range of channels, programs, and businesses.



## PROJECT DEVELOPMENT

Credentialed Project Developer calculates baselines, determines savings calculations, and develops plans for construction verification, operations and maintenance (O&M), and measurement and verification (M&V) according to ICP Protocols.



## QUALITY ASSURANCE

Third-party Credentialed Quality Assurance Provider reviews project for ICP compliance.



## CERTIFICATION

Project is certified as Investor Ready Energy Efficiency™.



## UNDERWRITING

Building owners and investors can make investment decisions with increased confidence based on predicted savings.



## PERFORMANCE

Building energy performance is optimized through execution of construction verification, O&M, and M&V plans.



For more information please visit [www.EEperformance.org](http://www.EEperformance.org)



## UNDERWRITING

Building owners and investors can make investment decisions with increased confidence based on predicted savings.



## PERFORMANCE

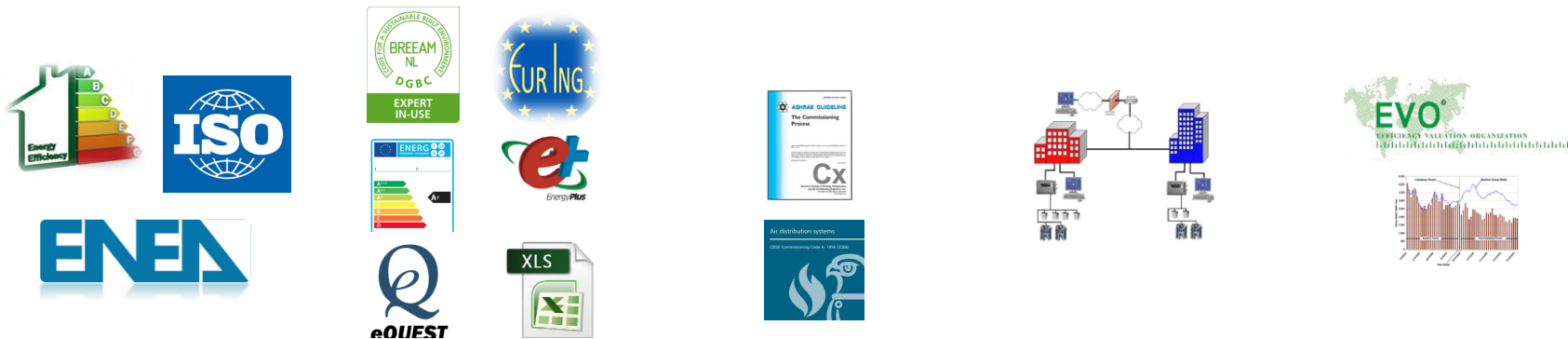
Building energy performance is optimized through execution of construction verification, O&M, and M&V plans.



For more information please visit [www.EEperformance.org](http://www.EEperformance.org)



# ICP Energy Performance Protocols



## BASELINING

- Existing Building
- Drawings
- Weather File
- Energy Usage
- Energy Rates
- Occupancy

## SAVINGS

- Model File
- Calibration Data
- Bid Packages
- Certifications

## COMMISSION

- Cx Plan
- Cx Authority
- Test Procedures
- Facilities Req.

## OPERATIONS

- BMS Points
- Fault Plan
- Maintenance Plan

## MEASUREMENT

- M&V Model
- Regression Model
- Adjustments
- Impact
- Baseline Adjustments

# ICP Europe Protocols Structure

Large Tertiary

Large Apartment  
Block

**Project capex > €1m, whole building retrofit**

Standard Tertiary

Standard Apartment  
Block

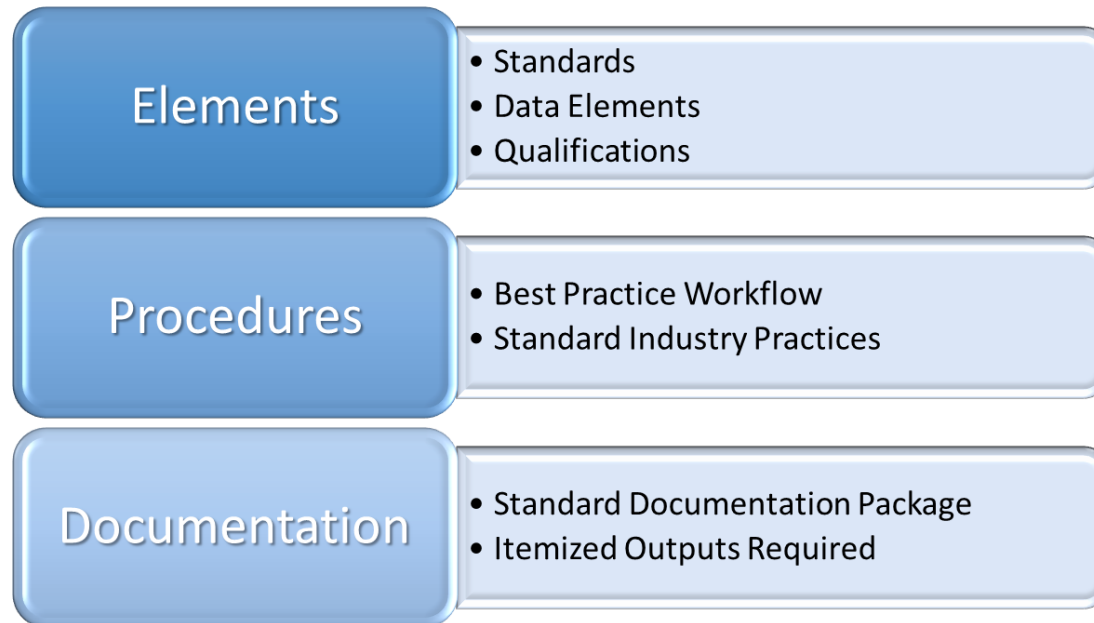
**Project capex < €1m, whole building retrofit**

Targeted Tertiary

Targeted Apartment  
Block

**Single or limited number of EE measures**

# Energy Performance Protocol Framework





# ICP Europe Product Structure

## Protocols do NOT:

- invent new standards
- attempt to impose national standards in another country
- restrict engineering solutions
- define a set level of energy savings



# Energy Performance Protocols Components



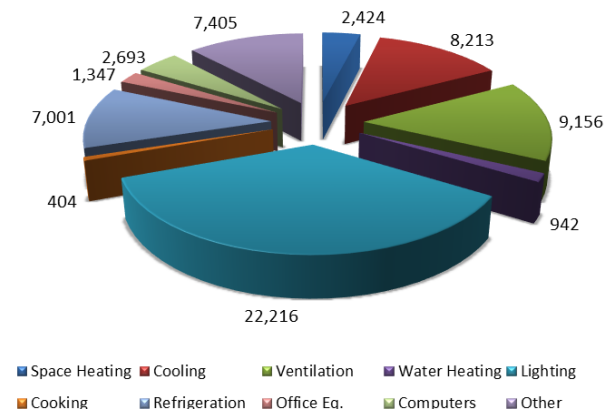


# 1. Baseline Development

Baselining provides a reference regarding energy use of a certain system, allowing for prediction of energy consumption in different utilization contexts, which in turn allows for energy savings calculations.

- 12-36 months of utility data
- Develop 12 month baseline
- Determine end-use energy use
- Collect building asset, operational and performance data
- Weather data
- Occupancy data

**EIA Based Electric Usage Allocation (kWh)**



## 2. Savings Calculations – Large (& Standard)

Savings calculations provide utmost relevant information for project valuation, demanding for the determination and modelling of the Energy Conservation Measures to be implemented.

- Energy modeling software
- Modeler credentials
- Supporting model files
- Model calibration
- Model process description
- Key metric benchmarks
- ECM model variables
- Individual savings results, and packaged results



### 3. Design, Construction and Verification

Design, Construction and Verification are all crucial phases , consequently proper procedures and documentation of these processes is a key element of the entire ICP structure.

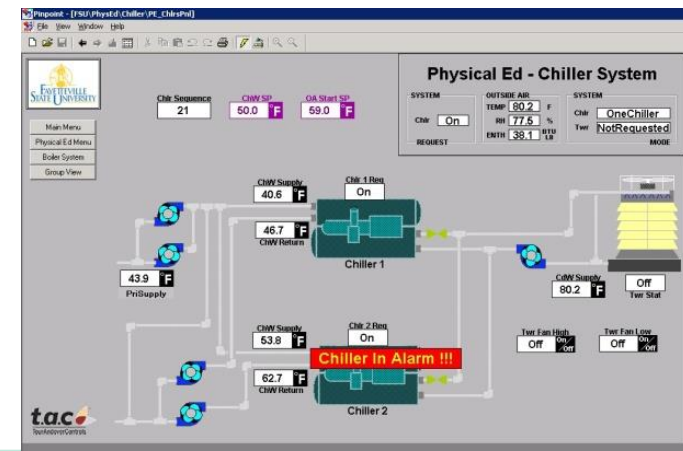
- Operational performance verification (OPV) Plan
- OPV Effort (targeted commissioning)
- OPV approaches
  - inspection, spot measurements, data logging, BAS trends, FPTs
- Training
- Systems manual



# 4. Operations, Maintenance & Monitoring

The way systems are operated and maintained are key elements of their energy performance, and only by having crucial information about these elements we may guarantee performance.

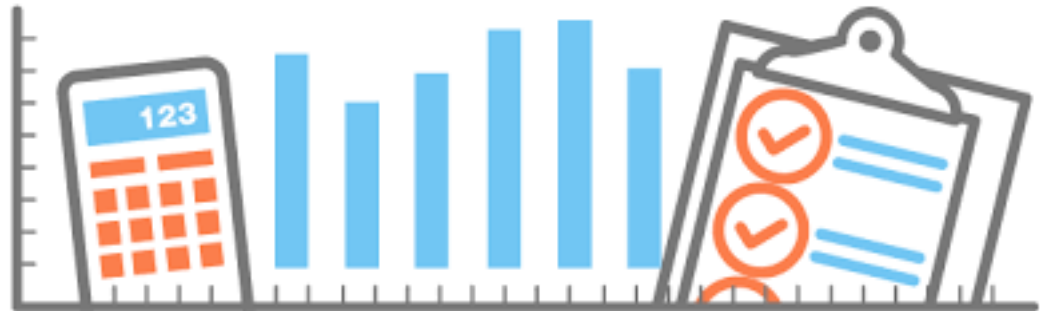
- OM&M plan
- OM&M process
  - Inspections, RCx, ongoing Cx, monitoring-based Cx
- OM&M management framework
- Operator's manual
- OM&M training



# 5. Measurement & Verification

Proper Measurement and Verification procedures validate the reliability and effectiveness of the foreseen energy savings.

- M&V provider credentials
- Options A and B: Retrofit Isolation
- Option C: Utility Bill Analysis
- M&V report



# Energy Performance Protocols (EPP)

## Example on Elements section of Savings Calculations on the Large Tertiary Buildings (LTB) and Standard Tertiary Building (STB) protocols:

### LTB

- ECM descriptions
- Model Data
- Model Calibration
- Modelling Process Description
- Reporting

### STB

- ECM descriptions
- Calculation Data
- Measure Calibration
- Calculation Process Description
- Reporting
  - **Reporting:** Use of an industry-accepted format for reporting of results and for compilation of methods and underlying data used for individual ECM calculations as well as for the package of recommended measures. At present, the industry standard for report presentation of ECM, building, and energy use data is *ISO 50002:2014 Energy audits – Requirements with guidance for use (section 5.8, and Annex A.3 following Type 3)*. Additionally, annual energy savings by fuel type shall be documented in terms of energy units, a percentage of the total volume of each fuel, and as cost savings using the correct marginal rate for that energy type.

# Energy Performance Protocols (EPP)

## ISO 50002 Annex A.3

**Table A.1 — Indicative details of energy audit types**

Type	1	2	3
Typical application	<p>Facilities / processes or fleets.</p> <p>Suitable as:</p> <ul style="list-style-type: none"> <li>- energy audit of smaller organizations or facilities, or</li> <li>- preliminary audit for larger organizations or facilities.</li> </ul>	<p>Single site / process or fleet.</p> <p>Detailed energy audit.</p> <p>Generally not cost effective for organizations with smaller energy budgets.</p>	<p>Whole site, process, system or fleet.</p> <p>Comprehensive energy audit with significant input from the organization.</p> <p>Generally only cost effective for organizations with high energy spends or institutions with targeted capital investment grants.</p> <p>Also applicable at the system level (e.g. compressed air).</p>
Business need addressed	<p>Indication of potential savings and benefits that could result from undertaking more detailed investigations, such as a Type 2 or Type 3 energy audits.</p> <p>Identification of focus areas for energy management resources.</p> <p>Improved awareness of energy costs and the potential benefits of energy management.</p>	<p>Identification and evaluation of a range of coherent and specific opportunities with quantified costs and benefits.</p> <p>Identification of opportunities for further or more detailed investigation.</p> <p>Auditors should have appropriate technical, managerial and professional experience and skills, and familiarity with the energy uses being audited.</p> <p>Auditors with appropriate professional skills and expertise analyse energy and process data to identify and evaluate opportunities.</p>	<p>Identification and evaluation of a range of coherent and specific energy performance improvement opportunities with identified costs and benefits, including quantification of "non-energy" gains.</p> <p>Auditors should have appropriate technical, managerial and professional experience and skills, and familiarity with the specific energy uses being audited - to analyse detailed energy and process data to identify and evaluate opportunities.</p> <p>More detailed investigation of opportunities.</p> <p>Consideration of business strategies in the audit.</p>



# Energy Performance Protocols (EPP)

<p>Data collection</p>	<p>Basic engineering or technical training with a general understanding of energy sources and systems.</p> <p>Facility energy data, including sub-meters and daily load profiles (where available).</p> <p>Appropriate data on relevant variables (e.g. production data, occupancy data) to establish overall EnPIs.</p> <p>Site equipment lists to include name-plate energy data, equipment description, operating schedules, duty factors and estimates of load factors.</p>	<p>Overall available energy data, including daily load profiles.</p> <p>Appropriate relevant variable data (e.g. production data, occupancy data) to establish EnPIs for significant energy uses.</p> <p>Sub-meter data.</p> <p>Full use to be made of available site data; It is not necessary for the auditor to take additional measurements as part of the audit unless the need for additional data is required to fulfil the requirements of the audit scope.</p> <p>Energy data and information to be collected in the audit could include:</p> <ul style="list-style-type: none"> <li>- detailed data on energy consuming systems, processes and equipment, including known relevant variables;</li> <li>- monitoring equipment configuration, and analysis information;</li> <li>- design, operation and maintenance documents;</li> <li>- energy audits or previous studies related to energy and energy performance;</li> <li>- future plans that affect energy use;</li> <li>- production and process data for evaluating performance.</li> </ul>	<p>Operating/load profile of the site or fleet.</p> <p>Appropriate relevant variable data (e.g. production data, occupancy data) to establish EnPIs for significant energy uses.</p> <p>Sub-meter data, evaluated down to load profile level for significant meters.</p> <p>Energy consumption data for the key site processes, systems and equipment.</p> <p>Full use to be made of available site data, including metered interval data; installation of additional sub-meters for monitoring or conducting of specific logging exercises should be considered.</p> <p>Data should be collected for a sufficient period to account for the expected range of values for the relevant variables and system demands.</p> <p>Energy data and information to be analysed in the audit could include:</p> <ul style="list-style-type: none"> <li>- detailed data on energy consuming systems, processes and equipment, including known relevant variables;</li> <li>- monitoring equipment configuration, and analysis information;</li> <li>- design, operation and maintenance documents;</li> <li>- energy audits or previous studies related to energy and energy performance;</li> <li>- future plans affecting energy use;</li> <li>- information on how the organization manages its energy performance;</li> <li>- supplier quotes for improvement opportunities.</li> </ul>
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Also addresses...analysis, opportunities identification, opportunities evaluation and outputs.



# Project Development Specification (PDS)

This ICP Project Development Specification (PDS) represents a comprehensive resource designed for project developers, third-party quality assurance providers, and investors to ensure that projects are developed in full compliance with the ICP Energy Performance Protocols.

This document will provide information about the protocol's requirements, best practices, quality management tasks, and references to ensure that all stakeholders are operating from a common set of requirements and practices.

# European and international standards

## Tertiary protocols



- IPMVP Volume 1: 2012
- Buildings Performance Institute Europe's Data Hub for the Energy Performance of Buildings (<http://www.buildingsdata.eu/>)
- EN 16247-2 Energy Audits – Part 2: Buildings
- EN ISO 13790:2008 Energy performance of buildings – Calculation of energy use for space heating and cooling
- ISO 50006:2014 Energy Management Systems – Measuring Energy Performance Using Energy Baselines and Energy Performance Indicators
- ISO 16346:2013 Energy Performance of Buildings – Assessment of Overall Energy Performance

# European and international standards

## Tertiary protocols



- EN ISO 13790:2008 Energy performance of buildings – Calculation of energy use for space heating and cooling
- EN 15265:2007 Energy performance of buildings – Calculation of energy needs for space heating and cooling using dynamic methods – General criteria and validation procedures
- ISO 50002:2014 Energy audits – Requirements with guidance for use
- IPMVP Volume 1: 2012
- ISO 15686-5:2008 Buildings & constructed assets – Service life planning - Part 5: Life cycle costing

Large tertiary only

# European and international standards

## Tertiary protocols



- EN 16212:2012 Energy Efficiency and Savings Calculation, Top-down and Bottom-up Methods
- European Central Bank's Harmonised Index of Consumer Prices (<https://www.ecb.europa.eu/stats/prices/hicp/html/index.en.html>)
- EN 15459:2007 Energy performance of buildings – Economic evaluation procedure for energy systems in buildings

Standard tertiary only

# European and international standards

## Tertiary protocols



- EN 13460:2009 Maintenance – Documents for maintenance

# European and international standards

## Tertiary protocols



- EN 15331:2011 Criteria for design, management and control of maintenance services for buildings

# European and international standards

## Tertiary protocols



- IPMVP Volume 1: 2012
- EN 16247-2 Energy Audits – Part 2: Buildings

# Cross protocol MS National resources reference document



ENERGY PERFORMANCE PROTOCOL

ANNEX A: INDEX OF NATIONAL STANDARDS

VERSION EU 0.1 – SEPTEMBER 2015



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 649836. The sole responsibility for the content of this document lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained therein.



# On MS National Resources

## UK example:

Protocol stage	Applicable protocols	Protocol component	European Reference Provision	Relevant European reference (where available)	National equivalent standard: tertiary	National equivalent standard: residential
2. Baseline - Core Requirements	All	Accurate total floor area	How to calculate total conditioned floor area (e.g. measured from inside, outside or middle of walls)	EN ISO 13790-2008 (Section 3.2.6)	CIBSE TM47: Operational Ratings and Display Energy Certificates	CIBSE TM47: Operational Ratings and Display Energy Certificates
		Occupancy data	Different occupancy (number of people) times/patterns, extended hours behaviour and internal loads. Also includes information such as previous energy audits, details on when the building was built and refurbished, set points and occupant behaviour.	EN 16247-2 Energy audits buildings - Part 2: Buildings (Section 5.3.2)	CIBSE TM47: Operational Ratings and Display Energy Certificates	CIBSE TM47: Operational Ratings and Display Energy Certificates
		Material specifications/inventories	Detailed checklist of information to collect during a survey (e.g. light fitting type, heating system type, controls information etc.), including by building type e.g. industrial, multi-family	EN 16247-2 Energy audits - Part 2: Buildings (Section 5.3.2 and Annex D)	CIBSE Guide F: Energy Efficiency in Buildings, Table 18.2	CIBSE Guide F: Energy Efficiency in Buildings, Table 18.2
	All	Data calendarisation	How periods are consolidated to the integer years /months periods applied. Determine average daily usage during each partial month covered, and summing the daily average usage over the number of days in the calendar month.	ISO 16346:2013 Energy Performance of Buildings – Assessment of Overall Energy Performance (section 8.2.2)	CIBSE TM47: Operational Ratings and Display Energy Certificates	CIBSE TM47: Operational Ratings and Display Energy Certificates
		Baseline regression model methodology	Explains the concept of normalisation (linear regression), and provides examples.	ISO 50006:2014 Energy Management Systems – Measuring Energy Performance Using Energy Baselines and Energy Performance Indicators methodology (Annex D)	CIBSE Guide F: Energy Efficiency in Buildings (Section 19)	CIBSE Guide F: Energy Efficiency in Buildings (Section 19)
		Accuracy (appropriate goodness of fit of energy data to independent variables)	Explains Uncertainty Analysis, including how to calculate CV (RMSE).	IPMVP vol1 2012 (Appendix B)	CIBSE Guide F: Energy Efficiency in Buildings (Section 19)	CIBSE Guide F: Energy Efficiency in Buildings (Section 19)
	Residential and targeted only	Baseline energy use characteristics of the equipment	Summarises how to estimate energy savings based on energy use characteristics i.e. load and hours-of-use, and the significant of whether components are constant or variable.	IPMVP vol1 2012 (section 4.7.1)	CIBSE TM22 - Energy Assessment and Reporting Methodology	CIBSE TM22 - Energy Assessment and Reporting Methodology
	All	Commercial benchmarking of energy end use	Database which can be filtered based on building type and country. Outputs total energy consumption data and energy end use data (heating, cooling, lighting and total) to give a reality check against estimates.	Buildings Performance Institute Europe's Data Hub for the Energy Performance of Buildings (see <a href="http://www.buildingsdata.eu/">http://www.buildingsdata.eu/</a> )	CIBSE TM46 - Energy Benchmarks	CIBSE TM46 - Energy Benchmarks

# ICP Europe Technical Research


# National Standards Research

[europe.eepformance.org/standards-research](http://europe.eepformance.org/standards-research)



# EUROPA NEEDS



JOIN UP AT [FABLE3KINGMAKER.COM](http://FABLE3KINGMAKER.COM)  **FABLE III**  
THE KINGMAKER

**Help Us Identify the  
Right National  
Standards**

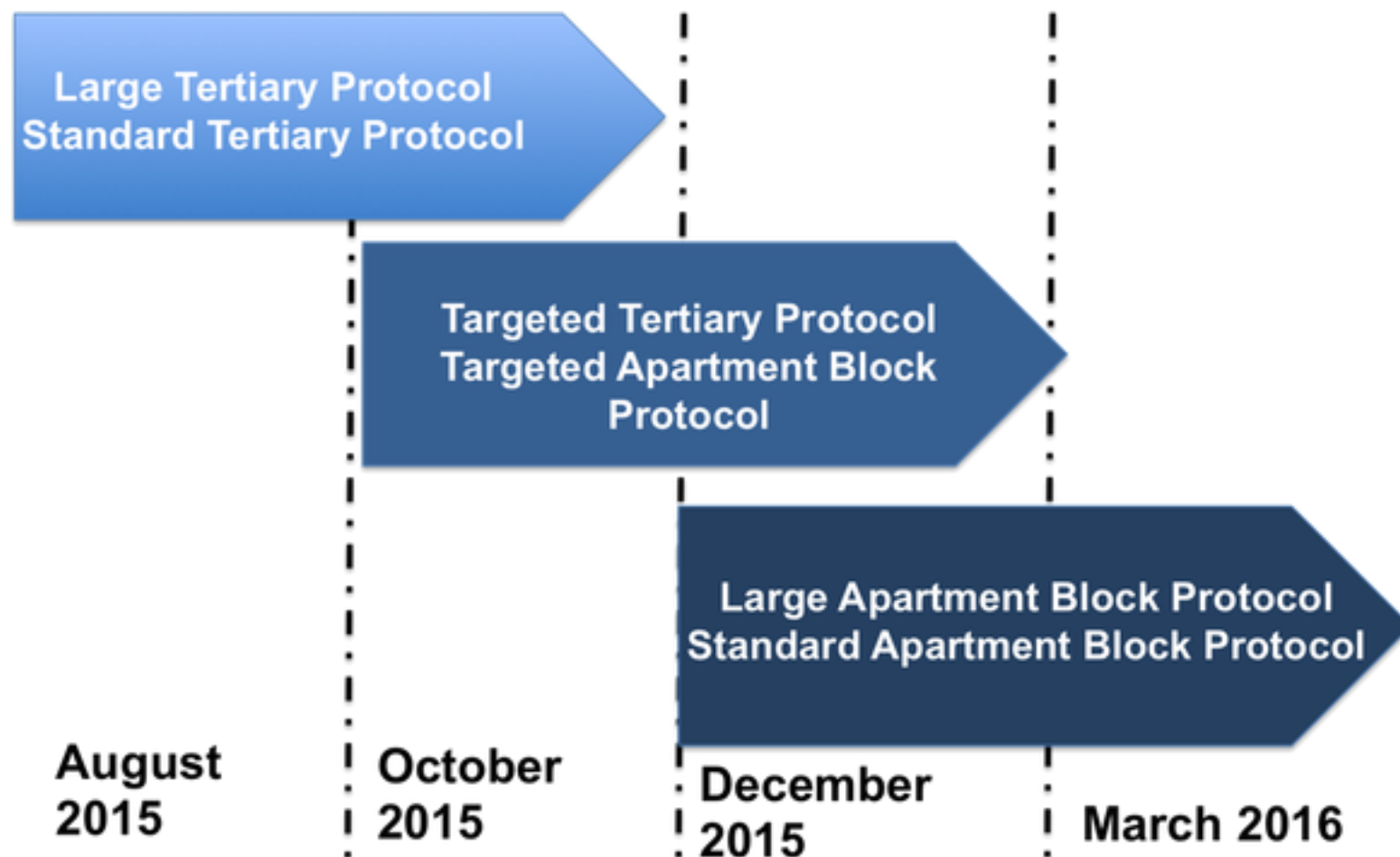
**[europe.eepformance.  
org/standards-research](http://europe.eepformance.org/standards-research)**

**[luiscastanheira@eep  
formance.org](mailto:luiscastanheira@eepformance.org)**

# Next Steps

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# ICP Europe Protocol Timeline – 2015-16



# How can you help:

- Tell us if these drafts fully respond to the needs and specificities of your markets – please comment;

<http://europe.eepformance.org/protocols-under-development.html>

- Deploying application on your projects – we are here to support you;
- Help us reaching experts to identify best practices;

<http://europe.eepformance.org/standards-research.html>

- Get in touch with us on a one to one basis, through myself if you would like to address any particular issue or just to discuss ;

[luis.castanheira@eepformance.org](mailto:luis.castanheira@eepformance.org)



# Technical Forum Webpage

## [europe.eepperformance.org/technical-forum](http://europe.eepperformance.org/technical-forum)

[ICP EUROPE](#)[COUNTRIES](#)[ALLIES](#)[BLOG](#)[PROTOCOLS](#)[TECHNICAL FORUM](#)[N. AMERICA](#)

### Welcome to the ICP Europe Technical Forum

The next Technical Forum meeting will take place on Thursday 24th September at 1500 CET (Brussels).

Webinar call-in details: [Join.me/icpeurope](https://join.me/icpeurope) [ID code 107-099-016].

The ICP Europe Technical Forum is an industry leading technical advisory group that assists the ICP Europe staff in the development and maintenance of the ICP Europe [Energy Performance Protocols](#). The Forum is an open attendance, transparent group that meets periodically via webinar and incorporates the broad range of interests, input, and skills in this diverse marketplace - please feel free join the discussion by registering below.



# Technical Forum Resources Webpage

## europa.eepperformance.org/technical-resources

Call Recordings - ICP Euro x

europa.eepperformance.org/call-recordings.html

Apps European Commission LIS TinyURL! Welcome to the Ass Netherlands Zorgverzekeraar VG Career Skills - Caree BusinessTools - Har The Dutch Table: Lim Other Bookmarks

INVESTOR  
CONFIDENCE  
PROJECT

ICP EUROPE COUNTRIES ALLIES BLOG PROTOCOLS TECHNICAL FORUM N. AMERICA

PROTOCOLS UNDER DEVELOPMENT  
TECHNICAL RESOURCES  
PROJECT DEVELOPMENT SPECIFICATION  
PROJECT FRAMEWORK

STANDARDS RESEARCH  
DISCUSSION NOTES  
CALL RECORDINGS

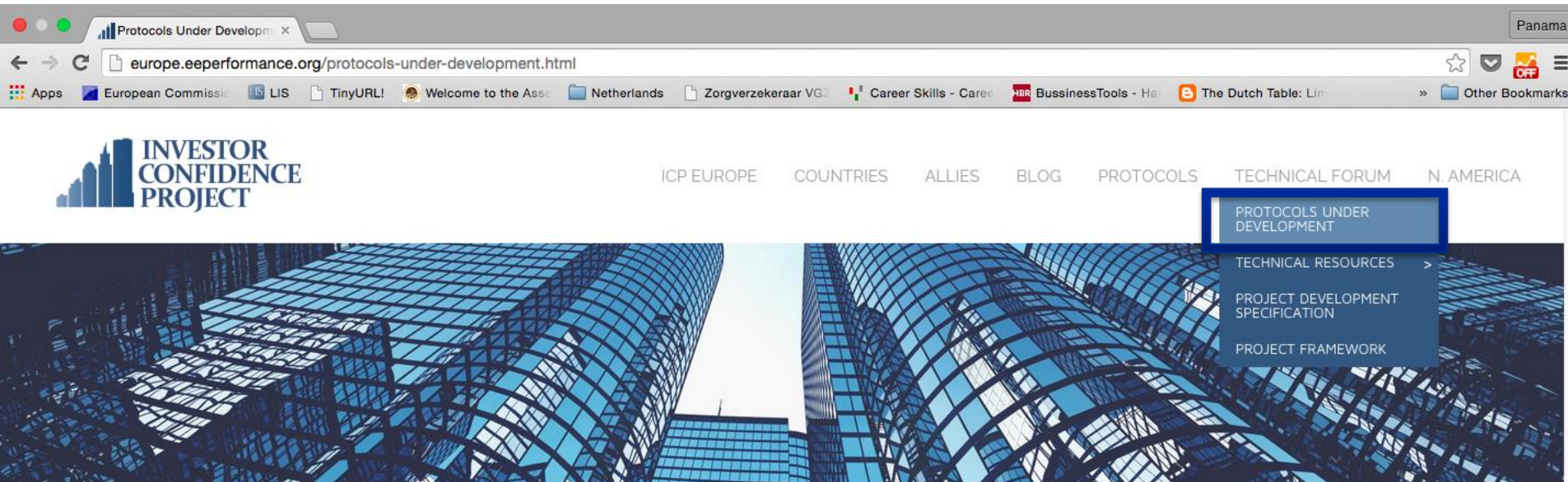
**Technical Forum Call - 30 June, 2015**

First ICP Europe Technical Forum Meeting. Details regarding Product Structure and overall scheme. Protocol Structure and Project Development Specification. Initial European Research results. Documentation package.

PLAY RECORDING

# Protocols Under Development Webpage

## europa.eepperformance.org/protocols-under-development



### Protocols Under Development

Below you will find the Investor Confidence Project Europe **Energy Performance Protocols** that are currently under development. The development process involves research and drafting by the ICP Europe staff, a series of review of drafts and comments by the ICP Europe **Technical Forum** and then a release to the market place with training on the use of the protocols.

The **Technical Forum** is a free to join group of industry experts drawn from finance, engineering, government, academia and other sectors interested in the financing of building energy renovations. The **Technical Forum** meets once a month via webinar for 1.5 hours to review protocols and offer feedback. If you would like to join the Technical Forum please feel free to do so at this [link](#).



# ICP Europe Ally Network Members

EMVC Solutions

CLIMATE & STRATEGY  
PARTNERS



Association for the  
Conservation of  
Energy

Green Investors



EUROPE REGIONAL NETWORK



AMBER



BASE



SURESENSE TECHNOLOGIES

SIEMENS

Decarbon  
Capital



ARUP



ENERGY EFFICIENCY  
in Industrial Processes

LENDERS  
COMMERCIAL FINANCE



COFELY  
GDF SUEZ



Alpheon  
energy

Verco



Green  
Investment  
Bank

GEOCAPITA axia  
partners



RdA  
CLIMATE SOLUTIONS

EcoProsperity Capital Ltd



lavery/pennell



CEF  
The CARBON & ENERGY FUND



Klimaschutz- und  
Energieagentur  
Baden-Württemberg  
GmbH



KEA



masterplan



British Energy Efficiency Federation



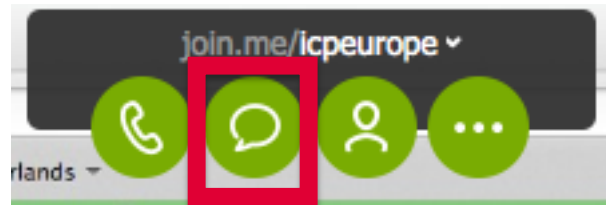
INVESTOR  
CONFIDENCE  
PROJECT

**THANK YOU ALL FOR YOUR TIME  
AND  
WELCOME TO ICP EUROPE TECHNICAL  
FORUM**

**TOGETHER WE WILL UNLOCK THE  
EUROPEAN EE INVESTMENT MARKET!**

# If You Have Questions

- Please click the “chat” button at the top of the screen, in the Join.me control panel:



- Please address your questions to “@icptechteam”,

# Investor Confidence Project Europe

[www.EEperformance.org](http://www.EEperformance.org)

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