Unlocking finance for industrial energy efficiency projects – ICP Europe fosters well developed, bankable projects

Topic: (7) Industry

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Abstract:

According to a recent IEA/IRENA study, average annual global investments into energy efficiency of more than $ 1,000 bn are necessary to limit global warming with a 66% probability to 2°C. This is five times the current amount of investments into energy efficiency. In the face of ambitious climate targets and decreasing public subsidies private investments need to play a more prominent role to tap the full economic and environmental potential of energy efficiency. But investors often don't find projects to invest in despite attractive returns and growing interest in energy efficiency, in particular because of a lack of standardisation.

The Investor Confidence Project (ICP) Europe developed a framework for investors, project owners and project developers to unlock financing for the energy efficiency markets by standardising how energy efficiency projects are developed, documented and measured. ICP's Investor Ready Energy Efficiency (IREE) certification ensures best practices, the right professionals and third-party validation are used to deliver high-quality building, industry, district energy and street lighting projects.

Keywords: Energy Efficiency, Finance, Industry, Certification

Introduction

According to a recent IEA/IRENA study, average annual global investments into energy efficiency of more than $ 1,000 bn are necessary to limit global warming with a 66% probability to 2°C. This is five times the current amount of investments into energy efficiency. In the face of ambitious climate targets and decreasing public subsidies private investments need to play a more prominent role to tap the full economic and environmental potential of energy efficiency.

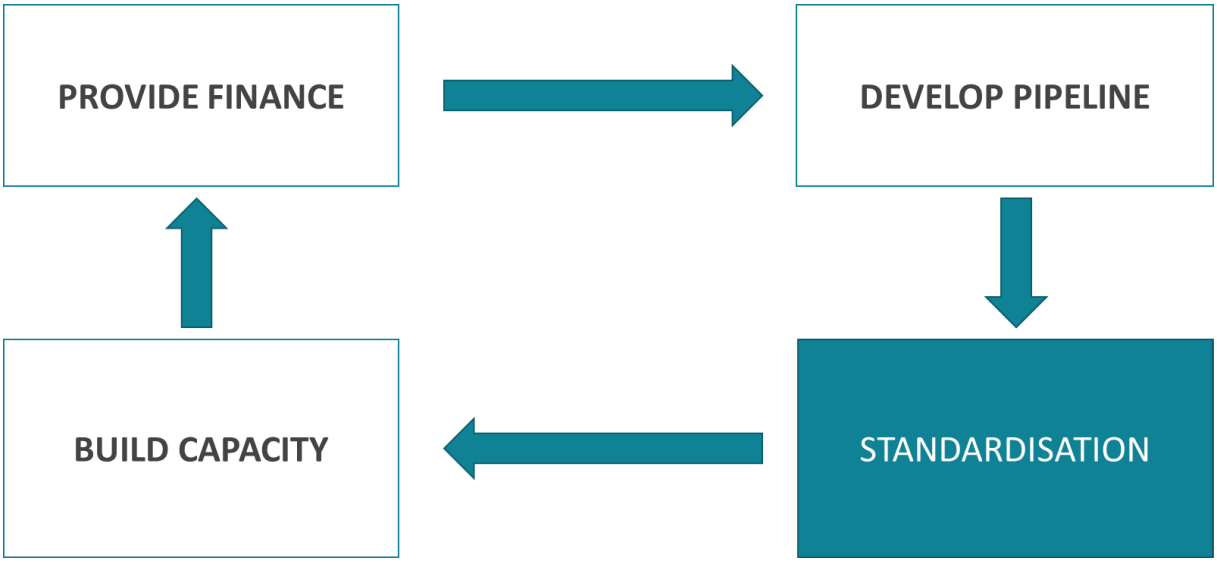

Fig. 1: The Energy Efficiency Finance cornerstones

However, investors often don't find projects to invest in despite attractive returns and growing interest in energy efficiency, in particular because of a lack of standardisation. This lack of standardisation in project development and documentation was identified by the Energy Efficiency Financial Institutions Group as one of the major barriers to increasing investment into energy efficiency and results in greater performance risk, higher transaction costs, uncertainty limiting demand as well as difficulties to aggregate projects in project portfolios and to build capacity.

Therefore, the Investor Confidence Project (ICP) Europe developed a framework for investors, project owners and project developers to unlock financing for the energy efficiency markets by standardising how energy efficiency projects are developed, documented and measured.

Methodology

ICP's Investor Ready Energy Efficiency (IREE) certification framework fosters transparent, consistent and trustworthy projects by standardising project development, the application of existing standards and best practices, and an independent verification during project development and operations. This allows for investment decisions with higher confidence in the technical fundamentals and the planned energy savings as well as lower transaction costs.

The ICP Protocols are at the centre of ICP Europe and were developed in a participatory approach together with technical experts from the buildings, industry, street lighting and district energy sectors. These Protocols and accompanying tools are published as open source documents on the ICP Europe website.

Fig. 2: Five phases of best practice project development according to ICP Protocols

These Protocols define a best practice process for energy efficiency project development and documentation that is based on existing standards and consists of five phases: The development of the energy baseline, the calculation of expected energy savings as well as the construction phase, the operations phase, and measurement and verification of energy savings. This covers all aspects of energy efficiency project development and documentation in a structured and consistent way.

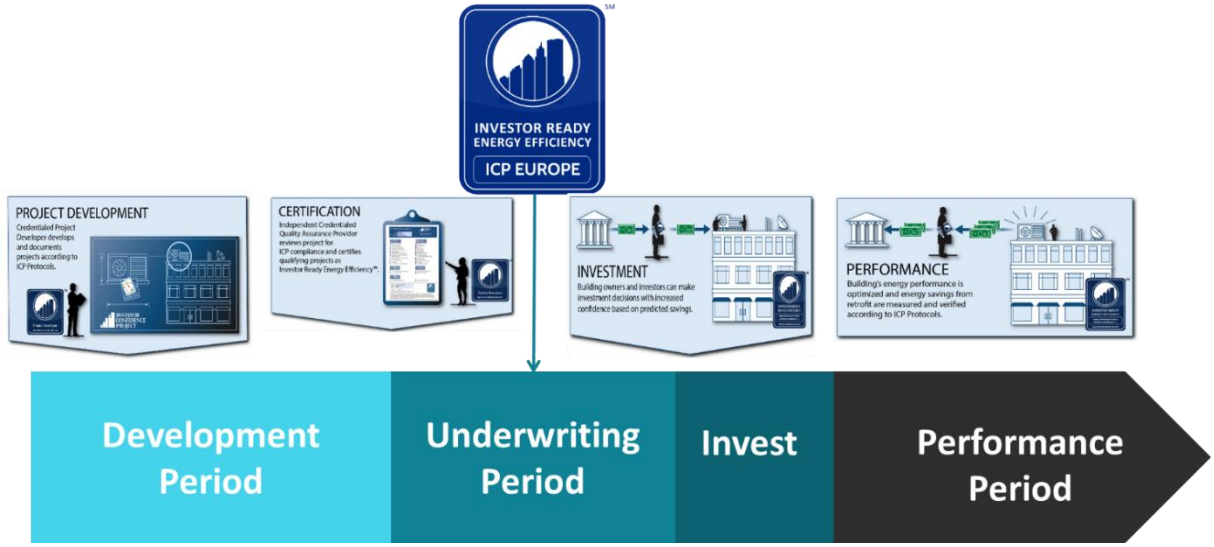

Fig. 3: IREE gives project owners and investors more confidence for their investment decisions

While a project is certified before its actual implementation, IREE guarantees that energy consumption is optimised after implementation and that energy savings are measured and verified according to the international IPMVP standard. Usually, a project is certified as Investor Ready at the end of the project development phase to give the project owner or investor in the underwriting phase more confidence for their investment decision.

Results

The IREE certification and ICP Protocols were developed with expert input in a collaborative process and successfully implemented in more than 30 pilot projects and programmes in the buildings sector across Europe in the first phase of ICP. In the second phase, ICP is currently applied to industry and energy supply as well as street lighting projects across Europe.

Application in industrial projects

The first industrial projects are developed and certified in the food processing and printing sectors in Austria and show that the project owners benefit from more robust baseline and savings calculations, an additional layer of quality assurance and a stronger focus on proper project implementation. In particular, the first IREE™ certification for an industrial project was awarded to a waste heat utilisation project at GMS GOURMET GmbH.

The project was implemented at the production site of GOURMET in Vienna and uses the ICP Europe Complex Industry Protocol. The energy conservation measure (ECM) uses the waste heat of two fast cooling plants (by means of heat exchangers in the hot gas tube with partially condensation) to support the heating demand of three ventilation systems located in the immediate vicinity in the engineering room at the top floor of the facility.

Apart from the reduction in natural gas demand due to reduced heat demand, the implementation of the ECM also reduces electricity demand of the multicompressor refrigeration systems by increasing their energy efficiency ratio (EER) during summer. The project was developed by denkstatt & enertec which provided baselining and energy savings calculations and also developed the OPV, OM&M and M&V plans. Working closely with denkstatt & enertec, the project's Quality Assurance Assessor Verco has applied the Complex Industry Protocol. This process was carried out after the project planning phase and denkstatt & enertec's documentation for the project was found to be ICP compliant.

Development of energy baseline and savings calculation

Generally, before applying the ICP framework, a project developer has to pursue a free online training and register in the ICP Project Developer network. Particular focus in the development of an energy efficiency project according to ICP lies on the first two phases of the ICP process:

- **Baselining:** Development of an energy baseline (usually using a regression model) and collection of all data for savings calculations, economic analyses, and implementation plans:

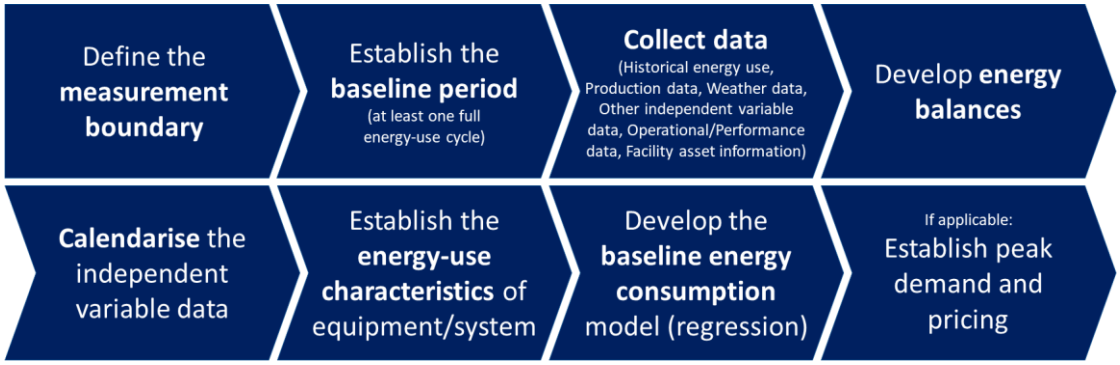

Fig. 4: Baselining process

- **Savings calculations:** Calculation of the projected energy savings on the basis of transparent calculation methods and tools and establishing the economics of the energy conservation measures:

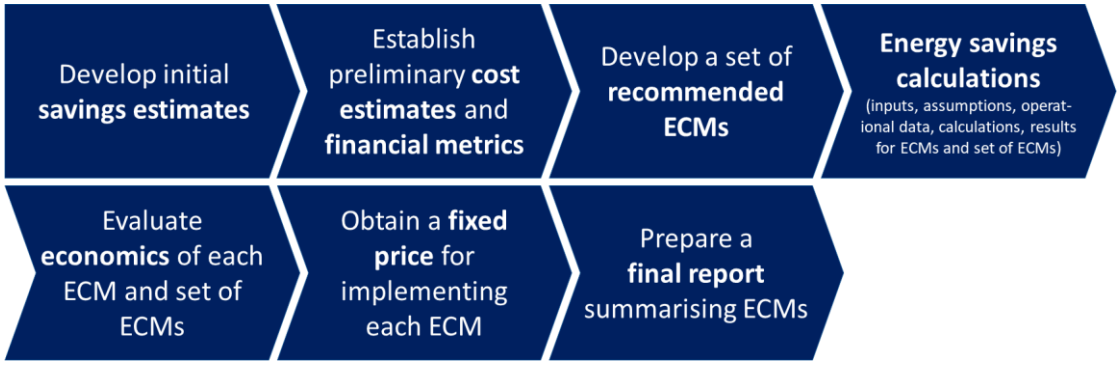

Fig. 5: Savings calculations process

In the abovementioned GOURMET project, a combination of IPMVP option C "Whole Facility" and Option B "Retrofit Isolation: All Parameter Measurement" was chosen. For the natural gas savings due to the implementation of the ECM, the natural gas consumption of the facility was chosen as baseline (Option C). For the electricity savings, the electricity consumption of the submeter covering the two fast cooling plants was chosen as baseline (Option B). A baseline period from 01.01.2017 until 31.12.2017 was chosen.

Correlation analysis was performed for the natural gas consumption for heating degree hours (data from the weather station at the facility) and weekly production rates (tonnes/week). Both variables showed strong correlation with natural gas consumption and were therefore considered for regression analysis. In the case of electricity consumption for the two fast cooling plants, correlation analysis was performed for cooling degree hours and the weekly production rates. Only the production rate showed to have a significant influence on this electricity consumption and was considered for regression analysis.

With regards to non-routine adjustment factors, natural gas consumption is dependent on the implementation / proper functioning of other waste heat recovery systems. Those systems are monitored by the building control system and issues that could occur are detected and can be considered accordingly in the calculation of energy savings for this ECM. Unexpected occurrences like shut downs or shifts in the type of products could have an impact on electricity consumption, but will be monitored by the project/maintenance manager and measures will be taken to be able to consider these effects in the energy savings calculation.

Energy demand of the ventilation systems was simulated on an hourly basis dependent on the outside air temperature of the baseline period (building control system). Waste heat "production" and electricity consumption of the fast cooling plants were calculated based on hourly data from the building control system on the runtime of the multicompressor refrigeration systems. The project has predicted annual energy savings of 635 MWh in natural gas and 135 MWh in electricity. A payback period of 6.3 years is calculated.

Generally, with regards to the implementation phases, specific plans have to be developed. In the GOURMET project, the existing ICP templates from the building sector were used as a starting point but had to be adapted to the specifics of an industrial project.

- **Operational Performance Verification (OPV) Plan:** Establish a process which ensures that energy conservation measures are installed correctly (including training plans and systems manuals) and capable of achieving the predicted energy savings.
- **Operations, Maintenance and Monitoring (OM&M) Plan:** Establish a systematic monitoring of energy system performance (including description of ongoing management regime, performance indicators, responsibilities, training plans and user manuals) including the implementation of corrective actions.
- **Measurement and Verification (M&V) Plan:** Develop an M&V Plan according to the international IPMVP standard to compare the actual and predicted performance to calculate the energy savings.

Quality Assurance

The quality assurance process – which can usually be done in parallel to project development – consists of a first review of the required information based on the respective ICP Protocol, followed by a gap analysis highlighting missing or non-compliant documents and information and further reviews of project documentation until a project fully complies with the requirements of ICP so that it can be certified as an IREE project.

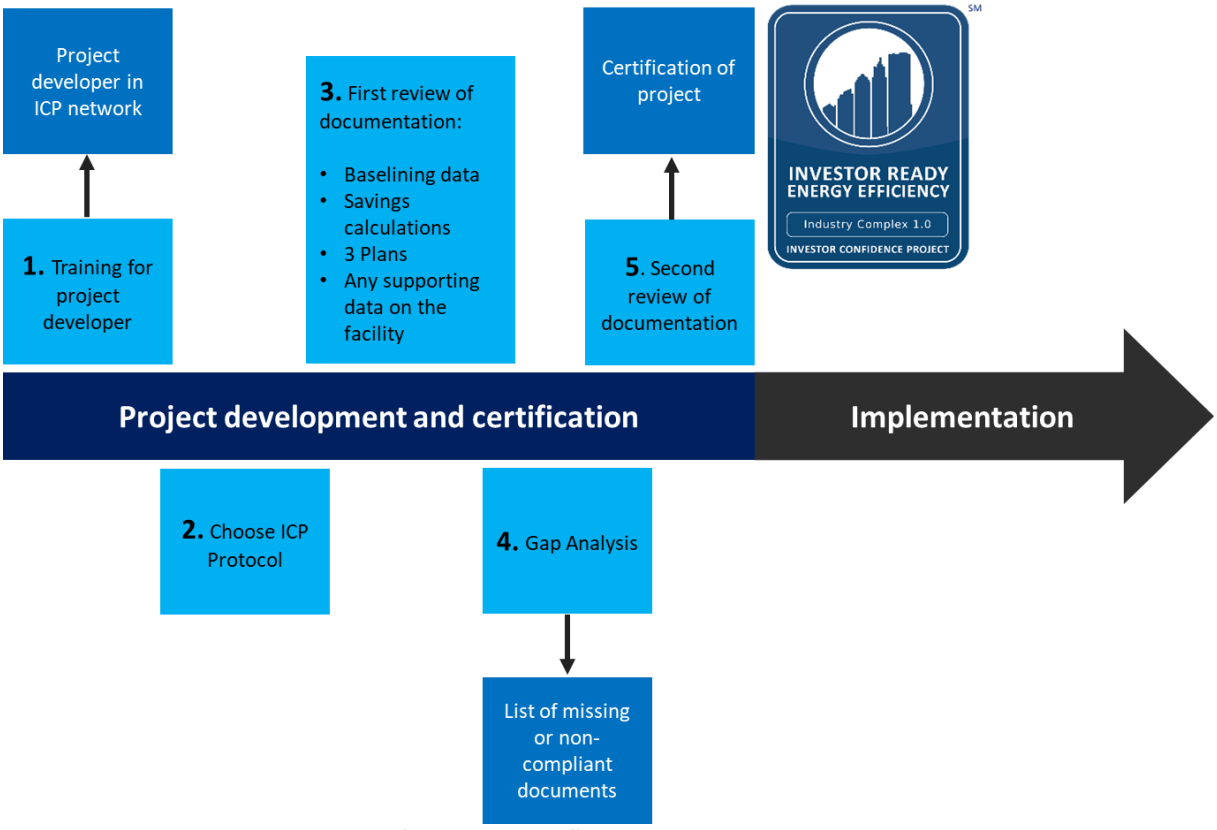

Fig. 6: ICP Quality Assurance process

Throughout this process, denkstatt & enertec provided its documentation electronically to Quality Assurance Assessor Verco. Verco, in its quality assurance role, provided support to denkstatt & enertec in developing the required documentation. Feedback was provided in a review tool, in spreadsheet format, which was created by Verco to cover each of the new protocols developed. The review tool generates the specific documentation requirements depending on the protocol being followed, and, as well as providing a record of which documentation has been submitted, it also provides a means of providing feedback to the project developer.

For this project, around four iterations of the review tool were completed, corresponding to each round of review. In addition to various emails between project developer and quality assurance assessor, several conference calls were also held to discuss the documentation submitted, with a particular focus on how the savings calculations had been developed – for most projects, this is an area which requires greatest effort by the quality assurance assessor.

In addition to the review of the documentation against the requirements of the protocol, technical guidance was also provided to the project developer, in particular on the content of the three implementation plans, the selection of the appropriate M&V approach, and the requirements of the regression analysis.

Additional benefits and effort required to apply ICP

Generally, ICP's best practice project development and quality assurance process reduces risks and transaction costs of a technical due diligence, makes projects comparable and lays a foundation for successful project implementation. The integrated monitoring and verification of energy savings according to IPMVP increases the reliability of projected energy savings. In particular, ICP leads to better projects through:

1. **Robust calculations:** Higher confidence in the engineering fundamentals and the realisation of calculated savings projections
2. **Best practices:** Clear, transparent and consistent energy efficiency project based on industry best practices, with external measurement & verification
3. **Qualified providers:** Evidence of the qualification of professionals
4. **Consistency:** Consistent documentation enables comparability of projects

The first certified industry project has confirmed that apart from the actual energy savings in terms of calculated natural gas and electricity savings the application of ICP provides additional benefits to the project owner. Compared to the standard approach of project development additional focus is put on the normalisation of the energy baseline (correlation and regression analyses) and the development of the implementation plans (in particular tasks and responsibilities, training documents and manuals, and monitoring and correction measures).

According to the project developer, the project owner particularly benefits from more robust savings calculations and a more robust baseline for the verification of energy savings, an additional layer of quality assurance, and a stronger focus on proper project implementation.

A major issue for project owners and project developers is the additional effort (compared to "regular" project development) required on the project developer side for developing a project according to the ICP Protocol and having it IREE certified. In the specific project, this additional

effort amounted to around 4.5 days and particularly included company, ECM and baseline descriptions, baseline calculations, and the implementation plans. However, denkstatt & enertec's ongoing work on a second industrial pilot project indicates that this additional effort should be significantly lower for subsequent projects. It is also expected that fewer review iterations would be required for a second project, since the project developer has a clearer understanding of the requirements of the protocol, and also because it is likely that many of the documents will be very similar to those produced for the first project.

Conclusion

ICP Europe has collaboratively developed its Investor Ready Energy Efficiency (IREE) certification framework to ensure best practices, the right professionals and third-party validation are used to deliver high-quality building, industry and energy supply, and street lighting energy efficiency projects.

This market-oriented certification framework for developing, documenting and measuring energy efficiency projects aims at transforming the market for energy efficiency investments and thereby closing the gap between energy efficiency projects and investors. In particular, ICP reduces risks and transaction costs of a technical due diligence, makes projects comparable and lays a foundation for successful project implementation. The integrated monitoring and verification of energy savings increases the reliability of energy savings.

Finally, as the ICP approach builds on a broad stakeholder engagement process on a European and national level, ICP has developed a network of qualified project developers and quality assurance assessors, a global Investor Network of energy efficiency investors who recognize the benefit of industry best practice and standardised energy efficiency project delivery, and a European-wide ally network with more than 200 stakeholders (project/asset owners, industry, project developers, utilities, energy efficiency services businesses, investors, NGOs, public sector, universities, etc.) that support the development of ICP.

More information on ICP Europe as well as the open source ICP Protocols and other tools can be found on the project's website at http://europe.eeperformance.org.

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