Newsletter 3

FinSESCo

Fintech Platform Solution for Sustainable Energy System Intracting and Contracting, Boosting Energy Saving and Renewable Energy

> *By adding end to end digitalisation FinSESCo supports efficient intracting and brings smaller projects to the energy contracting market allowing low risk private investments.*

Dear readers!

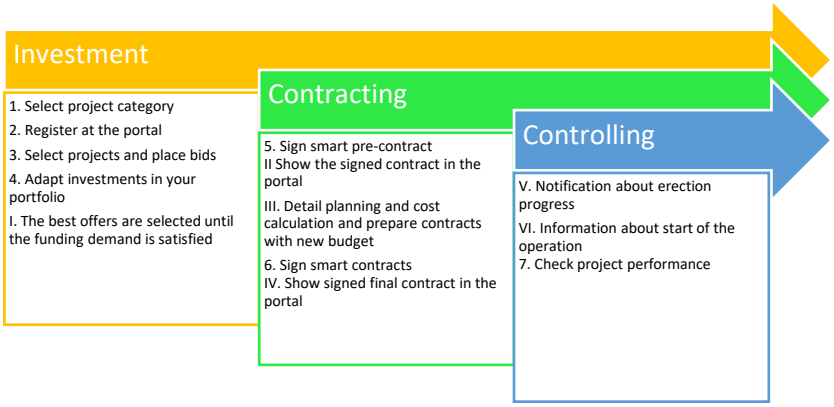
We are happy to present to you the third newsletter with news from the project. In this newsletter we will present two topics:

- Work parsing XML from Energy Performance Certification in WP3
- Results Field Work WP4 Evaluation

We have seen a swift change of the boundary conditions in recent months. Inflation was on the rise, interest rates have been increasing, price of energy was decreasing again after some excursion. Now we see subsidies will be reduced because of overstretched public budgets and elderly having difficulties to get credits from banks might be exempt from the need to decarbonize. FinSESCo adapts to that boundary conditions.

If you want to express your thoughts you might visit the social media channels listed at the next page, or write to office@energycontracting.info Enjoy reading!

Gerfried Cebrat, effiziente.st (efficiency1.st) project lead



ERA-Net Smart Energy Systems

Smart Energy Systems ERA-Net

This project has been funded by partners of the ERA-Net Smart Energy Systems (www.era-net-smartenergysystems.eu) and Mission Innovation (mission-innovation.net) through the Joint Call 2020. As such, this project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 883973.

FinSESCo
Crowd Investing Platform for Decarbonising the Building Stock

Project Duration

01.05.2022 - 31.12.2024

Project Budget

Total Budget: € 1,032,760.-

Project Coordinator

effiziente.st (Austria)

Project Partners

- Europa University Viadrina (Germany)
- SEnerCon (Germany)
- BEIA International Consultants (Romania)
- *Institute for Energy Studies Anna University (India)*
- *Velore Institute of Technology (India)*

Project Website

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ERA-Net Smart Energy Systems Joint Call 2020 (MICall20)

This project has been awarded funding within the ERA-Net SES Joint Call 2020 for transnational research, development and demonstration projects. 22 Mio EUR of funding have been granted to 21 projects active in 17 regions and countries.

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New Ideas for Intracting using 3DCAD Info

Intracting employs self-financing of a renovation process for building stock by means of the funds saved through energy-saving measures. The seed financing at the start comes from the organisation itself. The pay-back from the saved energy cost allows to continue with other internal energy saving or decarbonisation projects delivering lower cost by utilizing renewable energy.

The interesting nexus to ***FinSESCo*** is the possibility using algorithms to make the process more cost efficient by processing pre-existing information. The following Figure 1 shows the approach.

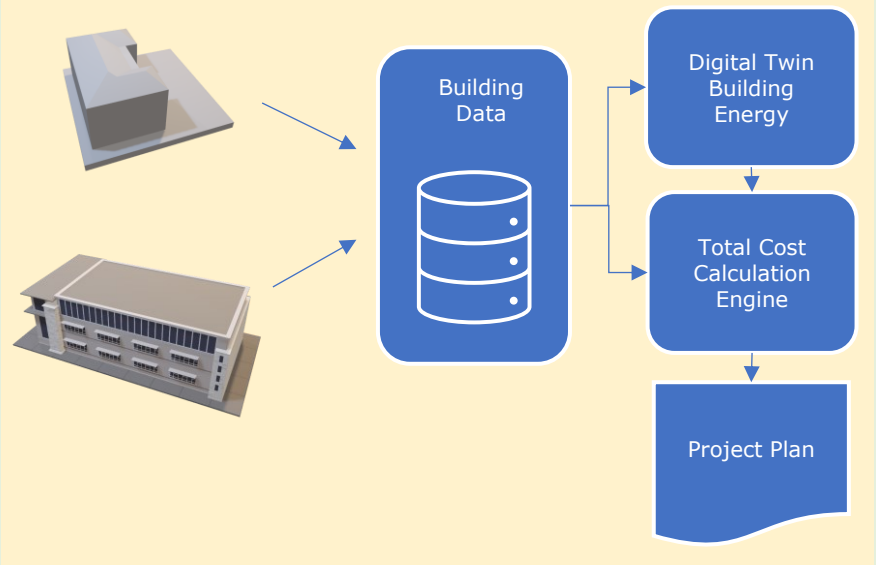

Figure 1 Block Diagram Intracting Optimisation

The availability of information from the Energy Performance Contracting however might not be sufficient. In ***FinSESCo*** we also investigated the usage of LoD3 CityGML, but the real potential lies in BIM because dimensions are depicted with greater precision. In the following we investigate the requirements for the cost saving effects.

Effect	Details	Data needed
Shared planning effort	Similar details allow reuse of planning	Detailed building information (layers etc.)
Economy of scale with non-standard building elements	Identical building elements/appliances may be ordered with rebate like special windows or special energy converters of the same size	Size of openings, design power (specification of energy converter, or other HVAC appliances)
Joint construction site service	Bureaus, toilettes, waste collection facilities may be shared	Location and cadastre plan
Better utilisation of containerized materials	Leftovers may be used for the following building	Minimum order volumes, utilisation per m²

Interoperability Testing Pilots

Fortunately, we can use XML from the energy performance certification at least from three countries, and we are additionally having different or no XML schemes for the regions in Austria[1]. So, the first target was to adapt the XML parsing software so it could process all of them. The targets were:

- Identify the source of the XML.
- Read building elements and general building data.
- Map the data to the data model for the simulation identifying gaps.
- Check usefulness of the tool in the context.

The following table lists some differences:

	Austria ZEUS[2]	**Germany DIBt[3]**	**Spain XMLVisor[4]**
Structure Building Elements	Elements->element, differentiation through 'Glasfläche' subelement	Heating Demand->Element with Type	Elements->Type->Element, heat bridges in the same structure
Details building elements	R, Type reflecting faced medium, historical, specific mass but no heat capacity, temperature correction, inclination, **no orientation**	Inclination, transparent roof element, no differentiation unheated rooms-outside air	Heat capacity c_p weight and conductivity λ for layers, no orientation
other	Degree days, units as attributes, system temperatures, (circulation) pipe length, pipe insulation, heating and cooling device types and energy demand, PV	Factor for heat bridges. Detailed energy demand figures, no air exchange factor	Orientation in % for transparent enclosures, Photo, CO_2 data for EPC classes, categories for power source

The roof surface could not be extracted from any XML schemas, so the first requirements for an update are to depict the possibility to add PV and give more data to be able to calculate optimal thermal renovation and exchange of energy converters. Applying the changes to the XML and adaptations to the parsing we could extract the information necessary to compile data to simulate the building. The approach is still focused on heating, but we show the result for the Spanish demo building.

[1] Salzburg, Styria, Burgenland, Carinthia, Lower Austria and Tyrol share a XML schema (https://www.energieausweise.net/), Vorarlberg has a more sophisticated but closed system (https://eawz.at/).

[2] https://www.energieausweise.net/doku/energieausweis/xml/v5

[3] https://energieausweis.dibt.de/schema/Kontrollsystem-GEG-2023_V1_0.xsd

[4] https://visorxml.codigotecnico.org/

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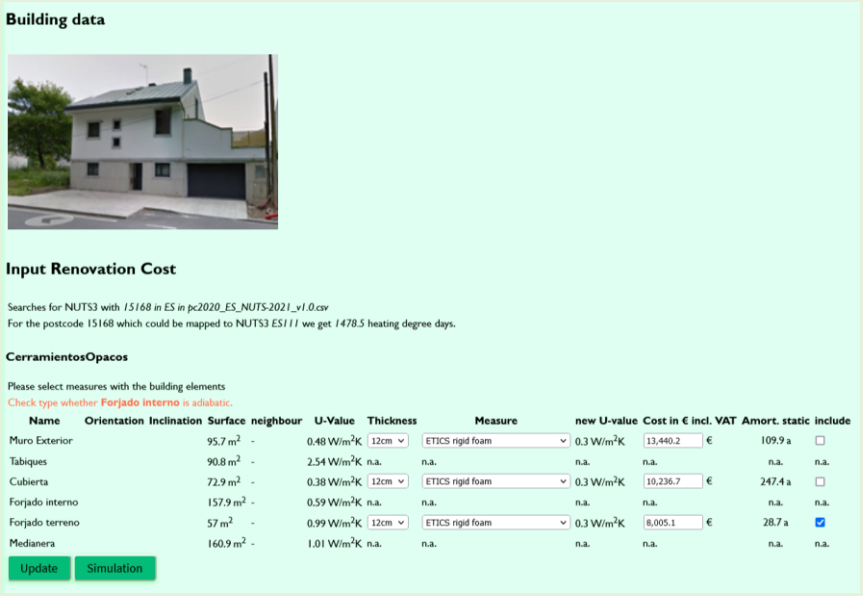

Building data

Input Renovation Cost

Searches for NUTS3 with *15168 in ES in pc2020_ES_NUTS-2021_v1.0.csv*
For the postcode 15168 which could be mapped to NUTS3 *ES111* we get *1478.5* heating degree days.

CerramientosOpacos

Please select measures with the building elements
Check type whether **Forjado interno** is adiabatic.

Name	Orientation	Inclination	Surface	neighbour	U-Value	Thickness	Measure	new U-value	Cost in € incl. VAT	Amort. static	include
Muro Exterior			95.7 m²	-	0.48 W/m²K	12cm	ETICS rigid foam	0.3 W/m²K	13,440.2 €	109.9 a	☐
Tabiques			90.8 m²	-	2.54 W/m²K	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Cubierta			72.9 m²	-	0.38 W/m²K	12cm	ETICS rigid foam	0.3 W/m²K	10,236.7 €	247.4 a	☐
Forjado interno			157.9 m²	-	0.59 W/m²K	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Forjado terreno			57 m²	-	0.99 W/m²K	12cm	ETICS rigid foam	0.3 W/m²K	8,005.1 €	28.7 a	☑
Medianera			160.9 m²	-	1.01 W/m²K	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Update Simulation

As in Romania the energy audit certificate data is not available in XML format, the file was generated manually to describe the location, the structure of the building, the thermal envelope, the energy demand, and the renewable energy sources.

Lessons learned

The parsing of the three different XML schemes was possible and information for a digital building twin could be derived. The PHP based parsing gave some challenge, since higher XPath versions are not supported, and the XML schemes differ in the XML from Energy Performance Certification. Not only translations were needed but fields were times missing in some schemes and the structure was more or less object oriented.

The identification of non-adiabatic elements follows different philosophies in the countries either via temperature factors or information what conditions are faced. It is possible to map data in the XML and work with defaults, but harmonisation of data models in the EU would be beneficial. Especially they should contain orientation for all elements and geometrical shading (overhang) information. And finally, the information stored in the XML depends on the quality of the preceding process of calculating the energy demand of the building. If there are wrong assumptions or the output is not clear whether the element is adiabatic there is room for mistakes in the economic evaluation of measures. Additional information given for layers is helpful, but a complex method needed to automate the compilation of the proposed renovation.

Assuming that more building element layer information will be given to assess and optimize the life cycle, the outlook is positive with regards to design the best suited renovation methods. Finally, we remind of the dramatic differences in the XML schemes, where EAWZ Vorarlberg Austria features the most complex approach, but also the Spanish Visor CTE-XML is a good basis if the information is quality assured.

Recommendations

- Redesign the XML scheme to fit the needs of the applications.
- Especially amend orientation and overhang as data fields
- Do not allow for estimations with Energy Performance Certification
- Mandate possibility to access own electronic building data

Exchange Format for Measuring and Validation

A dXML structure has been defined as an input for the Measurement&Verification tool, which includes information regarding the project scope and location, the investment elements and cost, and the investment pool structure. The existing dXML addresses the investment in renewable energy (photovoltaics), but the implementation of thermal rehabilitation projects is being prospected. The data used in the dXML provides a simulation of a real-life scenario, based on the existing infrastructure of the Romanian pilot building.

Based on the dXML data, smart energy IoT data (inverters, smart meters and smart plugs), environmental data (ambient temperature, solar irradiance, RH, PV cell temperature) and external data (e.g. weather forecasts), project specific KPIs can be calculated to describe the performance of the overall investment and the return of investment for each stakeholder (Figure 5).

Figure 5 Dashboard model for M&V

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Outlook

FinSESCo enters its third year. This will see completion of pilot involvement and start of the evaluation which is concentrating on the impact of a future system taking data from energy performance certification, increasing attractiveness for crowd investing and allowing portfolio management in crowd investing portal for energy (saving) contracting. Figure 2 Screenshot Crowd Investing PortalFigure 2 shows the prototype of the crowd investing portal with possibility to see details of selected projects before placing an investment bid.

Figure 2 Screenshot Crowd Investing Portal

The action immediately pending is the finalisation of the data model (dXML Schema) which is used in the Measuring&Verification process of the Energy Contracting. Figure 3 shows the data to be handed between the phases. The information contained in the XML shall be sufficient to erect the energy contracting contract and to compare the energy savings and yield to expected calculated values.

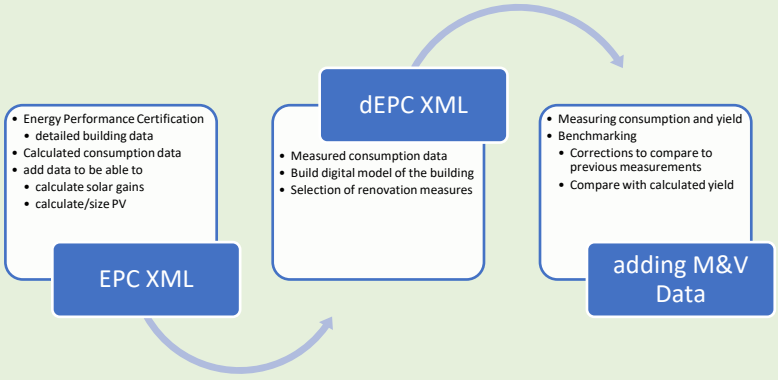

Figure 3 Data flow throughout the Energy Contracting Phases

As an additional exploitation path the use of external simulation software was explored, converting CityGML into gbXML shown in Figure 4.

gbXML can be seen as standard for building simulation and also imported to (German) energy consulting software.

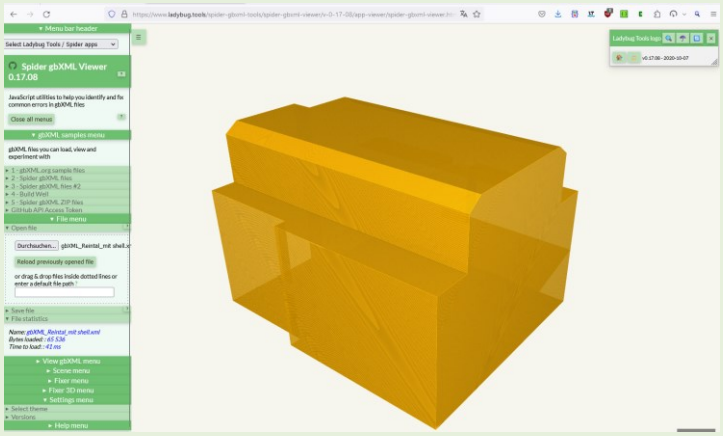

Figure 4 Visualisation of gbXML produced via the CityGML of the Austrian pilot.

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The project in a nutshell

Main Objectives

The aim of the project is to research technology and enabling factors for a platform supporting energy performance contracting. Individuals and investing entities may put their bids, financing implementation of small renewable installations and energy efficiency measures for individual single family building owners, apartment owners up to owners of several buildings. The applications utilising the platform components shall create trust by using secure transmission of meter data, automated publishing results for yields/ savings and payments.

Implementation

The FinSESCo platform supports, via end-to-end digitisation, the process of project definition, investor search, contracting and energy flow metering, quality control and payments. Using already existing data on buildings and energy saving measures, the definition of ESPCo/ESPCo projects can be done with less effort. The gamified investment process with a competitive component and the embedded networked meter-based repayment process with secured transmission is complemented by machine learning-based error detection, which aims to detect deviating yields for renewable energy in Energy Contracting projects, and lower savings in Energy saving contracting projects to be able to plan counteraction in due time.

The FinSESCo platform will include components for portals that focus on private projects but can also be used by companies and across sites to build an intracting solution. The project will explore the best use cases and test the acceptance and attractiveness among stakeholders, reaching TRL7 with the pilot implementation. The competences of the partners from 4 EU countries + India include the development of energy services, smart metering, machine learning, the implementation of energy contracting as a legal construct and social research.

Main Results

The outcome of the project is a specification validated through stakeholder acceptance, testing and technological assessments of the test implementations. Deliverables 2.1 Research analysis, 2.2 requirements manual prepare the pilots and a tool for interested parties to design a portal and test its suitability. Deliverable 4.1 Evaluation plan, 4.2 Evaluation summary, and 4.3 Exploitation plan follow. The dissemination comprises web site, newsletters, Social Media appearance, scientific articles, and conference posters.

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