



# PARadISE

Project acronym: procuRE

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Project full title: Pre-commercial Procurement of Breakthrough Solutions for  
100% Renewable Energy Supply in Buildings

## D1.4b PCP End of Phase I Report

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Participant No	Participant Organisation Name	Country
1 (Coordinator)	R2M Spain	Spain
2	R2M Italy	Italy
3	Prosume	Italy
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### Statement of originality

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

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## The innovative solution

### *The innovative solution (in its current form)*

PARadISE addresses the challenge of maximising the share of renewables used in existing buildings, while smoothing the integration of necessary system components, optimising the user's comfort and facilitating O&M. For that, PARadISE aims to provide a toolkit composed of reliable and modular hardware and software technologies. This will help procurers make informed decisions based on a framework that rates technologies performance by considering several indicators. BIM technology will be present throughout the whole process as the major enabler for the implementation of a novel retrofitting methodology. PARadISE will enable extensive use and adoption of the digital building logbook as a common practice by providing a solution that allows systematic information integration, data collection, processing, exchange and storage. In this context, PARadISE envisions a solution that serves procurers not only in the design phase, but also through the entire life-time of the retrofitting process, providing a BIM-based interface that is standardized, low intrusive, and modular. Finally, PARadISE provides procurers with all the necessary tools as well as a process that covers the education and training activities so that they can manage the solution on their own once procuRE is concluded.

### *Where exactly lies the innovativeness in the solution*

Current RES-based solutions make it difficult to reach an optimised retrofitting design and control of a building's system. These challenges arise mainly from the complexity of RES systems as well as the difficulty of optimising the design process to provide the best combination of RES and operation strategies. PARadISE tackles these problems through a 4-level Innovation (IL) approach:

**IL1 - Advanced and innovative technologies:** Open source tools and packages to model, validate and simulate the system design and operation in different scenarios. **IL2 - Smart technology integration:** Systematic methodology for optimised design + energy management package for monitoring & operation + multi-layered predictive control strategy. The BIM will facilitate the integration of all these technologies. **IL3 - New synergies:** Integration of load models and LCA/LCC, and combination of the synergies of all relevant agents to adapt it to specific needs. In addition, PARadISE enables full building flexibility and DR. **IL4 - Validation and R&D roadmap:** A robust infrastructure for validation of the PARadISE design both virtually and in real life. Guidelines and tools are provided to facilitate the implementation of the methodology after project completion.

### *The degree of innovation*

PARadISE solution is a new combination of existing products, services, processes and methods resulting in a toolset for **Co-Design based on BIM** that allows the implementation of a **3-phase retrofitting process** adapted from the ISO 22263 that adopts (i) **the Heat Pump** as the main energy transformer and (ii) **highly efficient PVT systems** as the main producers, both of them interconnected by an **open, flexible and scalable SCADA** which enables not only the BMS and EMS but the deployment of **smart algorithms for optimal operation** based on **open-source modelling and simulation** solutions.

A table with a description of the key elements/products/services/etc. that conform the PARadISE solution can be found in Appendix 1: Description of key elements.

## Commercialisation success

### *How mature is the innovative solution in terms of its readiness to commercialise widely?*

Table 1. Maturity level of the PARadISE solution

Item	TRL	Protection / Certification
Toolset for Co-Design based on BIM	8	The proposed solution relies on a set of commercial tools (with different levels of penetration) and the integration of the entire retrofitting workflow through BIM as the common repository (of information) along the whole process.
BIM-supported retrofitting process	7	Adaptation of the framework for project information management outlined in the ISO 22263. Implementation of a standardised EU Digital Building Logbook approach for the application of the retrofitting methodology.
Heat pump (HP)	9	The equipment shall comply with the certifications and standards set by the European Commission.
PVT solutions	9	Solutions certified according to EN-12975 and ISO 9806:2013. Collectors (Ecomesh model) with frontal insulating transparent cover patented by ENDEF (National patent: 201200571).
BMS/EMS	9	Based on standardized technologies (Microsoft .Net Framework 4.7 and Microsoft SQL Server). System integration →Bacnet IP protocol (communication gateway). Wealth credit compliance → Referred to WELL, LEAD and BREEAM certifications. EMS tool in accordance with ISO 50001.
System modelling	8	Development based on open-source libraries and tools. Modelling experience in previous EU projects.
Optimal operation control	7	Use of open-source control and optimisation modules for multi-layer architecture.

### *What is the current commercialisation success of the solution?*

Part of the developments that compose the PARadISE solution have been previously recognised for their participation in European and national projects, as well as in certain commercial projects. Furthermore, the consortium has licensing agreements for the use of the commercial BIM toolset on which the final solution is built.

In addition, all key developments are certified according to the certifications indicated in the table above.

## Other benefits obtained

This PCP represents a unique opportunity for PARadISE's partners to broaden their portfolio of clients and services and to expand across new markets in the EU and Associated Countries.

### ***Getting easier access to (a new segment of) the public procurement market***

Considering the portfolio of public buildings currently held by the Buyers Group, procuRE represents a highly valued opportunity for the growth of the PARadISE consortium partners. The partners have previously collaborated on public administration projects, but these have generally been local administrations. In this regard, procuRE expands this segment across the EU and associated members, allowing PARadISE's partners to extend their portfolio of products and services to a wider market.

### ***Growing your business across borders and/or to other markets***

This project introduces the PARadISE consortium partners to new markets, which represent interesting business opportunities. For instance, during Phase I, the procurers showed full availability to put the consortium in contact with local installers, which is also of interest to the consortium for future projects/businesses that may arise. In addition, at one of the sites, a parallel project is being carried out for the total renovation of the building and its surroundings and it is expected that both projects (the local one and the selected procuRE supplier) will work together, which provides an additional opportunity to generate new contacts.

### ***Shortening the time-to-market for your innovation thanks to early customer/end-user feedback***

In the case of R2M Spain, the main developer of model based optimization solutions, it is clear how procuRE will boost and accelerate the process of putting its developments in the market. procuRE closes the gap between EU funded R&D projects (carried out by R2M Spain during the past years) and the actual market. Procurers will become the early adopters of novel solutions that without procuRE's opportunity would take, at least, twice as long to reach the market.

### ***Other benefits / lessons learnt***

procuRE is also an opportunity for PARadISE to address the challenge of language barriers. It will also provide an insight into the regulations of the different countries involved in the project, which will encourage the search for new solutions to adapt to them. This could lead to the conception of new services to be developed in the future.

## Business growth

### *How much has your business already grown during the procurement*

So far business growth has not been perceived due to the short time of the procurement process (Phase I).

### *What are the prospects to grow your business via wider commercialisation of the solution:*

Market for PARadISE is a growing market due to the increasing needs for energy reduction and renewable penetration. **In EU, 97% of buildings need to be upgraded<sup>1</sup>**. The European building sector is the largest single energy consumer in the EU, accounting for 40%<sup>1</sup> of final energy consumption in the EU and contributing about 36% of EU greenhouse gas (GHG) emissions and 55% of its electricity consumption. The stock of buildings is relatively old in the EU, about 35% of the EU's buildings are over 50 years old, which by average use more energy than new buildings. If the energy consumption of buildings is to be reduced, the renovation of existing buildings is key. The renovation potential of buildings in the EU is up to 110 million buildings could need renovation (assuming 210 MM buildings in EU<sup>2</sup>).

Furthermore, BPIE's analysis of available EPC data finds that, considering EU all building stock, old and new buildings, less than 3% of the building stock in the EU qualifies the A-label. In addition, almost 75% of the building stock is energy inefficient<sup>3</sup>, and most building renovations do not achieve the full potential energy savings that could be achieved. There is a huge potential for energy efficiency gains. In this context, buildings are key to achieving the EU's climate and energy targets to cut CO<sub>2</sub> emissions by at least 40% by 2030 and to attain the 2050 goal of an 80-95% reduction in greenhouse gases compared to 1990 levels.

New solutions are required to develop smarter buildings that enable more automation and control systems to make building and integrated RES operate more efficiently. Moreover, by improving the energy efficiency of buildings, it is feasible to reduce total EU energy consumption by 5% to 6% and lower CO<sub>2</sub> emissions by about 5%.

Commercialisation of the full PARadISE solution can start right after finalisation of the project. Several technologies are already in the market (PVT, BIM tools, BMS) while others are in the latest stage of development and refinement during PARadISE (advanced controls).

The competition for PARadISE depends on the specific technology. Renewables are an existing market with major players competing, however innovative PVT technology has so far lower penetration. BIM tools for construction management have established players but with no comparable offering. Advanced controls have major players marketing products but the offering of PARadISE is not found in the market.

### *Which future steps do you plan to take to further grow your business?*

Then next steps for PARadISE are to fully integrate the workflow and services into the service offering from the contractors to increase their market share. This will enable them to reach the market with disruptive products and procedures that ensure full client satisfaction. Marketing activities and strengthening sales departments will be achieved.

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<sup>1</sup> <http://bpie.eu/>

<sup>2</sup> [http://www.europarl.europa.eu/RegData/etudes/STUD/2016/587326/IPOL\\_STU%282016%29587326\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2016/587326/IPOL_STU%282016%29587326_EN.pdf)

<sup>3</sup> [https://ec.europa.eu/info/sites/info/files/epbd\\_factsheet\\_20180503\\_dc\\_v03e\\_final.pdf](https://ec.europa.eu/info/sites/info/files/epbd_factsheet_20180503_dc_v03e_final.pdf)