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IZNAB Sp. z o.o.

"Innovation Oriented To Business"



IZNAB Sp. z o.o. (IZNAB) is an engineering-consultancy **SME**, focused on Cost-Effective processing technologies for *Energy-efficient Buildings, Smart & Green Transport, Clean & Green Energy, Environmental* and *Nano-Bio-Technology* applications. The company headquarters are located in **Warsaw, Poland**.

IZNAB is capable of providing a specialized service in this field involve precise identification of our customers' needs: from the selection (and supply) of promising raw materials & innovative techniques/processing technologies, optimized design & integration, up to the application and complete execution of solutions.

The goal and strategy of **IZNAB** is to apply a whole new analysis technique in order to improve High-performance materials, Energy-efficiency and to reduce GHG emission from overall industrial/building facilities. **IZNAB** Team have high expertise in design, optimization and integration of new compatible eco-innovative cost- and energy-efficient manufacturing technologies and processes, by using the latest tools for *Finite Element Analysis (FEA)* & *Life-Cycle Analysis (LCA/LCCA)* and applying it to understand the behaviour of innovative materials/complex structure, characterizing them, as well as application of *Computational Fluid Dynamics (CFD)* into the modelling of industrial processes and equipment, as well as in buildings. We achieve this using simulation programs, such as TRNSYS, and SimaPro.

IZNAB invest on Research and Development which enhances the creation of new products and services by expanding the scope of applications in the various areas and build common standards.

The guarantee of succeeding in **IZNAB** solutions is based on the Polish engineering acumen and the enhancement of technical know-how progress through close cooperation with the Academic world.

If you are interested in collaboration with **IZNAB**, please visit our web site www.iznab.pl or contact us directly by phone and/or e-mail.

We are available through emil.lezak@iznab.pl and/or **+48.518.414.114**, as well as **Skype: emil.lezak**



Current services of IZNAB

Our objective is to provide solutions in a highly competitive market with our experience in the ENGINEERING & CONSULTANCY area. We have the most specialised engineers with a high qualifications and experience to provide an adapted service which fulfils all of our client's requirements. Our services, amongst others, include:

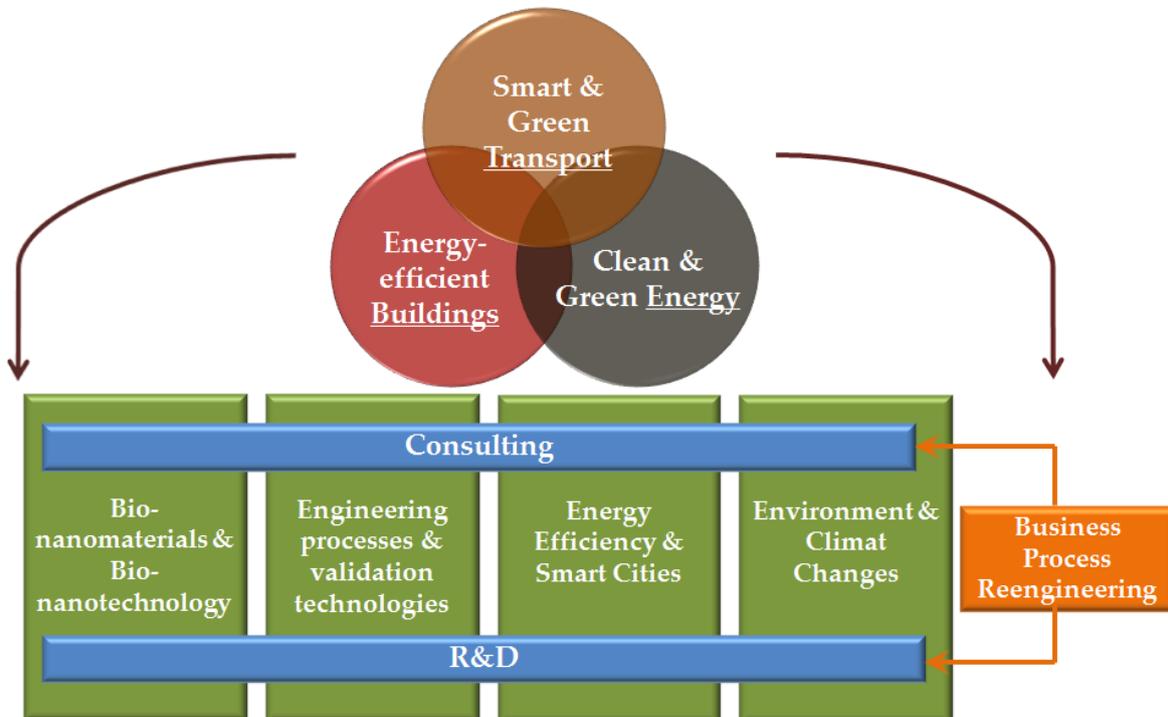


Figure 1 IZNAB`s services.

ENGINEERING:

Bio-nanomaterials & Bio-nanotechnology

Consulting in mechanical characterization of materials using unconventional techniques and advanced materials modelling. **IZNAB** use new materials to generate new business opportunities both within the Construction sector as well as in Energy sector management (PCM, FRP, Bio-based)

Engineering processes & validation technology:

IZNAB is a "team" of engineers specialized on finding innovative and profitable solutions in the field of the geotechnical and structural foundations and elements. Our designs and constructive solutions are a guarantee of minimum costs and optimal functioning during the service life of the building or infrastructure.

Energy efficiency & Smart Cities:

IZNAB collaborate with leading architectural companies to bring forth great landmark design and thus realise the ambitious projects of our clients using a green process. Energy efficiency and renewable energy are considered to be the twin pillars of sustainable energy policy. Reducing the use of energy reduces costs and helps reduce GHG emissions.

- Energy Audits: Energy audits improve energy efficiency in buildings. The process encompasses the improvement of energy equipment and the possibility of using renewable sources of energy in order to achieve the final objective: The accomplishment of economic and environmental savings.



- Renewable Energy Design: We provide comprehensive and affordable, renewable energy efficiency programs, systems and technologies. We have the knowledge and the ability to create specific solutions unique to customer's needs.

Environment & Climate Changes:

- Environmental management systems: Its application offers an approach to classify environmental features involved within activities, which take place in the organisation. Additionally, it endorses environmental protection and pollution prevention.
- Carbon footprint: Quantification, reduction and neutralization of GHGs emissions in products, organizations, events and services.
- Life Cycle Assessments: LCAs lessen the environmental impacts of products and services by guiding the decision making process towards sustainable development.

BPR - Business Process Reengineering Consultancy

The structure of the **IZNAB** tends to divide the processes in successive tasks, specializing the people and organizing them in a right hierarchy. This working method leads, after some years, into the fragmentation of the business activity that influences in a negative way on the costs and in the motivation of the people that work in it. We offer the skilfull "extensions" and task enriching methodologies, circuit's optimization, *Just-in-Time*, *Time-to-Market*, etc.

The novelty of the "*Business Reengineering*" methodology is in its global character. It allows to determine, within the complexity of the company, which are the processes or basic circuits of the business, how are they conceived and how could they be imagined again in order to make them more effective.

The reengineering process of an organization allows obtaining efficiency improvements of highly importance, but it demands an important commitment with the information and communication technologies.

CONSULTANCY:

Economic Evolution - Trust us for market intelligence, economic development projects and infrastructure programmes

In today's uncertain and changing economic climate, identifying markets for technological innovation that can boost an area's competitive advantage are vital to a region's continued prosperity.

IZNAB has experience, in working with economic development and business support organization's in Poland and across Europe. We have a detailed understanding of the needs and requirements of **IZNAB** public sector clients, as well as your reporting and publication requirements. We are therefore happy to work with you closely to develop the appropriate project strategies and plans.

During the last decade we have been involved in programme design and delivery aimed at a wide variety of economic development projects, including:

- Designing an appropriate business support or infrastructure programme based on international best practice;
- Enhancing business capacity for innovation activity through well-designed, cross-sectoral programmes;
- Identifying regional opportunities in a selected technology, sector or capability;
- Improving the technology expertise landscape in areas such as nanotechnologies and low-carbon technology;
- Reviewing strategy and policy initiatives;
- Supervising strategic projects and programmes to help meet clients' objectives whilst minimizing the administrative burden and the strain on in-house;
- Supporting specific sectors such as nano-bio-technology.



IZNAB highly experienced consultancy teams are able to not only gather the necessary evidence but also to effectively interpret the data and to present it in the appropriate way to help **IZNAB** public sector clients make strategic decisions on investment, innovation and policy.

From technology reviews and policy studies, through cluster mapping and development, to programme design and management, **IZNAB** has the people, the skills and the experience to improve the competitive position of selected sectors and industries whether at a regional, national or European level.

Profit-making Technology Transfer - Helping research centres and technology-based companies turn their IP into successful, marketable products

IZNAB is Transfer technological innovation (Knowledge valorization) into a marketable product or service always presents a range of challenges as well as opportunities. However, with detailed research and a clear strategy, risks can be overcome and commercialization can prove highly profitable. Before investment is released it is therefore vital that you are able to accurately assess the true market potential for the new technology.

Is YOUR Technology ...		
Offer lower costs and enhance product differentiation	Deliver a sustained technology lead	Form an integral of an IP platform
Offer a pioneering product with 1 st to market advantages	Deliver an Industry standards	Eliminate the need to purchase from present industry leader
Offer a direct substitute for other successful products	Stretch market boundaries	Require new manufacturing processes not used by current players

To help universities and research-intensive businesses identify and evaluate real commercial opportunities, IZNAB provides a comprehensive range of market research and strategy services, as well as business support and project management services moving forward. IZNAB expert teams take a structured approach to every project they undertake, providing a logical step-by-step approach from IZNAB first technology review, through product appraisal, to developing a fully-fledged, market entry strategy.

Profit-making Technology Transfer - Leading-edge methodologies

IZNAB don't like the traditional approach where knowledge creation and filtering precede any interaction with the market, **IZNAB** philosophy is to consider the commercialization with "*the market in mind*" from an early stage interaction with the market.

Combining technology expertise with research excellence, **IZNAB** deploys a rigorous set of technical and business focused methodologies. These include:

- Technology Attribute Mapping
- Research on Competing Technologies And Patents
- Technology Market Research
- Investor-Ready Business Plans
- Commercialisation Training Workshops

Whatever the current stage of your project, **IZNAB** can provide you with the appropriate level of evidence gathering, interpretation and reporting services to help you determine the potential risks and rewards before investing further in new product development. This research will not only look at the market size, growth potential and other trends, but also the true potential, customer demand, challenges to adaptation, barriers to entry and competitors' strategies.



Profit-making Technology Transfer - Proof-of-concept research

Employing a combination of desk-based research and customer interviews, **IZNAB's** proof-of-concept market research provides you with an overview of the current state of the market and helps you to identify those areas offering the greatest opportunities.

This *proof-of-concept* market research will not only help you verify that there is indeed a real appetite for your product or service, but also to discover whether the product or service needs to be modified or customized in any way to meet user requirements. Once we have assessed the potential market for your IP or technology, we will work with you to develop a range of company-specific commercial opportunities.

Sustainable Business Improvement - Promoting sustainable growth through innovation and market diversification

All businesses need to grow in order to survive while technology and changing market conditions challenge companies to reinvest and reposition. To grasp the new opportunities in a timely manner requires careful research, detailed analysis and informed decision making.

At **IZNAB** we can help companies and public sector investors to minimize risks by helping them develop relevant, practical and sustainable market development strategies. **IZNAB** range of research and strategy support services can help you identify new products and services for existing markets, as well as new markets for existing products and services. **IZNAB** experienced consultants can then make suggestions regarding the most successful routes to exploitation.

IZNAB's skills in this area have been proven over a wide-range of market sectors and an expansive history of assignments.

Sustainable Business Improvement - Identifying, analysing and synthesising market trends

Whatever growth strategy you eventually embark upon, it is important that you adopt a strong, competitive position and that you continue to offer products and services that the market demands. Primary market research is Key to ensuring that any new diversification opportunity or repositioning strategy is potentially viable, competitive and designed to meet the needs of your customers in your distinct target markets.

IZNAB's consultants combine rigorous academic and technical expertise with practical business knowledge and broad sector experience. They can therefore bring a range of leading-edge methodologies to each project, including:

- SWOT and PESTLE Analysis
- Diversification Mapping
- Sustainable Business Review
- Competitor Analysis
- Business Growth Planning

Ultimately, it will be your growth strategy. For this reason, we prefer to work closely with **IZNAB** clients, taking you through every step of the process. This enables you to provide input and make decisions at key points and ensures that you have total ownership over research and strategy for ongoing development.

Sustainable Business Improvement - Broad sectoral experience

We carry out marketing, strategy development and business planning assignments for RTD organization's, technology businesses and traditional businesses that aspire to become more knowledge-based.

IZNAB Team have worked for a variety of companies ranging from new ventures with one employee to multinational organization's. We can support businesses in a wide range of sectors encompassing the following areas:

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- Advanced Materials (including Nanotechnology)
- Biotechnology
- Chemicals and Pharmaceuticals
- Energy (including Renewables)
- Engineering & Manufacturing Technologies
- Environmental Products & Services
- Food & Drink
- ICT & Software
- Low Carbon Technologies
- Recycling and Waste Management

Ongoing EU projects of IZNAB:

"Design4energy": The project will take this into consideration and will develop tools and methodologies that can help designing energy efficient buildings that can consider both short term performance as well as future scenarios, considering important factors such as deterioration curves, technology evolution, climate change effect, users, energy neighborhood configuration, continuous commissioning alternatives while evaluating their impact in the Building Life Energy Performance. The continuous commissioning will include strategies as preventive maintenance, renovation of energy systems technologies (HVAC, RES), including deep retrofitting strategies.
<http://www.design4energy.eu/>

Involved activity of **IZNAB** in this project:

- *Definition of reference scenarios and identification of Target Customer and identification of the Value,*
- *Specification and evaluation of limits and barriers to create Value chain,*
- *Design and elaboration of data bases, operational guidelines to implemented the products and services,*
- *Knowledge valorization, exploitation of results, IPR management and Business models.*
- *Education and Training activities*

"EcoShopping": The project aims to build a holistic retrofitting solution for commercial buildings to reduce primary energy consumption down to less than 80kWh/m² per year and increase the share of RES (Renewable Energy Sources) more than 50% compared to the state of the art.
<http://ecoshopping-project.eu/>

Involved activity of **IZNAB** in this project:

- *Retrofitting Methodology Assessment and Design,*
- *Specification and integration of HVAC and RES,*
- *Theoretical and experimental performance identification,*
- *Dissemination and Training activity (incl. Business Model).*

"MF-Retrofit": The project aims to deal with the numerous requirements of facade panel retrofitting by developing a light-weight, durable, cost effective and high performance panel. Its layered structure allows for separate but also synergistic function regarding high thermal and acoustic insulation, excellent mechanical properties, up to standards flame retardancy and photocatalytic activity. <http://www.mf-retrofit.eu/>



Involved activity of **IZNAB** in this project:

- *Requirements and Specifications of novel and innovative materials,*
- *Structural characterization and modeling of performance,*
- *LCA and LCCA analysis,*
- *Dissemination and Exploitation (incl. Business Model).*

"MAESTRI" – (H2020; SPIRE Initiative) aims to advance the sustainability of European manufacturing and process industries. This is done by providing a management system in the form of a flexible and scalable platform, and to guide and simplify the implementation of an innovative approach, the Total Efficiency Framework. The overall aim of this framework is to encourage a culture of improvement within process industries by assisting the decision-making process, supporting the development of improvement strategies and helping define the priorities to improve the company's environmental and economic performance. Its development and validation will be achieved through application in four real industrial settings across a variety of activity sectors. The Total Efficiency Framework will be based on four main pillars to overcome the current barriers and promote sustainable improvements: a) an effective management system targeted at process and continuous improvement; b) efficiency assessment tools to define improvement and optimisation strategies and support decision-making processes; c) integration with a toolkit for Industrial Symbiosis focusing on material and energy exchange; d) a software Platform, based on the Internet of Things (IoT), to simplify the concept implementation and ensure an integrated control of improvement process. Over a period of 4 years, the project will deliver exploitable results clustered into technological outputs (including eco-innovative products, processes and services tailored to industrial end-users) and structured solutions (involving technical, economical, legislative and policy solutions synergistically combined).

Main roles attributed to IZNAB

WP1	<p>IZNAB will define Business Cases (for 4 industrial partners), identifying which areas in the company will be involved in the testing and validation of the MAESTRI results. In addition, it will include identification of the most critical issues in terms of energy and resource efficiency within the process (technical and non-technical) and the targeted improvements foreseen for these critical aspects.</p> <p>IZNAB will contribute in completing the requirements analysis and goal setting for each of the use cases specifications, and re-iterated through each of the project phases.</p> <p>IZNAB will participate in necessary modifications in the design specifications, model definitions and validation activities and the subsequent re-engineering and validation of the affected artefacts.</p>
WP2	<p>IZNAB will study and analyse the eco-efficiency methodologies and tools, namely ecoPROSYS and MSM, in order to define how their integration will be performed, in compliance with the requirements. IZNAB will define the structure to be used to assess and evaluate the environmental influence – incorporate of LCA methodologies within the efficiency framework.</p> <p>IZNAB will develop Efficiency Framework, by the integration of all tools and methodologies (LCA/LCC) defined previously. The matching of the tools and methodologies outputs, namely KPI related environmental impact, cost and value, will allow to be defined overall and sector/company specific eco-efficient indicators (as well as additional efficiency-representative ratios).</p> <p>IZNAB will support in adjustment of Efficiency Framework, in order to assure its application to any process industry regardless the type of industry/sector and size.</p>
WP4	<p>IZNAB will identify the challenges and success factors for regional collaboration in waste exchange. IZNAB will participate in build a library of industrial symbiosis case studies (both</p>



	<p>successes and failures). IZNAB will contribute in prescribing steps to engage in industrial symbiosis, supported by the use of the tools from previously tasks.</p>
WP6	<p>IZNAB will participate in create a baseline scenario for the project pilot processes by identifying, analysing and assessing its efficiency, both from environmental and economic perspectives. For this purpose, all process stages and elementary flows, both inputs (energy, materials, consumables, equipment, labour, etc.) and outputs (products, by-products, residues, emissions, etc.) will be properly identified and quantified taking into account a life cycle perspective.</p> <p>IZNAB will contribute in identification and definition of improvements (measures) to enhance the pilot's efficiency for each pilot, including all process elementary flows. An individual Action Plan will be draw considering these opportunities, including potential improvement measures contributing to the optimization of overall process efficiency.</p> <p>IZNAB will support the definition of specific procedures to monitor each pilot case study relevant aspects, in order to assess and evaluate their overall efficiency.</p> <p>IZNAB will participate in implementation of improvement measures, in order to generate a reference scenario process and respective KPIs.</p> <p>IZNAB will contribute in validation of the project concept as an overall approach for the effective efficiency management in process industries, including the platform, and its different modules, and management system.</p>
WP7	<p>Leading this work-package, IZNAB will: evaluate of EU frameworks (including SPIRE Roadmap) progress based on the achievements obtained during the project, as well as develop approaches for Roadmap improvements, in order to boost Eco-efficiency on European Process Industries; contribute to EU Standardization based on the implementation of improvement measures and Monitoring. IZNAB will approach the market by designing and implementing innovative Business models/opportunities associated with MAESTRI platform and its methodologies; guide the project towards a viable exploitation strategy on a global scale by developing an exploitation plan, that will cover: individual and whole consortium exploitation plans, establishing guidelines to the commercial deployment of the MAESTRI project results, targeted stakeholders and assessment of the competitive environment surrounding the project.</p>
WP8	<p>IZNAB will: participate in develop the project identify, and all the communication material; facilitate the external communication and share project activities and outputs with the stakeholders, in order to spread replication; promote the dissemination of the project among third parties; boost the exploitation of results.</p>

Involvement of IZNAB in project proposals (FP7/H2020):

- **"InDeal"** - Challenged by climate change, and coupled with the need to secure sustainable economic growth and social cohesion, Europe must achieve a genuine energy revolution to reverse present-day unsustainable trends and live up to the ambitious policy expectations. A rational, consistent and far-sighted approach to heating and cooling is key for ensuring such transformation. Toward this direction, district heating and cooling systems need to be more efficient, intelligent and cheaper. InDeal project will offer an innovative platform that will impose a fairly distribution of heating and cooling among the network's buildings by: (i) real – time energy consumption data gathering via artificial intelligent meters, (ii) identifying and evaluating the network's buildings' need and demand for heating and cooling depending to their energy efficiency, energy consumption and type of building (EDP tool), (iii) predicting the short-term and long-term weather conditions and forthcoming need for heating and cooling (EDP tool), (iv) monitoring and control the level of energy stored in network's storage stations and substations (SMT), (v) 24/7 monitoring of the DHC system by a central control platform and (vi) minimizing heat losses via novel pipe design solutions and



innovative insulation materials. The target of InDeal is to turn the current DHCS into a new next-level automated DHCS that will guarantee the increase of the overall energy efficiency of the system accomplishing a fairly distribution of heating and cooling energy demands. In light of this, InDeal will make a significant step forward contributing to wider use of intelligent district heating and cooling systems and integration of renewables, waste and storage.

Main roles attributed to IZNAB

WP2	IZNAB will participate in development of a new sustainable insulation material to reduce heat losses.
WP3	IZNAB will participate in creation a dynamic simulation platform-building on system models of urban energy systems with real-time tooling and test facility offering high speed simulations for data processing acquiring energy consumption in buildings.
WP4	IZNAB will contribute to development an immune-inspired supervised learning method for weather forecast.
WP5	IZNAB will contribute to development the necessary ICT architecture for the operation of overall system.
WP6	IZNAB will lead the Life Cycle Cost Analysis (LCCA) study
WP7	IZNAB will lead the Dissemination, Exploitation and Training work-package – ensure an adequate level of dissemination of all research results and to facilitate that the public is aware of the main issues deal with the project; control the website; arranging training modules; organize conferences and support preparation of scientific/technical papers.

- **"EffiHeatIn"** - aims at developing the necessary heat pump (HP) technology towards recovering low temperature waste heat rejected from industrial processes, and pumping it into higher temperature heat supply streams, in order to reuse it as high temperature process heat. EffiHeatIn will provide a ready-made and economically competitive solution with wide replication potential, adaptable to every industrial sector. EffiHeatIn will improve HP technology in terms of temperature range, energy efficiency and cost effectiveness. EffiHeatIn will include development of new/innovative compressor and HP technology for the 30-150°C temperature range, using an environmental friendly refrigerant among butane, water, or new generation ozone friendly halogenated synthetic refrigerants of very low GWP. After developing small scale pilot units, an industrial scale compressor and HP system will be developed. Three industrial scale prototypes will be manufactured and tested, which will be installed at three demo plants for full scale validation purposes. Each demo plant will integrate waste heat stream connection, HP plant and process heat supply. The economic parameters will be closely assessed and monitored. Large replication and market readiness level will be ensured by innovative business and financial models, plus a comprehensive market study and strategy addressing key industrial sectors, as well as the creation of a spinoff. EffiHeatIn is in complete alignment with SPIRE PROCESS Key Action 2.2: Energy harvesting, storage and reuse, and Horizon2020 topic EE-18-2015. EffiHeatIn is implemented by a consortium of 23 EU organizations, including a compressor manufacturer, a HP manufacturer, an industrial energy systems manufacturer, a HP installer, industrial consultants, research institutes and Universities and a power utility as linked third party. EffiHeatIn has a budget of ~5.2 million euro and a duration of 5 years.

Main roles attributed to IZNAB

WP1	IZNAB will contribute to the design of the evaporator and condenser.
WP7	IZNAB will be responsible for the modelling and optimisation of the heat recovery from natural gas effluent, will also model the burner efficiency and gas lift at the pipe exit as a function of humidity removal and fan speed and contribute to the engineering design of the LAMBORGHINI demo plant.
WP10	IZNAB will contribute to the evaluation of environmental impact through LCA analysis, as well as to the evaluation of the economic and operational performance of the EffiHeatIn



heat pump system.

WP11 IZNAB will contribute to the preparation of the European market study.

WP12 IZNAB will disseminate project results in the cement sector, identify potential applications of the EffiheatIn heat pump system in cement and chemicals sectors, organise the national workshop for Poland, and participate in the project final conference.

- **"FACTUS"** - AM techniques have already been highlighted as potential ground breaking processes, opening to new customization and production scaling scenarios. Among these, 3D welding and laser metal deposition are highlighted as the most promising ones due to the higher productivity and flexibility achievable. Widespread diffusion of such innovative techniques is nowadays still limited by the lack of a service infrastructure that would allow filling the gap between innovation and actual industrial needs. FACTUS aims at establishing such a service infrastructure, by translating knowledge coming from both experienced partners and innovative simulation tools into a usable solution, to provide a strong, comprehensive and knowledge based tool with the purpose of guiding AM implementation and exploitation through the whole process chain in real industrial environments, "from sketch to batch". FACTUS outcomes will be capable of guiding design in its early stage, by exploiting both improved topology optimization tools and a novel integrated design for additive manufacturing approach that would allow designing components and choosing optimal processes, and related process parameters, taking into account feasibility, cost and performance. FACTUS will then impact over the production lead-time of the designed component, by providing an integrated and innovative CAM software dedicated to AM processes capable of generating optimal travelling-paths to achieve the desired level of accuracy and productivity, "right first time". Finally, at the production stage, the developed Cyber Physical System will monitor and control AM processes in real-time to ensure that the desired level of accuracy and performance is achieved and maintained. The potential impact of FACTUS will be objectified by three complementary industrial case studies that will demonstrate how the developed services will proficiently allow to exploit AM potential in different industrial realities, with general and distinctive needs.

Main roles attributed to IZNAB

WP1 IZNAB will support the initial and final analysis of the industrial partners, especially for the SWOT, PESTLE and LCA of the new technologies available thanks to FACTUS.

WP7 IZNAB will tackle the dissemination, exploitation and standardization and policy of the project results among the additive manufacturing stakeholders community with concern to the specific results obtained by FACTUS.

- **"rHELIOS"** - Residential buildings comprise the biggest segment of the EU's building stock (75%) and are responsible for the majority of the sector's energy consumption (68%). Taking into account that 49% of population lives in densely populated areas and the emigration toward urban areas is a real tendency, the only way to achieve the new 40-27-27 objectives by 2030 is through deep-nZEB energy refurbishment of existing multi-family residential buildings. rHELIOS will developed a low invasive and cost-effective residential building deep retrofitting methodology and system which, taking advantage of solar energy through a multifunctional envelope and the interaction with the district energy system, will allow to reduce by at least 60% of the fossil energy use for heating and domestic hot water (DHW). rHELIOS underlying concept considers the building as a Solar Energy Nodes in a district network, managing the building as a Prosumer which can produce or consume energy from the network through an innovative Distributed District Energy Management System (D2EMS). The best solar exposed residential buildings will be selected as the Solar Energy Node which will share surplus energy with nearby buildings and districts. Taking into account solar energy availability cannot be controlled, it is necessary to integrate new compact thermal energy storage systems at building scale which will help off-setting supply with demand. rHELIOS will be demonstrated and validated through three real retrofitting deployments, covering



main climatic areas in Europe. Moreover, the replicability of rHELIOS results will be further validated through three complementary virtual projects covering additional climatic areas and end-uses. An innovative business model based on triple dimension (technical, social and financial) will be intensified by a comprehensive "Train the Trainer" and an innovative market approach which will allow results to be transferred to all key players of the value chain.

Main roles attributed to IZNAB

WP2	IZNAB will participate in stakeholder involvement and engagement, through in-depth understanding of views of both private and public owners regarding deep retrofitting of residential buildings at both building and district levels, which will be captured through a combination of social media surveys, virtual and physical workshops and face-to-face interviews. IZNAB will contribute in developing an integrated and systematic retrofitting methodology to identify, determine and implement the most cost effective retrofitting solutions for residential buildings to achieve the nZEB while maintaining satisfactory service levels and acceptable indoor thermal comfort.
WP5	IZNAB will participate in provide a sophisticated web-based 3D visualisation tool to understand the impact of potential interventions for either individual buildings or district.
WP7	IZNAB will support the demonstration activities, which will have a multi-fold objective: to monitor the implementation of the retrofitting solutions proposed for each of the demonstrators; to ensure that the implementation of the proposed retrofitting solutions will not deviate from the initial plan, especially from the estimated cost but also on effectiveness targets and timing; to assist in the establishment and implementation of the monitoring plan by providing a smooth interface between the demonstrators and the responsible for the design of the monitoring plan. IZNAB will contribute to critical assessment of the implemented solutions and moreover to ensure that the results of this critical assessment would be comparable against other potential solutions. Data acquisition will be done according to the International Performance Measurement and Verification Protocol (IPMVP)
WP8	IZNAB will develop a common framework to test the replicability of the designed systemic approach and the solution kits beyond the scope of the three real demonstration cases used to create them. The framework will provide a common set of criteria to assess the feasibility of the deployment of the solution kits developed for the real demonstrators on the virtual demo districts.

- **"ReBondable"** - the main objective to develop methods, protocols and processes for debonding multi-material components, for reusing and/or recycling each material, including rebonding of components made of recycled material. By combining a number of such methods, the project will pave the way for increased sustainability and competitiveness in the manufacturing of adhesively bonded multi-material components including fibre-reinforced composites in several sectors. By facilitating ReBondability for fibre composites we will increase reuse and remanufacturing rates, enhancing productivity by reducing waste and cost levels, as well as productivity through automation of equipment and methods.

Main roles attributed to IZNAB

WP4	IZNAB will support: analysis of each use case field, in order to define the requirements for each application scenario; develop an Eco-innovative approach for product design, taking into account re-use and re-manufacturing aspects for enhanced product recovery and spare parts/services support; develop a comprehensive supply chain study for all the use cases fields represented in the project; develop a preliminary business plan for relevant application fields.
WP5	IZNAB will participate in ensuring the greatest environmental and economic impact of the



	project proposed products and processes by considering a lifecycle approach to quantify and direct the project developments. LCA/LCC will be used to evaluate: currently available product lifecycles, and any new approaches proposed in the project.
WP6	IZNAB will contribute in: validate the rebondable fibres technology to promote the reuse and recycling of polymer fibres in relevant industrial environments; evaluate the technical performance of the rebondable fibres technology in industrial sectors; develop relevant case studies to drive the understanding of the wider benefits of the technology; drive the wider uptake of the rebondable technology in multiple industries.
WP7	IZNAB will participate in creating a project spinoff by the end of ReBondable project, to exploit the solutions developed in the project.
WP8	IZNAB will support the communication of planned project activities and dissemination of project results, to all stakeholders in the countries where

- **"COh-Efficient"** - proposes a systemic approach to retrofit residential buildings considering the Participatory Design Approach (PDA) as the most promising one to face the challenge of deep rehabilitation of residential buildings (including buildings of historic value) while lowering the costs of refurbishment with affordable breakthrough solutions. PDA aims to be a contribute to the building efficiency by creating a favorable joint between socio-economical, environmental and technological elements for improved residents' behaviors under efficiency aspects and implement actions to stimulate final-beneficiaries to invest in their own life quality. These goals will be pursued and assessed through collaborative and cross-disciplinary validation actions in real-life operational settings, in Italy and France, with the active involvement of several SMEs with R&D capacity, Stakeholders and the end-users. The COH-EFFICIENT piloting is arranged in a parallel double road map, combining affordability along the whole life cycle, reduced maintenance and higher performance reliability with reduced energy use. The first one starts from Cohousing Chiaravalle (Italy), where the "participatory method" management is oriented to exploit local energy sources combined with an Energy Multi Generation Hybrid System (MNEMGHS), which will be managed through innovative ICT solutions, complementing the envelope characteristics of the future refurbished building. This methodology will be then applied, albeit with some variations, to the second pilot case in France, Cohousing Les Fractales. The second one starts from the third pilot site "Roissy Porte de France". Then, the district dimension will be also evaluated in Chiaravalle area. In parallel, business, financial and dissemination plans, aiming to reduce individual costs and ensuring cofunding and exploitation, will be set up and implemented.

Main roles attributed to IZNAB

WP1	IZNAB will: benchmark available systemic approaches (at building and at district level), to outline the guidelines for the participatory design (at building and at district level), to share a knowledge-based background to compare results; outline the guidelines for integration the most promising cost-effective technologies and materials, to share a knowledge-based background to compare results; outline the guidelines for a COH-EFFICIENT business model at district level.
WP4	IZNAB will contribute in raise awareness of local community. Engagement and empowerment: constitution of a district scope association of end-beneficiaries/owners to start energy transition.
WP5	IZNAB will contribute in: validation co-design approach and method; validate ICT management and control tool implemented; validate technologies implemented; validate building technologies and materials implemented (all validation activities at building level and at district level)
WP6	Leading this work-package, IZNAB will define of appropriate measures and methodologies for managing exploitation of project results, including management of IPR, definition and yearly update of an Exploitation and IPR Protection Plan; develop and exploitation plan, achieving the necessary studies so as to prepare the grounding for early use and



exploitation of the developed solutions just after completion of the project; develop an Business plan, performing market research analysis.

WP7 IZNAB will guarantee the dissemination of results through a systemic approach.

- **"TRASMIT4EPB"** - the project has the aim to improve the traditional ventilated façades through the use of innovative materials in order to obtain considerable energy savings that will lead buildings to become NZEB. To improve the energy performance of the façade, innovative materials, such as the phase change materials (PCM) and the porous media, will be studied for the construction of the device in order to assess what is the one that facilitates the flow and allows obtaining the optimal speed inside the cavity. The modelling of façade will be done through the use of Computational Fluid Dynamics software (CFD). The project idea aims to demonstrate the improvement of the energy performances in a building using innovative materials. The target of the project is to demonstrate that it is possible to obtain energy saving of about 85% compared to a traditional solution. It will be demonstrated through the realization of real pilots. The innovative materials will be tested in laboratory and all energy parameters will be verified. The entire demo building energy parameters will be monitored during the test period to achieve the optimal configuration. The optimal solution will be modelled by means of a numerical solution to verify energy saving and it will be modelled in terms of district too. Another objective of the project is to give a complete framework at the issue from the technical, environmental and economic point of view in order to assess and understand environmental and energetic gains and economic feasibility of the ventilated façade in the target countries. To achieve these goals, the project includes LCA/LCC study. The performances of the innovative technology will be verified also through technology verification schemes such as the ETV pilot programme.

Main roles attributed to IZNAB

WP2 IZNAB will support: identify and choose the most suitable, cost-effective and performing materials PCMs and Metallic foams based; characterise these materials and solutions with ad hoc experimental test campaigns towards the system engineering; obtain reliable, accurate and representative experimental outputs in order to implement them as input for modelling phase, and to set the basis for the set-up and the industrial production of the innovative façade system; improve step-by-step, optimize and finalize the system as a whole during the project duration taking into account the Modelling outputs and the different climate conditions.

WP3 IZNAB will contribute in: model, calibrate and evaluate the different configurations solutions in different countries, including the integration of PV systems. A cost-optimal approach will be followed in order to classify and prioritize the combination of solutions which can be applied at each European country.

WP4 IZNAB will participate in: implement the control and automation system. All applicable local and national norms will be observed and the resulting system functionality will be devised.

WP5 IZNAB will support verification and validation the different project developments through a progressive demonstration, by: proposed of the project methodology and approach; cost-efficiency and disruption level of the construction processes; LCC cost models; adaptation and implementation of the monitoring plan; achieved improvements in the pilot buildings indoor environment and energy demand reduction; solid and long term continued operation; end user acceptability.

WP6 IZNAB will analyse the cost of the whole production-to-disposal chain for TRASMIT4EPB system, using for it most of the inputs obtained in the previous task for the LCA. As a result, a complete LCC will be also addressed. The potential environmental impacts of the façade system solution in each demo-sites will be analysed as well.

WP7 IZNAB will participate in demonstration of market availability and feasibility of TRASMIT4EPB solutions by addressing changes and costs of the industrial production line



and exploitation of results. It will be setting exploitation and financial plans to guarantee full market uptake through smart specialization strategies & others financing sources.

WP8 Leading this work-package, IZNAB will: inform about and to promote and communicate project activities and results to identified target groups; generate and raise interest of stakeholders beyond the consortium structure; support internal communication and project management.

• **"WHITE-IS"** - This project focuses on the development of an integrated modular system for the recovery, storage and conversion of waste heat to be implemented in a large industry manufacturing copper from scrap, which could be the start of a modular technology that could accommodate any type of manufacturing industry with waste heat streams with similar characteristics such as cooling systems or furnaces used in copper wire manufacturing. The WHITE-IS project will develop and demonstrate cost-effective, resource and energy efficient and environmental-safe solutions for recovering industrial waste heat from different sources and/or processes, and storing and/or producing electricity with a modular system, designed to be integrated in a manufacture company and transferable to other industries with similar processes and/or waste heat stream characteristics. The expected outcomes of the project are: • A cost-effective system to store industrial waste heat in the form of thermal energy. • A cost-effective system to convert waste heat streams into electrical energy. • New processes for upgrading waste heat streams at higher temperature levels. • An integrated modular system to recover at least 25% of waste heat generated at industrial facilities.

Main roles attributed to IZNAB

WP2	IZNAB will establish a system requirements, in order to fit the main characteristics of heat flows generated by industries and working conditions for the different approaches to capture, store and use the generated thermal energy.
WP3	IZNAB will select the more suitable systems for thermal energy capturing from waste heat as a function of heat flow characteristics.
WP4	IZNAB will select the more suitable systems for thermal energy storing from waste heat as a function of the heat flow characteristics, focused on develop a modular solution for highly efficient storing waste heat based on cold and heat storage; carry out process optimization of the integrated solution according to the waste heat grade and flow identified.
WP5	IZNAB will select the more suitable system for thermal energy conversion into electricity, taking into account the waste heat flow characteristics.
WP6	IZNAB will develop and implement ICT and control systems needed to manage the heat storage and electrical power generation from the wasted heat; apply the different new technologies for developing a friendly user interface for remote control and remote management of the control electronics.
WP7	IZNAB will analyse of the user requirements and of the technical parameters of the proposed technologies for the demonstrator.
WP8	IZNAB will perform an environmental and economic sustainability assessment of the integrated system through life cycle and cost analysis (LCA/LCC).
WP9	IZNAB will participate in: detail the exploitable results of the project and develop exploitation strategies for each of them; test and validate the value proposition developed for the exploitable results, paving the way to a final exploitation plan aiming for market take-up; design and execute high quality communication material and activities from the start of the project; disseminate project results to relevant stakeholders in industry, academia and policy making circles.



- **"SPInES"** - The performance of buildings depend on a number of factors such as the performance of the installed heating system and building envelope, climatic conditions, behaviour characteristics, and social conditions. Data on typical heating consumption levels of the existing stock by age shows that the largest energy saving potential is associated with the older building stock. Due to the long renovation cycles of buildings (around 20 years for heating, ventilation and air-conditioning systems), these groups of building represent 11 billions m² of useful floor space with an age between 25-50 years. These houses will require a full rehabilitation within the next years. To carry out energy efficient building retrofitting, new affordable breakthrough technologies and solutions at building and district scale are needed. SPInES proposes a technical development for the market for energy-efficient, clean and affordable buildings based on a compact solar assisted thermal storage system with high temperature (40-70°C) and low temperature storage materials (5-20°C) that allow operating effectively with any type of air source heat pump. Therefore the following technologies and systems will be studied and improved within SPInES: • Low temperature thermochemical store • High temperature PCM Storage energy modulation • Smart control systems • Use of testing facilities to assembly the new concepts from SPInES with heat pump cycles SPInES is a project focussing in providing advanced thermal energy storage solutions with long term performance during multi-cyclic seasonal use, aiming at a minimum of 20 years performance. In SPInES it is also taken into account the limited space in single buildings from existing housing stock, and this is why the volume per dwelling will not exceed 2.5 m³. SPInES main objective aims to reduce the net energy consumption of a building by at least 15% and having a return on investment period below 10 years.

Main roles attributed to IZNAB

WP2	IZNAB will: define of boundary conditions and targeted in- and output attributes for the main functional components; definition of functional requirements for the heat storage system; definition of customer requirements and application descriptions, including system costs; definition of system design including a description of all main functional components; definition of building integration requirements.
WP3	IZNAB will support both low and high temperature thermal storage modules building, which will be integrated and evaluated.
WP4	IZNAB will participate in the system integration and development in real scenarios, including the ICT based advanced energy management system.
WP5	IZNAB will assess individual component performance and complete overall systems performance under laboratory conditions that not only mimic those of the chosen test sites but also are capable of underpinning modelling results to ensure an understanding of the broader European deployment.
WP6	IZNAB will demonstrate and validate the performance of the thermal storage system for building applications
WP7	IZNAB will support business approach, potential market and dissemination activities, by: optimize the value of project results and enhance the respective impact, comprising activities relating to the demonstration and dissemination of the project results; demonstrate the profitable of the SPInES solution investment (Business Plan); facilitate links and networking between partners and external stakeholders, projects and networks, comprising all issues related to external knowledge exchange and PPP partnership and building a new market of innovative start-ups; support the duplication, extension and exploitation of SPInES.

- **"SYMBIOSIS"** - project overall objective is to brings together the integrated management of wastewater, sewage sludge and food waste, into the Wet Biodegradable Waste (WBW) category, which nowadays represents a significant large portion of waste produced across EU: in 2010 4.600 million m³/year of wastewater was collected, while 46,3 million tons/year of sewage sludge and 62,1 million tons of food waste were produced. Although the EU Landfill Directive discourages their



landfill, in Europe about 14,8 million tons of food waste and 6,5 million tons of sewage sludge were landfilled in 2010. SYMBIOSIS innovation potential will readdress a large amount of recoverable resources from landfill to market. SYMBIOSIS solutions will gain in productivity for waste treatment plants and will demonstrate a novel highly replicable WBW Management System, in which separate industries act collectively to obtain a mutual competitive advantage exchanging materials and energy. SYMBIOSIS will achieve the industrial symbiosis through the realization of a large-scale DEMO eco-industrial park integrating two different actions: 1) Waste streams integration increases WBW recycling amount due to collected material merging and higher valuables concentration; 2) the use of wasted thermal energy increases WBW energy recovery efficiency. SYMBIOSIS will contribute to readdress the current destination of WBW into high value feedstock for industrial end-users, with a concomitant water and energy recovery, thus completely avoiding WBW landfilling starting from 2030 and considerable decreasing the use of primary resources (i.e.phosphorus). All these aspects will have relevant impact in terms of WBW landfill diverting, primary resources saving and greenhouse gas emissions reduction, coherently with the SPIRE PPP Roadmap and VOICES project.

Main roles attributed to IZNAB

WP2	IZNAB will participate in: implementation and evaluation of novel technologies according to Industrial Emissions Directive (IED) and according to Environmental Technology Verification (ETV) pilot programme; contribute to WBW legislative framework simplification and implementation; develop tools for measuring and increasing citizens awareness about WBW management; develop guidance and DSS for SMSs implementation.
WP4	IZNAB will demonstrate food waste positive impact on wastewater treatment plant efficiency; design of optimal treatment model(s) for wastewater treatment.
WP6	IZNAB will validate innovative technologies for phosphorous and nitrogen recovery from wastewater; identify industrial applications for recovered phosphorous, nitrogen and mineral matter.
WP8	IZNAB will validate the business model for WBW management at a large/small scale based on an LCA perspective; redesign of the eco-industrial park optimized for large-scale WBW management system.
WP9	IZNAB will participate in: ensuring that the project objectives, activities and the most promising and innovative results are successfully transferred to end users and reach a wider audience or are considered for further exploitation; facilitating collaboration and information exchange with the relevant stakeholders; ensuring that a robust knowledge and innovation management plan is in place, including the data management; developing a robust exploitation plan and business plan for project outcomes, including market analyses in preparation for post-project exploitation of the results: implementation of the knowledge sharing and training activities in order to promote the Science and Policy interface and therefore transfer the knowledge generated by the project to the industry, local authorities and policy makers in different regions across Europe.