



## EUWaste

### Ecological Utilization of Waste (Phase 2)

SMEInst-11-2016-2017: “Boosting the potential of small businesses in the areas of climate action, environment, resource efficiency and raw materials”

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#### Table of Contents

<b>TABLE OF CONTENTS</b> .....	<b>1</b>
<b>1. EXCELLENCE</b> .....	<b>2</b>
<b>2. IMPACT</b> .....	<b>2</b>
<b>3. IMPLEMENTATION</b> .....	<b>9</b>

## 1. Excellence

### 1.1 OBJECTIVES

#### Our company and Objectives

Utilization of health-care waste, both hazardous and non-hazardous, is still a worldwide challenge. An average amount of hazardous waste generated per patient per day<sup>1</sup> goes up to 0.5 kg. As of 2016, hospitals generate about 3 450 000 tonnes of hazardous waste annually<sup>2</sup>. At the EU level, total amount of health-care waste is estimated at about 2.5 million tonnes per year with about 20% of the total or 500,000 tonnes being considered hazardous healthcare waste.<sup>3</sup>

After the adoption of Landfill Directive and Waste Incineration Directive<sup>4</sup>, different types of hazardous waste were banned from landfill and special requirements for waste incineration were introduced, which, in turn, have significantly raised disposal costs of hazardous waste. For instance, price ranges for hospitals' medical waste disposal vary from 450 to 1000 euros<sup>5</sup> per tonne of medical waste, depending on the type of waste and country.

“Institute of Human Ecology-INECO” (INECO) founded in 1996 has been involved in the development of new technologies that help solving environmental problems and forecasting of emergencies of natural and synthetic nature accidents. **INECO has developed an innovative complex for safe disposal of medical waste (medical, hazardous and toxic) – MedWaste Pro gasifier. MedWaste Pro treats any medical hazardous waste** with very low energy consumption and low maintenance costs, which makes it **economically feasible for various types of healthcare institution**, including ones in remote regions. INECO has demonstrational working prototype in its current facilities, which attracts attention of the potential clients from numerous markets. However, in order to commercialize *MedWaste Pro* the demonstrating of its reliability to investors and end-users through piloting with end-user and making the final design of the product based on the feedback from the users is needed.

**The main objectives of Ecological Utilization of Waste (Phase 2) projects are:**

- Advanced prototyping and design of the final *MedWaste Pro* gasifier, which will be fully ready for market entry
- Demonstration activities to prove technical and financial feasibility of the *MedWaste Pro* gasifier through the piloting with end-user
- Update of *MedWaste Pro* commercialization strategy and increase of investment attraction readiness;

To reach the objectives, the following sub-objectives identified:

- Advanced prototyping of *MedWaste Pro* gasifier by incorporating advanced technologies such as the Nano-Carbonic Filter that will permit elimination of harmful emissions and remote management system.
- Testing and certification of *MedWaste Pro* in the EU and Associated Countries.
- Validation of the production process and its readiness, as well as installation and maintenance.
- Implementation of Partner Strategy by build a network and develop collaboration with installers, distributors and end users.

#### Addressing EU-wide and Global Challenges

Utilization of health-care waste, both hazardous and non-hazardous, is still a challenge in Europe<sup>6</sup>. Improper healthcare waste management proves to be harmful to the environment. It is not only a threat to the employees working in the hospitals, but also endanger environment and therefore all living people. All individuals exposed to hazardous health-care waste are potentially at risk, including those within health-care establishments that generate hazardous waste, and those outside these sources who either handle such waste or are exposed to because of careless waste management. According to the [Guidance on Health-Care Waste Management](#), possible hazards from healthcare waste are the following:

- **Physical Hazards:** E.g. physical injuries from waste collection and handling, etc.
- **Chemical Hazards:** Hazardous chemical and pharmaceutical products that may be found in small quantities in health care waste may cause intoxication and injuries, including burns.
- **Biological Hazards:** Infectious waste may contain variety of pathogenic microorganisms. According to the official data from WHO, 25 million people have been infected with hepatitis viruses C and 260.000 with HIV, because of the inappropriate management of health-care waste.
- **Environmental Hazards:** Apart from the risk to the patients and health care personnel, medical waste not treated properly can negatively affect public and environment. Thus, there is a large need for cost-effective utilization solutions that minimize the mentioned risks.

<sup>1</sup> <http://www.who.int/mediacentre/factsheets/fs253/en/>

<sup>2</sup> <http://data.worldbank.org/indicator/SH.MED.BEDS.ZS>

<sup>3</sup> [http://ec.europa.eu/eurostat/statistics-explained/index.php/Healthcare\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Healthcare_statistics)

<sup>4</sup> [http://ec.europa.eu/environment/waste/landfill\\_index.htm](http://ec.europa.eu/environment/waste/landfill_index.htm)

<sup>5</sup> [http://www.s-ge.com/sites/default/files/private\\_files/BBK\\_Waste\\_management\\_report\\_Turkey\\_0.pdf](http://www.s-ge.com/sites/default/files/private_files/BBK_Waste_management_report_Turkey_0.pdf)

<sup>6</sup> [https://www.researchgate.net/publication/278357206\\_Healthcare\\_waste\\_management\\_in\\_the\\_UK\\_The\\_challenges\\_facing\\_healthcare\\_waste\\_producers\\_in\\_light\\_of\\_changes\\_in\\_legislation\\_and\\_increased\\_pressures\\_to\\_manage\\_waste\\_more\\_efficiently](https://www.researchgate.net/publication/278357206_Healthcare_waste_management_in_the_UK_The_challenges_facing_healthcare_waste_producers_in_light_of_changes_in_legislation_and_increased_pressures_to_manage_waste_more_efficiently)

# MedWaste Pro gasifier

## Innovation

Ground breaking technology of steam, ozone, oxygen thermolysis of organic materials with a moisture content up to 75%, which allow to dispose practically any type of medical or hazardous waste.



### Easy to use

Gasifier is installed in client's premises, takes little space and is user friendly



### Environmental impact and safety



No harmful emission  
No contaminations risks  
Produces energy



### Breaking the chain

Eliminates the expensive chain of waste collection and utilization



### Significant savings



Little initial investment  
Small costs of waste disposal  
Saving logistics costs

### Efficiency



Residues waste volume and weight to 5%  
Produces Syngas with higher calorific value

## Target user groups

Four customer segment was defined. First two was chosen as potential.



Mid-size and large hospitals



Waste management service providers



Pharmaceutical



Clinical laboratories

## Potential on the market

MedWaste Pro is the solution with clear value proposition for healthcare sector and guaranteed place on the market

2022

Amount of medical waste	3,9 bn tonnes
Medical waste management market value	3,5 bn EUR
MedWaste PRO sales	29 units
Revenue	7,25 m EUR

The lack of appropriate waste management services combining high prices for waste utilization, as well as raising expenditures in healthcare system create significant demand for innovative solutions for healthcare waste management.

Due to the high competition on waste management operators market, operators are highly exposed to implementation of innovation solutions to increase their competitiveness.

## Foreseen development

INECO was awarded SME Instrument Phase 1 funding and raised 400k EUR from private sources and secured 450k from investors for further development. The next step for successful commercialization is the SME Instrument Phase 2: modernization of gasifier, piloting the technology and breaking barriers to enter the market (certifications, regulations, IPR)

### Technical / Development

1. Nano-carbonic filters
2. Online monitoring and remote diagnostic system
3. Modernizations based on piloting users feedback

### SME Instrument Phase 2 goals

### Commercial

1. Production of the initial batch of Med Waste Pro gasifiers for piloting and validation
2. Increasing attraction readiness
3. Market entry

**MedWaste Pro gasifier is addressing issue of drastically high price for disposal of the medical and hazardous waste for healthcare institutions worldwide.** Medical and especially hazardous waste management for healthcare institutions is very expensive and limited in options. Usually healthcare institutions sign contracts with municipal or other local waste management service companies that provide the whole cycle of the medical waste disposal: collection, transportation, separation and disposal. Due to long and complicate process, including processing of the hazardous and dangerous waste,

final price for medical waste disposal for healthcare institutions is pretty high and in some regions could reach 1000 euros per tonne<sup>7</sup>. INECO's technology offers end-users an affordable solution to reduce the costs of medical waste disposal without removing the waste from the territory of the healthcare institutions and therefore minimize the risks related to collection, transportation and disposal of the hazardous waste.

**Economic problem to be addressed:** there is a demand for *MedWaste Pro gasifier* as it is an economically feasible hazardous waste disposal solution that can be used inside of the healthcare institutions and therefore reduce the expenditures related to waste management process (collecting, transportation, processing, recycling, disposal). During the process of collecting, transportation, processing, recycling and disposal services price increases from stage to stage, becoming extremely high for the healthcare institutions as end-users.

**Environmental and healthcare opportunity:** the opportunity for INECO is to offer to end-users more secure solution for medical waste disposal. According to WHO, millions of people have been infected with different infectious diseases because of the inappropriate management of health-care waste. A big part of these infections was caused by longer than allowed process of disposal and failure to comply with established norms at certain stages of destruction. *MedWaste Pro* can ensure the disposal of all medical waste on site of healthcare institutions and therefore avoid any risks of spread of infectious waste during the collecting or especially transporting process.

**The main opportunity for INECO is to use the *MedWaste Pro* gasifier as the first step to build a global company reputation enabling the future introduction of successful new innovative solutions for waste disposal in order to contribute to the global efforts in reducing the infection rate.** Successfully establishing and scaling *MedWaste Pro* gasifier business will allow INECO to develop and launch new waste disposal products, create revenue streams to finance further activities, create good global reputation for INECO as an established and reliable company.

*MedWaste Pro* is high quality gasifier that uses oxidative thermolysis for effective full gasification of all organic feedstock elements. The gasifier produces minimal tar or toxic substances. Physical footprint of *MedWaste Pro* gasifier is several times smaller than of conventional gasifier. Conducting steam gasification process at a temperature over 1300 °C allows to avoid the synthesis gas liquids (resins) which are formed in large amounts at lower temperatures, which eliminates the need of recycling. Also, the high temperature of the process allows to achieve the complete destruction of toxic and recalcitrant constituents of waste and, in the presence of chlorine-containing waste components, particularly to eliminate the synthesis of secondary toxic substances (dioxins).

#### **SME-Instrument Phase I Feasibility assessment**

INECO has implemented successful Phase I project in the period from March 1<sup>st</sup>, 2016 to August 31<sup>st</sup>, 2016. Feasibility study was carried out, resulting in:

- ✓ **Validation of market demand.** Turkish and Romanian markets were chosen for an in-depth analysis in order to conduct validation of market demand and based on potential for high price of medical waste services, as well as increasing number of healthcare institutions (including a big number of private healthcare institutions) and familiarity with markets. Taking into account large increase of healthcare institutions' number in last few years and very high (in some regions) price of the medical waste services, Turkish market was identified as ready for market introduction, with proven demand and a clear business case for *MedWaste Pro* as well as a short period for payback period for end-users. Additionally, we have identified two different types of market for which two different market entrance strategies should be applied: emerging markets – direct sales to end-users (healthcare institutions) and developed markets – sales to waste management services providers. Romania was validated as a very promising market due to very high prices for medical waste management services and small number of existing medical waste incinerators (after EU accession 270 out of 289 hospital incinerators were closed due to failure to comply with EU standards), thus, it was recognized as a secondary market for market penetration.
- ✓ **Identification of target groups' needs, requirements and expectations related to the product:** needs and expectations of 4 user groups were analysed in-depth based on the *MedWaste Pro* project's current developments, inquiries from potential customers and results of identified markets analysis: mid-size and large hospitals and ambulatory hospitals, pharmaceuticals producers and retailers, clinical and R&D laboratories, waste management companies.
- ✓ **Elaboration of the detailed business plan:** detailed business plan was prepared based on the results of market analysis and target groups analysis. It contains market entry strategies, IPR strategy, pricing strategy, financial model and preliminary list of targeted customers. Overall the SME-instrument Phase 1 has validated that there is a market demand, that the solution is commercially attractive for end-users, and that the medical waste gasifier technology is economically feasible to be introduced to the market and scaled. The business plan has validated that INECO has the knowledge, expertise, facilities and partners required for the practical implementation of the commercialization strategy. Before the SME-instrument phase 1 project, the technical feasibility of the gasification system has been validated, while Phase 2 project will include technical performance verification tests for validating and demonstrating the technical feasibility and reliability over time.

<sup>7</sup> <http://umaine.edu/wcs/files/2012/02/Least-Cost-Options-for-Biomedical-Waste-in-Maine-2002.pdf>

## 1.2 RELATIONSHIP TO THE WORK PROGRAMME

Our proposal relates to the dedicated SME Instrument Phase 2, Call Topic SMEInst-11-2016-2017: “Boosting the potential of small businesses in the areas of climate action, environment, resource efficiency and raw materials” and intends to help developing a smart economy at a European continent and abroad. The EUWaste project aligned with the Eco-innovation initiative, a part of the EU's [Entrepreneurship and Innovation Programme](#) (EIP) and focuses on reducing environmental impact and making better use of resources.

In the short run, proposed solution brings:

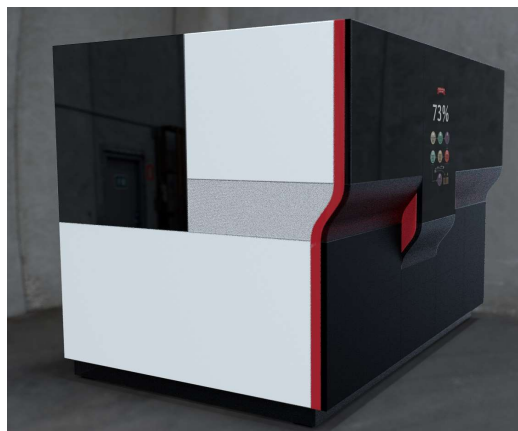
- Significant cost savings in waste utilization against the state of the art for waste treatment plants or alternative medical waste treatment methods;
- Reduction of greenhouse gas and other pollutants emissions.

In the long run, *MedWaste Pro* gasifiers developed by INECO can help European countries to solve existing problems related to hazardous waste.

## 1.3 CONCEPT AND METHODOLOGY

### a) Concept

#### Innovation description

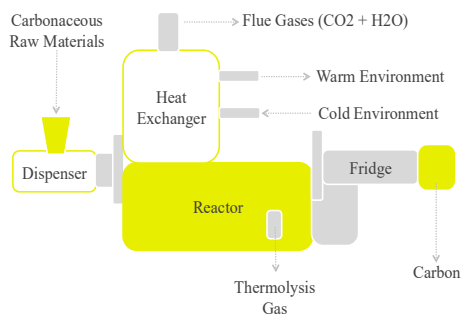


The Institute of Human Ecology-INECO has developed new and ground breaking gasifier technology for safe and efficient utilization of hazardous and other types of waste. In *MedWaste Pro* gasifier it is possible to achieve 1400°C. In such conditions, larger molecules are completely broken down into the components of synthesis gas, a fuel gas mixture consisting primarily of hydrogen, carbon monoxide, and very often some carbon dioxide, which can be cleaned and processed before any further use (electricity and/or heat production). Furthermore, the oxygen-deficient atmosphere in a gasifier does not provide the environment needed for hazardous dioxins and furans to form or reform. In its design INECO specialists have incorporated number of ways to improve the gasification probability of complex hydrocarbons. First, **hydrocarbons are looped several times through the reactor in order to increase the probability to gasify**

**these molecules.** Second, **low temperature plasma torches** were incorporated to reduce the size of the particles, thus increasing their reaction surfaces and hereby **optimizing the gasification potential.** Third, we create a **high-speed vortex in our reactor**, which has the effect of **increasing the gasification probability without increasing the size of the reactor chamber.**

#### Key innovation elements are:




- 1) An innovative method of steam, ozone, oxygen thermolysis of organic materials with a moisture content up to 75%, which allow to dispose practically any type of medical or hazardous waste.
- 2) *Inductive steam producer* design as opposed to other gasifiers' steam producers that are corrosion prone with possible system failure as a result. Induction is used during the start-up phase of the gasifier. Heat from the heat exchanger takes over steam production once the reactor is at operating temperature.
- 3) *Special refractory material* for the inner lining of the reactor that is moldable as well as extremely heat resistant (up to 1600 °C) allowing to us to reduce the construction costs of *MedWaste Pro gasifier*.
- 4) *Heat exchanger* that is able to withstand high temperatures during continuous operation without leakage.
- 5) *Automated control*, which allows to achieve the simplicity design objective: *MedWaste Pro* is a one-button device with a fully-automated, real-time microprocessor control system and requires only one staff member to operate. An elaborate software control system enables to continuously optimize the functioning of the gasifier, especially when using nonhomogeneous feedstock, which tends to create fluctuation conditions in the reactor.
- 6) *Bottom feeding* that allows us to eliminate the risk of explosion by separating feed location (at the bottom) and gas production (at the top – updraft) physically. In other gasifier systems this has sometimes resulted in an undesirable characteristic of increased tar formation, however, since we have a very compact reactor design in combination with all other design elements, we are able to avoid this tar formation in our system



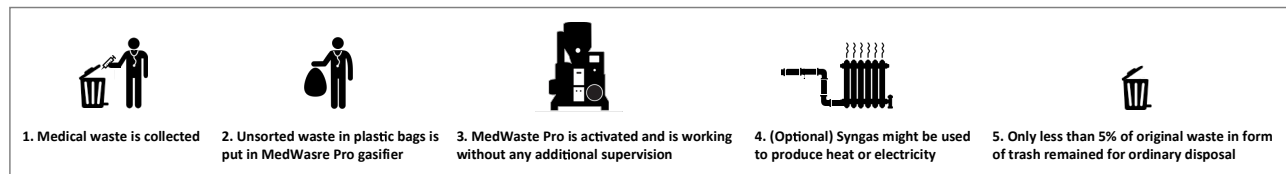
<sup>8</sup> “A smart economy minimizes the production of waste and reuses waste as a resource. Resource constraints and environmental pressures will accelerate the transformation from a linear extraction-use-throw away model of production and consumption to a circular one. Moving towards a near-zero waste society not only has an environmental rationale, it increasingly becomes a factor of competitiveness.” – European Commission, 2014

## Key advantages to the users

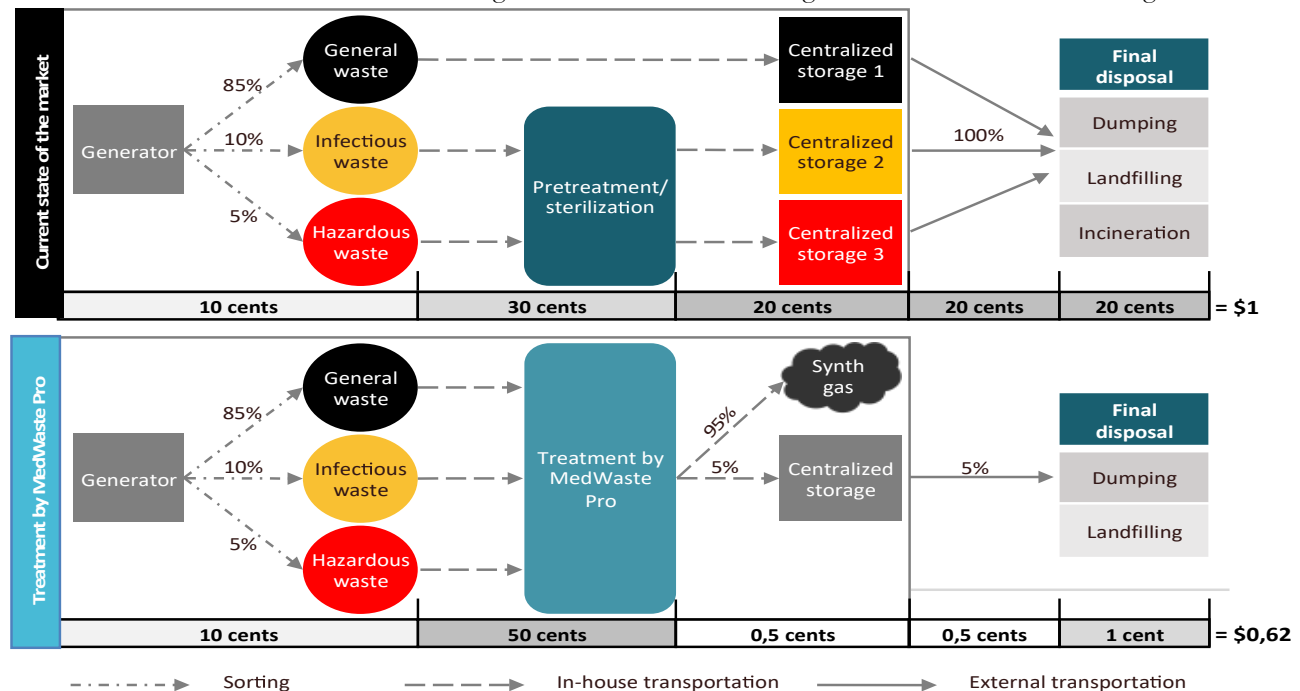
**MedWaste Pro** gasifier brings technical, economic and environmental benefits to its users:

 Technical benefit	 Economic benefit	 Environmental benefit
<ul style="list-style-type: none"> <li>□ Low soot and tar formation</li> <li>□ Utilization of high moisture waste up to 75%</li> <li>□ Ability to treat all types of healthcare waste</li> <li>□ Easy to use automated system with remote control and monitoring</li> </ul>	<ul style="list-style-type: none"> <li>□ Reduces cost of waste management due to reduction of transportation cost and preventing expenditures on sort and storage</li> <li>□ Low installation and operational costs</li> <li>□ Affordable price</li> </ul>	<ul style="list-style-type: none"> <li>□ Decreases harmful emission of hazardous waste</li> <li>□ Reduces energy expenditures related to sterilizing and transportation</li> <li>□ Prevents risk of contamination</li> </ul>

In addition, **MedWaste Pro** is easy to operate:



Furthermore, **MedWaste Pro** provides economic benefits that can be seen in the following picture that compare current health care waste management flow and waste management flow with **MedWaste Pro** gasifier.



## Environmental Safety

In case of incinerators and gasifiers we deal with three main types of exhaust gases: 1) Dioxins and Furans; 2) Nitrogen Oxides and 3) CO<sub>2</sub>. For work with dioxins and furans, we are creating a very hot combustion zone in the gasifier at a temperature above 1250 °C. Therefore, product gas also has a very high temperature of about 1250 °C. The output we pass the gas through a specially designed heat exchanger that is integrated into the gasifier. Gas temperature is reduced to about 100 °C, so formation of dioxins and furans is eliminated. Recovered heat from the gas in the gasifier is recycled, for example to produce steam in a specially designed steam generator. Effective reuse of heat improves efficiency of the gasifier system. Gasifier meets the requirements of the EU Directive on waste incineration.

## Demand for the product and value for money for users

SME-instrument phase I validated that there is a market demand for small-scale gasifier for medical waste (up to 250 kg/hour). Main reason behind high demand is solution's financial feasibility – **usage of MedWaste Pro is twice profitable than disposal with current methods** in Turkey and Romania, as well as in other emerging markets.

The financial model developed during SME-instrument phase I validates that **MedWaste Pro** provides end users or investors high return on investment with payback period of 5 years.

## Development of the technology

*MedWaste Pro* gasifier is a genuine INECO project, developed entirely by our company specialists. Over the last 7 years INECO has been developing utilization solutions and different prototypes have been build (4 using technology of pyrolysis and one prototype using plasma, and another - gasification). After testing and taking into account regulations, most promising technology has appeared to be the gasification technology. Waste management: collection (transportation and storage), processing and disposal of hazardous waste, including health care waste is under strict regulatory control at both EU and country level and currently is an expensive service for health care facilities.

Development of the initial general concept	Establishing the most promising technology for MedWaste complex	Construction of the pilot gasifier	Testing the prototype in real conditions	SME Instrument Phase 1: feasibility study
2002	2008	2012	2014	2016
Mr. Yuriy Zabulonov developed the initial concept of MedWaste Pro complex.	Four different technologies of pyrolysis, one prototype of complex that use plasma and one that use gasification were tested. After deep analysing of the results and taking in account regulation (EU and Ukrainian) gasification technology was established as most promising for MedWaste Pro.	Using the own sources of INECO, pilot gasifier was built. During the development of the prototype development, was taken in account all regulations related to medical waste disposal process, and therefore the prototype was developed especially for utilization of medical and hazardous waste.	Testing was done in Kyiv, Ukraine using the actual medical waste from hospitals in order to mimic the amount and substance of real conditions. The testing was carried out during 2 months period in order to check the stability of the solution, checking it under different conditions of use.	<ul style="list-style-type: none"> <li>✓ An in-depth analysis of Turkey, Romanian and Polish markets;</li> <li>✓ Analysis of target groups' (1. Hospitals, 2. Transfusion and transplant centers. 3. Medical waste management services providers);</li> <li>✓ Elaboration of detailed business plan.</li> </ul>

The gasifier technology development led INECO through different technological readiness levels (TRL). ***MedWaste Pro* is currently at TRL 7** (see Section 4-5 for more in-depth description of current stage of development and pictures of the current demonstration model). During EU Waste phase II project, the TRL will increase to level 9.

Period	Investment, EUR	Activities implemented	TRL
2008	50 000	Development of initial Concept	TRL 1-2
2009	150 000	Construction of early prototype	TRL 3
2010	35 000	Commissioning of early prototype	TRL 4
2012	60 000	Validation activities of early prototype in relevant environment (reshaping the conditions of health institutions)	TRL 5
2013	55 000	Demonstration activities of early prototype in relevant environment (reshaping the conditions of health institutions)	TRL 6
2014	50 000	Demonstration activities of prototype in relevant environment (reshaping the conditions of health institutions)	TRL 7

During EU Waste Phase II we intend to add to *MedWaste Pro* gasifier two important features: Nano-Carbonic filter and online monitoring and remote diagnostic and control system, and also to upgrade the whole gasifier to TRL 9.

## Business risks assessment

Business risks, associated with the development of *MedWaste Pro* gasifier business, are described below. For risks associated with implementation of **EUWaste** Phase II project, including technological risks foreseen in the project, see Section 3.

Business risk	Description	Probability	Impact	Mitigation measures
<b>Fragmented and highly regulated markets</b>	On a couple of markets additional licensees are required for waste treatment. In addition, healthcare waste merge might be prohibited.	Medium	Low	In the first phase only countries that did not require additional licenses will be selected. Later, special division of the company will work for obtaining all necessary documentation.
<b>Lack of production ability</b>	Main production process will be outsourced and will be provided by demand due to this fact there is a high risk of contractor's failure.	Medium	High	Development of tough contracts including penalties scheme. Diversification of production by increasing number of contracting organizations.
<b>Go-to-market challenges</b>	There is a lack of sales channels available for such kind of equipment. From another hand distributors of healthcare equipment might lack experience and service teams for such solutions.	Low	Medium	Conducting regular training and practical sessions. Preparation of documentary and marketing material. Development of the certification system for sales representatives and service engineers.

## b) Methodology

### Concept and activities to be implemented during the project

INECO project activities focus on few major aspects: piloting of the *MedWaste Pro* gasifier and commercialization of the *MedWaste Pro* gasifier. By piloting INECO will increase demand for the *MedWaste Pro* gasifier and will enable commercialization of *MedWaste Pro* gasifier through the B2B business model.

**Table 6. Methodology and approach to be undertaken:**

ACTIVITY	Description
Production of the initial batch of Med Waste Pro gasifiers for piloting and validation (WP2)	INECO will develop 4 piloting units of <i>MedWaste Pro</i> gasifier with various utilization capacity: 2x50kg/h, 100 kg/h and 250 kg/h. These units will be used for piloting and validation activities.
Piloting (WP3)	INECO will choose piloting sites in perspective markets and will pilot each unit in different operational situations.
Increasing investment attraction readiness (WP5)	For efficient commercialization of the <i>MedWaste Pro</i> gasifier IPR strategy will be updated. The commercialization Strategy Plan will be updated and also the Organizational Growth and Investment Strategy will be developed. In addition partnership network will be developed.
Marketing, Communication and Dissemination (WP6)	INECO will implement the marketing and communication plan, developed during the implementation of WP 5. Additionally demonstration activities will be organized for the main stakeholders for deeper impact. INECO team will participate in main worldwide Fair and Trade shows.

#### *EUWaste and overall plan to reach the market*

The activities of EUWaste project will help INECO on two major aspects: developing a fully functional modernized *MedWaste Pro* gasifier and demonstrating its' reliability to the potential customers, investors and partners. This will ensure successful initial commercialization of *MedWaste Pro* gasifier on Turkey and Poland markets and enable the company to expand globally.

#### *EU-wide and global challenges*

EUWaste project will help in development of a completely new gasification solution for medical waste utilization that allows utilizing hazardous medical waste and provides cost cutting opportunities for both waste generators and waste utilizers. In addition, the project will divert medical waste from landfills, thus increase the sustainability of waste management EU-wide, reduce safety and environment risks associated with utilization of hazardous medical waste and contribute to circular economy goals.

#### *Sex and gender issues*

EUWaste project does not imply any specific sex and gender issue and all activities in the project will provide equal opportunities of participation for both men and women. During the project execution, we will support the recruitment of qualified female personnel and continue this effort with the philosophy of INECO, which is committed to gender equality.

## 1.4. AMBITION

### Ambition and improvement potential

Our ambition is to decrease spending of healthcare institutions for medical waste management services by using *MedWaste Pro* gasifier innovation, and therefore encourage healthcare institutions to use safe and environmental friendly method of disposal for all type of medical waste. Another our ambition is to become leading provider of gasification solutions and to create a global company offering solution for medical and hazardous waste disposal of the highest possible quality and lowest possible price.

Novelty of *MedWaste Pro* is development and commercialization of a unique, modular based solution for disposal of hazardous waste with lowest expenditures in comparison with similar solutions, therefore no other solutions provide the same benefit and value proposition as *MedWaste Pro* gasifier. The innovative product aims to solve two problems addressed by INECO:

1. The company has ambition to contribute to price decrease of medical waste disposal services, and therefore contribute directly to medical security increase through penetration of this new method to highest possible number of healthcare institutions.
2. Large number of people is under the risk of infections (including Hepatitis and HIV) due to bad unsafe disposal method of medical waste. INECO aims to increase the quantity of medical waste disposed through safe method and therefore to reduce the risks of infections.



*MedWaste Pro* gasifier will allow end-users to dispose the medical waste on site. The INECO solution can also be used for disposal of different other types of hazardous waste, such as pesticides, herbicides, organic waste and unsorted municipal waste. Thus, the INECO solution, besides healthcare industry, can be used in agriculture and chemical industry.

Hazardous waste disposal through gasification method is a constantly evolving field with a wide array of competing solutions which differ in many factors: energy consumption; discharges into the atmosphere; maintenance costs, life period, personnel needed for maintenance, etc. However, compared to gasification technology developed by INECO, all the main waste disposal solutions have key disadvantages that are shown in the figure below:

Disposal method	Landfill	Sterilization and landfill	Incineration	Gasification system of other procedures
Features	<ul style="list-style-type: none"> <li>In isolated regions, mountains, islands is practically impossible to develop this kind of solution due to lack of free land</li> <li>Needs big number of involved personnel (collection, transportation, landfilling)</li> <li>Very high risk of infection of the environment and people</li> </ul>	<ul style="list-style-type: none"> <li>In isolated regions, mountains, islands is practically impossible to develop this kind of solution due to lack of free land</li> <li>Needs big number of involved personnel (collection, transportation, landfilling)</li> <li>Relatively high expenditures for development</li> </ul>	<ul style="list-style-type: none"> <li>Due to big size impossible to install inside of healthcare institutions</li> <li>High discharges into the atmosphere</li> <li>High maintenance costs</li> <li>Doesn't permit the disposal of waste with high moisture</li> <li>High energy consumption</li> </ul>	<ul style="list-style-type: none"> <li>High maintenance costs</li> <li>Big number of personnel for maintenance</li> <li>High energy consumption</li> <li>Not possible to re-use the eliminated gas for gasification process</li> </ul>
Price				
Environmental impact				

The INECO product and technology will be continually optimized to increase the „period of life” of the gasifier and reduce the price for maintenance activities. Also, we intend to develop and implement two new components of the system:

1. **New nano-carbonic filter** that will decrease drastically elimination in atmosphere of environmental dangerous elements.
2. **Online monitoring and remote diagnostic & control system**, that will permit waste management services provider to oversee activity of the managed gasifiers in different healthcare institutions from one central command center.

Additionally, INECO plans to optimize manufacturing process to reduce its' costs. The ambition of INECO is to develop and introduce to the market standardized and easy to scale gasification system able to dispose all types of medical waste (including ones with moister concentration bigger than 75%). This would enable end-users to use *MedWaste Pro* gasifier for all types of waste that they generate, and therefore achieve zero external costs of waste treatment.

## 2. IMPACT

### 2.1 EXPECTED IMPACTS

#### a) Market & Users

The medical waste management market segmented by services into collection, transportation, and storage, treatment and disposal, recycling, and other services. Among various services, the treatment and disposal segment to reach largest share of the market and expected to grow at the highest CAGR from 2015 to 2020. High growth in this segment attributed to the increasing number of initiatives taken by government and non-government organizations for appropriate disposal of medical waste.





Year	Ratio of hospital bed
2015	9,3
2020	12
CAGR	5,2%

The medical waste management market segmented by treatment type into incineration, autoclaving, chemical treatment, and other treatments. The incineration treatment segment is poised to be the fastest-growing segment during the forecast period. The medical waste management market segmented by treatment site into offsite and onsite treatment. Due to the lack of solutions for onsite treatment, the offsite segment still holding the largest share of the market. Based on geography, the global medical waste management market segmented into North America, Europe, Asia, and the Rest of the World (RoW). North America expected to keep leading position on the market during the forecast period.

#### Target Users

During implementation of SME-instrument phase I an overview of potential customers needs was conducted and 4 customers groups were formed based on projects current development, inquiries from potential customers and markets analysis. Deeper analyses show that first two segments (hospitals and service providers) have the most potential for

market entrance. Thus, these groups are the final customers of *MedWaste Pro* gasifier at target markets, where the company plans to continue implementing its current business model.

 <p>Mid-size and large hospitals</p>	<ul style="list-style-type: none"> <li>To reduce expenditures for the disposal of the medical and hazardous waste</li> <li>To simplify complex and complicate procedure of the collecting, preservation and transportation of the medical waste that generate risks of contamination of involved personnel or of the environment.</li> <li>To decrease number of the involved personnel responsible for collecting and preservation of the medical waste until the waste management services will come to take it off.</li> </ul>
 <p>Waste management service providers</p>	<ul style="list-style-type: none"> <li>To reduce costs for collecting and transportation of the waste from different point (healthcare institutions positioned in different part of the city, or even in different cities or regions).</li> <li>To moderate risks related to personnel that work directly with hazardous waste (including contagious).</li> <li>To moderate risks of contamination of the environment and related to this risk high expenditures paid as fines and reputation damage.</li> </ul>
 <p>Pharmaceutical</p>	<ul style="list-style-type: none"> <li>To reduce expenditures for the disposal of redundant active substances and expired product</li> </ul>
 <p>Clinical laboratories</p>	<ul style="list-style-type: none"> <li>To ensure on-site waste treatment.</li> <li>To moderate risks related to personnel that work directly with hazardous waste (including contagious).</li> <li>To moderate risks of contamination of the environment and related to this risk high expenditures paid as fines and reputation damage</li> </ul>

After winning SME Instrument Phase 1 INECO received numerous request form wide variety of potential clients for piloting MedWaste Pro. After deep analyses of requests, based on such criteria's as type and amount of generated waste, market potential, type of a client and their potential to purchase solution in the future, we have choose 5 potential piloting sites (quantity exceed planned to mitigate potential risk of piloting process).

Name of pilot site	Country	Description
<b>Burn center of Kyiv City Clinical Hospital No.2</b>	Ukraine	Provides highly specialized care to patients with thermal injuries, soft tissue defects of various sites, removal of defects after suffering burns and other injuries.
Dila	Ukraine	Medical laboratory which serves more than 600 thousand of patients annually and performs more than 2 million tests per year
<b>Rota Insaat Dekorasyon Sanayi Ve Ticaret Ltd St</b>	Turkey	General Contractor construction of the new clinic in the Ankara Kent Hospital.
Frogner kvantemedisin senter	Norway	Highly innovative diagnosis center.
<b>International Institute for Cryosurgery The Rudolfinerhaus</b>	Austria	World leading medical center of cancer treatment using cryosurgery.

#### **Environmental and social benefits**

Large number of people is under the risk of infections (including Hepatitis and HIV) due to unsafe disposal method of medical waste. According to WHO, millions of people were infected due to inappropriate management of health-care waste. A big part of these infections addresses to complicated multistage process of disposal and failures to comply with established norms at certain stages such a collecting, sorting and transportation. *MedWaste Pro* gasifier allows end-users to dispose the medical waste on site, where waste was generated *MedWaste Pro* can ensure the disposal of all medical waste inside of healthcare institutions and therefore avoid risks of spread of infectious waste during the collecting or especially transporting process. From another hand, proposed equipment opens opportunity for significant reduction of energy costs of healthcare waste treatment by absorbing energy generated during disposal. Tests shown that using waste with sufficient energy value of equipment allow achieving zero energy consumption and even synthesizing it. Another key benefit is prevention risks of contamination. Ash, final product of waste disposal, is inactive and does not interacts with the surroundings. Risks of air pollution also prevented by using Nano-Fiber filters. Advanced control system permanently monitors performance indicators and prevents the use of faulty equipment.

#### **Potential of the Medical Waste management market**

Potential of the Medical Waste Management Market evaluated based on the number of hospital beds (which exist now or is forecasted).

According to the World Health Organization at this moment an average number of hospital bed per 1000 people is 2.92, which means that about 21 m hospital bed currently exist worldwide. Moreover, according to the report of WHO an average hospital generates 1.5 kg/bed/day of waste on average, from which 0.5 kg/bed/day represents hazardous waste that should be disposed through thermal or disinfection methods.

Based on the information presented above total amount of hazardous medical waste generated worldwide annually is about 3.9 m tonnes. Based on the average price for destroying of 1 kg hazardous waste, which is \$0.15 per kg, the worldwide medical waste management market (only disposal) is about \$585 mln or 550 mln Euros. In addition to disposal expenditures, expenditures related to equipment acquisition and maintenance should be taken into consideration. Such expenditures are the most important. Thus, at least 10684 incinerators are needed for disposal of 3.9 m tonnes of hazardous medical waste or 10 684 000 kg per day. The price of one hospital incinerator with a capacity of 0.75 tonne/hour, operating on a continuous feed, could go from 0.5 to 1.0 million euros to implement. Air pollution control systems, if they are added to meet the standards, could cost another 0.5 to 1.0 million euros to implement. Incinerators, which operate on a batch basis, are typically dedicated to one hospital, as their capacity is limited to less than 1 tonne/day. Therefore, total market value of the medical waste management solutions is about 16 bn euro. But because the number of hospital is much higher than 10684, and usually incinerator doesn't work on full load, real number of incinerators needed

#### Medical Waste based on the number of hospital beds

Avg. № of hospital beds (per thsd. person)	2.92
Amount of hospital beds worldwide (mil.)	21
Avg. hospital waste generation (kg/bed/day)	1.5
Hazardous waste (kg/bed/day)	0.5

Market	Ratio of hospital bed	Generation of medical waste (kg/bed/day)	Price for utilization per kg (EUR)
North America	2.8	1.5	0.9
Europe	5.3	0.8	1
Asia Pacific	4.3	0.5	0.3

is higher and is about 50 000, which increase the value of the market at least by 5 times.

Due to different economic development level, the real market value and prices are different. Therefore the biggest and most expensive market is North American. There were 900 thousand hospital beds, which generated in average 1.5 hazardous waste per day or 492 750 tonnes per year (12% from the

worldwide) in the USA in 2014. Also due to high standards price for the disposal of 1 kg is higher than average per world and is about 1 \$ per kg or 0.9 euro. Therefore, total value of the medical waste management market (disposal only) is about 392 m Euros. It is less than in Europe, but due to very developed and expensive disposal technique and expensive filtrations systems, the real market value has increased 10 time, up to 3.2 bn euros.

At the same time Europe is a leader at the number of hospital beds per 1000 people – 5.3 or 4 770 000 hospitals beds. However, due to smaller quantity of generated medical waste – average 0.8 kg /bed/day the total market does not exceed US Market very much. The total market value exclusively for disposal of medical waste is about 1.39 bn euros. The total market value of medical waste management services increases up to 2.7 bn due to other expenditures related to acquisition of the incinerators and filtration system. Nevertheless, in comparison with the USA, European healthcare institutions prefer to outsource the medical waste management services, and therefore are less interested in acquisition of the incinerators for each healthcare institution.

The third market according to total market value is Asian-Pacific. Despite the highest number of population and good ratio of hospital bed per capita (4.3 per 1000 people), due to lower price for the disposal (0.3 euros per kg) and the smaller quantity of generated medical waste (0.5 kg/day/bed) the total market is smaller than European and American.

#### Main competitors

11 potential competitors for *MedWaste Pro* were identified and further analyzed in Phase 1 feasibility study. However, **most of those companies are working in different segments** – their solutions based on different technologies and are unable to treat chemical and genotoxic waste. This implies that competitors' solutions are mainly designed for treat only infectious waste, which does not exceed 15% of total healthcare waste. Furthermore, none of the competitors analyzed could offer solution for synth-gas production.

Taking that into account, several criteria were used to identify the actual competitors, including readiness for commercialization of system, same or similar level of waste amount reduction as *MedWaste Pro*. Out of the total potential list of competitors, 3 closest competitors were identified and analysed in-depth.

Company and Product	Website	Technology	Capacity	Max moisture	Hazardous feedstock			Waste residue	Subproduction	Price, Eur
					Infectious	Chemicals	Drugs			
Environmental Waste International, Canada, MD1000	ewi.ca	Depolymerization	50 kg/h	20%	+			100%		1820000
Vance IDS/Bio Arc, US	plasmaenergygroup.com	Plasma pyrolysis	102 kg/h	80%	+		+	10%	Heat	819000
METEKA GmbH, Austria	meteka.com	Sterilisation	10 kg/h	20%	+			100%		108895
INCINER8 International	inciner8.com	Air incinerator	60 kg/h	50%	+		+	3%		367000
INECO, Ukraine, MedWaste Pro	inecoinstitute.com	Thermolysis (gasification)	50 kg/h	75%	+	+	+	5%	Synth Gas (Heat+Electricity)	175000
			100 kg/h							300000
			200 kg/h							500000

<i>Market barriers:</i>	
Barrier	Mitigation measures
<b>Lack of credibility &amp; Market Acceptance</b>	One must have a good credibility in order commercialize a solution in healthcare industry. It can be acquired by demonstrating reliability of the solution; however, it makes entry extremely difficult, timely and costly for new entrants. During SME-instrument Phase II MedWaste Pro will demonstrate reliability during 8 months period in order to prove its reliability and build credibility.
<b>Strong legislation standards and requirements</b>	Healthcare industry as well a hazardous waste management industry extremely regulated. Measures to mitigate these barriers implemented at initial stages of developing MedWaste Pro to ensure its compliance in sense of environmental pollution, operation safety and continuous usage. During SME-instrument Phase II will be conducted additional stress tests to prove its compliance and obtained required certification.
<b>Technical capacity</b>	In order, for a competitor to enter this market, very strong technical and intellectual capacity required to create competing solutions. Many years of experience and already developed know-hows will restrict new-comers from replication of the MedWaste Pro solution as competitors would not only need to develop new customers but would also have to create their own network of suppliers and devote significant time and money resources to form own processes.

## b) Company

INECO founded in year 1996. Company founders have more than 20 years of experience and expertise in a comprehensive environmental radiation monitoring; development and creation of utilization solutions for safe disposal of organic (medical, municipal, and other toxic) waste; independent environmental impact assessment; and in development of diagnostic, rehabilitative medical systems. For these purposes, a number of unique innovation products have been developed, mass-produced and used in many CIS and European countries. (Please find the full list of projects, products and services in Section 4).

From the initial stage of company establishment, the firm has been extensively working in R&D related to utilization of hazardous waste. MedWaste PRO project is fully in line with firm's growth strategy and its plans to develop new products for waste utilization. More than 20 years of experience of the INECO's key personnel have led to knowledge of the whole construction process from A to Z (supply chain, knowledge of feedstock, in depth knowledge of the business, availability of financing, etc.). The company currently finalizing the most economically & technologically feasible product-market fit that will allow the company to meet client's needs with a well-established, superior product.

Therefore, **EUWaste Phase 2 project is strategic for the future business of INECO, as it will create the possibility to develop and create sources of revenues and profits that are viable in the long term.**

For a detailed description of technical, business, management expertise of the INECO team, its suppliers, partners and facilities, please see Section 4.

Even though the team has vast experience in both commercializing industrial solutions and developing businesses on global scale, additional coaching will be used in MedWaste Pro project. INECO identified key topics that they would like to receive mentorship and support from experienced business coaches:

- Support in business model implementation,
- Support in development of international investor and partnership networks.

### ***Financial forecast of the company and growth potential of the project***

Currently INECO plans to create revenue stream by selling its solutions. After successfully implementing SME phase II the company would increase its stream of revenue through demonstration and commercialization of MedWaste Pro. During SME phase I, an elaborate financial model was created to forecast financial results and the growth potential of the company. Due to successful implementation of SME phase II:

- The company will achieve revenue by 11.9 million € and profit by 1.9 million €;
- The company would directly employ additional 12 people up to 2021;

Year	2018	2019	2020	2021	2022	Total
<b>Selling solution stream revenue</b>		175	1 150	3 250	7 250	<b>11 825</b>
<b>Maintenance stream revenue</b>			4	23	65	<b>92</b>
<b>Costs</b>	1 200	800	1 050	2 250	4 650	<b>9 950</b>
<b>Total revenue</b>	0	175	1 154	3 273	7 315	<b>11 917</b>
<b>Total profit</b>	-1 200	-625	104	1 023	2 665	<b>1 967</b>

### **Overall financial forecast**

Forecasted that the profit of INECO will see a general trend of sustainable growth but will be negative for first two years, but in 2020 INECO expect to earn first profit and achieve breakeven point in 2022. The main profit driver

expected to be a sale of 48 gasifiers. However, we expect that by 2022 company's profit margin will increase significantly to 36.7%. This increase forecasted due to growth in sales and decreasing costs.

### Funding estimations

INECO has already invested about €0.6 million in MedWaste Pro. We have estimated that for the success of MedWaste Pro project a total investment of almost €1.48M which includes full budget for personnel, travel, equipment, materials, and subcontracting for testing, characterization and investment in commercial growth (as detailed in section 3). We estimate a post-project investment of 0.5-1 million euro to scale-up production site.

### Return on Investment

Based on a Phase 1 budget of €71 429 and a Phase 2 budget of €1.48M, our R.O.I.5years = (Profit – Investment Cost)/Investment Cost = 1.58. Therefore, after 5 years of MedWaste Pro sales, for each euro invested we will have generated €0.58 of added revenue.

## 2.2 MEASURES TO MAXIMISE IMPACT

a) SME-instrument Phase 1 project clearly have validated the market demand. The company have collected end user's feedbacks and planned to modernize MedWaste Pro in Phase 2 implementation to ensure it conformity to customer needs. Market research has identified that market conditions in Turkey, Romania and Poland are currently exceptionally favorable for INECO entry with its MedWaste Pro gasifier. The lack of appropriate waste management services (services provides by municipalities) in Turkey combining high prices for waste utilization, large amount of midsize and large hospitals, as well as relatively big investments in healthcare system create significant demand for innovative solutions for healthcare waste management. Similar conditions observed in Romania, which, despite the existence of private waste management service providers, was faced with waste utilization issues related to waste pre-treatment by sterilization using substandard liquids. Market conditions slightly differ in Poland, where primary market redistribution by private service providers is currently undergoing. It is evident that with such market conditions service providers are highly exposed to implementation of innovation solutions to increase their competitiveness.

### Stakeholders

To achieve the technical development and industrial scale-up and to ensure commercialization and implementation of MedWaste Pro after Phase 2, we have found specific stakeholder's profiles. The list of key stakeholders and their roles described below.

Stakeholder	Description
<b>Governmental and international institutions</b>	Institutions might be interested in INECO solutions in terms of developing and updating guidance, recommendations and regulations
<b>End users</b>	Companies and communities buying MedWaste Pro
<b>Investors</b>	Will influence on company strategy
<b>Academic institutions</b>	Acts in further product development and testing.

### Partners

The team established a network of international partners interested in further development and scale up of the Innovation and continued the work on research and production of INECO related products.

Partners category	Description
<b>Manufacturing</b>	INECO plan to rent production site, outsource minor technical tasks and procure parts for assembling from another companies. INECO already agreed cooperation with two leading medical equipment producers in Ukraine: Kiev Production Association "Medapparatura" and State Enterprise "Tehnokom"
<b>Promotion and business development</b>	To achieve current objectives INECO cooperates with NRG One LLC, who already acts as representatives at external markets and promote current solution worldwide. For additional promotion INECO will involve A7 Group.
<b>Consultants</b>	Will help to protect intellectual property, to meet legal requirements, update and implement commercialization strategy. INECO already works with Civitta, leading consulting company in Eastern Europe

<b>Testing and certifications</b>	INECO already establish cooperation with leading testing laboratories: TESKO and certification agent of Ministry of Economic Development of Ukraine state enterprise of Ministry of Economic Development of Ukraine “All-Ukrainian state research and production center for standardization, metrology, certification and consumers' rights protection”
<b>Advisors</b>	A numerous organizations intend to assist INECO in implementation of the project. We identify them as advisors, who possible bring their experience on way to achieve projected goals. There are such organizations as INDRA SCIENTIFIC, Norwegian-Israel Chamber of Commerce, Genesis Holdind AS, etc.

### Strategy plan for commercialization






During implementation of Phase I, we have noticed that markets roughly divided into two types: emerging and developed. Due to significant differences of these types, we have developed a specific business model for each type. Main criteria used to identify types listed below:

Criteria	Emerging markets	Developed markets
<b>Disposal method of hazardous waste</b>	Prevailing unsafe treatment: Dumping, Open-air burning, Landfill	Incineration, Controlled landfilling, Exporting
<b>Waste management operators</b>	Municipal services, polluters	Private service providers
<b>Expenditures on healthcare</b>	Over 5% of GDP	Less than 5% of GDP

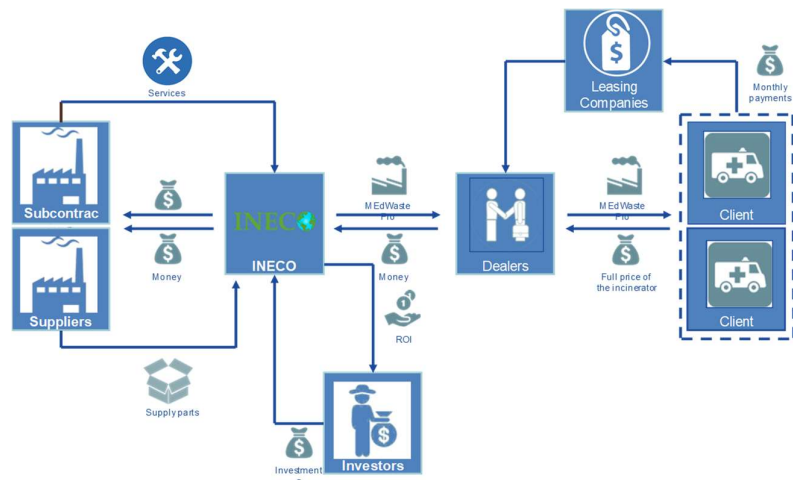
2 different business models will be used to achieve targeted revenue:

- Indirect sales and maintenance to hospitals – for emerging markets;
- Direct sales to waste management operators – for developed markets.

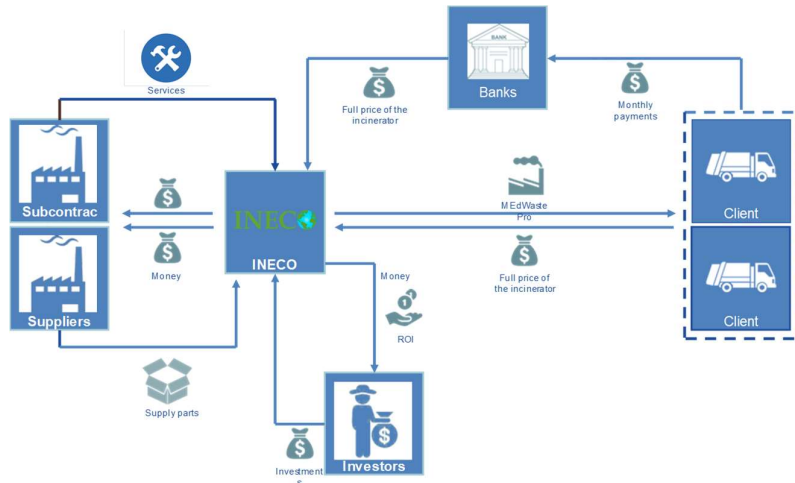
A detailed description of business model is provided in table below.

	Emerging	Developed
 <b>Customer Segments</b>	Mid-size and large hospitals	Waste management operators
 <b>Value Proposition</b>	Cutting-edge all-in-one equipment that will prevent harmful impact on the environment coupled with a reducing an waste management costs.	Reducing cost of transportation and storage
 <b>Sales channels</b>	B2B, indirect thru medical equipment and engineering systems distributors.	B2B, direct.
 <b>Revenue Streams</b>	Project revenue created by assets sales	Project revenue created by assets sales Recurrent revenue created by lending/leasing
 <b>Key Partners</b>	Service company Leasing companies Insurance companies Waste services providers	Leasing companies Insurance companies

In the business model for **emerging markets** main customers are healthcare facilities and municipalities (in most cases municipalities are responsible for a waste treatment). Based on existing data we can conclude that at this moment, in those target markets our main or early adopters of our system would be University clinics, which are the biggest one across private, and MoH hospitals. We assume that such kind of hospitals will be more inclined for investment in innovative equipment. Because mainly municipalities are responsible for waste disposal and a lot off low populated regions lack waste treatment



equipment and landfill sides we assume that such regions are highly motivate to adopt MedWaste Pro. Value proposition for customer on emerging markets is that our gasifier will reduce hospitals cost of waste disposal in two ways: lowering cost of treatment per kilogram and simplifying waste management process by shrinking operational cycle with collecting, pre-treatment, storage. All sales will be indirect thru medical equipment suppliers and distributors of engineering systems. Thus, the business model for emerging market graphically represented above.



We assume that on **developed markets** main customers will be private waste management operators. We assume that due to well-established waste management cycle healthcare facilities would not be interested in any changes of this cycle. From another hand private waste management companies might be interesting in reducing cost of waste treatment. For such markets our value proposition will be reducing storage and transportation costs by diversification of waste treatment sides. For such markets our value proposition will be reducing storage and transportation costs by diversification of waste treatment sides. All sales will be direct to waste management operators sides. For

such markets our value proposition will be reducing storage and transportation costs by diversification of waste treatment sides. All sales will be direct to waste management operators. Schematically it illustrated above.

INECO also consider a possibility to sell licence on equipment of even technology for distant markets (North America, Asia, Latin America) as well as potential of venture enterprise for building large scale gasifiers (plants) based on MedWaste technology.

### Manufacturing

Due to relatively small size of gasifier (fit to sea container) and risks related to IP protections INECO will assemble MedWaste PRO at their domestic country: Ukraine. To reduce costs related to downtime company will rent production site and will be subcontracting minor tasks, which are not related to know-hows. To ensure production capacity and manage risks associated with supply chain, it is very important to develop and maintain diversified network of suppliers. Company will rent production site and will be subcontracting minor tasks, which are not related to know-hows, to reduce costs related to downtime. INECO's many years of field experience allowed them to already build a network of different suppliers for the development of its solution. Also company plans to develop procurement procedures including quality testing to mitigate risk related to materials quality. For a detailed analysis of the supplier network, see Section 4

### Dissemination Strategy

Dissemination activities will address all potential end-users and stakeholders: hospitals and waste management operators, as well as all other decision makers related to healthcare waste management. Our strategy has a clear objective: to impact target end-users and let themselves to realize that *MedWaste Pro* perfectly fits their needs. At the initial stage our marketing activities will be focused on acquiring a maximum number of warm contacts with our end-users. After the first year of commercialization our marketing policy will be aimed at consolidating the image previously obtained at the start of the company during the first year. At this stage, apart from reinforcing our visits to private companies, we will be developing referrals network of government institutions and professional, involving them in the dissemination activities. Our presence at Events where users will be provided with information, and invitation to meet our pilot site, will make them experience the capabilities of *MedWaste Pro* first-hand.

### Freedom to Operate

An extensive patent landscape analysis was carried out during SME-instrument phase I to ensure that there are no known impediments to our development of this technology related to protection of intellectual property (IP). The main keywords: *gasifier, gasification, waste treatment* analysed through various online search services, such as:

- Google patents – <http://www.google.com>
- European Patent Officer (EPO) - <http://www.epo.org/>
- United States Patent and Trademark office (USPTO) - <https://www.uspto.gov/>
- Canadian Intellectual Property Office (CIPO) - <http://patents.ic.gc.ca/>
- Ukrainian Institute of Intellectual Property (UKRPATENT) - <http://base.ukrpatent.org/>
- The Eurasian Patent Organization (EAPO) - <http://www.eapatis.com/>
- State Intellectual Property Office of China (SIPO) - <http://english.sipo.gov.cn/>
- Japan Platform for Patent Information (PAJ) - <https://www.j-platpat.inpit.go.jp/>

- Free Patents Online (FPO) - <http://www.freepatentsonline.com/>
- World Intellectual Property Organization (WIPO) - <http://patentscope.wipo.int/>

Company	Country	Patent No.	Description
Shandong Shinva Medical Environmental Equipment CO LTD	CH	CN204026701 U	Medical waste incinerator, environmentally friendly, due to a grate structure.
Global Environmental Technologies, Llc	US	WO2003102470A2	A process for the pyrolysis of waste material produced;
Institute For Plasma Research	IND	WO2008136011 A1	A plasma pyrolysis device is provided for dispensing-off a variety of waste materials.
Ceramatec Inc	US	US8826834B2	A method and apparatus for incinerating a medical waste material.
OnSite Sterilization LLC	US	US8802023 B1	An apparatus for autoclaving of the medical waste

Despite the variety of results and processes, an in-depth analysis of these patents revealed that none of them covers areas of the *MedWaste Pro*. The conclusion of the analysis is that *MedWaste Pro* does not infringe existing patents held by other organizations. Therefore, the **freedom to operate for *MedWaste Pro* has been confirmed.**

### **IPR Strategy**

During SME-instrument phase I IPR strategy was drafted in full correspondence with INECO market entry strategy, competitive landscape and overall development objectives.

To ensure protection of INECO's IP at local (Ukraine) and international level INECO envision next steps:

- INECO will apply for two different patent types at a local level: for utility model and for invention. This is advantageous for the following reasons. Application for invention is under examination of Ukrpatent, and a decision on this application will be obtained within 18-24 months from the date of filing. The utility model application does not require the examination, and thus the patent on it might be obtained within 5-6 months from the filing date. Moreover, the deadline for receipt of a patent for utility model can be reduced to 2-2.5 months.
- INECO will apply for international patent in each country where we will intend to operate.
- INECO intellectual property includes registered rights on a trademark (*MedWaste Pro*®). In order to ensure protection of this IP, INECO is committed to ensure that the trademark does not become generic, as in that case the rights for it will be lost.

Also, as part of company's development in 2018- 2022 a series of measures is expected to be implemented that will ensure preservation of trade secrets in the enterprise and protection of intellectual property rights:

- Carry out regular monitoring of placement of publications and other materials about the new invention, before adoption of the further address the commercialization of such a decision.
- Make the appropriate patents on innovations in Ukraine and abroad
- Keep track of market innovations and patents, which are in the interests of the Institute.
- Conduct support patents and monitoring patents in patent databases, to prevent the risk of infringement of intellectual property rights, as well as for development of business strategy
- Restrict access to confidential information of the Institute and others.
- To ensure legal protection of intellectual property rights in the workplace and to prevent losses, through signing of confidentiality agreements when negotiating and sharing information with business partners in order to protect trade secrets.
- To ensure protection and security of classified information in both paper and electronic form (safe access passwords in IT systems, etc.)
- Determine the right of access to classified information in the enterprise.
- Divide the design and technological documentation for individual and independent blocks of information.

### **Regulations and Standards**

Regulatory and standard issues are critical components for the project, as healthcare waste management quality and safety requirements are very strict. Deep study was done in order to match those requirements established by current European and international regulatory frame. Main requirements to be fulfilled:

- **The Basel Convention**, a global agreement, ratified by 178 member countries to address the problems and challenges posed by hazardous waste.



- **The Stockholm Convention on Persistent Organic Pollutants**, a global treaty to protect human health and the environment from persistent organic pollutants (POPs).
- Waste Framework **Directive 2008/98/EC**
- Machinery **Directive 2006/42/EC**
- Risk assessment in the sense of **EN ISO 14121-1**
- Parts of control systems according to **EN ISO 13849-1, EN ISO 13849-2, EN 62061**

## Communication

We have included in Communication Strategy Plan of the MedWaste Pro project internal dissemination of the project results and development of communication tools to be used within the Dissemination activities. In this way, the Communication activities divided in two operational levels:

- **Internal level:** Dissemination of the results and advancements in the project between INECO participant employees, stakeholders, subcontractors and interested customers, is essential for communication flow and delivery of results in time and according to planned actions. We will use periodical meetings as main communication tools at this level. We will consider possibility of using activity reports to provide information on the project execution. Further information on this strategy has been described in Work Package 6.
- **External level:** Maximum publicity outside the project members is needed in order to create network of collaborative distributors and clients to ensure suitable commercialization for future expansion and potential penetration into new markets. We will take advantage of media resources to communicate at external level. Further information on this strategy has been described in Work Package 7.

### Media resources for communication:



**Website**, which will provide all information: activities, services, products, news, articles etc.



A **film** on the prototype, that could be used for initial dissemination activities in order to attract potential customers and stakeholders and could be published in YouTube



Publications in **specialized media**



**Mailings or newsletter** or current developments to be sent to customers, reporting new achievements, contracts, changes in the legislation, offers, promotions, agreements, certificates, etc.



Preparation of **leaflets, brochures** to be distributed in events as Fairs and other presentations

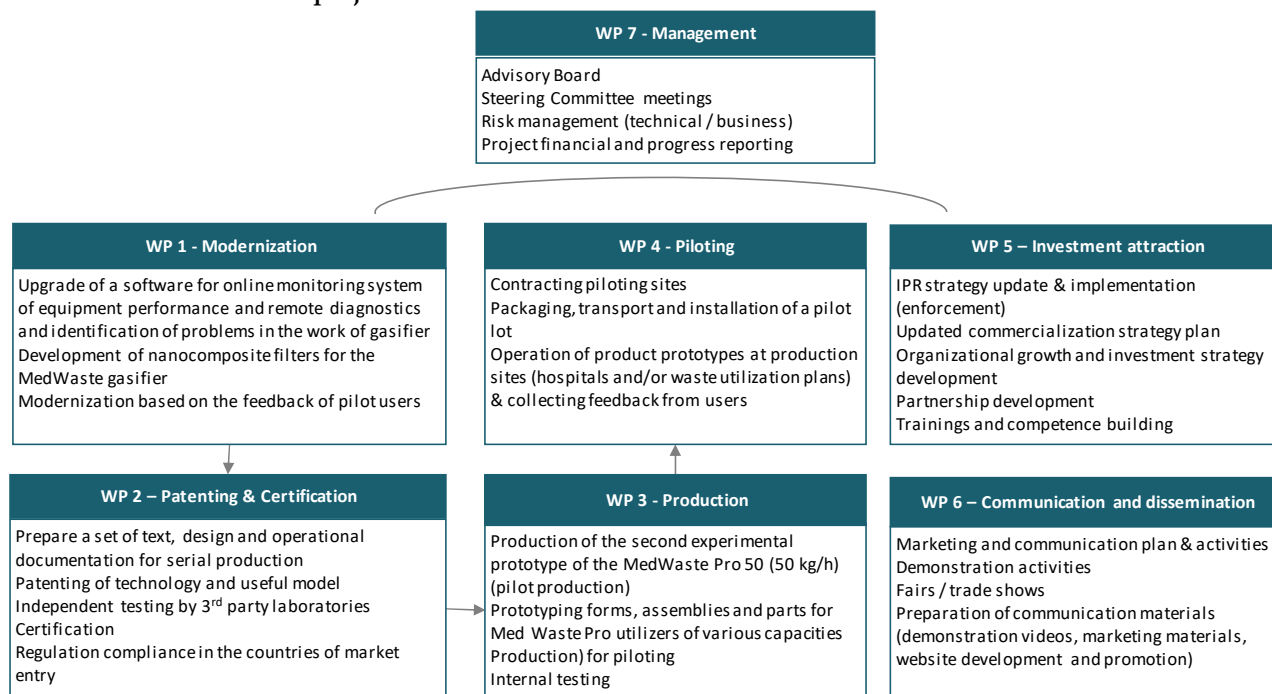
### 3. IMPLEMENTATION

#### 3.1 WORK PLAN – WORK PACKAGE AND DELIVERABLE

**Technical work packages: 1-2-3-4:** During the technical part of the project INECO aims to modernize *MedWaste Pro* gasifier with a new features in order to better satisfy pilot consumers needs, which have been already identified during Phase 1 (online monitoring and remote diagnostic system and nanocomposite filters) or will be identified during the project as a result of user feedback. INECO plans to produce piloting batch of *MedWaste Pro* gasifiers. The piloting batch will consist of 1 *MedWaste Pro 50* (50kg/h) gasifier to be used for independent testing, certification, demonstration at trade shows and fairs and constant on-site modernisation based on users feedback, other three *MedWaste Pro* gasifiers of different utilization capacities of 50kg/h, 100kg/h and 250kg/h, which will be used for **piloting** and **performance verification** at the sites of potential customers after receiving all necessary certifications. Finally, a **demonstration** will be conducted with the medical waste to show that *MedWaste Pro* gasifier can operate for >1000 hours utilizing the waste to satisfy the end-user and investor reliability requirement identified during Phase 1.

**Management and Commercial Work Packages 5, 6, 7.** The technical activities will be supported by the management structure that will oversee the quality, timely and on budget implementation of activities, ensure correct financial and technical administration as well as reporting related to it. Additionally, different supporting activities will be implemented to develop an updated commercialisation strategy, to prepare the organisation for growth and to increase the investment readiness of the organisation. Supportive marketing, communication and dissemination actions will be implemented to increase the reach of the demonstration activities and will contribute to increasing the market acceptance of the INECO's *MedWaste Pro* gasifier, facilitating the future market introduction and market uptake.

#### PERT Chart for EUWaste project



#### GANTT chart for EUWaste project

No	Description	Months																							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
<b>WP1</b>	<b>Modernization</b>																								
T1.1	1. Identification scope of modernisation			D1.1																					
T1.2	2. Upgrade of a software for online monitoring system of equipment performance and remote diagnostics					M1.1																			
T1.3	3. Design of nanocomposite filters for the MedWaste gasifier					M1.2																			
<b>WP2</b>	<b>Patenting, independent testing and certification</b>																								
T2.1	1. Prepare a set of text, design and operational documentation for serial production									D2.1															
T2.2	1. Patenting of technology and useful model																				D2.2				
T2.3	2. Independent testing by 3rd party laboratories										D2.3	M2.1													
T2.4	3. Certification																				D2.4				
<b>WP3</b>	<b>Prototyping initial batch of Med Waste Pro gasifiers for piloting and performance validation</b>																								
T3.1	1. Manufacturing second experimental prototype of the MedWaste Pro 50 (50 kg/h) (pilot production)									M3.1															
T3.2	2. Prototyping forms, assemblies and parts for Med Waste Pro utilizers of various capacities																								
T3.3	3. Production of Med Waste Pro 50 (50kg/h) for piloting										M3.2														
T3.4	4. Production of Med Waste Pro 100 (100 kg/h) for piloting													M3.3											
T3.5	5. Production of Med Waste Pro 250 (250 kg/ h) for piloting																				M2.4				
T3.6	6. Internal testing								D3.1	D3.1			D3.1								D3.1				
<b>WP4</b>	<b>Piloting</b>																								
T4.1	1. Contracting piloting sites																								
T4.2	2. Packaging, transport and installation of a pilot lot																								
T4.2	3. Operation of product prototypes at production sites (hospitals and/or waste utilization plans) & collecting																						M4.1		D4.1
<b>WP5</b>	<b>Increasing attraction readiness</b>																								
T5.1	1. IPR Strategy update & Implementation (enforcement)										D5.2														
T5.2	2. Updated Commercialisation Strategy Plan						D5.1																		
T5.3	3. Organisational Growth and Investment Strategy												D5.3												
T5.4	4. Partnership development																M5.1								
T5.5	5. Trainings and competence building																								
<b>WP6</b>	<b>Marketing, Communication and Dissemination</b>																								
T6.1	1. Marketing and Communication plan & activities					D6.1																			
T6.2	2. Demonstration Activities																	M6.1			M6.2			M6.3	
T6.3	3. Fairs/Trade Shows																								
T6.4	4. Demonstration videos, marketing materials and website development & promotion																								
<b>WP7</b>	<b>Management</b>	M7.1																							
T7.1	1. Advisory Board																								
T7.2	2. Steering Committee Meetings																								
T7.3	3. Risk management (technical / business)																								
T7.4	4. Project financial and progress reporting																								

Table 3.1 a: Work package description

<b>Work package number</b>	1	<b>Lead beneficiary</b>	INECO
<b>Work package title</b>	Modernization		
<b>Person/months per participant:</b>	24		
<b>Start month</b>	1	<b>End month</b>	24
<b>Objectives:</b> To modernize <i>MedWaste Pro</i> gasifier based on identified customers' needs and feedback from piloting users.			
<b>Description of work</b>			
<b>Task 1.1. Identification scope of modernization. (Month 1 – Month 3)</b>			
To develop <i>MedWaste Pro</i> gasifier that will provide the best user experience for its customers, tasks for modernization should be identified based on user feedback obtained during Phase 1 implementation. During this task users' needs (needs of hospitals and waste management companies), which have already been identified, such as online monitoring system and remote diagnostics will be further elaborated and formalized in terms of technical specifications.			
<b>Output: Scope identified. Tasks formalized. Task leader: Yuriy Zabulonov (Project Manager)</b>			
<b>Task 1.2. Upgrade of a software for online monitoring system of equipment performance and remote diagnostics and identification of problems in the work of gasifier (Month 2 – Month 6)</b>			
In order to provide better user experience and better satisfy the potential customers' needs identified during preparation of piloting during Phase 1 INECO intends to upgrade its control system into an adaptive emissions monitoring system in conjunction with the control system to enabling to control parameters of gasifier's performance. Software will be developed. In addition, the development of functional concepts and manufacture of microprocessor units and units that allow real-time change the parameters of the complex, depending on the results of monitoring will be conducted during this task. After manufacturing and commissioning of units and blocks and development of the software for the control system, testing, monitoring and performance verification of management and control system will be conducted.			

**Output: Upgraded software for system monitoring and remote diagnostics. Task leader: Volodymyr Burtniak (OS Development Expert)**

**Task 1.3. Development of nanocomposite filters for the *MedWaste Pro* gasifiers (Month 1 – Month 5)**

INECO has already used nanocomposite filters for other products and now want to incorporate this solution to *MedWaste Pro* gasifier. The task will start with the development of technical specifications, technical documentation and design documentation to be used by contractors. Then materials needed for manufacturing of nanocomposite filters such as nanodispersion fiber, nanodispersion silicon and polymer substrate will be designed and produced. Using the produced materials nano filters will be manufactured and assembled. Finally, nano filters will be tested and their performance will be verified to ensure the high quality of the final product.

**Output: Nanocomposite filters for the *MedWaste Pro* gasifiers are developed. Task leader: Viktor Korzun (Technical Development Director)**

**Milestones :**

**MS1.1 – Online monitoring and remote diagnostics system are developed.**

**MS1.2 – Nanocomposite filters for the *MedWaste Pro* gasifiers are developed.**

**Deliverables:**

**D1.1 List of identified pilot users’ needs (Month 3).**

Work package number	2	Lead beneficiary	INECO
Work package title	Patenting, independent testing and certification		
Person/months per participant:	23		
Start month	4	End month	20

**Objectives:** To prepare technical and design documentation of the gasification system, to apply for patents of technology and useful model, to conduct independent testing of the gasifier and to receive necessary certification.

**Description of work**

**Task 2.1. Prepare a set of text, design and operational documentation for serial production (Month 5 – Month 9)**

The next set of documentation will be prepared:

- Set of design documentation
- Technical documentation describing technological process of product manufacturing
- Set of operational documentation

**Output: Technical, design and operational documentation is prepared. Task leader: Yuriy Zabulonov (Project Manager)**

**Task 2.2. Patenting of technology and useful model (Month 6 – Month 20)**

During the SME-instrument Phase II project, the company will apply for patent(s) to national patent office, in order to build a stronger patent portfolio that would protect INECO IPR and prevent other organizations from filing for patents that would limit the freedom to operate for INECO. This will be implemented in 3 steps:

1. Application to national patent office in Ukraine
2. Obtaining patents in Ukraine
3. Further patents support.

**Output: Patent granted. Task leader: Lyudmila Odukalets (IPR and Regulatory Compliance Director)**

**Task 2.3. Independent testing by 3rd party laboratories (Month 8 – Month 10)**

Technical Development Director Viktor Korzun will be responsible for an independent testing in 3<sup>rd</sup> party laboratories. Product will be prepared for transportation to 3<sup>rd</sup> party laboratories in Ukraine. Service provider will test product on the impact of destabilizing factors in the package and out of package. Product will be dismantling on components and laboratory will analyze each part on the compliance with technical standards. Results and recommendations will be described in the technical report.

**Output: Results of independent testing received. Task leader: Viktor Korzun (Technical Development Director)**

**Task 2.4. Certification (Month 9-Month 11)**

During Phase 1 INECO has analyzed procedures, legislation and technical regulations for certification process. The company will prepare stand for equipment certification testing among with supporting documentation.

Applications and documents for certification will be submitted to the three accredited laboratories:

1. State Enterprise "Ukrainian State Research and Production Center of Standardization, Metrology, Certification and Consumer Protection" (SE "Ukrmetrteststandart").
2. Research Center of Preventive toxicology, food safety and chemical safety named after L.I.Medved, Ministry of Health.
3. O.M. Marzeiev Institute for Public Health (IPH), National Academy of Medical Sciences of Ukraine

**Output: *MedWaste Pro* gasifier is certified. Task leader: Lyudmila Odukalets (IPR and Regulatory Compliance Director)**

**Milestones :**

**MS2 – Results of independent testing received (Month 10)**

**Deliverables:**

**D2.1 Set of technical documentation prepared (Month 9).**

**D2.2 Granted patent (Month 20).**

**D2.3 Technical report of independent testing (Month 10)**

**D2.4 Certification report (Month 11)**

<b>Work package number</b>	3	<b>Lead beneficiary</b>	INECO
<b>Work package title</b>	Prototyping the initial batch of <i>Med Waste Pro</i> gasifiers for piloting and performance validation		
<b>Person/months per participant:</b>	60		
<b>Start month</b>	4	<b>End month</b>	16

**Objectives:** To produce and successfully test (internally) the initial batch of *Med Waste Pro* gasifiers of different utilization capacities:

- Experimental prototype of the *MedWaste Pro 50* (50 kg/h) for certification and modernization
- Prototype of *MedWaste Pro 50* (50 kg/h) for piloting
- Prototype of *MedWaste Pro 100* (100 kg/h) for piloting
- Prototype of *MedWaste Pro 250* (250 kg/h) for piloting

**Description of work**

**Task 3.1. Manufacturing of the second experimental prototype of the *MedWaste Pro 50* (50 kg/h) gasifier (pilot production) (Month 4-Month 7)**

Based on customers' needs that have been already identified during Phase 1 and the pilot consumers' needs identified during Task 1.1 INECO will develop the second experimental prototype of *MedWaste Pro* gasifier. The existing prototype of *MedWaste Pro* gasifier is too obsolete and has already been tested with different types of feedstock. Since there will be intensive internal and external testing during the project it is necessary to build second experimental prototype of the *MedWaste Pro 50* gasifier. The second *MedWaste Pro* gasifier will be upgraded with online monitoring and remote diagnostics system and will be improved based on intense testing of current prototype. INECO intends to use second experimental prototype of the *MedWaste Pro* gasifier for certification, external testing and further in-house performance validation as well as to exhibit it at the conferences and trade fairs.

**Output: Developed second prototype of the *MedWaste Pro 50* gasifier. Task leader: Yuriy Zabulonov (Project Manager)**

**Task 3.2. Prototyping of forms, assemblies and parts for *MedWaste Pro* utilizers of various capacities (Month 6 – Month 8)**

Based on developed technical assignment, design and technical documentation, 3D model of necessary prototyping of forms, assemblies and parts for gasifiers of various capacities will be developed. 3D model will be used for production of prototypes of required forms, components and parts needed for production of larger *MedWaste Pro* gasifiers (100kg/h and 250kg/h)

**Output: Developed prototypes of necessary forms, assemblies, components and parts. Task leader: Yuriy Zabulonov (Project Manager)**

**Task 3.3. Production of *MedWaste Pro 50* (50kg/h) gasifiers for piloting (Month 8-Month 9)**

Since the *MedWaste Pro* gasifier produced in task 2.1 will be sent for independent external testing and certification, another *MedWaste Pro 50* gasifier will be produced specifically for piloting and performance validation. Current production capacities of INECO allows to assemble two *MedWaste Pro 50* or *100* gasifiers at once within 2-3 months. During the **EUWaste** project gasifiers will be developed in consecutive order. New *MedWaste Pro 50* (50kg/h) gasifiers will be specifically designed for medical waste.

**Output: *MedWaste Pro 50* is produced. Task leader: Viktor Korzun (Technical Development Director)**

**Task 3.4. Production of *MedWaste Pro 100* (100 kg/h) for piloting (Month 10-Month 12)**

In order to validate performance of the gasifier with bigger utilization capacity and show reliability of the gasification system to potential customers (large hospitals or health institutions) *MedWaste Pro 100* (100kg/h) gasifier will be produced. The consecutive development and installation of gasifiers will enable to modernize each next version and correct all flaws identified during testing or piloting.

**Output: *MedWaste Pro 100* is produced. Task leader: Viktor Korzun (Technical Development Director)**

**Task 3.5. Production of *MedWaste Pro 250* (250 kg/h) for piloting (Month 2-Month 6)**

Large *MedWaste Pro 250* gasifier (with the utilization capacity 250kg/h) is designed for waste utilization companies. Its production is estimated to take about 4 months.

**Output: *MedWaste Pro 250* is produced. Task leader: Viktor Korzun (Technical Development Director)**

**Task 3.6. Internal testing (Month 5-Month 7)**

After each *MedWaste Pro* gasifier will be developed, INECO plans to conduct extensive internal testing in order to verify the correct performance of gasification system and ensure product quality and the highest safety standards of the product. In order to conduct the internal testing INECO will purchase the raw materials needed to composite feedstock (waste) identical to the original medical waste. After the testing and performance verification the adjustments in the design and technical specification of the gasifier will be done.

**Output: Successfully tested and ready for piloting *MedWaste Pro* gasifiers. Task leader: Igor Tishchenko (Quality Assurance Manager)**

**Milestones :**

**MS3.1 – Experimental *MedWaste Pro 50* gasifier manufactured (Month 8)**

**MS3.2 – Prototype *MedWaste Pro 50* gasifier for piloting is produced and pass internal test (Month 10)**

**MS3.3 – Prototype *MedWaste Pro 100* gasifier for piloting is produced and pass internal test (Month 13)**

**MS3.4 – Prototype *MedWaste Pro 250* gasifier for piloting is produced and pass internal test (Month 16)**

**Deliverables:**

**D3.1 Internal testing reports (for each produced gasifier) (Month 8, Month 10, Month 13, Month 16).**

<b>Work package number</b>	4	<b>Lead beneficiary</b>	INECO
<b>Work package title</b>	Piloting		
<b>Person/months per participant:</b>	10		
<b>Start month</b>	14	<b>End month</b>	23

**Objectives:** To pilot three *MedWaste gasifiers* at potential customer's site.

**Description of work**

**Task 4.1. Contracting piloting sites (Month 3 – Month 7)**

During this task sites for piloting will be contracted. The project envisions piloting of three *MedWaste Pro* gasifiers. According to the feasibility study conducted during Phase 1 project, it was identified that gasifiers with 50kg/h utilization capacity are the best fit for individual hospitals of medium size (400-600 beds) in emerging markets and gasifiers with 100 kg/h utilization capacity better suits for larger hospitals or medium size hospitals in developed countries where personal costs are high. *MedWaste Pro 250* (250 kg/h) is designed for waste utilization companies.

**Output: Three piloting sites are chosen and conditions of piloting is agreed. Task leader: Sergey Sereda (Business Development Director)**

**Task 4.2. Packaging, transport and installation of a pilot lot (Month 11, Month 14, Month 17)**

As soon as gasifier is developed it will be packed for transportation. For this purpose shipping containers for transportation of gasifiers will be ordered. After the product is ready for shipment it will be transported to the customer/piloting site. Upon delivery to the customer site *MedWaste Pro* gasifier will be installed and assembled. In addition, inspection of territory and premises will be made in order to prepare the infrastructure at the piloting for gasifier usage. The primary product launch will be conducted together with provision of necessary trainings for the personnel of piloting site (hospital/health care institution or waste management company) to ensure a proper usage and exploitation of *MedWaste Pro* gasifiers. **Output: *MedWaste Pro* gasifiers are installed and running at piloting sites. Task leader: Yuriy Zabulonov (Project Manager)**

**Task 4.3. Operation of *MedWaste Pro* prototypes at piloting sites (hospitals and/or waste utilization plans) and collection of feedback from the users. (Month 11-Month 23)**

Prospective customers of INECO *MedWaste Pro* gasifiers have indicated that before ordering their utilization system, they want to see the system to have operated for at least 1000 hours. As the piloting sites will be chosen in the countries

of initial market entry (Turkey and Romania) demonstrational visits for other potential clients from that country will be held. The demonstration and monitoring activity will be open to selected interested parties, and show the *MedWaste Pro* gasifier operating for at least 6 months, with the gasifier working at least five days per week, 8 hours per day. After 6 months, the *MedWaste Pro* gasifier will have worked for around 1000 hours, taking into account downtime for maintenance, repair, collecting samples for tests etc. **Output: Feedback collected and product performance verified. Task leader: Yuriy Zabulonov (Project Manager)**

**Milestones :**

**MS4.1 – MedWaste Pro 50 gasifier has worked for 1000 hours (Month 14)**

**MS4.2 – MedWaste Pro 100 gasifier has worked for 1000 hours (Month 17)**

**MS4.3 – MedWaste Pro 250 gasifier has worked for 1000 hours (Month 19)**

**Deliverables:**

**D4.1 Piloting feedback reports (Month 24).**

<b>Work package number</b>	5	<b>Lead beneficiary</b>	INECO
<b>Work package title</b>	Preparation of investment attraction strategy		
<b>Person/months per participant:</b>	28		
<b>Start month</b>	1	<b>End month</b>	24

**Objectives:** The aim of this WP is to increase investment attraction readiness by enforcing IPR strategy, updating commercialization plan, developing partnership network and developing organization growth and investment strategy.

**Description of work**

**Task 5.1. IPR Strategy update & Implementation (enforcement) (Month 4 – Month 9)**

In order to ensure an effective exploitation of the project results, INECO will further strengthen its IPR portfolio and develop a strategy for enforcement of the IPR in alignment with the development of the updated Commercialization Plan. This task will include planning and documentation preparation for an application to at least one new patent, specifically related to the *MedWaste Pro* gasifier and unique processes or design that is patentable. An external specialized patent attorney, Borovyk and Partners, will be used for the identification of new patent opportunities, the filing of new patent applications and the development of an IPR enforcement strategy to protect current INECO's IPR in terms of existing patent, design and secret know-how.

**Output: Updated IPR strategy. Task leader: Lyudmila Odukalets (IPR and Regulatory Compliance Director)**

**Task 5.2. Updating Commercialization Strategy Plan (Month 1 – Month 6)**

The existing Commercialization Strategy Plan will be updated and adapted during the process of the project, based on technical progress and results during WP 1-3 and 5, as well as based on the identified users' needs, findings from end-user feedback, feedback from prospective customers and Trade Shows. The Commercialization Strategy Plan will include specific planned sales activities related to the dissemination and exploitation of the waste gasification system that are outside the scope of this Phase 2 project and will be financed fully by INECO. An updated Commercialization Strategy Plan including a record of activities related to dissemination and exploitation that have been undertaken and those still planned will be included in the periodic and final reports.

**Output: Updated Commercialization Strategy Plan, Task leader: Sergey Sereda (Business Development Director)**

**Task 5.3. Organisational growth and investment strategy development (Month 7-Month 12)**

INECO will implement this task in following steps:

- 1) Identification of funding requirements in order to find the ways for further growth of the company
- 2) Identification of relevant investors – making research to obtain information about investors and create target list of of 10 to 15 funds and 20 to 40 individuals who are relevant.
- 3) Developing investment pitch – develop business plan and make presentation for potential investors.

**Output: Presentation for potential investors, Business plan. Task leader: Iryna Poplavets (Business Development Manager)**

**Task 5.4. Partnership development (Month 2-Month 24)**

The main purpose is identifying strategic stakeholders which are divided on such key partners roles:

- Suppliers – producers of required details and materials for gasification systems.
- Companies that provide maintenance services are needed to ensure reliability of the *MedWaste Pro* gasifiers and reduce concerns of potential customers, especially outside Ukraine, in Turkey, Romania and Poland.

- Distributors and dealers – strategic partners with the main role to find new customers for INECO and sell *MedWaste Pro* gasifiers
- Insurance companies – to distribute potential risks between stakeholders.
- Leasing companies – to making rental agreements with customers.

**Output: Strategic partnerships are established. Task leader: Sergey Sereda (Business Development Director)**

**Task 5.5. Trainings and competence building (Month 3-Month 5, Month 11-Month 20)**

In order to prepare the organization for growth, it is important to develop a training and competence building program enabling to efficiently train current and future staff in the design, manufacturing, assembly, operating, maintenance and repair of the INECO *MedWaste Pro* gasifiers. Yuriy Zabulonov is the person in INECO with the most know-how and knowledge about the design, assembly and operating of the gasification system and he will take the lead in designing a training and competence building program that will enable the training of all new employees. This in return will enable INECO to grow faster and to hire and train new employees in order to keep up with the foreseen quick growth of market demand.

**Output: Developed training materials. Task leader: Yuriy Zabulonov (Project Manager)**

**Milestones:**

**MS5.1 – Meeting with at least 5 distributors or dealers and 5 maintenance service companies in the countries of initial market entry (Month 15)**

**Deliverables:**

**D5.1 Updated Commercialization Strategy Plan (Month 6)**

**D5.2 Updated IPR strategy (Month 9)**

**D5.3 Organisational growth and investment strategy (Month 12)**

<b>Work package number</b>	6	<b>Lead beneficiary</b>	INECO
<b>Work package title</b>	Marketing, Communication and Dissemination		
<b>Person/months per participant:</b>	20		
<b>Start month</b>	1	<b>End month</b>	24

**Objectives:** To update the marketing and commercialization strategy for INECO *MedWaste Pro* and increase pull of potential clients.

**Description of work**

**Task 6.1. Marketing and Communication plan & activities (Month 1 – Month 24)**

The existing communication plan contains targeted communication and dissemination activities focused on the identified target groups. Besides physical presence at the most relevant Trade shows (see Task 5.3), the dissemination activities will focus on increasing the visibility of the INECO *MedWaste Pro* gasifiers in relevant online and offline media. The aim is to get editorial articles by providing news-worthy stories. A minimum of 8 articles in the following online and offline media is foreseen during the length of the project: [Waste Management](#), [Waste Management & Research](#), [BioMed Central](#), [Environmental Expert](#). Additionally, active participation in carefully selected LinkedIn groups will be conducted to increase the visibility of INECO waste gasification system among targeted energy and waste professionals. Examples of targeted LinkedIn Groups are: [Medical Waste Management](#), [Medical Waste Advisory Group](#), [Medical Waste generators](#), [Waste Management and Recycling professionals](#). The ambition is to have weekly to monthly contributions to selected groups, ranging from highlighting project results, initiating online discussions for gaining feedback and engaging in relevant discussions raised by others to increase visibility and profile of INECO and its staff as waste to energy experts. Existing communication plan will be continuously updated based on new findings, progress, and commercialization strategy and identified new communication opportunities. A report of completed and planned communication activities will be added to the periodic and final reports.

**Output: Developed Marketing and Communication Plan. Task leader: Sergey Sereda (Business Development Director)**

**Task 6.2. Demonstration Activities (Month 17, Month 20, Month 23)**

In order to show how the *MedWaste Pro* gasifier works in real life 3 demo days, one at each piloting site, will be organized. Identified potential customers will be invited in advance. Since demo days for potential clients will be organized in places of piloting sites (Turkey, Poland, Romania), it will guarantee that potential clients of first market entry will attend them. Demo days will be organized after the prototypes work for more than 500 hours (after 3 months of exploitation).



**Output: Demo days are held. Task leader: Sergey Sereda (Business Development Director)**

**Task 6.3. Fairs/Trade Shows (Month 1 – Month 24 (not every month))**

A number of selected Trade Shows are chosen for increasing the visibility of INECO and its innovative *MedWaste Pro* gasifier in order to receive feedback on its value proposition and performance indicators from end-users and market professionals. Additionally, these Trade Shows will be used to identify existing competing solutions and identification of future technological and business trends. INECO is planning to participate in fairs in countries of market entry and the biggest conferences in the industry.. The full list of trade shows is described in Section 4. Participation fee include renting of floor space, designing a booth, and developing INECO mobile exhibition equipment.

**Task leader: Sergey Sereda (Business Development Director)**

**Task 6.4. Demonstration videos, marketing materials and website development & promotion (Month 2, Month 8, Month 14, Month 21)**

A successful Commercialization Plan needs to be supported by promotional materials which will include:

- 1) Development of INECO website
- 2) Preparation of marketing material, which will include: a demonstrative video, posters, leaflets and the release of press articles to be used in events and Fairs.
- 3) Social media promotion among interested stakeholders, to promote INECO results and advances.

**Output: Fully functioning and up-to-date website, demonstration video and market materials. Task leader: Sergey Sereda (Business Development Director)**

**Milestones :**

**MS6.1 – Demo days are held (Month 17, Month 20, Month 23)**

**Deliverables:**

**D6.1 Marketing and Communication plan (Month 6).**

<b>Work package number</b>	7	<b>Lead beneficiary</b>	INECO	
<b>Work package title</b>	Project Management			
<b>Person/months per participant:</b>	12			
<b>Start month</b>	1	<b>End month</b>	24	

**Objectives:** To manage the project according to the project plan, Grant Agreement, within budget and overseeing the timely and high quality implementation of the overall project

**Description of work**

**Task 7.1. Organize Steering Committee Meetings (Month 1 – Month 24)**

The current Shareholders of INECO, Yuriy Zabulonov and Sergey Sereda and Lyudmila Odukalets will take place in the Steering Committee of the project and will meet twice per month to discuss the progress of the project and take formal decisions on the strategic choices to be made and approve deliverables before submitting to the EC. The project manager, who is also responsible for the organization of the meetings and drafting of agenda, chairs the Steering committee. The minutes of the meeting will be made by the participants (rotating) and will consist of the main decisions taken.

**Output: Steering Committee meetings are regularly held. Task leader: Yuriy Zabulonov (Project Manager)**

**Task 7.2. Set up an Advisory Board (Month 6)**

The project manager will be responsible for setting up of an Advisory Board who will meet twice per year with the Steering Committee on provide strategic feedback on the progress of the project and strategic decisions for further commercialization, both on technical and commercial aspects. The project manager can consult with individual members of the Advisory Board on specific strategic questions. The role of the Advisory Board is to increase the quality of decisions to be made. The Advisory Board will consist of [6 people].

**Output: Advisory Board set up and meets regularly. Task leader: Yuriy Zabulonov (Project Manager)**

**Task 7.3. Implement Administrative and Financial Project Management (Month 1-Month 24)**

The project manager will follow the project progress in order to meet project schedule and that the budget complies with the estimated plan and Grant Agreement. The INECO’s accountant will assist the project manager in the drafting of the Administrative and the Financial progress report, according to the Grant Agreement.

**Output: Project is implemented according to the budget and project plan. Task leader: Yuriy Zabulonov (Project Manager)**

**Task 7.4. Technical and Commercial Risk Management (Month 1-Month 24)**

A dedicated Quality Assurance Manager will be pointed at the start of the project who will consult with Project Manager regarding quality assessments and identification and both technical and commercial risks. This will entail

ensuring that the technical and commercial activities of the project are on track and possible risks are identified in an early stage enabling to develop mitigation plans. The Quality Assurance Manager will be responsible for writing an annual Quality Assurance report, consisting of the identified technical and commercial risks and their proposed or already implemented mitigation actions.

**Output: Both technical and commercial risks identified and mitigation actions implemented. Task leader: Task leader: Igor Tishchenko (Quality Assurance Manager)**

**Milestones :**

**MS7.1 – Kick-off meeting (Month 1)**

**MS7.2 – Project closing meeting (Month 24)**

**Deliverables:**

**D7.1 Quality assurance reports (Month 13, Month 24).**

**Table 3.1 b: List of work packages**

WP	Work Package Title	Participant No	Participant Short Name	Person-Months	Start Month	End Month
<b>WP1</b>	Modernization	1	INECO	24	1	24
<b>WP2</b>	Patenting, independent testing and certification	1	INECO	23	4	20
<b>WP3</b>	Production of the initial batch of <i>Med Waste Pro</i> gasifiers for piloting and performance validation	1	INECO	60	4	16
<b>WP4</b>	Piloting	1	INECO	10	14	23
<b>WP5</b>	Increasing attraction readiness	1	INECO	28	1	24
<b>WP6</b>	Marketing, Communication and Dissemination	1	INECO	20	1	24
<b>WP7</b>	Management	1	INECO	12	1	24

**Table 3.1 c: List of Deliverables**

Deli vera ble no.	Deliverable name	WP no.	Short name of lead participant	Type	Dissemin ation level	Delivery date
D1.1	List of identified pilot consumers' needs	1	INECO	R	CO	M 3
D2.1	Set of technical documentation	4	INECO	OTHER	CO	M 9
D2.2	Granted patent	4	INECO	OTHER	PU	M 20
D2.3	Technical report of independent testing	4	INECO	R	CO	M 10
D2.4	Certification report	4	INECO	R	CO	M 17
D3.1	Internal testing reports	2	INECO	R	CO	(M8, M 10, M 13, M 16).
D4.1	Piloting feedback reports	3	INECO	R	CO	M24
D5.1	Updated Commercialization Strategy Plan	5	INECO	R	CO	M 6
D5.2	Updated IPR strategy	5	INECO	R	CO	M 9
D5.3	Organizational growth and investment strategy	5	INECO	R	CO	M 12
D6.1	Marketing and Communication plan	6	INECO	R	CO	M 6
D7.1	Quality assurance reports (2)	7	INECO	R	CO	M 13 M 24

### 3.1 MANAGEMENT STRUCTURE AND PROCEDURES

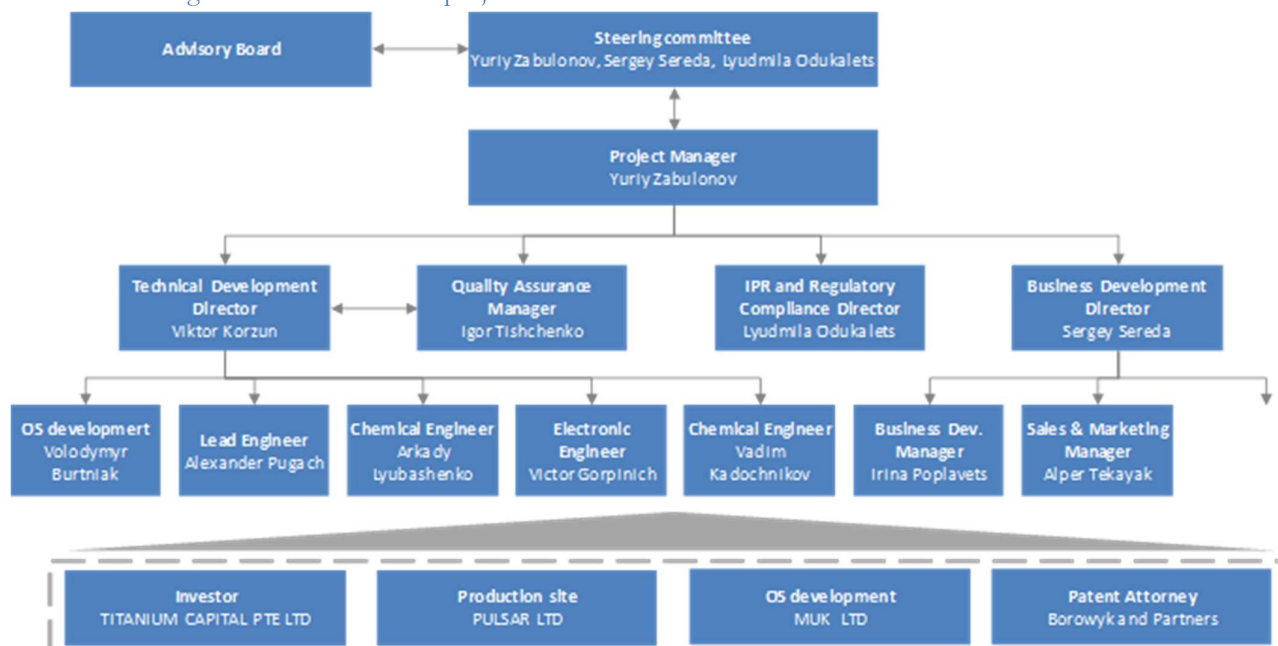
The project has divided responsibilities of different tasks to different employees of INECO, according to their expertise, know-how and role in the company. The project will be managed by the project manager, Yuriy Zabulonov, who will oversee the overall progress of the project. The project will involve all employees of INECO: detailed team description can be found in sections 4-5. Different WP and Task leaders will be appointed for the implementation of activities according to their expertise and interest, enabling a high quality implementation of the project. Each of the

Team Members is highly specialized in their field of expertise and well equipped in fulfilling their responsible tasks to the highest required quality.

Strategic decisions are being made in the Steering Committee, which is made up of the following key decision makers: Yuriy Zabulonov, Sergii Sereda and Lyudmila Odukalets. Decisions will be based on unanimity, and in case no unanimity is reached, the founder of the INECO, Yuriy Zabulonov will have a casting vote. Steering Committee meets every other week (virtually or physically).

### Organisational Structure

Table 3.2a Management structure of the project



A strategic advisory board consisting of technical, research, business and investment expert will meet twice per year to provide an overall expert advice on the strategic directions for the project on both technical and business sides. The members of the advisory board can be consulted for specific strategic questions on individual basis

Table 3.2 a: List of milestones

No	Milestone name	WP	Month	Means of verification
MS1.1	Online monitoring and remote diagnostics system is developed	1	6	Approval of online monitoring and remote diagnostics system by Steering Committee
MS1.2	Nanocomposite filters for the MedWaste Pro gasifiers are developed	1	6	Performance report verified by Quality Assurance Manager
MS2.1	Results of independent testing received.	4	11	Report on the results of independent testing
MS3.1	Experimental MedWaste Pro 50 gasifier has been produced and tested	2	8	Internal testing report verified by Quality Assurance Manager
MS3.2	MedWaste Pro 50 gasifier for piloting has been produced and tested	2	10	Internal testing report verified by Quality Assurance Manager
MS3.3	MedWaste Pro 100 gasifier for piloting has been produced and tested	2	13	Internal testing report verified by Quality Assurance Manager
MS3.4	MedWaste Pro 250 gasifier for piloting has been produced and tested	2	16	Internal testing report verified by Quality Assurance Manager
MS4.1	MedWaste Pro 50 gasifier has worked for 1000 hours	3	17	Performance report verified by Quality Assurance Manager
MS4.2	MedWaste Pro 100 gasifier has worked for 1000 hours	3	19	Performance report verified by Quality Assurance Manager
MS4.3	MedWaste Pro 250 gasifier has worked for 1000 hours	3	22	Performance report verified by Quality Assurance Manager

MS5.1	Meeting with at least 5 distributors or dealers and 5 maintenance service companies in the countries of initial market entry	5	15	Minutes notes or e-mails with agreements
MS6.1	Demo days are held	6	17, 20, 23	List of participants
MS7.1	Kick-off meeting	7	1	Minutes of the Kick-off meeting
MS7.2	Project Closing	7	24	Minutes of the Project Closing meeting

### Procedures

In order to ensure effective and successful Project management three key procedures were identified:

**Table 1: Procedures to ensure effective and successful Project management**

No.	Procedures	Description
1.	Assurance of effective communication	PM will be responsible for ensuring effective internal communication within Project members and marketing manager is responsible for ensuring effective external communication.
2.	Management of Knowledge and IPR	CEO and IPR Specialist with the help of Borovyk and Partners will be responsible for management of knowledge and IPR. Intellectual property rights (copyright, design rights, patent rights, or similar forms of protection) will be managed according to local laws where legal entity is established.
3.	Non-discrimination Aspects	PM will be responsible for ensuring gender equality and non-discrimination within the framework of the Project. Both women and men will have equal rights to become members of the Project team or Pilot group.

### Innovation Management

The team members in INECO have many years of experience in developing new products and bringing these successfully to the market. Strong technical background, successful track record, and engineering competences combined with the entrepreneurial business experience of the key personnel provide INECO with the right skills to implement this ambitious innovative project. For its commercialization process, INECO will implement a stage-gate process for managing the innovation processes. Further investments and commercialization steps will depend on the success of each previous stage, in order to minimize the risks involved.

### Critical Risks

**Table 3.2b: Critical risks for implementation**

Description of risk	Level of impact	Level of likelihood	WP	Proposed risk-mitigation measures
Breakdown of the MedWaste Pro gasifiers	Medium	Medium	2-4	Gasifier has been designed and tested to work with a high variety of different medical waste. Gasifier is built in modular design, enabling the fast and east replacement of broken sections
Breakdown of gasifier due to low quality of materials used in production of gasifier	Medium	Very low	4	INECO intends to buy materials with in small order amount and test materials internally before ordering a larger amount of materials.
Lack of supply parts	High	Low	1-3	The supply parts, which INECO need for implementation of EUWaste Phase II project easily can be found on the market and are not a rarity. INECO is in touch with many suppliers to be able to substitute needed supply components.

### 3.3 CONSORTIUM AS A WHOLE

No consortium was formed for this proposal. INECO has the financial, technical and managerial capacity to implement this project. Section 4-5 describes the **INECO team, including a description of their scientific, technical and business expertise**. The section also describes the **main service providers, subcontractors** and the **supplier network** that will in different roles contribute to the successful implementation of the **EUWaste** project. A description of current **INECO facilities** is also provided in Section 4-5. The founder of INECO, Yuriy Zabulonov will be assigned as PM of the project. He has profound experience in managing innovation projects and has already brought numerous innovation solutions to the market. He will coordinate the work of Technical Technical Development Director Viktor Korzun,

Business Development Director Sergey Sereda, Quality Assurance Manager Igor Tishchenko and IPR and Regulatory Compliance Director Lyudmila Odukalets. Viktor Korzun and Sergey Sereda will coordinate technical and business teams respectively. During the project, INECO is also planning to continue its active collaboration with members of the HOPE and MSW. The chosen management structure is appropriate to the complexity and scale of the project.

### 3.4 RESOURCES TO BE COMMITTED

The budget for the project has been carefully calculated and amounts to **1 480 194 EUR**, with a requested EC contribution of 1 036 136 EUR. INECO has the resources required for the 30 % co-finance through their investors. In the design of the project, there is a homogeneous distribution among the budget allocation per WP in relationship with the personnel effort. External service providers play an important role in the project and independent performance verification. This role is reflected in the budget allocated for them in relevant WPs.

**Table 3.4a: Budget per work package and summary of staff effort (in EUR)**

Budget	WP1	WP2	WP3	WP4	WP5	WP6	WP7	Total
Total person months	24	23	60	10	28	20	12	177,00
<b>Total personnel costs</b>	<b>67500</b>	<b>65875</b>	<b>161500</b>	<b>29500</b>	<b>90875</b>	<b>60000</b>	<b>41000</b>	<b>516250,00</b>
Travel	0	0	0	45500	45600	59880	0	150980,00
Equipment	0	0	70800	0	0	0	0	70800,00
Other goods and services	35300	51000	215555	15000	7500	80610	0	404965,00
<b>Total other direct costs</b>	<b>35300</b>	<b>51000</b>	<b>286355</b>	<b>60500</b>	<b>53100</b>	<b>140490</b>	<b>0</b>	<b>626745,00</b>
Indirect costs	25700	29218,75	111963,8	22500	35993,75	50122,5	10250	285748,75
<b>Subtotal</b>	<b>128500</b>	<b>140844</b>	<b>559819</b>	<b>112500</b>	<b>179969</b>	<b>250613</b>	<b>51250</b>	<b>1423495,00</b>
Subcontracting	25200	14300	0	7020	0	31180	0	77700,00
<b>Total budget</b>	<b>153700</b>	<b>155144</b>	<b>559819</b>	<b>119520</b>	<b>179969</b>	<b>281793</b>	<b>51250</b>	<b>1501195</b>
<b>Requested EC contribution</b>	107590	108600,8	391873,3	83664	125978,3	197255,1	35875	1050836,5

**Table 3.4 b: 'Other direct cost' items (travel, equipment, infrastructure, goods and services)**

1. INEKO	Cost (€)	Justification
<b>Travel</b>	150 980	WP 4: Accommodation in Europe – 8 100 euro; Daily allowances – 16 900 euro; Installing pilot sites – 21 000 euro; Tickets in Europe – 19 200 euro; Transfers -1 400 euros. WP 5: Accommodation in Europe – 9 600 euro; Daily allowances – 9 600 euro; Tickets- 24 000 euro; Transfers 2 400 euro; WP 6: Accommodation in Europe – 8 100 euro; Accommodation out of Europe – 4 650 euro; Daily allowances in Europe – 9 900 euro; Daily allowances out of Europe – 6 000 euro; Tickets in Europe – 15 300 euro; Tickets out of Europe – 8 700 euro; Transfers – 900 euro; Visas in Europe – 4 680 euro; Visas out of Europe – 1 650 euro.
<b>Equipment</b>	70 800	WP 4: Renting production site and equipment – 70 800 euro.
<b>Other goods and services</b>	383 965	<i>Are presented by tasks. The full list is presented in Annexes 1, Table 1.</i> WP 1- Task 1.2 - Upgrade of a software for online monitoring system of equipment performance and remote diagnostics and identification of problems in the work of gasifier – 13 315 euro; Task 1.3 -Development of nanocomposite filters for the <i>MedWaste Pro</i> gasifier – 11 985 euro. WP 2 – Task 2.2. - Patenting of technology and useful model – 7 000 euro; Task 2.3 - Independent testing by 3rd party laboratories – 13 000 euro; Task 2.4 – Certification – 31 000 euro; WP 3 – Task 3.1 - Production of the second experimental prototype of the <i>MedWaste Pro 50</i> (50 kg/h) (pilot production) – 26 513,8 euro; Task 3.3 - Production of <i>Med Waste Pro 50</i> (50kg/h) for piloting – 26 513,8 euro; Task 3.4 - Production of <i>Med Waste Pro 100</i> (100kg/h) for piloting – 46 388,8 euro; Task 3.5 - Production of <i>Med</i>

		<p><i>Waste Pro 250</i> (250kg/h) for piloting – 106 138,8 euro; Task 3.6 - Internal testing – 10 000 euro.</p> <p>WP 4 – Task 4.3 - Packaging, transport and installation of a pilot lot – 15 000 euro;</p> <p>WP 5 – Task 5.6 - Trainings and competence building – 7 500 euro;</p> <p>WP 6 – Task 6.2. - Demonstration Activities – 1 200 euros; Task 6.3 - Fairs/Trade Shows – 79 410 euro ;</p>
<b>Total</b>	605 745	
<b>Direct costs of subcontracting</b>	77 700	<p>WP1: Development of software for online monitoring system and remote control -25 200 euro; WP 2: Pateting services – 14 300 euro; WP4: Updating of the software for online monitoring system and remote control based on users feedback – 7020 euro;</p> <p>WP 6: Web-site development – 31 180 euro</p>