Portable Pyrolysis Plant – Technical Specifications (SPECs) and Pilot Deployment Requirements

1. Purpose of the Document

This document defines the technical specifications (SPECs), operational framework, and logistical requirements for the deployment of a portable pyrolysis plant within sub-projects under the EMBEDED project.

The plant will be **operated by Envirohemp** during a two-week pilot phase aimed at the transformation of different types of subproducts into biochar.

2. Pilot Nature and Legal Disclaimer

This deployment is strictly experimental and demonstrative in nature.

- It is part of a pilot activity under the EMBEDED project.
- No legal liability or consequences shall be attributed to:
  - EMBEDED project
  - Envirohemp S.L.
  - Any technology provider or project partner

The sub-project host (subgrantee) assumes full responsibility for site conditions, logistics and compliance with local regulations.

3. General Description of the Plant

The system is a modular, containerized pyrolysis plant, consisting of two 40ft containers:

- Main Container (Process Unit):
  - Rotary kiln furnace (150–800°C)
  - Feeding system (screw feeder)
  - Burner system
  - Gas treatment unit
  - Water-cooled discharge system
- Auxiliary Container (Support Unit):
  - Cooling system (water tank + closed circuit)
  - Power generation unit
  - Electrical cabinet
  - PLC-based control system

Key Operational Features:

- Continuous operation
- Typical feed rate: 70–90 kg/h

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- Residence time: 12–60 minutes
- Oxygen-free (nitrogen atmosphere) pyrolysis
- Self-sustaining heating using produced biogas

4. Core Technical Specifications (SPECs)

Thermal Conditions

- Furnace temperature: 150 – 800 °C
- Burner temperature: 150 – 900 °C

Pressure Conditions

- Internal pressure: -25 to -80 Pa
- External pressure: -10 to -25 Pa

Mechanical Operation

- Rotary kiln speed: 1 – 5 rpm
- Typical operation: 3 – 5 rpm

Feeding System

- Capacity: 0.07 – 0.8 m^3/h
- Motor power: 1.5 kW

Electrical Requirements

- Required supply: 380V, 50 Hz
- Required breaker: 80 A

5. Responsibilities of Envirohemp

Envirohemp will provide access to the pyrolysis plant on an **in-kind basis**, with no financial compensation received for its use.

Envirohemp will be responsible for:

- Installation and operation of the pyrolysis plant during the pilot
- Process control and monitoring
- Adjustment of parameters (temperature, feed rate, residence time)
- Ensuring safe operation of the system

6. Responsibilities of the Subgrantee

The subgrantee must provide all infrastructure, logistics and operational support required for the pilot.

6.1 Site and Infrastructure

- Accessible space for truck access and maneuvering
- Suitable area for:

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  - Installation of two 40ft containers
  - Safe operation of high-temperature equipment
- Stable and level ground

Envirohemp shall have the final authority to determine, at its sole discretion, the suitability of any proposed site for the project operations. Such determination shall be formally conveyed via written communication. The Subgrantee is responsible for identifying a potential location and must submit detailed site plans to Envirohemp for review. Prior to providing formal confirmation, Envirohemp reserves the right to conduct an on-site inspection. If the subgrantee cannot provide a site deemed suitable for the installation of the plant, the project shall be rendered unfeasible and shall not proceed.

6.2 Permits and Compliance

- All local permits and authorizations
- Compliance with:
  - Environmental regulations
  - Safety and industrial operation laws

6.3 Feedstock Supply

- Supply of feedstock:
  - Stored in Big bags or 50L sacks
- Feedstock must be:
  - Pre-collected
  - Available at the operation site
  - **Moisture content under 15%**
  - Maximum particle size (granulometry) of less than 5 cm

6.4 Material Handling Equipment

- Forklift (mandatory if using big bags)
- Personnel for loading/unloading

6.5 Biochar Handling

- Transport and management of produced biochar
- Storage or removal from site

6.6 Transport and Logistics

The Pyrolysis plant is stored in Puente la Reina, Navarra, Spain. All costs, responsibilities, and arrangements related to the transportation of the plant from

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the storage location to the sub-grantees' premises shall be borne exclusively by the sub-grantees, including:

- Transport of two 40ft containers from Puente la Reina (Navarra, Spain) to pilot site and return to Puente La Reina (Navarra, Spain).
    - Including Rental of:
        - Flatbed trucks
        - Crane for loading/unloading containers
- Daily local transport for Envirohemp operators

6.7 Personnel Costs

- Accommodation and subsistence for 2 Envirohemp operators
    - Approx: €50/day/person
    - Duration: 14 days

6.8 Energy Supply

Option A – Grid Connection:

- Provide 380V / 50 Hz / 80A

Option B – Generator:

- Provide diesel for generator operation

Estimated diesel consumption in daily operation (8–10 hours): 100-150 liters/day

6.9 Other supplies needed for the operation of the pyrolysis plant:

- Nitrogen gas: One 50 Liters cylinder (200 bar, oxygen-free industrial grade)
- Diesel for initial combustion of the oxidation chamber (25 liters/day of operation).

6.10 Insurance

- Operational insurance (on-site activities)
- Transport insurance for containers and equipment

7. Additional Costs to be Covered by Subgrantee

The following potential costs must also be considered:

- Site preparation (leveling, ground reinforcement if needed)
- Fire safety equipment (extinguishers, safety perimeter)
- Security and access control
- Waste management (non-process residues)
- Water supply
- Temporary fencing or signage if necessary
- Environmental monitoring (if required by local authorities)

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- Standby technical personnel or operators (local support)

8. Operational Considerations

- Continuous monitoring is required during operation
- Feedstock variability may affect performance

or inability to supply the material where such notice is not duly provided.

9. Liability Waiver

The EMBEDED project shall not be liable for any direct, indirect, incidental, consequential, or special damages arising out of or in connection with the use, handling, transport, storage, or application of the resulting biochar by the sub-grantees or any third party. The sub-grantees shall assume full responsibility for ensuring that the use of the biochar complies with all applicable laws, regulations, and safety requirements, and shall indemnify and hold harmless the EMBEDED project against any claims, damages, or liabilities arising from such use.

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