



## PLUG-N-HARVEST

**Plug-n-play passive and active multi-modal energy  
Harvesting systems, circular economy by design, with  
high replicability for Self-sufficient Districts & Near-  
Zero Buildings**

*768735, H2020-EEB-2017*

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### **Ethical monitoring & Contingency Plans**

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AHC – Agencia de l’Habitatge de Catalunya – Spain

RWM – Region of Western Macedonia – Greece

CCC – County Council of the City and County of Cardiff – United Kingdom

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### Deliverable D7.2.3: Short Description

This report summarizes the ethical monitoring plans and countermeasures that will be used in order to guarantee the privacy of sensitive personal data during the data collection, storage, and process phases of the PLUG-N-HARVEST project

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## Executive Summary

This document is the outcome of the efforts made by the PLUG-N-HARVEST consortium in the context of WP7 entitled “Project Management” in order to address several issues regarding the overall project management and the establishment of the proper communication, quality, and monitoring mechanisms towards the smooth implementation of the project. More particularly, the current document covers the issues of **ethical monitoring** and **contingency planning**. Within these lines, the objectives of this deliverable are:

- To report all potential ethical and legal issues stemming from the project research activities as well as the involvement of subjects in the realization of the pilots;
- To provide the necessary contingency plans towards eliminating possible considerations concerning the privacy and confidentiality issues that could arise within the scope of the project as well as on-site trials.

In order to assess the effectiveness of the proposed solution, the PLUG-N-HARVEST project involves the collection of data in four pilot sites that will be conducted in Germany, United Kingdom, Spain and Greece. Although the collected data will not introduce any critical ethical issue, several considerations concerning the privacy and confidentiality issues could arise within the scope of the project, which are typical to Information and Communication Technology (ICT)<sup>1</sup> initiatives as well as on-site trials. The PLUG-N-HARVEST consortium is fully aware of these issues and has prepared appropriate ethical monitoring activities that are in compliance with both the European Union (EU) and national legislations, while at the same time enables the distribution of the data between the project participants.

Initially, the PLUG-N-HARVEST Ethical Monitoring approach is described (Section 2.1), analysing in detail the legislation of the countries involved in the pilots (Section 2.2). Supporting information regarding the ethical issues that may arise and definition of the PLUG-N-HARVEST Ethical Policy are provided in Section 2.3. Moreover, the responsibilities of the PLUG-N-HARVEST Ethical Advisory Board (EAB) along with the respective activities are presented in Sections 2.4 and 2.5. Finally, an initial identification of potential ethical risks concerning the data collection and management (Section 3) together with closing remarks (Section 4) are provided.





## 1 Introduction

The main strategic goal of the PLUG-N-HARVEST project is to design, develop, demonstrate and exploit a new modular, plug-n-play concept/product for Adaptable/Dynamic Building Envelopes (ADBE) - deployable to both residential and non-residential buildings - which is able to provide high (maximum possible) energy use reductions and high (maximum possible) energy harvesting from Renewable Energy Sources (RES) both at the single-building and the district scale while requiring medium-to-low installation costs and almost-zero operational costs. Moreover, by appropriately exploiting its attributes, the PLUG-N-HARVEST system will be designed and implemented considering circular economy principles, which will allow implementing new business models based on leasing and renting modes and, by this, leaving the door open to massive implementations.

Deliverable D7.6 (*Ethical monitoring & Contingency Plans*) deals with task T7.2 (*Quality Assurance, Risks and Ethics Management*), the scope of which is -among others- the establishment of the PLUG-N-HARVEST:

- Ethical Advisory Board (EAB) which provides continuous support concerning ethical and legal issues to the consortium, ensuring that the project is proceeding in a responsible and ethically acceptable manner.
- Quality Control Board (QCB) for formulating a quality plan describing in detail the quality requirements of the project and the respective guidelines in order to achieve this quality level.
- Detailed contingency plan for project's technical and other (end-users involvement, organizational, legal, ethical) objectives that is constantly updated during the project lifetime.

This task also identified and included all relevant national and international European legislation and directives related to the countries where the pilots took place, aiming at decreasing the probability and impact of events adverse to the project. On the other hand, any event that could have a positive impact should be exploited.

For providing constant advice about ethical and data protection issues that may arise during the project's lifecycle a centralized service has been established from month 3, namely the internal PLUG-N-HARVEST EAB. It has the responsibility for implementing and managing the ethical and legal issues of all procedures in the project, ensuring that each of the partners provides the necessary participation in PLUG-N-HARVEST and its code of conduct towards the pilot participants. Mitigation plans are defined for all issues that may arise.

The situation and the content of this report will be reviewed if any issues do arise during project's timeframe.

## 2 Ethical Monitoring Activities

In order to understand the relationship of building performance, energy demand, energy generation, occupants' behaviour, thermal comfort and satisfaction, it is necessary to collect, process, and analyse a variety of data sources from smart meter reading (e.g. energy consumption, occupancy, indoor environmental conditions, etc.). In this context, data will be automatically collected by smart sensors as well as other proprietary equipment installed at the selected pilot areas in Germany, United Kingdom, Spain and Greece, during the execution of the four (4) envisaged pilot use cases.

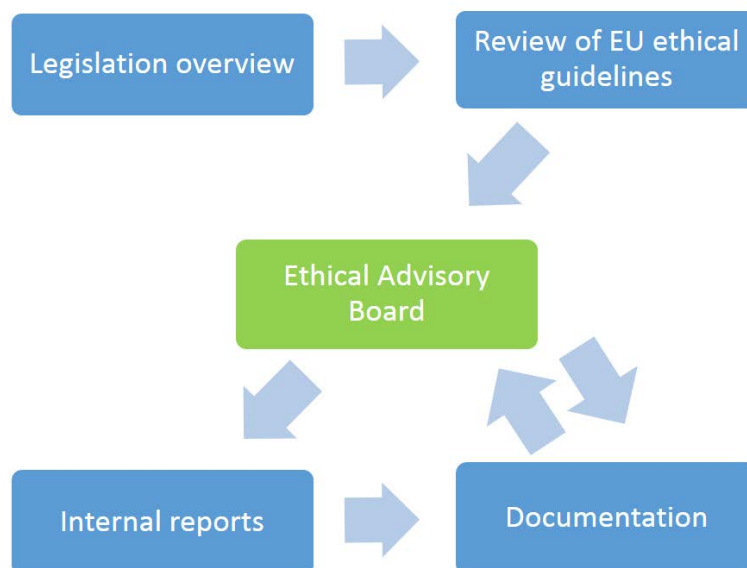
In more detail, two types of data will be collected during these executions, namely:

1. Data necessary to monitor the contextual conditions (energy consumption, temperature, humidity, weather, etc.) of the pilot areas; and
2. Data related to the occupancy evaluation techniques (questionnaires, interviews and workshops with key building users and managers) of the actual use case end-users.

In the latter case, the data may involve sensitive personal data. Motivated by this, PLUG-N-HARVEST propose solutions, which guarantee that these data will not be exposed, used or analyzed for any other purpose outside the scope of the project. Moreover, all provisions for data management will be taken in compliance with the national and European Union (EU) legitimates. As a result of all the measures undertaken and our detailed Data Management Plan, no ethical issues are raised by the technologies to be employed in pilot sites foreseen in Germany, United Kingdom, Spain and Greece.

### 2.1 Methodology

Although PLUG-N-HARVEST does not introduce any critical ethical issues, several considerations typical to Information and Communication Technology (ICT)<sup>1</sup> as well as on-site trials need to be taken into consideration. Thus, from the very beginning the consortium has decided to invest time and effort in order to ensure that the outcome of the Ethical Management of the project will meet all the respective ethical rules and obligations. The methodology followed towards this direction comprises of 5 steps, which are analysed below:



**Figure 1. PLUG-N-HARVEST Ethical Management Methodology**



### **2.1.1 Legislation overview**

The first step was to investigate and study the laws which are associated with the activities of the project. Beside the directives of the EU, the legislation of the countries where the four major pilots of PLUG-N-HARVEST have been established (Germany, United Kingdom, Spain and Greece) has been taken into consideration. Concisely, the legislation with which the PLUG-N-HARVEST framework has to conform includes:

- European Union - Data Protection Directive 95/46/EC<sup>2</sup>, the EU General Data Protection Regulation - Regulation (EU) 2016/679 (GDPR)<sup>3</sup> upon its date of application, Directive 2002/58/EC<sup>4</sup> and European Charter of Fundamental Human Rights.
- Germany - Bundesdatenschutzgesetz BDSG (German Federal Data Protection Act-BDSG) and the responsible state data protection acts, relating to the collection, processing and use of personal data<sup>5</sup>.
- United Kingdom - Data protection Act 1998.
- Spain - Organic Law of Protection of Personal Data 15/1999 (LOPD) and its amendments by Laws 5/2002 and 424/2005, the Royal Decree 1720/2007 (last amendment from March 2012) which establishes the deployment of the cited Organic Law 15/1999 & the Royal Decree 1074/2015 of 27 November.
- Greece - Law 2472/1997 and its amendment by Law 3471/2006 of the Hellenic Parliament.

### **2.1.2 Review of EU ethical guidelines**

The second step includes a thorough investigation about the ethical guidelines for research projects in EU and an examination of the “*Guidance-How to Complete your ethics self-assessment*”<sup>6</sup>, the “*Guidelines on FAIR Data Management in Horizon 2020*”<sup>7</sup> and the “*Guidelines to the Rules on Open Access to Scientific Publications and Open Access to Research Data in Horizon 2020*”<sup>8</sup> of the ethical and data management review in H2020. This investigation has revealed the major concerns around data protection and privacy.

### **2.1.3 Ethical Advisory Board establishment**

After the overview of the relevant legislation and the EU ethical guidelines, the project Consortium established from the early phases of the project the PLUG-N-HARVEST Ethical Advisory Board (EAB). The EAB consists of a centralized service that provides the necessary advice, support and supervision around ethical issues that may arise during the project lifecycle. It has a significant role in ethical management and is responsible for implementing and managing the ethical and legal issues of all procedures in the project. The representatives of the EAB are Ms. Tanja Osterhage (RWTH) for German pilot, Dr. Hu Du (CU) and Mr. Gareth Harcombe (CCC) for British pilot, Mr. Jose Pablo Rodriguez-Marín and Ms. Anna Mestre (AHC) for Spanish pilot and Mr. Dimitrios Mavromatidis (RWM) for Greek pilot. A more detailed description is provided in Section 2.4.

### **2.1.4 Internal reports overview**

In order to identify all the possible ethical risks and issues that may arise during the project lifecycle, a series of internal reports will be sent to all partners in order to receive feedback and take into account all the considerations or directives. In that way all partners will be kept up to date regarding the Ethics of the PLUG-N-HARVEST project and will help to create a solid ethical framework. The exchange of internal reports is intended to continue until the end of the project.

### **2.1.5 Documentation**

The initial results of the previous steps are analysed in the current deliverable. In addition, in case of human participation and/or data collection in pilot sites, the appropriate documentation will be



delivered, summarizing all the guidelines that have to be taken into account. All necessary documents will be sent to the ethical committee of each pilot partner (RWTH, CCC, AHC, RWM) upon getting an ethical approval.

## 2.2 Legislation

The PLUG-N-HARVEST consortium is aware that a number of privacy and data protection issues could be raised by the activities to be performed in the scope of the project, especially in Work Package 3 (*The PLUG-N-HARVEST Control and Management at Building and District Level*), Work Package 4 (*Integration, Pilot Implementation and Assessment*) and Work Package 6 (*Dissemination of Results & Communication*). The project involves the carrying out of data collection in all pilots (Germany, United Kingdom, Spain and Greece) under the leadership of each pilot site responsible, for implementing and deploying PLUG-N-HARVEST core components and assessing the effectiveness of the proposed solution. For this reason, human participants will be involved in certain aspects of the project and data will be collected. This will be done in full compliance with any European and national legislation as well as directives relevant to the country (i.e. Germany, United Kingdom, Spain and Greece) where the data collections are taking place (International/European). This section is devoted on discussing the EC and national legislations related to this project.

### 2.2.1 EU legislation

Regarding the EU legislation, the PLUG-N-HARVEST consortium takes into account the following:

- Data Protection Directive 95/46/EC<sup>2</sup>, the EU General Data Protection Regulation - Regulation (EU) 2016/679 (GDPR)<sup>3</sup> upon its date of application & Directive 2002/58/EC<sup>4</sup> of the European parliament regarding issues with privacy and protection of personal data and the free movement of such data<sup>1</sup>;
- Core ethical issues, which are defined by the European Charter of Fundamental Human Rights, as well as any relevant EU standard in the fields of privacy and data protection.

In particular, according to the “Data Protection Directive 95/46/EC”, which is related to the protection of individuals with regard to the processing of personal data and on the free movement of such data, the EC defines the personal data as:

*“Any information relating to an identified or identifiable natural person ('data subject'); an identifiable person is one who can be identified, directly or indirectly, in particular by reference to an identification number or to one or more factors specific to his physical, physiological, mental, economic, cultural or social identity [art. 2(a)]”.*

Likewise, the Directive 2002/58/EC deals with the regulation regarding the confidentiality of information.

Moreover, in order to protect the privacy rights of participants (i.e., public building employees, students, visitors, etc.), a number of best practice principles will be followed. These principals include:

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<sup>1</sup> Note that all EU countries were obligated to incorporate this directive into their national law by October 31, 2003.



- No data will be collected without the explicit informed consent of the individuals under observation. This involves being open with participants about what they are involving themselves in and ensuring that they have agreed fully to the procedures/research being undertaken by giving their explicit consent.
- No data collected will be sold or used for any purposes other than the current project.
- A data minimization policy will be adopted at all levels of the project and will be supervised by each responsible Pilot Demonstration. This is imposed by the EU Directive 2002/58/EC and aims at ensuring that no data, which is not strictly necessary to the completion of the current study will be collected.
- Any shadow (ancillary) personal data obtained during the course of the research will be immediately cancelled. However, the plan is to minimize this kind of ancillary data as much as possible. Special attention will also be paid to complying with the Council of Europe's Recommendation R (87) 15 on the processing of personal data for police purposes, Art.2:

*"The collection of data on individuals solely on the basis that they have a particular racial origin, particular religious' convictions, sexual behaviour or political opinions or belong to particular movements or organisations which are not proscribed by law should be prohibited. The collection of data concerning these factors may only be carried out if absolutely necessary for the purposes of a particular inquiry."*

- Compensation (if and when provided) will correspond to a simple reimbursement for hours lost as a result of participating in the study; special attention will be paid to avoid any form of unfair inducement.
- If employees of partner organizations, are to be recruited, specific measures will be in place in order to protect them from a breach of privacy/confidentiality and any potential discrimination; In particular, their names will not be made public and their participation will not be communicated to their managers.

### **2.2.2 German-pilot legislation**

German pilot trials which will take place in Aachen, Germany have to comply with German legislation "Bundesdatenschutzgesetz BDSG" (German Federal Data Protection Act-BDSG) and the responsible state data protection acts, relating to the collection, processing and use of personal data<sup>9</sup>. The BDSG (in the version promulgated on 14 January 2003 (Federal Law Gazette I p. 66), as most recently amended by Article 1 of the Act of 14 August 2009 (Federal Law Gazette I p. 2814)) serves to implement Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data (OJ EC no. L 281, p. 31 ff.). In particular, it defines – among others – the following issues, which are relevant for the PLUG-N-HARVEST project:

- The federal regulatory authorities of Germany is the German Federal Data Protection Authority (BfDI)<sup>10</sup> while in the state of North Rhine-Westphalia, where the German pilot in Aachen is located, it is the North Rhine-Westphalia Commissioner for Data Protection and Freedom of Information<sup>11</sup>.
- The purpose of the BDSG is to protect the individual against his/her right to privacy being impaired through the handling of his/her personal data (any information concerning the personal or material circumstances of an identified or identifiable individual).



- Personal data are to be collected, processed and used, and processing systems are to be designed in accordance with the aim of collecting, processing and using as little personal data as possible. In particular, personal data are to be aliased or rendered anonymous as far as possible and the effort involved is reasonable in relation to the desired level of protection.
- The collection, processing and use of personal data shall be admissible only if permitted or prescribed by this Act or any other legal provision or if the data subject has consented.
- Personal data may be collected without his/her participation only if
  1. a legal provision prescribes or peremptorily presupposes such collection, or
  2. the nature of the administrative duty to be performed or the business purpose necessitates collection of the data from other persons or bodies, or
  3. the collection of the data from the data subject would necessitate disproportionate effort and there are no indications that overriding legitimate interests of the data subject are impaired.
- If personal data are collected from the data subject, the controller is to inform him/her as to the identity of the data collecting body, the purposes of collection, processing or use and the categories of recipients only in so far as the circumstances of the individual case provide no grounds for the data subject to assume that data will be transferred to such recipients, unless the data subject has already acquired such knowledge by other means. If personal data are collected from the data subject pursuant to a legal provision which makes the supply of particulars obligatory or if such supply is the prerequisite for the granting of legal benefits, the data subject shall be informed that such supply is obligatory or voluntary, as the case may be. In so far as the circumstances of the individual case dictate or at the data subject's request, he/she shall be informed of the legal provision and of the consequences of withholding particulars.
- Consent shall be effective only when based on the data subject's free decision. Data subjects shall be informed of the purpose of collection, processing or use and, in so far as the circumstances of the individual case dictate or upon request, of the consequences of withholding consent. Consent shall be given in writing unless special circumstances warrant any other form. If consent is to be given together with other written declarations, it shall be made distinguishable in its appearance.
- In the field of scientific research, a special circumstance pursuant to sub-Section 1 third sentence above shall also be deemed to exist where the defined purpose of research would be impaired considerably if consent were obtained in writing. In such case the information pursuant to sub-Section 1 second sentence above and the reasons from which considerable impairment of the defined purpose of research would arise shall be recorded in writing.
- In so far as special categories of personal data (Section 3 (9)) are collected, processed or used, the consent must further refer expressly to these data.

By following the principals described in Section 2.2.1, PLUG-N-HARVEST project fully complies with the BDSG, which incorporates the Directive 95/46/EC.

### **2.2.3 British-pilot legislation**

British pilot trial which will be conducted in Cardiff, United Kingdom have to comply with the British<sup>12</sup> legislation "Data protection Act 1998". According to this law<sup>13,14</sup> everyone responsible for using data has to follow strict rules called "data protection principles". According to them:

1. Personal data shall be processed fairly and lawfully and, in particular, shall not be processed unless:
  - at least one of the following conditions is met,



- i. The data subject (the person whose data is stored) has consented (“given their permission”) to the processing;
- ii. Processing is necessary for the performance of, or commencing, a contract;
- iii. Processing is required under a legal obligation (other than one stated in the contract);
- iv. Processing is necessary to protect the vital interests of the data subject;
- v. Processing is necessary to carry out any public functions;
- vi. Processing is necessary in order to pursue the legitimate interests of the “data controller” or “third parties” (unless it could unjustifiably prejudice the interests of the data subject).

and

- in the case of sensitive personal data (subject's race, ethnicity, politics, religion, trade union status, health, sex life or criminal record), at least one of several other conditions must also be met before the processing can comply with the first data protection principle<sup>15</sup>.
2. Personal data shall be obtained only for one or more specified and lawful purposes, and shall not be further processed in any manner incompatible with that purpose or those purposes.
  3. Personal data shall be adequate, relevant and not excessive in relation to the purpose or purposes for which they are processed.
  4. Personal data shall be accurate and, where necessary, kept up to date.
  5. Personal data processed for any purpose or purposes shall not be kept for longer than is necessary for that purpose or those purposes.
  6. About the rights of individuals<sup>16</sup> personal data shall be processed in accordance with the rights of data subjects (individuals).
  7. Appropriate technical and organisational measures shall be taken against unauthorised or unlawful processing of personal data and against accidental loss or destruction of, or damage to, personal data.
  8. Personal data shall not be transferred to a country or territory outside the European Economic Area unless that country or territory ensures an adequate level of protection for the rights and freedoms of data subjects in relation to the processing of personal data.

Moreover, the individual needs to consent to the collection of their personal information and its use in the purpose(s) in question, following the European Data Protection Directive 95/46/EC. This means that the individual may signify agreement other than in writing. However, non-communication should not be interpreted as consent.

Additionally, consent should be appropriate to the age and capacity of the individual and other circumstances of the case. E.g., if an organisation “intends to continue to hold or use personal data after the relationship with the individual ends, then the consent should cover this.” And even when consent is given, it shouldn't be assumed to last forever. Although in most cases consent lasts for as long as the personal data needs to be processed, individuals may be able to withdraw their consent, depending on the nature of the consent and the circumstances in which the personal information is being collected and used.

The Data Protection Act also specifies that sensitive personal data must be processed according to a stricter set of conditions, in particular any consent must be explicit<sup>15</sup>.

By following the principals described in Section 2.2.1, PLUG-N-HARVEST fully complies with the Data protection Act 1998, which incorporates the Directive 95/46/EC.

#### 2.2.4 *Spanish-pilot legislation*

Spanish pilot trial which will be conducted in Barcelona, Spain have to comply with the Spanish legislation “Organic Law 15/1999” (“Organic Law of Protection of Personal Data”, LOPD as its Spanish acronym) and its amendments by “Laws 5/2002 and 424/2005”. This law is part of the Spanish legislation regarding personal privacy and data protection. Its deployment was established by the Royal Decree 1720/2007 (last amendment from March 2012). An Authority called “Data Protection Agency” or “Agencia Española de Protección de Datos” (AEPD) has been created<sup>17</sup>, as described in the Chapter VI – Article 35, in order to enforce it.

1. *The Data Protection Agency is a body under public law, with its own legal personality and unlimited public and private legal capacity, which acts fully independently of the public administrations in the performance of its tasks. It shall be governed by the provisions of this Law and in a Statute of its own to be approved by the Government.*
2. *In the exercise of its public functions, and until such time as this Law and its implementing provisions are adopted, the Data Protection Agency shall act in conformity with Law 301992 of 26 November on the Legal Status of Public Administrations and the Common Administrative Procedure. Its acquisitions of assets and contracts shall be governed by private law.*
3. *The posts in the bodies and services belonging to the Data Protection Agency shall be filled by officials of the public administrations and by staff recruited to this end, in accordance with the functions assigned to each post. The staff is obliged to keep secret any personal data of which they acquire knowledge in the performance of their task.*

Another legal basis worth mentioning is the Royal Decree 1074/2015 of 27 November. This Royal Decree amends some aspects related to the data to be stored in the Supply Points Information System or “Sistema de Información de Puntos de Suministro” (SIPS) which is regulated by Article 7 of the Royal Decree 1435/2002 setting the basic conditions for acquisition of energy contracts and access to low voltage grids. The SIPS is a database managed by the Distribution System Operators (DSOs). Only the National Regulatory Authorities (NRA), the National Securities Market Commission (CNMC), and energy suppliers are able to access to this database.

In this context and following the Directive 2002/58/EC, the pilot trials participants will be informed and agree for the data that will be collected. Additionally, the data minimization policy, described in Section 2.2.1, will be followed. Finally, no data will be used outside the scope of the PLUG-N-HARVEST project. Further information can be found at the webpages of Agencia de Protección de Datos ([www.aepd.es](http://www.aepd.es)) and Fundación Española para la Ciencia y la Tecnología ([www.fecyt.es](http://www.fecyt.es)).

#### 2.2.5 *Greek-pilot legislation*

Greek pilot trials which will take place in Grevena, Greece have to comply with the Greek legislation “Law 2472/1997 and its amendment by Law 3471/2006 of the Hellenic Parliament”. According to these laws:

- The regulatory authority in Greece is the Hellenic Data Protection Authority<sup>18</sup>.
- Any use of electronic communications services offered through a publicly available electronic communications network, as well as the pertinent traffic and location data, as described in art. 2 of the present law, shall be protected by the principle of confidentiality of telecommunications.
- The storage of data or gaining access to information already stored in the terminal equipment of a subscriber or user is only allowed if the specific subscriber or user has





given his/her consent following clear and detailed information, according to art. 11, par. 1 of law 2472/1997, as effective. The consent of the subscriber or user can be given by means of appropriate settings in the web browser or by means of another application.

- The processing of personal data, must be limited to those absolutely necessary to serve the purposes thereof.
- The processing of personal data is only allowed if:
  1. The subscriber or user has given consent upon notification as to the type of data, the purpose and extent of the processing, the recipients or categories of recipients, or
  2. The processing is necessary for the implementation of the agreement to which the user or subscriber is a party, or the measure-taking, during the pre-agreement stage, following an application by the subscriber.
  3. In cases where the present law requires the subscriber's or user's consent, the relevant statement is given in writing or by electronic means. In the latter case, the controller ensures that the subscriber or user acts in full awareness of the consequences of his/her statement, which is recorded in a secure manner, can be accessed by the user or subscriber at any time and can be withdrawn at any time.
  4. The design and selection of technical means and information systems as well as the equipment for the provision of publicly available electronic communications services must be performed with the processing of the minimum personal data as the main criterion.
  5. The provider of publicly available electronic communications services must enable the use and the payment of services anonymously or by pseudonym, to the extent that this is technically feasible and subject to law 3783/2009 (Official Gazette A' 136/7.8.2009), as effective. In case of a dispute, the National Telecommunications and Postal Services Committee (EETT) shall deliver an opinion on the technical feasibility of paying these services anonymously or by pseudonym.
- Subject to article 10 of law 2472/1997, as effective, by the measures of the present article at least: a) it is ensured that only authorized personnel and for lawfully approved purposes shall have access to personal data, b) the stored or transferred personal data are protected against accidental or unlawful destruction, accidental loss or alteration and unauthorized or unlawful processing, including storage, access or disclosure and c) the application of security policy in relation to the processing of personal data is safeguarded. Relevant special provisions and regulations of Independent Authorities continue to apply.

By following the principals described in Section 2.2.1, PLUG-N-HARVEST fully complies with laws 2472/1997 and 3471/2206 of the Hellenic Parliaments. Finally, note that the law 3471/2206 is the incorporation of the Directive 2002/58/EC.

### 2.3 Ethical & Social Issues

The PLUG-N-HARVEST project will follow the opinions and recommendations of various expert committees in the field, such as the European Group on Ethics (EGE), in science and new technologies to the European Commission. In addition, all national legal and ethical requirements of the Member States, where the research is performed will be fulfilled. Any data collection involving humans will be strictly held confidential at any time of the research. In more detail, the



following principals will be implemented:

- all the test subjects will be informed and given the opportunity to provide their consent to any monitoring and data acquisition process. In other words, all the subjects will be volunteers and all test volunteers will receive detailed oral information;
- no personal or sensitive data will be centrally stored. In addition, data will be scrambled where possible and abstracted in a way that will not affect the final project outcome.

Moreover, in order to ensure that the participants are fully aware of the objectives and progress of the project, as well as their rights, they will receive in their own language:

- a commonly understandable written description of the project and its goals;
- the planned project progress, as well as the related testing and evaluation procedures;
- advice on unrestricted disclaimer rights on their agreement.

On the other hand, the EAB will scrutinize the research, to guarantee that no undue risk for the user, neither technically nor related to the breach of privacy, is possible. Thus, the consortium shall implement the research project in full respect of the legal and ethical national requirements and code of practice. Whenever authorisations have to be obtained from national bodies, those authorisations shall be considered as documents relevant to the project. Copies of all relevant authorisations shall be submitted to the Commission prior to commencement of the relevant part of the research project.

The main procedures for the data collection within PLUG-N-HARVEST project, so as to be conformed to the ethical rules and standards of H2020 will be:

- For each of the pilots, permission from the national data protection authorities, namely German Federal Data Protection Authority, Spanish Data Protection Agency and Hellenic Data Protection Authority, and, will be acquired to collect the necessary data. The permissions will clarify that no personal or sensitive information will be collected.
- A consent form (depicted in Section 2.5.2) signed by individuals that will voluntarily declaring their consent to participate in each of the pilot use cases.

This methodology guarantees that:

- All the participants are fully informed of the data that will be collected;
- No sensitive data will be distributed outside the PLUG-N-HARVEST project; and
- All the partners of PLUG-N-HARVEST will have access to the data necessary for the completion of the research.

## 2.4 PLUG-N-HARVEST Ethical Advisory Board

PLUG-N-HARVEST Ethical Policy is based on the guidelines of expert committees in the field (e.g. the European Group of ethics in science and new technologies of the European Commission (EGE)). It is within the PLUG-N-HARVEST Consortium scope to ensure that those guidelines were diffused to all involved parties and were appropriately adopted. To this end, the PLUG-N-HARVEST internal Ethical Advisory Board (EAB) has been founded. The members of the EAB are provided in Table 1 which may be assisted by further external experts (or the commission), if necessary.

The PLUG-N-HARVEST EAB was established on month 3 and consists in a centralized service which provides constant advice about ethical and data protection issues that may arise during the project's lifecycle. The EAB has the responsibility for implementing and managing the ethical and legal issues of all procedures in the project, ensuring that each of the partners provides the necessary participation in PLUG-N-HARVEST and its code of conduct towards the Pilot participants. All technologies that will be developed and corresponding acquisition protocols will

be verified beforehand by the PLUG-N-HARVEST EAB regarding their impact to the business actors, as well as the end users. The board consists of at least one person per site and organization who will be responsible for identifying possible ethical issues, implementing the PLUG-N-HARVEST ethical policy, as well as providing solutions in ethical issues during the trials, and the ethics director, who will serve as the coordinator of the EAB.

**Table 1. PLUG-N-HARVEST Ethical Advisory Board**

Partner	Person	e-mail
CERTH	Dimosthenis Ioannidis (Ethics Director) Elias Kosmatopoulos	<a href="mailto:djoannid@iti.gr">djoannid@iti.gr</a> <a href="mailto:kosmatop@iti.gr">kosmatop@iti.gr</a>
RWTH (German pilot)	Tanja Osterhage	<a href="mailto:tosterhage@eonerc.rwth-aachen.de">tosterhage@eonerc.rwth-aachen.de</a>
CU (British pilot)	Hu Du	<a href="mailto:duh4@cardiff.ac.uk">duh4@cardiff.ac.uk</a>
ALUMIL	Alexios Matakos	<a href="mailto:a.matakos@alumil.com">a.matakos@alumil.com</a>
AIGUASOL	Toni Herena	<a href="mailto:toni.herena@aiguasol.coop">toni.herena@aiguasol.coop</a>
ODINS	Antonio Skarmeta	<a href="mailto:skarmeta@odin.es">skarmeta@odin.es</a>
SIE	Septimiu Nechifor	<a href="mailto:septimiu.nechifor@siemens.com">septimiu.nechifor@siemens.com</a>
ETRA	Álvaro Nofuentes	<a href="mailto:anofuentes.etraid@grupoetra.com">anofuentes.etraid@grupoetra.com</a>
ET	John Blower	<a href="mailto:johnblower@energytransitions.uk">johnblower@energytransitions.uk</a>
EIG	Maria Colantoni	<a href="mailto:m.colantoni@ecointelligentgrowth.net">m.colantoni@ecointelligentgrowth.net</a>
AHC (Spanish pilot)	Jose Pablo Rodriguez-Marín Anna Mestre	<a href="mailto:jpr-marin@gencat.cat">jpr-marin@gencat.cat</a> <a href="mailto:annamestre@gencat.cat">annamestre@gencat.cat</a>
RWM (Greek pilot)	Dimitrios Mavromatidis	<a href="mailto:d.mavromatidis@pdm.gov.gr">d.mavromatidis@pdm.gov.gr</a>
CCC (British pilot)	Gareth Harcombe	<a href="mailto:gharcombe@cardiff.gov.uk">gharcombe@cardiff.gov.uk</a>

Likewise, the EAB members will be the only ones to possess the key to re-identify the data collected in the pilot sites. Note that, in order to ensure that the national legislation of each pilot site will be taken into account, during the trials, each pilot site will have its own ethics committee and one person will be nominated per site as responsible for following the project's recommendations as well as the National and European legislations.

The EAB will advise the project Consortium on issues regarding data privacy, potential for infringement of human rights, and misuse of technologies developed. Additionally, the EAB will be provided with a clear mandate, whereas it is expected to provide support to the project



participants and training on ethical and privacy concerns to the research team at the offset of the project. By taking into account the European legislation and the national legislation of the countries, the EAB will additionally provide several guidelines and recommendations for the pilot sites, in which the pilot application scenarios will take place (Germany, United Kingdom, Spain and Greece).

## 2.5 Pilot Stakeholders

The target group of pilot stakeholders presents considerable distinctions, due to:

- Lack of technical background in the topics addressed by PLUG-N-HARVEST;
- Possible difficulties with English-written promotional materials;
- Possible concerns about personal privacy and disturbance of normal activities, during the execution of the pilots;
- Dependence on their explicit consent and/or active participation;
- Possible difficulties to clearly understand the value proposition of their acceptance to participate in the pilots.

For the time being, the pilot recruitment process together with the methods and guidelines for delivering the informed consent will be presented. In a later version of this deliverable, along with project's evolvement, the nature of this target group will be discussed (identifying relevant subgroups), a plan for each of the subgroups will be defined and the necessary means of dissemination activities used in the pilots will be identified.

### 2.5.1 *Pilot participant recruitment process for the execution of the pilot use cases*

The PLUG-N-HARVEST Pilot Use Cases will involve existing habitants/employees/residents or visitors of selected buildings in each of the selected pilot areas along with volunteers wishing to participate in some of the envisioned Pilot Use Cases. All people that will be actively participating and/or being affected by the execution of each of the Pilot Use Case, will take part in a thorough recruitment and informed consent procedure, that will be particularly stringent to ensure no coercion (not even soft or indirect) is exerted. The specific criteria for the selection of the volunteer participants will be determined by the pilot requirements, while there will be participants with various roles.

Furthermore, specific measures to protect the participants from a breach of privacy/confidentiality and potential discrimination will be applied, as it follows:

- **Confidentiality:** The names of the employees participating in the pilots will be never revealed in any document and their participation will not be communicated to other pilot participants. As already stated above, all personal data stored during the pilot trials will completely and irreversibly anonymised and will be erased at the completion of the PLUG-N-HARVEST project. As an absolute minimum anonymised process, data will not contain any of the following, or codes for the following:
  - Participant's name, address, phone/fax. number(s), e-mail address, full postcode;
  - Any identifying reference numbers, photographs, information about relatives.
- **Right to get more information about the pilots:** The pilot participants will be able to ask any questions about the pilot trials at any time throughout the pilot realisation phase. The corresponding pilot site responsible partner will be available to answer any questions, interests or concerns about the pilot trial executions. During the pilot executions, each of the pilot participants will have the right to withdraw from the trials at any time, without having to give any explanation and without being affected in any way.

- **Informed Consent:** A detailed informed consent form will be carefully prepared for each pilot site, fully outlining the scope of the trial and its purposes along with the data collected and analysed. Note that the template of the informed consent form is provided in Section 2.5.2. This form will be shared to all the participants.

### 2.5.2 Methodology & Guidelines for the delivery of informed consent

The consent procedures will be carefully determined and managed by Pilot-Specific Work Package (WP4) that will manage the Use Cases which will be performed in selected pilot areas. Thus, it will require the enrolment of people voluntarily declaring their consent to participate in each of the Pilot Use Cases. However, the design of the observational study will be prepared in strict collaboration with the EAB of the PLUG-N-HARVEST consortium, in order to respect privacy and ensure ethical issues implied by the data to be collected and analysed. In particular the consortium will take the appropriate action for excluding that:

1. data can be collected without the explicit informed consent form of people under observation; no person (children and/or adults) unable to express a free and informed consent for age-related reasons, ongoing medical and/or psychological conditions, mental incapacity, will be enrolled in the study;
2. data collected may be sold or used for any different purposes from the PLUG-N-HARVEST project;
3. any data, which is not strictly necessary to accomplish the current study, will be collected; data minimisation policy will be adopted at any level of the project and will be supervised by the ethical/privacy component of the project;
4. any shadow (ancillary) personal data obtained in the course of the observation will be immediately cancelled. However we plan to minimize as far as possible this kind ancillary data. Special attention will be also paid to comply with Council of Europe's Recommendation R(87)15 on the processing of personal data for police purposes, Art.2:

*“The collection of data on individuals solely on the basis that they have a particular racial origin, particular religious’ convictions, sexual behaviour or political opinions or belong to particular movements or organisations which are not proscribed by law should be prohibited. The collection of data concerning these factors may only be carried out if absolutely necessary for the purposes of a particular inquiry.”*

Some sessions between technical and ethical components of the project will be devoted to this.

The consent procedure for the pilot use case realisation at each of the selected pilot sites will be obtained through a two-stage procedure:

1. Initially each pilot leader will orally present the pilot to people that will be involved, carefully describing the level of privacy infringement that the execution of each of the pilot realisation involves. In case someone wants to exercise his/her Right Not to Know personal research results, he/she will be excluded from the pilot.
2. Then, after a few days, subjects will be required to read and sign an informed consent form that will explain in both plain English and in local language what the trial leader has already orally explained. The informed consent forms in English and in local language to be used will be sent to the European Commission and included in the experimental protocol.

A template of such a consent form, to be adopted as required per pilot use case, is provided on the next page.



## Consent Form

### Project Purpose

- *A commonly understandable written description of the project and its goals even for people that are not familiar to the project scope (2-3 paragraphs)*

### Project Progress Schedule

- *The progress schedule of the project and the related testing and evaluation procedures (1-2 paragraphs)*

### Disclaimer Rights

- *Advice on unrestricted disclaimer rights on their agreement.*

### Voluntary Participation Form

#### 1. General Information

- *Participant basic information*
- *ID (reference code) of the participant, which will be used throughout the pilot trial execution)*

#### 2. Study Information

- *Details about the Pilot Use Case*

#### 3. Participant's Questionnaire

*Questions verifying that he/she:*

- *has been fully informed on the purpose, duration, procedures of the study;*
- *has been informed on the rights to deny participating or to quit from the study and about the corresponding consequences;*
- *has been informed on the contact person in case that he/she has questions and queries about the study;*
- *had adequate time to make his/her decision concerning his/her participation in the study;*
- *comprehend that he/she can quit from the study at any time without having to justify his/her decision;*
- *has been informed about potential effects, difficulties and dangers;*
- *has been informed about the sensors equipment that will be used to collect data;*
- *has been informed about the security of the study data and results;*
- *has been ensured about the confidentiality of his/her personal information. Publications of the study results do not allow the personal data recognition, due to the principle of anonymity. Always under the confidentiality principles.*

#### 4. Signed Consent to Participate

- *A signed consent of the participant allowing the study responsible to examine and inspect the data collected during the study.*



Furthermore, all End Users participating in the pilots will be informed about project’s objectives and challenges through the brochure and the flyer (translated also in local language upon request) which will be distributed and presented in Figure 2 and Figure 3.



**PLUG-n-HARVEST Approach Vs. Existing Approaches**

Approach	Installation Costs	Operational Costs	Energy Life Reduction	Energy Harvesting (Renewable and Self-Generation Exploitation)
Plug-n-Harvest	MEDIUM to LOW	ALMOST-ZERO	HIGH	HIGH
Advanced ADBE systems	HIGH	MEDIUM	HIGH	HIGH
Building Automation	MEDIUM	MEDIUM	LOW-MEDIUM	LOW-MEDIUM
Conventional Renovation	HIGH	ZERO	HIGH	NO

**Plug-n-Harvest is a 4-year project, funded by the EU's Horizon 2020 programme.** The main strategic goal of the P-n-H is to design, develop, demonstrate and exploit a new modular, plug-n-play concept/product for ADBE (Adaptable/Dynamic Building Envelopes) – deployable to both residential and non-residential buildings – which is able to provide high (Maximum possible) energy use reductions and high (Maximum possible) energy harvesting from RES (Renewable Energy Sources) both at the single-building and the district scale while requiring medium-to-low installation costs and almost-zero operational costs.

**Four Different Pilots**  
Buildings - located in Germany, Spain, Greece and the U.K. - will be used for demonstrating and evaluating the use of the integrated P-n-H system in full-scale, on a 24/7 basis and for a long period, so as to be able to evaluate its performance under all different real-life scenarios. The individual P-n-H components will be validated against their requirements and various KPIs-including occupants comfort and satisfaction while the overall solution will be evaluated for its acceptance by its intended user, and for its impact on the involved business models.

**ADBE**  
The novel Adaptive/Dynamic Building Envelope (ADBE) designs are able to transform the static building envelope into "an active, adaptive skin that interacts with the external environment and strongly influences the building energy performance and indoor comfort", by continuously and proactively reacting to outdoor and indoor environment conditions and facilitating and enhancing the exploitation of renewable and storage sources

**IMCS**  
The ADBE system is connected and managed by a highly Intelligent Control and Management System (IMCS) which controls all different elements of the ADBE in a very intelligent and delicate manner. Due to the efficient operation of ADBE by the IMCS, P-n-H delivers significant advantages towards the **Installation & Operation Costs, Energy Harvesting & Use** comparing with the existing state of the art approaches

**OEMS**  
The ADBE system is connected and managed by a highly intelligent control and management system at District Level: A Modular, Interoperable and Scalable Plug-n-Play Optimal Energy Management System (OEMS) at the District/Grid Level, enables the optimal coordination and cooperation between: (a) the different P-n-H buildings (b) the different P-n-H Buildings and the different energy networks (electricity network, heating/cooling, domestic hot water, etc), towards the optimal coordination of the energy flow within the district.

**PLUG-n-HARVEST**  
Plug-n-play passive and active multi-modal energy Harvesting systems, circular economy by design, with high replicability for Self-sufficient Districts & Near-Zero Buildings

**A** P-n-H proposing an attractive solution to every building owner (even low-income building owners) and enable its massive implementation by: **The use of reusable, non-toxic and recyclable materials and components, specifically for the ADBE systems:** P-n-H solution could be placed and removed after some years, being continuously updated, while the "removed" items can be recycled/re-used

**B** The **Low-cost installations for the IMCS**

**C** The guaranteed **maximum energy reductions and maximum energy harvesting**, owed to the use of the smart and adaptable to all conditions control system (IMCS), which enables to establish a clear and transparent payment model for every investor.

**D** The **Plug-n-Play** district dimension of P-n-H enables different modules of the solution to be installed in different buildings types

**E** The introduction of a **self-learning & self-adaptable** low cost technology which is able to **co-operate with already established energy networks** as those of heating, cooling, hot water, maximising the harvesting of renewable energy sources

**F** The establishment of a **circular economy, eco-friendly concept**, that integrates **different investment options** based on each building resident/owner income and economic capability profile

**G** P-n-H encompass **highly safe & secure** operations

Figure 2. PLUG-N-HARVEST brochure



Figure 3. PLUG-N-HARVEST flyer





### 3 Ethical Risks and Mitigation Strategies

Several considerations concerning the privacy and confidentiality issues could arise within the scope of PLUG-N-HARVEST project, even though the collected data do not introduce any critical ethical issue. These considerations are typical to Information and Communication Technology (ICT)<sup>1</sup> initiatives as well as on-site trials. An initial ethical risks description together with proposed countermeasures are listed in Table 2 below.

**Table 2. Mitigation strategies for Ethical Risk Items**

Risk description	Mitigation measures
Storage and process of occupant-related privacy data towards person localization and extraction of patterns and flows within selected pilot tests.	For humans, localization privacy-preserving sensors will be utilized and data processing will be performed in a totally anonymous and unobtrusive manner. Also, the provided identification tags will be assigned to roles (e.g. occupant, workers, etc.) and not to particular (named) people. Any original records or data will be destroyed after that, if this is not forbidden by law of the country in which the information was collected, stored and analysed. Issues of privacy will be addressed with emphasis at the elicitation of requirements.
Difficulties in ensuring the security of shared personal/ private data in the pilot tests.	Special attention will be given to ensure confidentiality and for incorporating Privacy Enhancing Technologies (PET) such as data anonymization & pseudonymization to ensure protection from data breaches. PLUG-N-HARVEST partners have proven capacity and the experience to cope with the delivery of advanced security mechanisms, if needed.
Difficulty in ensuring the security of human data collected during the execution of the trials.	PLUG-N-HARVEST partners have the expertise and the know-how from similar past and ongoing research projects, towards providing the necessary ethical guidelines that should be adopted during the execution of the pilots. Pilot-related ethical responsible members (and the National committees, if considered necessary) will be formed by each responsible partner and will be informed towards getting an official permission for the execution of the selected Pilots. Thus, the



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	<p>respective test's transparency will be maximized.</p>
Lack of transparency	<p>The Ethical Advisory Board will provide the necessary documents (e.g. ethics manual) in order to minimize this risk (as well any other similar that may arise during the project lifetime) and being in compliance with National and European legislation. A detailed informed consent form will be carefully prepared for each pilot site by the local ethical committees, fully outlining the scope of the trial and its purposes along with the data collected and analysed.</p>
Delegation of Control Privacy. Incidental Findings	<p>Within the project a sub-activity has been included to address local and European legislation. In that context, all the Pilot Use Cases will be performed according to them and relevant data protection authorities will be informed on time.</p>
Improper use of IT equipment	<p>The consortium partners have the expertise to make the appropriate installation for the purposes of the pilots. Data routing equipment that will be used already has reliable embedded security mechanisms. In addition, most of the partners have participated in several National and European projects related to integration of sensors for research purposes and their use in ethical compliance with National and European legislations. The PLUG-N-HARVEST Ethical Advisory Board will monitor pilot realization ensuring the appropriate use of IT equipment.</p>



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## 4 Conclusions

This document has presented the ethical scope of PLUG-N-HARVEST, as well as the procedure followed in order to identify the potential ethical risks that may occur during the development of the project and its data collection, storage, and process phases. Furthermore, contingency plans have been proposed in order to avoid possible negative risk impacts.

With respect to the European laws for Human Rights and the National laws for Ethics, the PLUG-N-HARVEST framework introduces innovative ideas proposing new technologies. To that direction, an Ethical Advisory Board has been established in order to procure necessary information to any concerned party, but also to observe the compliance of the PLUG-N-HARVEST project with the documented ethical and social policy and monitor the preparation and realization of the pilots.

Finally, the pilot ethical methodology has been described, which guarantees that all the PLUG-N-HARVEST partners will have access to the data necessary for the completion of the research, while at the same time no sensitive data will be distributed outside project's scope. Ethical monitoring will be examined thoroughly throughout the project lifetime. This deliverable is an ongoing document that is being evolved along with the project progress and will be regularly updated to reflect up-to-date information.



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