

Innovation Action



inteGRIDy

integrated Smart GRID Cross-Functional Solutions for
Optimized Synergetic Energy Distribution, Utilization
& Storage Technologies

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WP10 – Project Management

**D10.15 – inteGRIDy Data Management Plan
(Updated)**

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Abstract:	This is an updated version of D2.3, D2.4 and D10.14 documents. It encompasses the elaboration of the Data Management Plan (DMP) for the participation to the 'Pilot on Open Research Data in Horizon 2020', comprising of (i) handling of research data during & after the project (ii) what data will be collected, processed or generated (iii) what methodology & standards will be applied and (iv) whether data will be shared /made open access/ how data will be curated and preserved. The DMP is implemented across other WPs, based on data delivered. This report also includes the analysis of the cyber security & privacy issues in the context of each of the demonstration sites countries, taking into account guidelines for appropriate security measures for smart grids published by European Network and Information Security Agency.
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Executive Summary

inteGRIDy is a H2020 innovation action European demonstration project and aims to integrate cutting-edge technologies, solutions and mechanisms in a scalable Cross-Functional Platform connecting energy networks with diverse stakeholders, facilitating optimal and dynamic operation of the Distribution Grid (DG) fostering the stability and coordination of distributed energy resources and enabling collaborative storage schemes within an increasing share of renewables.

This report is an updated Data Management Plan (DMP), and is part of the 'Pilot on Open Research Data in Horizon 2020', comprising the following:

- Handling of research data during and after the project.
- What data will be collected, processed or generated.
- What methodology & standards will be applied.
- If data will be shared /made open access/ how data will be curated and preserved.

In order to ensure that the above criteria are fulfilled and on the onstart of the project, a data set template has been created and distributed to all work package (WP) tasks leaders. The description of project datasets is classified according to the work package and specific tasks. See section 3.

Furthermore, this DMP includes sections (2.2, 2.3, and 2.4) on cybersecurity and privacy issues in the context of each of the demonstration sites countries, taking into account guidelines for appropriate security measures for smart grids published by European Network and Information Security Agency. A cybersecurity survey has been designed and conducted. Accordingly, a cybersecurity and privacy template has been created and distributed to all pilots' demonstration sites in the eight countries. The survey results has been analysed and colour coded according to level of awareness in the following five categories:

- datasecurity in terms of acquisition, transmission, storage and access,
- personal data, in terms of acquisition and sensitivity,
- data Privacy in acquisition transmission, storage and access,
- Auditing, in terms of mechanisms used or available to record data processing and handling operations
- Certifications in terms of applicable standards and sought certifications already in place or are imminent.

A summary of the analysis of the cybersecurity and privacy survey are shown Table 17 in Section 2.4.1.

Section 1.5 of this report includes updates to the previous DMP in terms of refined project datasets. The update has been done in order to set the focus on pilot datasets, as main source of investigation and critical point for assessing security and confidentiality. Therefore, just WP6 and WP7 datasets are kept in this report. All other general purpose datasets for other WPs are detailed in previous versions [IND14].

This report has been developed following the Horizon 2020 guidelines [ECD17] with additional guidance from the UK's Digital Curation Centre [DCC17], via the web resource DMP Online <https://dmponline.dcc.ac.uk/>, and the joint OpenAIRE and EUDAT webinar "How to write a Data Management Plan" [OAE16].

The DMP is implemented across other WPs, based on data delivered. The DMP will be updated throughout the life cycle of the project.

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List of Acronyms and Abbreviations

Term	Description
ADAE	Authority for Communication Security and Privacy
ADSL	Asymmetric Digital Subscriber line
AEPD	Spanish Data Protection Agency
AMI	Advanced Metering Infrastructure
ANSSI	Agence Nationale de la Sécurité des Systèmes d'Information
APN	Access Point Name
ARRA	American Reinvestment and Recovery Act
AWS	Amazon Web Services
B PLC	Broadband Power Line Communications
BSA	Business Software Alliance
CC	Common Criteria
CC0	Creative Commons No Rights Reserved licence
CC-BY	Creative Commons Attribution International licence
CCN	National Cryptologic Center
CDN	Content Delivery Network
CERTs	Computer Emergency Response Teams
CESTI	Centre d'évaluation de la sécurité des technologies de l'information
CLEF	Commercial Evaluation Facilities
CMP	inteGRIDy's Cross Modular Platform
CHP	Combined Heat and Power
CNRI	Corporation for National Research Initiatives
CNIL	Commission Nationale de l'Informatique et des Libertés
CNPD	Electricity Sector Information Sharing and Analysis Center
COFRAC	Comité français d'accréditation
CSIRTs	Computer Security Incident Response Teams
DCC	Digital Curation Centre
DG	Distribution Grid
DMP	Data Management Plan
DPA	Data Protection Authority
DOE	Department of Energy
DRAS	Demand Response Automation Server
EAC	Electricity Authority of Cyprus
ECCDIS	Electronic Chart Display and Information System
EECSP	Energy Expert Cyber Security Platform
EISA	Energy Independence and Security Act
E-ISAC	Electricity Sector Information Sharing and Analysis Center
ENISA	European Network and Information Security Agency
FOSS	The Research Centre for Sustainable Energy (Cyprus University)
GDPR	General Data Protection Regulation
GPRS	General Packet radio Service
GSM	Global Mobile Communication

HAN	Home area Network
HDPa	Hellenic Data Protection Authority
HTTPS	Hypertext Transfer Protocol for secure communication
HUB	Home User and Business
IoT	Internet of Things
IMS	Information Management System
IP	Internet Protocol
IPSEC	Internet Protocol Security
ICS	Industrial Control Systems
LTE	Long Term Evolution
LV	Low Voltage
KPI	Key Performance Indicators
MAC	Media Access Control
MDMS	Meter Data Management System
MQTT	Message Queue Telemetry Transport
MySQL	My Structural Query Language
NDA	Non-Disclosure Agreement
NB_PLc	National board Power Line Communication
NERC	North American Electric Reliability Corporation
NIS	Network and Information Systems
NIST	National Institute of Standards and Technology
NRAs	National Regulatory Authorities
OA	Open Access
OT	Operational Technology
PII	Personally Identifiable Information
PLC	Power Line Communication
PURPA	Public Utility Regulatory Policie
PV	Photovoltaic
RADIUS	Remote Authentication Dial-In User Server/Service
RES	Renewable Energy Source
REST	Representational State Transfer
RMP	Risk Management Plan
SG	Smart Grid
SM	Smart Meter
SNMP	Simple Network Management Protocol
SOC	State of Charge
SSH	Secure Shell
SSL	Secure Socket Layer
TCP	Transmission Control Protocol
TSO	Transmission system Operator
UKAS	United Kingdom Accreditation Service
VLAN	Virtual Local Area Network
WP	Work Package
4 G	Fourth Generation broadband cellular network

1.Introduction

1.1 Scope and objectives of the deliverable

inteGRIDy is a H2020 funded innovation action project. inteGRIDy aims to integrate cutting-edge technologies, solutions, and mechanisms in a scalable Cross-Functional Platform connecting energy networks with diverse stakeholders, facilitating optimal and dynamic operation of the Distribution Grid (DG), fostering the stability and coordination of distributed energy resources and enabling collaborative storage schemes within an increasing share of renewables. This Data Management Plan (DMP) outlines how data collected or generated by the inteGRIDy project will be organised, stored, and shared. It specifies which data will be open access and which will be confidential within the consortium, as far as it is possible to do so at this stage. Additionally, abidance to regulation for privacy and cybersecurity will be analysed in the context of each of the demonstration sites countries taking into account guidelines for appropriate security measures for smart grids published by European Network and Information Security Agency.

The first audience for this report is internal; there are thirty partner organisations participating in inteGRIDy working on ten demonstrations sites in eight countries across Europe. The DMP will establish consistent practices between partners to increase the efficiency and robustness of data handling during delivery of the project.

The second audience for this report is the community of researchers, engineers, and facility managers interested in energy use in the built environment, particularly at its intersection with the wider energy system.

1.2 Structure of the deliverable

The report begins by outlining its purpose, intended audiences, and the process for ongoing development. Section 2 outlines approaches to data management in terms of data storage and sharing as well as cyber security and privacy. The former describes the concepts of open access publishing and open access data in scientific research and the latter analyse privacy and cyber security. Related issues such as a classification for project datasets and an overview of copyright licensing for open access are then discussed. Each project dataset is then described in detail in Section 3 using a standardised template. Finally, conclusions are drawn and references presented.

1.3 Relation to Other Tasks and Deliverables

The DMP was initiated in WP2 Task 2.3 and then transferred to WP10 to continue updating it beyond M12, as WP2 finalized at that deadline. WP10 is currently in charge of updating the datasets used in WPs as they are evolving.

This way, this Data Management Plan report relies on its previous three issues, namely D2.3 [IND23] (Released in June 2017), D2.4 [IND24] (updated in December 2017) and D10.14 (updated in June 2018).

All WPs directly contribute to the implementation of the DMP with partners responsible according to their relevant activities.

1.4 Updating the Data Management Plan

An initial version of the DMP, prepared at the outset of the project, was delivered in M6, M12 and M18. This updated version of the DMP contains some changes due to inclusion of the followings:

- Inclusion of the dataset analysis done at D1.6 (final reference architecture) [IND16] level
- Specification of datasets per pilot as main input

Previous issues of this report were describing various sources of data being used. This entailed the description of data for desktop research and report publication. Nevertheless, the main source and the most restrictive and subject to analysis scenario for inteGRIDy consists on the data associated with pilots. This include data collection, processing and generation by the inteGRIDy small and large scale pilots, that is, WP6 and WP7. All other WP dataset general descriptions can be seen on previous vesions of this report [IND14].

The final DMP report will be updated in M48. A public version will be released in month 46 for the final review. Following the Horizon 2020 guidelines (EC DG R&I, 2017) and recommendations of the UK's Digital Curation Centre (DCC, 2017), **this review will pay particular attention to enabling reuse of the datasets.**

Specifically, it considers updating the details of the following aspects:

- **how discoverable and identifiable the datasets are**
- **what licenses and/or restrictions are applicable to the accessible datasets**
- **whether or not the datasets are intelligible to third parties for scrutiny and peer review**
- **if the datasets will be useable by third parties for the indefinite future**
- **to what extent the datasets are formatted to community standards to be interoperable between researchers, institutions and organisations**

The final review, at the close of the project, will fine-tune the DMP to fully reflect the final project outputs, relevant communities, standards, and uses identified by the consortium.

1.5 Data Availability and Open Access

Open access (OA) refers to the free, online provision of re-useable scientific information to other users. There are many good reasons to make the data and findings from publically funded research openly available to the research community, the commercial sector, and civil society.

As the “Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020” [ECD17] outline, more open access to scientific publications and data serves a number of purposes. It will i) improve the quality of research by building on a stronger body of existing work, ii) increase efficiency of research by reducing duplication of effort, iii) bring innovations to market quicker by reducing barriers to information flow, and iv) enhance the transparency of scientific progress. There is also the economic and ethical principle that information that has been paid for with public money should not have to be paid for again when it is required for use by other researchers, industry, or citizens.

As outlined above, the first decision to be made in research dissemination is whether to publish research findings or to protect some aspects for commercial exploitation. The Draft IPR Management Report (D9.6), led by SIEMENS to be delivered in M18, updated M30 and M48, will outline the key datasets, outputs and processes that will determine the path for different aspects of the inteGRIDy project.

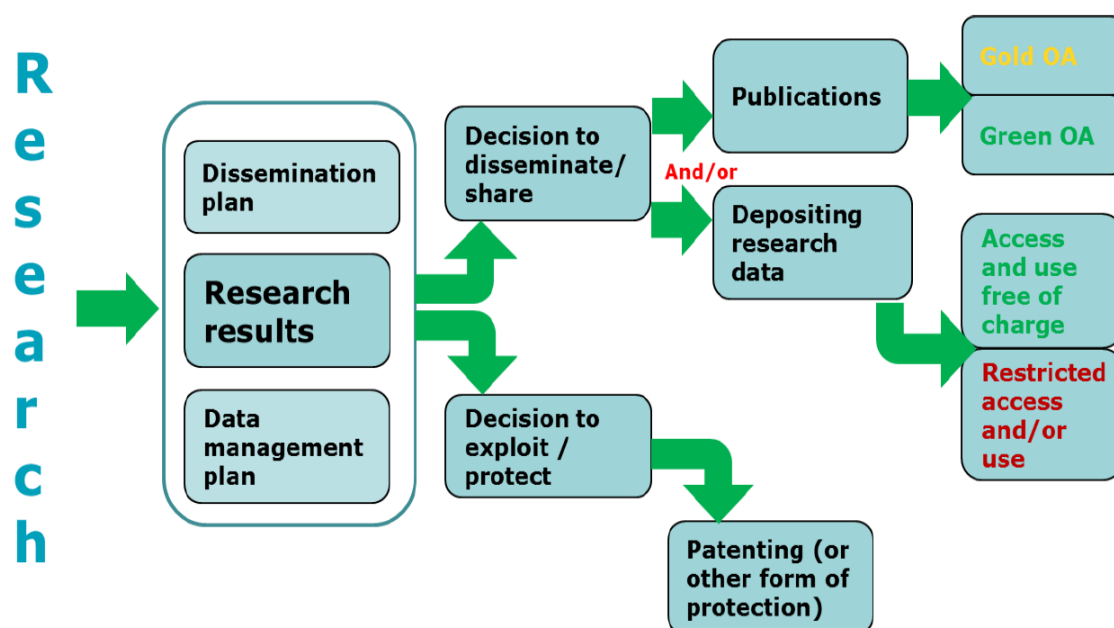


Figure 1. Open access to scientific publication and research data in the wider context of dissemination and exploitation (Reproduced from ECD (2017) H2020 programme guidelines on Open Access to scientific publication and research data in H2020)

Then the process will for each exploitable result, guide ER managers and any jointly involved partners through the steps outlined in Figure 1. Where necessary, patent searches and the clarification of each partners' legitimate interests in relation to the project outputs will be performed, and IPR agreements between partners, prior to dissemination of findings, will be introduced. The Exploitation Plan (interim version) D9.6, M18, has clarified these findings and ultimately lead to the final Exploitation Plan, D9.7, at the close of the project in M30.

1.5.1 Classification of Data Availability

Data availability is therefore categorised at this stage in one of three ways:

- **OpenData**, that is shared for re-use or that underpins a scientific publication.
- **Consortium**, Confidential data that is accessible to all partners, but retained within the consortium and subject to the project Non-Disclosure Agreement (NDA).
- **Private**, data that is maintained by an individual partner for their own purposes.

Much of the data gathered by the project is for the purpose of project management and delivery rather than new knowledge creation; it is therefore likely that much of the data is categorised as Consortium. However, the project will seek to openly disseminate its research findings, except in cases where there are defined exploitable outcomes, privacy concerns or there will be a high administrative burden for a dataset or limited worth to other users. The two main aspects of this dissemination approach are open access to scientific publications and open access to research data. Each one is considered in the following sections.

1.5.2 Open Access publishing

Open access publishing is essentially defined as the free availability of peer-reviewed scientific publications for any user. There is no single legal definition in the context of H2020 but the inteGRIDy Grant Agreement specifies that each beneficiary must ensure open access (free of charge online access for any user) to all peer-reviewed scientific publications relating to its results. In particular, it must:

- As soon as possible and at the latest on publication, deposit a machine-readable electronic copy of the published version or final peer-reviewed manuscript accepted for publication in a repository for scientific publications;

Moreover, the beneficiary must aim to deposit at the same time the research data needed to validate the results presented in the deposited scientific publications.

- Ensure open access to the deposited publication - via the repository - at the latest:
 - on publication, if an electronic version is available for free via the publisher, or
 - Within six months of publication (twelve months for publications in the social sciences and humanities) in any other case.
- Ensure open access - via the repository - to the bibliographic metadata that identify the deposited publication.

The bibliographic metadata must be in a standard format and must include the following:

- the terms “*European Union (EU)*” and “*Horizon 2020*”;
- the name of the action, acronym and grant number;
- the publication date, and length of embargo period if applicable, and
- a persistent identifier.

To achieve this, we will use both “green” and “gold” open access routes. “Green” open access, or self-archiving, is the release of a final peer reviewed manuscript through an online repository, possibly after an embargo period, whereas “gold” open access relates to open access publishing.

Atos is committed to ensuring that the outputs of its research are readily accessible and will provide the Atos online repository and portal (inteGRIDy.atosresearch.eu). Atos proposes to host all the scientific publications arising from inteGRIDy project, with the consent of the authors and in compliance with other publishers’ policies.

All deposits in Atos repository will be assigned a persistent identifier registered with the Handle System, run by the not-for-profit Corporation for National Research Initiatives (CNRI) and authorized by the DONA Foundation.

Manuscripts will be deposited by authors in a timely manner, within three months of acceptance to a journal, and released to public access within one month, although in some cases publishers request an embargo period.

Gold open access is via traditional academic journals but shifts the fees for publishing from readers to researchers. One off charges, of the order of €2000 per paper, is usually levied at the time of acceptance.

inteGRIDy will make other public deliverables, such as technical reports, working papers and conference papers, which are not scientifically peer reviewed, openly accessible via the project website, www.integrity.eu, and other online research dissemination platforms such as ResearchGate and OpenAIRE’s Zenodo repository.

1.5.3 Open Data

inteGRIDy project has not been mandated to participate in the ‘Pilot on Open Research Data in Horizon 2020’ but has committed to do so voluntarily. The rationale is to open access of scientific publications; research integrity will be increased through transparency, impact will be greater through re-use, duplication of efforts will be reduced, and civil society will benefit from better value from its financial contribution.

There are four main aspects of open data summarised in the acronym FAIR [FOR16]:

- **Findable:** data has a unique, persistent ID, located in a searchable resource, and documented with meaningful metadata.



- **Accessible:** data is readily and freely retrievable using common methods and protocols, metadata is accessible even if the data is not.
- **Interoperable:** data is presented in broadly recognised standard formats, vocabularies, and languages.
- **Re-useable:** data has clear licences, and accurate meaningful metadata conformity relevant community standards and identifying its content and provenance.

The data management plan establishes how this approach will be realised in practice with the initial plan presenting an overview and detail will be provided in the interim and final reports as the work packages proceed.

Project datasets for dissemination will be open access by default, as a minimum to validate scientific publications. However, not all of the project work packages will produce datasets that are intended for public dissemination; much of the data created and stored during the project is for internal management and communication within the consortium only. Of the datasets intended to be open access some, such as those that identify residential users, may also require aggregation or anonymization for security or commercial reasons prior to release.

1.5.4 Copyright Licenses

When material is widely shared, copyright licences protect the authors of work and grant specific rights to publishers and others to use this work. The European Commission encourages authors to retain their copyright whilst disseminating it as open access. Creative Commons provides legal tools to enable open access in these circumstances, with CC-BY (Creative Commons Attribution International licence) and CC0 (Creative Commons No Rights Reserved licence) enabling re-use by third parties [CC16].

Where research findings are published in a journal or other scientific outlet there should be consideration of the copyright agreement with the publishers, which may involve an embargo period. Submission in Atos repository requires the author to agree to a non-exclusive distribution licence, and a Creative Commons licence may be added at this stage.

At this initial stage it is not possible to define the copyright arrangement for each project dataset. The most appropriate licencing arrangements for each of the project datasets will be investigated as they are better characterised by their respective work packages and the Management of Exploitable Results WP9. The mid-term and final data management plans will be updated to that effect.

2. Approaches to Data Management

As aforementioned, this report has been developed following the Horizon 2020 guidelines (EC DG R&I, 2017) with additional guidance from the UK's Digital Curation Centre (DCC), via the web resource DMP Online <https://dmponline.dcc.ac.uk/>, and the joint OpenAIRE and EUDAT webinar "How to write a Data Management Plan" [OAE16].

2.1 Data Storage & sharing

The project has five main data storage and sharing facilities according to the type of data and its intended accessibility.

- **Private.** Stored locally on organisational networks and assets, subject to institutional back up practices.
- **Consortium.** Atos IT services will host a common space which is secure, robust and accessible to all partners. Consortium data will be uploaded to this cloud storage for simple, secure access for all partners from within a web browser. Data is maintained with regular offsite backups.
- **Open.** Three facilities will be used during the project.
 - The project website <http://integrity.eu/> managed by Atos, will be the first point of contact for public dissemination. It will host project technical reports and other materials such as events listings, blog articles, images, videos, links to partner organisations and related projects.
 - Atos repository will make scientific publications indefinitely accessible and discoverable in the mode of "green" open access publishing.
 - Large, re-useable data sets will be deposited in an open data repository, e.g. Zenodo, selected by the task leaders during the delivery of the relevant work packages.

2.2 Cyber Security and Privacy

The smart grid consists of several domains including customer, market, service provider, bulk generation, operations, transmission and distribution domains [IEEE17]. The communications and control of devices in each domain include local area, wide area and field networks that manage transmission and distribution as seen in Figure 2. Premises networks that interface electric vehicles, smart meters (SM) and energy service interfaces with premises as well as the Internet of Things (IoT); enterprise buses that run within the operations domain; and internet/e-business networks running across domains to link markets, operations and service providers with the premises [DRA16].

These networks have to deliver communications and control information to the nodes they are interfacing, using a range of wired and wireless technologies including cable, short range radio, microwave and fiber optic links [IEEE13]. The quality of communication will depend on the chosen signalling format, the distance covered and the type of interface at the destination, as well as its resilience to cyber intrusion.

The combined technologies make the system vulnerable to cyber-attacks, increasing what is called the attack surface of the grid. In order to establish the security of communication and control signals, the two main requirements are,

- To guarantee authentication (who can talk to the device?) and
- To guarantee integrity (has the information been modified in transit?) [ANS17].

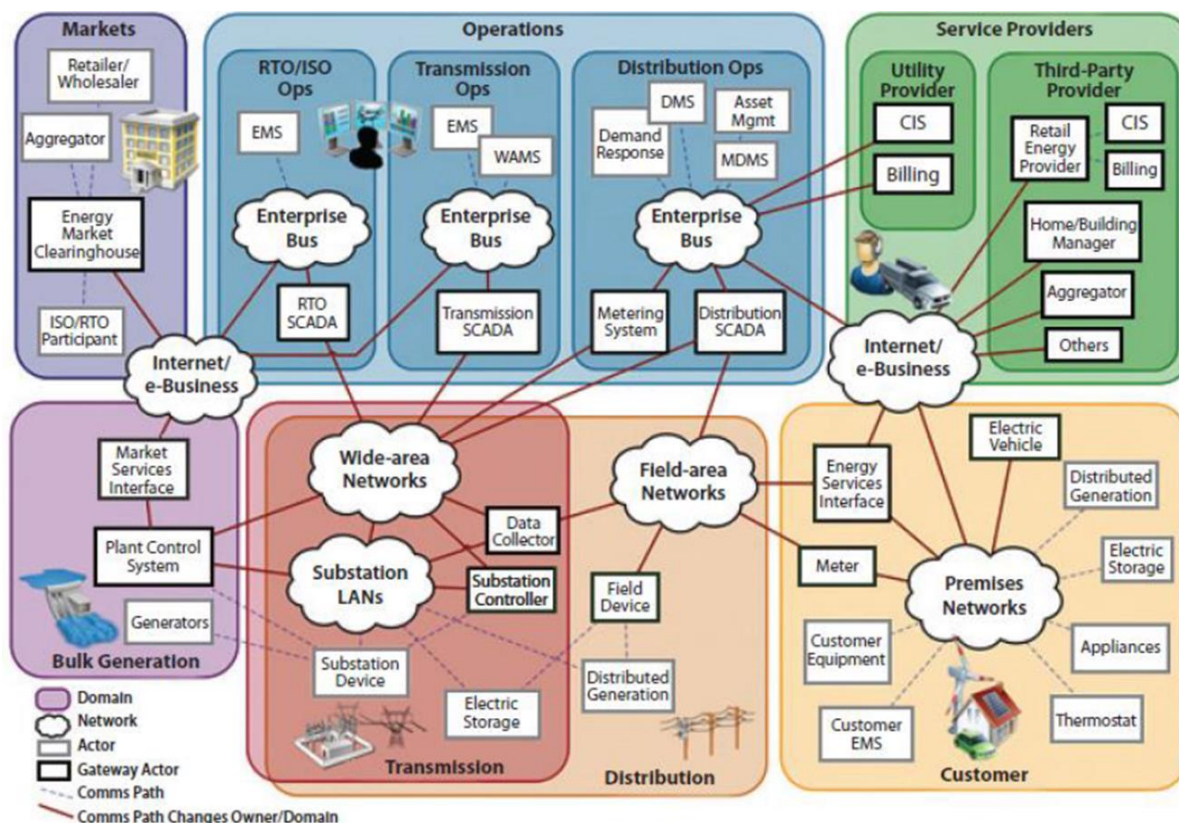


Figure 2. Communication networks linking the domains of a smart grid [DRA16]

Range of Distributed Energy Resource (DER) cyber-attacks can be diverse and may include Denial of Service (DOS) attacks to obstruction of commands that control the DER, interception/modification of monitoring traffic and compromising the functioning of DER devices.

The cybersecurity governance challenges are mainly due to [LAM16]:

- Lack of a standardised risk assessment approach exists across the sector.
- Widespread use of IT frameworks used for Operations Technologies (OT).
- Diverse array of current standards.
- Lack of use cases on how to apply standards.
- Increased risk from third parties as OT become more integrated.
- No single point of reference for ICS/OT security controls.
- Standards are geographic in nature and do not fit well in with some countries.
- Risk vs. Compliance based approaches to security.

In essence, there exists no definitive standard to guarantee the grid to function as a truly resilient, evolving network. In addition, the penetration of RES markets have been faster than the development of legal and regulatory policies.

The digital transformation or smartening of the EU energy grid is a result of significant EU initiatives on this matter, such as the 2015 Digital Single Market Strategy and the European Agenda on Security 2015 – 2020, which were built upon the 2013 Cyber Security Strategy of the European Union [EUR17, ENI14]. The decentralized and digitalized nature of smart grids reflects the ever-growing introduction of decentralized generation from renewable sources, electricity storage and electric vehicles into the energy distribution system under the support of ICT systems, which results in many opportunities within energy markets, as it includes

consumer across the energy value chain and increases the efficiency, reliability, flexibility and adaptability of the grid [DEC14]. This new scenario, which is deeply reliant on ICT systems and on the cyberspace, deepens the connections – hence the dependencies – of energy networks of the 28 EU Member States. Nonetheless, this growing dependency also makes the energy networks more prone to cybersecurity incidents, either intentional or not – e.g. the ones caused by natural disasters or by hacking attacks. On the other hand, the developments on data mining and machine learning have raised increasing concerns about the (mis)use of “sensitive” data derived, in particular, from energy usage consumption habits.

Until recently cybersecurity has been overlooked by the different energy network and market operators. Although most organizations now recognize the need to protect their assets (infrastructure) and respond to their client concerns there is still a long way to go. First of all, organizations have to understand that a security policy is not limited to complying with standards. The evolving technological landscape and the human factor involved make it mandatory to put in place a true security strategy, backed by a detailed plan and assessing tools, which have to be reviewed periodically.

This reality stems in part from the newness of regulatory frameworks that try to bring harmonized perspectives of the field but also from some technical challenges. The majority of infrastructure operators have to deal with legacy systems that have little or no provision at all for security protocols. On the other hand, of the spectrum, some of the more recent (Internet of Things) devices are also less than secure due to faulty implementations of the security mechanisms or inadequate deployment procedures.

2.2.1 Policy Development

The major policy developments for grid policies took place from 2007 as the US Congress issued the Energy Independence and Security Act (EISA) and Public Utility Regulatory Policies Act (PURPA) in order to establish grid modernization and encourage investment in smart grids (Table 1). In 2014, the Cybersecurity Framework Version 1.0 was announced by the National Institute of Standards Technology (NIST) to establish the regulatory issues of smart grid cybersecurity.

Given that cybersecurity incidents within the energy sector can impact vital energy services – e.g. electricity provision –, the tailoring of cybersecurity legislation within the EU is an essential matter at present [MEN17].

In light of this, the Commission has been diligently working to include cybersecurity within its new policy agenda, focusing on the collaboration between public and private sectors to enable information exchange and the creation of national cybersecurity agencies. Illustratively, in 2016 the EU adopted two key legislations towards a safer online environment, namely the Directive on Security of Network and Information Systems (NIS Directive) and the General Data Protection Regulation (GDPR), aimed at creating a homogenized cyber security and data protection framework across the 28 EU Member States [EUR17].

Table 1. Smart Grid Policy development history from 2004-2014

Year	Body	Act
2007	US Congress,	Energy Independence and Security Act (EISA) established grid modernization as a national policy. NIST coordinating development of a framework for interoperability of grid devices and systems. Public Utility Regulatory Policies Act (PURPA) allow state utility regulatory authorities to amend their policies on grid investment to include smart grid investments
2009	NIST	American Reinvestment and Recovery Act (ARRA) appropriated \$4.5 billion for grid modernization projects
2012	US Congress	Developed the electricity subsector cybersecurity Risk Management Plan (RMP) Guideline.
2014	DOE, NERC, NIST	NIST released its Cybersecurity Framework Version 1.0.

Specifically, the NIS Directive represents the first EU-wide legislation targeting the security of information networks and systems, encompassing in this way “operators of essential services”, such as search engines, cloud computing services, online marketplaces/businesses, and digital and financial market infrastructures, among others. Alongside, the GDPR – adopted in 2018 – relates to the protection of personal data, thus reinforcing citizen’s rights and facilitating companies’ business within the online environment. In this way, both legislations provide support to the implementation of the EU Digital Single Market [ENI14].

Complementarily, some organizations were established to provide further support on the implementation of these legislations. Illustratively, the European Network and Information Security Agency (ENISA) and the Computer Emergency Response Team for the EU institutions (CERT-EU), were created to ensure the smooth implementation of the NIS Directive. Additionally, the EU, together with DG Energy, through the Energy Expert Cyber Security Platform (EECSP) Expert Group, envisioning a strategy on cyber security for the energy sector in 2015 as a reinforcement to the NIS Directive.

In conclusion, developments on cyber security and data protection within the EU still present a high degree of market fragmentation, given the variation in how policies are implemented and technologies are developed in each of the 28 EU Member States. Nonetheless, it is expected that the NIS Directive, together with the entering into force of the GDPR in 2018, are going to address key points regarding this matter. Specifically, the new legislations are aimed at fostering information exchange and cooperation on cyber security problems at cross-border level, thus preventing cyber incidents, homogenizing the cybersecurity space, and increasing the resilience of its cyber environment.

2.2.1.1 EU Member-States’ Regulations and Legislations

Under the broad umbrella of the NIS Directive GDPR enacted by the EU, each Member State has adopted different procedures to address cybersecurity and data protection issues related

to the energy sector. In this sense, [ENI14] provides a comparative overview on the diverse ways in which the 8 EU Member States that are part of the InteGRIDy consortium have organized, adopted and executed their distinct standards on cybersecurity (i.e. security mechanisms and frameworks that focus on interoperability or certification aspects), guidelines (i.e. good practices, technical reports, worksheets, etc.) and regulatory documents to tackle cyber threats [PAT17]. To this regard, the information presented was directly extracted and adapted from the comprehensive study performed by the BSA EU Cybersecurity Dashboard, who assessed national approaches within the EU on cybersecurity policies under five different perspectives [BSA15]:

- Legal/policy frameworks on cybersecurity: it relates to national cybersecurity strategies which, in an optimal scenario, should be dynamic – i.e. constantly updated – and designed and implemented in partnership with private stakeholders.
- Sector-specific plans: it relates to the establishment of sector-specific approaches towards cybersecurity.
- Partnership between public and private stakeholders: it relates to formal cooperation between public and private stakeholders – i.e. non-governmental entities that operate vital infrastructures such as energy, health, etc. – under the forms of dialogue and information sharing facilitation.
- Operational capability: it relates to the establishment of National Regulatory Authorities (NRAs) to set cybersecurity baselines and certifications, and Computer Emergency Response Teams (CERTs) and Computer Security Incident Response Teams (CSIRTs) to provide incident response or information sharing services, thus reinforcing network and information security.
- Public awareness and appropriate public input that relates to education and awareness raising on cybersecurity.

Furthermore, Table 4 presents the national legislations on data protection implemented by each EU Member State aforementioned that transposed the EU Data Protection Directive 95/46 EC, besides the respective Data Protection Authorities [PRI17, RAU15].

Table 2. Comparative overview on the cybersecurity environment of 7 EU Member States

Question	Portugal	Spain	UK	France	Italy	Greece	Romania	Cyprus
LEGAL FOUNDATIONS								
National cybersecurity strategy?	Draft	Yes (2013)	Yes (2011)	Yes (2011)	Yes (2014)	No	Yes (2014)	Yes (2013)
Critical Infrastructure Protection (CIP) strategy/plan?	No	Yes	Yes	No	Yes	Yes	Yes	No
Legislation/policy that requires the establishment of a written information security plan?	No	Yes	Partial	No	No	Partial	No	No
Legislation/policy that requires an inventory of “systems” and the classification of data?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partial
Legislation/policy that requires security practices/ requirements to be mapped to risk levels?	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Legislation/policy that requires at least an annual cybersecurity audit?	Partial	Partial	No	No	No	No	No	No
Legislation/policy that requires a public report on cybersecurity capacity for the government?	Partial	No	Partial	No	Yes	No	No	No
Legislation/policy that requires each agency to have a chief information officer (CIO)/ chief security officer (CSO)	No	No	No	Yes	No	No	No	No

Question	Portugal	Spain	UK	France	Italy	Greece	Romania	Cyprus
Legislation/policy that requires mandatory reporting of cybersecurity incidents?	No	No	No	No	No	No	Partial	Yes
Legislation/policy include a definition for CIP?	No	Yes	Yes	No	Yes	Yes	Yes	No
Cybersecurity solutions fully based on international accreditation or certification schemes without local requirements?	N/A	Yes	Partial	Partial	Yes	Yes	Partial	No
OPERATIONAL ENTITIES								
CERT or CSIRT?	Yes (2008)	Yes (2008)	Yes (2014)	Yes (2008)	Yes (2014)	Yes (2009)	Yes (2011)	No
National competent authority for network and information security (NIS)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partial
Cybersecurity incident reporting platform?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Conduction of national cybersecurity exercises?	Partial	Partial	Yes	Yes	Yes	Yes	Partial	Partial
National incident management structure (NIMS) to respond to cybersecurity incidents?	Partial	Yes	Yes	No	Yes	No	Partial	No
PUBLIC PRIVATE PARTNERSHIPS								
Cooperation between public and private entities?	Partial	Yes	Yes	No	Partial	No	No	Partial
Industry cybersecurity councils?	No	Yes	Yes	No	Partial	No	Partial	No

Question	Portugal	Spain	UK	France	Italy	Greece	Romania	Cyprus
Plans for new public private partnerships?	No	-	-	Partial	Partial	No	Yes	No
SECTOR SPECIFIC CYBERSECURITY PLANS								
Joint public private sector plan on cybersecurity?	No	Yes	Yes	Yes	No	No	No	Partial
Definition of sector specific security priorities?	No	Partial	Partial	No	No	No	No	No
Conduction of sector cybersecurity risk assessments?	No	No	No	No	No	No	No	No
EDUCATION								
Education strategy to raise cybersecurity awareness among public from a young age?	No	No	Yes	Yes	Yes	No	Yes	No

Table 3. National legislations on data protection that transposed the EU Data Protection Directive 95/46 EC

EU Member State	Applicable legislation on data protection	Data Protection Authority
Portugal	<ul style="list-style-type: none"> • Law No. 67/98 of 26 October 1998 (Data Protection Act) • Law No. 103/2015 • Law No. 2/94 • Law No. 68/98 • Law No. 36/2003 • Law No. 43/2004 • Law No. 46/2012, of 29 August 2012 (ePrivacy Act) • Constitution of the Portuguese Republic (Articles 34 and 35) 	Portuguese Data Protection Authority (CNPd) (1991) (http://www.cnpd.pt/)
Spain	<ul style="list-style-type: none"> • Organic Law 15/1999, of 13 December of Personal Data Protection • Royal Decree 1720/2007, of 21 December • Final provision Fifty-six of Sustainable Economy Law 2/2011 	Spanish Data Protection Agency (AEPD) (1993) (https://www.agpd.es/)
UK	<ul style="list-style-type: none"> • Data Protection Act 1998 • Privacy and Electronic Communications (EC Directive) Regulations 2003 	UK Information Commissioner (https://ico.org.uk)
France	<ul style="list-style-type: none"> • French Data Protection Act n°78-17 of 6 January 1978 (French DPA) – revised in 2004 • Postal and Electronics Communications Code 	Commission Nationale de l'Informatique et des Libertés (CNIL) (http://www.cnil.fr/)
Italy	<ul style="list-style-type: none"> • Legislative Decree n. 196 of 30 June 2003 (Privacy Code 2003) 	Italian Data Protection Authority (http://www.garanteprivacy.it/)
Greece	<ul style="list-style-type: none"> • Law 2472/1997 • Law 3471/2006 • Law 3873/2009 • Law 3917/2011 • Law 3943/31.3.2011 and • Ministerial Circular 1185/1.9.2011 • HDPA's opinion no. 4/14.10.2011 • Law 4170/2013 • Ministerial Circular 1258/6.12.2013 • HDPA's opinion no. 5/2013 	Hellenic Data Protection Authority (HDPA) (http://www.dpa.gr/)
Romania	<ul style="list-style-type: none"> • Law no. 677/2001 • Law no. 506/2004 • Law no. 298/2008 	National Supervisory Authority for Personal Data Processing

		(http://www.dataprotection.ro/)
Cyprus	<ul style="list-style-type: none"> • Processing of Personal Data (Protection of Individuals) Law of 2001¹ (138(1)/2001) • Data Processing (Permits and Fees) Regulations 2002 • Regulation of Electronic Communications and Postal Services Law of 2004 • Constitution of the Republic of Cyprus 	Commissioner for the Protection of Personal Data http://www.dataprotection.gov.cy

2.3 Certification

The implementation of cybersecurity certification schemes represents a step further in the deployment of smart grids, given that it creates trust and confidence along the smart grid chain. However, at present smart grid cybersecurity certification initiatives are still fragmented and uncoordinated among EU Member States, lacking EU-wide supervision. In this sense, efforts should be put in the creation of a common and harmonized reference model for cybersecurity that covers the entire EU smart grid chain, in line with existent standardization efforts, such as the M/490 SG-IS20 [CEN14].

In 2014 **ENISA** published a thorough study [ENI14] that comprises an inventory of existing good practices and standards on smart grid cybersecurity certification that are widely recognized in the EU, including the following:

- **ISO 9001**: it is a high-level quality management system certification for manufacturing and service industries, thus not specifically targeting smart grids. Nonetheless, it can be used as a starting point to the implementation of smart grid cybersecurity certification schemes [ISO15a].
- **ISO/IEC 27001 & ISO/IEC27019**: ISO/IEC 27001 is an information security management certification, used to certify the existence of policies and procedures for smart grid systems/components within a given organization. System operators in Germany and UK must comply with this standard. In turn, ISO/IEC27019 (which is based on ISO/IEC 27002) provides guiding principles for information security management applied to process control systems [ISO15b].
- **ISO/IEC 15408 Common Criteria (CC)**: it is a component security certification scheme that evaluates the technical implementation claims of the security functions of a given product, relying on independent laboratories that are accredited by national standardization entities for this, as follows [CCRA17]:
 - **France** : the Comité français d'accréditation (COFRAC) accredited the Centre d'évaluation de la sécurité des technologies de l'information (CESTI), which follows norms set by the Agence nationale de la sécurité des systèmes d'information (ANSSI) ;
 - **UK**: the United Kingdom Accreditation Service (UKAS) accredited Commercial Evaluation Facilities (CLEF);
 - **Spain**: the National Cryptologic Center (CCN) accredited Common Criteria Testing Laboratories operating in the Spanish Scheme
- **IASME**: it is an UK-based standard for information security management certification based on ISO/IEC 27001 that targets SMEs [IASME17].

- **CPA:** it is an UK-based component security certification standard, used to complement or substitute other standards, such as the Common Criteria [NCSC17].
- **CSPN:** it is a French component security certification standard developed by ANSSI that certifies IT security products, having common features with Common Criteria and CPA [ANS17].
- **ISO/IEC 19790:** it is a certification standard for cryptographic modules [ISO12].
- **IEC 62443:** IEC 62443 is a standard that focus on the functional security properties – i.e. industrial automation and control systems – of an entire smart grid system. Nonetheless, its certification services are only available in Japan or in the US.

Given that each certification standard presented has specific properties, [ENI14] further categorizes them by application field as follows:

- **Operation certification:** it focusses on the certification of the operation of a given process in relation to an established standard, based on documentation or audits.
- **System (functional) certification:** it focusses on the certification on an entire smart grid system in relation to an established standard. In this sense, components – e.g. hardware, software -, people, and related procedures of a system are integrated into one system.
- **Development certification:** it focusses on the certification of a given process – i.e. a given method to develop a given smart grid system, product or component – in relation to an established standard.
- **Component certification:** it focusses on the certification of a given component or product in relation to an established standard.

2.4 Pilots

A survey template was prepared and sent to each pilot manager to gather information regarding cybersecurity and privacy. See Table 4 pilot site cybersecurity and privacy Template.

The received surveys are presented on the next tables. All pilot sites took part in this survey. See Table 4 to Table 15.

Table 4. Survey on Cybersecurity and Privacy template

Pilot & Data Manager	
Dataset description:	<i>(brief description of the dataset and data flows)</i>
Data security (acquisition, transmission/storage/access):	<i>(mechanisms/protocols used or available to ensure secure data handling; certifications)</i>
Personal data:	<i>(ways in which the collected or processed data can becomes personal or “sensitive” considering the recently adopted EU General Data Protection Regulation)</i>
Data privacy (acquisition, transmission/storage/access):	<i>(mechanism/protocols used or available to ensure data privacy including encryption, anonymization, aggregation)</i>

Auditing:	<i>(mechanisms used or available to record data processing and handling operations)</i>
Certification:	<i>(applicable standards and sought certifications already in place or expected in the near future)</i>

Table 5. Nicosia (Cyprus) Pilot Cybersecurity Template

Pilot & Data Manager	<p>Pilot: Cyprus demonstration site (two different sites: 1) Microgrid at University of Cyprus, 2) dispersed prosumers within Cyprus)</p> <p>Data Manager: EAC (DSO) with FOSS (University of Cyprus)</p>
Dataset description: <i>(brief description of the dataset and data flows)</i>	<p>University Microgrid: Pilot Energy Management Data including the energy consumption of the several buildings within UCY, production from the rooftop and ground PV installations, state of charge of the storage, energy forecasting data, signals from DSO (e.g. energy prices, signals for DR, etc.), several control signals, etc. The data is collected and stored locally (at FOSS server). Within the university, the existing broadband connectivity is utilized for the data exchange. The communication with EAC is carried out through the current communication infrastructure.</p> <p>Dispersed Prosumers: Pilot Energy Management Data including the energy consumption and PV production at each prosumer premises. The data will be collected and send to EAC, which will provide them to FOSS in an anonymized way for further editing.</p>
Data security (acquisition, transmission/storage/access): <i>(mechanisms/protocols used or available to ensure secure data handling; certifications)</i>	<p>Each prosumer will have access to its own data by getting a security code to the data monitoring system. From EAC side, only authorized persons will have access to the data. Web management systems are secured according to the best practices. Regarding cyber security, the governing law 22(III)/2004 should be respected (referring to cyber-attacks).</p>
Personal data: <i>(ways in which the collected or processed data can becomes personal or “sensitive” considering the recently adopted EU General Data Protection Regulation)</i>	<p>The processing of personal data is governed by the Processing of Personal Data (Protection of the Individual) Law, which is harmonized with the Data Protection Directive of the EU (95/46). A written</p>

	statement has been submitted to the Commissioner for the Protection of Personal Data in order to ensure that every individual's right to privacy is protected when personal data is processed.
Data privacy (acquisition, transmission/storage/access): <i>(mechanism/protocols used or available to ensure data privacy including encryption, anonymization, aggregation)</i>	<p>Data is acquired by the DSO using its metering devices and is transmitted using a secure protocol. A data anonymization process takes place as soon as data is received by the Electricity Authority of Cyprus. Then, data is transmitted to the partners anonymously.</p> <p>According to Data Protection in Cyprus, the Law 138(I)/2001 should be respected.</p>
Auditing: <i>(mechanisms used or available to record data processing and handling operations)</i>	Data processing can be performed with various types of files, the most commonly used being .csv and .sql files. System detailed operation is maintained on text log files.
Certification: <i>(applicable standards and sought certifications already in place or expected in the near future)</i>	A certification from the Commissioner for Data Protection is to be acquired regarding the data editing from the prosumers on the basis of the submitted application. EAC, being a public company, has already all the required certifications for data handling.

Table 6. St Jean (France) pilot cybersecurity template

Pilot & Data Manager	Pilot : St Jean de Maurienne, France Data Manager: Sylvain Berlioz (INNED)
Dataset description: <i>(brief description of the dataset and data flows)</i>	<p>Pilot Energy Management Data including aggregated energy consumption and forecast, PV and Hydro power plants energy production and forecast.</p> <p>Measurement data is collected and stored locally and transferred to a platform server using a broadband connection.</p>
Data security (acquisition, transmission/storage/access): <i>(mechanisms/protocols used or available to ensure secure data handling; certifications)</i>	EU defined security policies in accordance with best practices of the country concerned.
Personal data: <i>(ways in which the collected or processed data can becomes personal or "sensitive" considering the recently adopted EU General Data Protection Regulation)</i>	In France, the National Commission of Informatics and Civil Liberties (CNIL) is in line with EU recent regulation. We will follow then these requirements and practices.

	https://www.cnil.fr/fr/plus-de-droits-pour-vos-donnees
Data privacy (acquisition, transmission/storage/access): <i>(mechanism/protocols used or available to ensure data privacy including encryption, anonymization, aggregation)</i>	EU defined privacy policies in accordance with best practices of the country concerned.
Auditing: <i>(mechanisms used or available to record data processing and handling operations)</i>	System detailed operation is maintained on text log files.
Certification: <i>(applicable standards, regarding both privacy and cybersecurity, and sought certifications already in place or expected in the near future)</i>	<p>REGULATION (EU) 2016/679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL</p> <p>of 27 April 2016</p> <p>on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)</p> <p>The Regulations, contrarily to the Directives, are directly applicable into the Member States. This Regulation shall apply from 25 May 2018</p>

Table 7. Thessaloniki (Greece) pilot Cybersecurity template

Pilot & Data Manager	<p>Pilot: Thessaloniki demonstration sites:</p> <ol style="list-style-type: none"> 1) Demand Response in residential buildings with smart meters and Battery Energy Storage Systems (BESS), 2) Demand Response in commercial building with smart meters and BESS. <p>Data Manager: WVT (Utility), SUNLIGHT (SME) with CERTH (Research Centre)</p>
Dataset description: <i>(brief description of the dataset and data flows)</i>	<p>WVT has already developed an advanced metering infrastructure (AMI), so smart meters can measure and record actual energy consumption from all the buildings at constant time intervals of 5 minutes. Further occupancy and environmental monitoring equipment will be utilized in the commercial building use case. The data gathered will be aggregated at a gateway at the building level and forwarded to the back-end WVT analytics system over a secure network through wired or wireless communication. AMI consists of three basic components: smart metering devices at the user end, two-way communication path between the end-user (HAN)</p>

	<p>and WVT and automated software and operation centre for data processing.</p> <p>A database known as Meter Data Management System (MDMS) is utilized by WVT to store and manage the collected data. This system includes analytical tools which enable different sections of operation and management system to interact with it and collect the required data.</p>
<p>Data security (acquisition, transmission/storage/access): <i>(mechanisms/protocols used or available to ensure secure data handling; certifications)</i></p>	<p>Issues, like data cybersecurity, are critical for the smart distribution networks integration; have to comply with the Greek legislation “Law 2472/1997 and its amendment by Law 3471/2006 of the Hellenic Parliament”.</p> <p>In Greece, there is no comprehensive legal framework on Cyber Security. In the Criminal Code the following cybercrimes are included: computer fraud (art. 386a) violation of secrecy of computer programs or data (art. 370B), unauthorized use of software, (art. 370c para. 1), unauthorized data access (art. 370c paras. 2 & 3), child pornography (art. 348a), grooming (art. 337). However, Greece signed, but did not ratified the Cybercrime Convention and its legislation does not provide for legal sanctions in case of attacks against information systems. The Data Protection Act (Law 2472/1997, art. 10 para. 3) provides for the obligation of the data controller to take technical and organizational measures for the protection of personal data. In addition, Law 3471/2006 (Article 12) transposing Directive 2002/58 provides for the obligation of telecom providers to take technical and organizational measures to ensure the security of its services and of the public electronic communications network. With Law 3115/2003 the Hellenic Authority for Communication Security and Privacy (ADAE) was established and the framework for the protection of the confidentiality of communication was laid down.</p> <p>It is noted that in case of a breach of security or integrity the provider is under the obligation to notify the National Authority for Telecommunications and Post and the latter may notify the National Authority for the Protection of Secrecy of Communication and ENISA. Furthermore, the National Intelligence Service has been designated as the National CERT, which is responsible to deal mainly with cyber threats and attacks against Greek public institutions and critical infrastructures, in accordance with Law 3649/2008 and Presidential decree 126/2009.20 Finally, it should also be mentioned that there is a Draft National Cyber Security Strategy, which is in</p>

	<p>line with international best practices. It provides for, inter alia, the creation of a National Authority on Cyber Security that will be responsible to implement the National Strategy on Cyber Security, and a National Council for Cyber Security.</p> <p>Based on the current installation of the WVT infrastructure, only authorized persons have access to the dataset collected at the back-end WVT analytics system. Web management systems utilized are secured according to the best practices.</p>
<p>Personal data:</p> <p><i>(ways in which the collected or processed data can become personal or “sensitive” considering the recently adopted EU General Data Protection Regulation)</i></p>	<p>Data protection in Greece is primarily founded in Law 2472/1997, which harmonized the Greek legislation with Directive 95/46/EC. This law sets out the obligations of those who process personal data and the respective rights of those to whom the data processing relates. The same Law also provides for the establishment of the Hellenic Data Protection Authority (HDPa).</p> <p>Additionally, when it comes to special cases of personal data processing, other laws may apply as well: e.g. Law 3471/2006 on personal data protection in respect of electronic communications (vide Directive 2002/58/EC), Law 3917/2011 on the retention of data processed within the framework of public electronic communications (vide Directive 2006/24/EC), article 34 of Law 4002/2011 on the processing of personal data conducted by the Gaming Supervision & Control Commission within the framework of the Gaming Market regulations, etc.</p> <p>All the pilot participants (around 100 residential buildings and around 20 people working on the commercial building) will be properly informed and educated on the planned activities of the pilot trials, and further asked to sign an Informed Consent Form prior to the pilot realisation.</p>
<p>Data privacy (acquisition, transmission/storage/access):</p> <p><i>(mechanism/protocols used or available to ensure data privacy including encryption, anonymization, aggregation)</i></p>	<p>According to the article 9A Greek Constitution all persons have to be protected from the collection, processing and use, especially by electronic means, of their personal data. Furthermore, the protection of personal data is ensured by an Independent Authority: Data Protection Authority (D.P.A.). However, communications data as part of the electronic communications are protected in the same way and under the same requirements as the content.</p> <p>In order to meet the requirements in terms of data privacy, the solutions to be deployed will be compliant with respective legislation in Europe. The most popular wired technology in Europe is Power Line Communications (PLC), which refers to the use of the existing power lines for the signal transmission and</p>

	<p>includes the broadband PLC (B-PLC) and narrowband PLC (NB-PLC) standards. The basic benefit of this technology is that there is no need for new infrastructure. As for the wireless technologies, they are divided into three categories: (i) the point-to-point (mobile communication), point-to-multipoint (star topology) and radio mesh networks.</p> <p>In Greece, the main technologies that have been used for smart metering data transmission are the power line communication NB-PLC and wireless technologies over GPRS and GSM. Since the collected data contains critical personal as well as business information, the storage facilities should be disaster proof and all required back up and contingency plans for different scenarios should be carefully designed for them. Data are sent from the smart meter through a secure Cloud Service to the back-end WVT MDMS database system , which is using MySQL, which offers enterprise-grade security features including network access control, Firewall, Enterprise Authentication, Enterprise Encryption & Transparent Data Encryption to ensure data is protected against external attacks and misuse of information while helping WVT achieve regulatory compliance.</p>
Auditing: <i>(mechanisms used or available to record data processing and handling operations)</i>	Data processing can be performed with various types of files, the most commonly used being .csv and .sql files. System detailed operation is maintained on text log files.
Certification: <i>(applicable standards and sought certifications already in place or expected in the near future)</i>	A certification from the Commissioner for Data Protection is to be acquired regarding the data editing from the prosumers on the basis of the submitted application. WVT, being a utility company, has already all the required certifications for data handling.

Table 8. Xanthi (Greece) Pilot Cybersecurity and Privacy Template

Pilot & Data Manager	<p>Pilot 8: Optimum Distributed Control of RES-Enabled Islanded Grids Local Storage Xanthi.</p> <p>Data Manager: CERTH/CPERI, Sunlight S.A.</p>
Dataset description: <i>(brief description of the dataset and data flows)</i>	Energy production data from each of the three microgrids, microgrid consumption data, Energy Management Data, state of charge of the batteries, hydrogen storage,

	energy forecasting data, electrical signals, electrochemical signals and several control signals. The data is collected and stored locally. The data exchange between the microgrids and the control station is implemented with the existing wired local network. There is the feasibility for authorized users to communicate with control station remotely.
Data security (acquisition, transmission/storage/access): <i>(mechanisms/protocols used or available to ensure secure data handling; certifications)</i>	<p>Issues, like data cybersecurity, have to comply with the Greek legislation "Law 2472/1997 and its amendment by Law 3471/2006 of the Hellenic Parliament". The Data Protection Act (Law 2472/1997, art. 10 para. 3) provides for the obligation of the data controller to take technical and organizational measures for the protection of personal data.</p> <p>Data that is collected from the microgrid subsystems are not personal data but can be considered sensitive for CERTH and Sunlight, hence they are password protected. Web management systems are secured according to the best practices.</p>
Personal data: <i>(ways in which the collected or processed data can becomes personal or "sensitive" considering the recently adopted EU General Data Protection Regulation)</i>	Pilot 8 is a RES islanded smart microgrid. In such cases, the interaction with the end user is minimal. The collected data from each subsystem of the grid cannot be considered as personal data. Operators of the system are authorized personnel from Sunlight S.A. and CERTH.
Data privacy (acquisition, transmission/storage/access): <i>(mechanism/protocols used or available to ensure data privacy including encryption, anonymization, aggregation)</i>	Data is acquired in each subsystem by using metering devices and is transmitted using a secure protocol. The data is collected and stored locally. Local access protected by basic authentication (username/password).
Auditing: <i>(mechanisms used or available to record data processing and handling operations)</i>	Data processing can be performed with various types of files, the most commonly used being .csv and .sql files. System detailed operation is maintained on text log files.
Certification: <i>(applicable standards and sought certifications already in place or expected in the near future)</i>	No certification is needed due to lack of personal/sensitive data.

Table 9. San Severino (Italy) pilot site Cybersecurity Template

Pilot & Data Manager	San Severino Marche Pilot site Data Manager: A.S.SE.M. S.p.A.
Dataset description: <i>(brief description of the dataset and data flows)</i>	<p>Two different datasets will be managed in the Pilot.</p> <p>A first one will be limited to private users' sites, involved in the pilot tests. For each LV user involved (5 to 10 users are supposed to cooperate in the project) consumption and production (eg photovoltaic) data will be measured, as well as installed storage (data').</p> <p>The second dataset is relevant to the public distribution grid, in particular in order to optimize the system; electrical parameters such as voltage, power, and frequency will be measured at certain strategic points of the network/grid.</p> <p>In addition, weather data will be acquired by a provider.</p> <p>Control signals will then be sent to peripheral equipment such as IMS and storage.</p>
Data security (acquisition, transmission/storage/access): <i>(mechanisms/protocols used or available to ensure secure data handling; certifications)</i>	<p>Data will be mainly exchanged through 4G LTE service for mobile access to the ASSEM intranet through dedicated APN.</p> <p>Through a RADIUS server each peripheral router placed on the specific site of interest will be authenticated via Login and PW; furthermore, at the same router a private and static IP address will be assigned from RADIUS itself.</p> <p>The center star router (HUB) placed in the DSO control center will be connected via ADSL and VPN line. The VPN will only be allowed to access the IP addresses of the HUB router and the RADIUS server.</p> <p>Data exchange between the center of the DSO and the storage will be via web cloud.</p> <p>Currently the data exchange between the DSO and the TSO is done by CDN line.</p> <p>The data at the DSO are handled via an ORACLE database.</p> <p>Only authorized DSO personnel can access the stored data.</p>

Personal data: <i>(ways in which the collected or processed data can become personal or “sensitive” considering the recently adopted EU General Data Protection Regulation)</i>	<p>The data collected by the users involved (consumers, producers, storage owners) are likely to become private data when and if they were associated with users' ID.</p>
Data privacy (acquisition, transmission/storage/access): <i>(mechanism/protocols used or available to ensure data privacy including encryption, anonymization, aggregation)</i>	<p>All the information related to the first dataset (the one limited to private users' sites, involved in the pilot tests) will be managed by UNE webserver which includes a redundant virtual machine with databases installed into it in a cloud. It has used an encrypted Modbus TCP Protocol for transmission data via https.</p> <p>Those data will be relevant to consumers that signed a contract with UNE in order to manage a LV energy storage system. Consequently, UNE will not be allowed to use data outside this agreement.</p> <p>Only authorized UNE personnel can access the stored data.</p> <p>With respect to the second dataset, all the information is stored in the DSO control center (ASSEM) that is in a private server; only authorized DSO personnel can access the stored data.</p>
Auditing: <i>(mechanisms used or available to record data processing and handling operations)</i>	<p>N/A</p>
Certification: <i>(applicable standards and sought certifications already in place or expected in the near future)</i>	<p>N/A</p>

Table 10. Terni (Italy) pilot site Cybersecurity Template

Pilot & Data Manager	Terni (Italy) Pilot Data Manager: A.S.M. Terni S.p.A.
Dataset description: <i>(brief description of the dataset and data flows)</i>	Pilot Energy Management Data including aggregated and disaggregated energy consumption and forecast, CHP energy production, PV energy production and forecast, battery storage system state of charge. Measurement data are collected and stored locally by a concentrator installed in the secondary substation. Data are then transferred to PC servers using a GSM network. Commands do not follow a symmetric path.
Data security (acquisition, transmission/storage/access): <i>(mechanisms/protocols used or available to ensure secure data handling; certifications)</i>	Organization defined security policies including account settings and access privileges. Monitoring network accesses are limited by functionality and basic authentication. Web based management system services is secured in accordance with best practices.
Personal data: <i>(ways in which the collected or processed data can becomes personal or “sensitive” considering the recently adopted EU General Data Protection Regulation)</i>	The microgrid electrical energy consumptions and productions are in possession only of the Distribution System Operator.
Data privacy (acquisition, transmission/storage/access): <i>(mechanism/protocols used or available to ensure data privacy including encryption, anonymization, aggregation)</i>	Data is acquired using a cabled interface and transmitted using a secure protocol. Disaggregated data is available both to the end user and the Distribution System Operator; no anonymization is in place yet.
Auditing: <i>(mechanisms used or available to record data processing and handling operations)</i>	Microgrid smart meter recordings are maintained on text log files.
Certification: <i>(applicable standards and sought certifications already in place or expected in the near future)</i>	Legislative Decree n. 196 of 30 June 2003 (Privacy Code 2003)

Table 11. Lisboa (Portugal) pilot cybersecurity template

Pilot & Data Manager	<p>Pilot: Lisboa microgrid demonstration site at Campo Grande City Hall building</p> <p>Data Manager: ENOVA (Administration) with VPS (Technology)</p>
Dataset description: <i>(brief description of the dataset and data flows)</i>	<p>Pilot Energy Management Data including aggregated and disaggregated energy consumption and forecast, <u>PV</u> energy production and forecast.</p> <p>Measurement data is collected and stored locally (concentrator) and transferred to a cloud server using a broadband connection. Commands follow a symmetric path.</p>
Data security (acquisition, transmission/storage/access): <i>(mechanisms/protocols used or available to ensure secure data handling; certifications)</i>	<p>Monitoring network, essentially a wired solution, uses a secure protocol (https) to transfer data to the cloud server. Local access protected by basic authentication (username/password).</p> <p>Web based management system services secured in accordance with best practices. User's accesses limited by functionality (profile) and basic authentication.</p>
Personal data: <i>(ways in which the collected or processed data can become personal or "sensitive" considering the recently adopted EU General Data Protection Regulation)</i>	<p>Monitoring data may be susceptible to be considered personal, in particular disaggregated electrical energy consumptions, although it is being collected on a public building. For this reason, this matter will be analysed in detail and the necessary development to protect the privacy of the works and users of the building will be done in accordance with the EU Directive on Data Protection.</p>
Data privacy (acquisition, transmission/storage/access): <i>(mechanism/protocols used or available to ensure data privacy including encryption, anonymization, aggregation)</i>	<p>Disaggregated data is available only to authenticated end users; no anonymization is in place yet.</p>
Auditing: <i>(mechanisms used or available to record data processing and handling operations)</i>	<p>System detailed operation is maintained on text log files.</p>
Certification: <i>(applicable standards and sought certifications already in place or expected in the near future)</i>	<p>.At this time, we are not looking for any particular certification but that might change during the course of the project.</p>

Table 12. Ploiesti (Romania) pilot site Cybersecurity Template

Pilot & Data Manager	<p>Pilot: Ploiesti, Romania demonstration site (three buildings with residential apartments in Ploiesti) plus a small commercial area.</p> <p>Data Manager: ELECTRICA (DSO) with SIVECO Romania SA</p>
Dataset description: <i>(brief description of the dataset and data flows)</i>	<p>Residential Consumers: Pilot Energy Management Data including aggregated energy consumption of the several buildings in Ploiesti</p> <p>Measurement data is collected and/or stored locally (data concentrator) and transferred to a server using a Wi-Fi/GPRS connection. Commands follow a symmetric path.</p> <p>The communication with DSO is carried out through the current communication infrastructure.</p>
Data security (acquisition, transmission/storage/access): <i>(mechanisms/protocols used or available to ensure secure data handling; certifications)</i>	<p>Local access protected by basic authentication (username/password).</p> <p>Each user (administrator, DSO, consumer) will be granted secured access to own/relevant data.</p> <p>In the case of DSO user role, only authorized persons will have access to the data.</p> <p>Web management systems are secured according to the best practices.</p> <p>Regarding cyber security, the Romanian Government Decision No 271/2013 approving the Cyber Security Strategy in Romania should be followed.</p> <p>A protocol between SIVECO and ELECTRICA will describe how data will be transferred. This agreement will also include the privacy level of the processed data. The protocol will be based on “need to know” principle.</p>
Personal data: <i>(ways in which the collected or processed data can becomes personal or “sensitive” considering the recently adopted EU General Data Protection Regulation)</i>	<p>The processing of personal data is governed by the Processing of Personal Data as described in Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)</p> <p>As the number of consumer’s involved in Ploiesti Pilot is small, i.e. 8 individual consumers and a small commercial facility, an Informed Consent with each consumer will be proposed for signature.</p>

	<p>Furthermore, if necessary, an approval for collecting and processing personal data will be submitted to The National Supervisory Authority For Personal Data Processing by both SIEVCO and ELECTRICA.</p> <p>To the extend possible the data will be anonymized at an early stage.</p>
Data privacy (acquisition, transmission/storage/access): <i>(mechanism/protocols used or available to ensure data privacy including encryption, anonymization, aggregation)</i>	<p>Data is acquired by the DSO using its metering devices and is transmitted via data concentrator using secure protocol De la A data anonymization process takes place as soon as data is received by Eleetrica (Romanian DSO) Then, data is transmitted to the partners anonymously.</p> <p>According to The National Supervisory Authority For Personal Data Processing in Romania, Law nr 677/2001 should be respected.</p>
Auditing: <i>(mechanisms used or available to record data processing and handling operations)</i>	<p>Data processing can be performed with various types of files, the most commonly used being .csv and .sql files. System detailed operation is maintained on text log files.</p>
Certification: <i>(applicable standards and sought certifications already in place or expected in the near future)</i>	<p>Electrica, being a company, has all the required certifications for data handling.</p> <p>The management systems implemented in SIVECO Romania are certified in accordance with the requirements of EN ISO 27001:2013 - The Information Security Management System</p>

Table 13. Barcelona (Spain) pilot cybersecurity Template

Pilot & Data Manager	Sport Centre Claror Barcelona, Gas Natural Fenosa
Dataset description: <i>(brief description of the dataset and data flows)</i>	<p>Dataset in the pilot includes:</p> <ul style="list-style-type: none"> Indoor conditions: Temperatures, Relative Humidity. Energy consumption/generation: active/reactive power, gas consumption, photovoltaic generation, battery power Equipment status: SOC of battery Energy demand: inlet/outlet water temperature, water flow rate. <p>Those variables will be sent in time steps of 15 minutes or hourly. To be defined.</p>

<p>Data security (acquisition, transmission/storage/access):</p> <p><i>(mechanisms/protocols used or available to ensure secure data handling; certifications)</i></p>	<p>It needs to comply with ISO27002 and the regulation of data protection in Spain.</p> <ul style="list-style-type: none"> • ISO 27017: It provides guidance on the information security aspects of cloud computing, recommending the implementation of cloud-specific information security controls that supplement the guidance of the ISO 27002 and ISO 27001 standards. This code of practice provides additional information security controls implementation guidance specific to cloud service providers. • ISO 27018: It focuses on protection of personal data in the cloud. It is based on ISO information security standard 27002 and provides implementation guidance on ISO 27002 controls applicable to public cloud Personally Identifiable Information (PII). It also provides a set of additional controls and associated guidance intended to address public cloud PII protection requirements not addressed by the existing ISO 27002 control set. <p>Security of the data depends on its classification level and exposure.¹</p>
<p>Personal data:</p> <p><i>(ways in which the collected or processed data can become personal or “sensitive” considering the recently adopted EU General Data Protection Regulation)</i></p>	<p>All data are personal and sensitive</p>
<p>Data privacy (acquisition, transmission/storage/access):</p> <p><i>(mechanism/protocols used or available to ensure data privacy including encryption, anonymization, aggregation)</i></p>	<p>It needs to comply with ISO27002 and the regulation of data protection in Spain.</p> <p>General Data Protection Regulation (GDPR): It will be complied by AWS on May 25, 2018.</p> <p>All data needs to be encrypted.</p> <p>Access mechanisms need to be defined guaranteeing that data is only accessed by those authorized.¹</p>
<p>Auditing:</p> <p><i>(mechanisms used or available to record data processing and handling operations)</i></p>	<p>Auditing is not required</p>

Certification: <i>(applicable standards and sought certifications already in place or expected in the near future)</i>	Following EU regulation
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Table 14. Isle of Wight (UK) Minus 7 Cybersecurity Template

Pilot & Data Manager	Isle of Wight – Minus7 Control Hub
Dataset description: <i>(brief description of the dataset and data flows)</i>	From property: electricity and heat metres, store temperatures, heat pump status To property – heat pump off/on
Data security (acquisition, transmission/storage/access): <i>(mechanisms/protocols used or available to ensure secure data handling; certifications)</i>	MQTT messaging
Personal data: <i>(ways in which the collected or processed data can becomes personal or “sensitive” considering the recently adopted EU General Data Protection Regulation)</i>	Not required
Data privacy (acquisition, transmission/storage/access): <i>(mechanism/protocols used or available to ensure data privacy including encryption, anonymization, aggregation)</i>	End, End encryption
Auditing: <i>(mechanisms used or available to record data processing and handling operations)</i>	Auditable, but standard encryption protocols
Certification: <i>(applicable standards and sought certifications already in place or expected in the near future)</i>	Standard encryption protocols

Table 15. Isle of Wight (UK) Pilot site Cybersecurity Template

Pilot & Data Manager	Pilot: Isle Of Wight
Dataset description: <i>(brief description of the dataset and data flows)</i>	Pilot distribution network data including Distribution network operator measurements
Data security (acquisition, transmission/storage/access): <i>(mechanisms/protocols used or available to ensure secure data handling; certifications)</i>	Measurement and network data will be acquired from Scottish and Southern Electricity Networks. Measurements include,

	voltage, current, substation demand and generation profiles. These data will be transferred to UNEW.
Personal data: <i>(ways in which the collected or processed data can become personal or “sensitive” considering the recently adopted EU General Data Protection Regulation)</i>	Not applicable
Data privacy (acquisition, transmission/storage/access): <i>(mechanism/protocols used or available to ensure data privacy including encryption, anonymization, aggregation)</i>	Some network data is already publicly available. Measurements from substations should be kept confidential.
Auditing: <i>(mechanisms used or available to record data processing and handling operations)</i>	Data will be transmitted through a secure tool provided by the DNO
Certification: <i>(applicable standards and sought certifications already in place or expected in the near future)</i>	No particular certification is required at this time

Table 16. Isle of Wight (UK) SIE Cybersecurity Template

Pilot & Data Manager	Isle of Wight - SIE
Dataset description: <i>(brief description of the dataset and data flows)</i>	Measurement data is collected and stored locally (concentrator) and transferred to a cloud server using a broadband connection. Commands follow a symmetric path.
Data security (acquisition, transmission/storage/access): <i>(mechanisms/protocols used or available to ensure secure data handling; certifications)</i>	<p>IPSEC – the integrated hardware encryption engine delivers high performance IPSEC traffic without using the main processor</p> <p>HTTPS – for secure access to the web interface.</p> <p>Monitoring network accesses limited by functionality and basic authentication. Web based management system services secured in accordance with best practices.</p> <p>802.1x – to ensure only permitted devices can connect to the device</p> <p>MAC access list – control access to devices that do not support RADIUS</p>
Personal data: <i>(ways in which the collected or processed data can become personal or “sensitive”)</i>	None based on recently adopted EU General Data Protection Regulation

<i>considering the recently adopted EU General Data Protection Regulation)</i>	
Data privacy (acquisition, transmission/storage/access): <i>(mechanism/protocols used or available to ensure data privacy including encryption, anonymization, aggregation)</i>	<p>Disaggregated data is available only to the end user; no anonymization is in place yet.</p> <p>SNMPv3 – encrypted authentication and access security Passwords – compliant with NERC guidelines including provision for RADIUS based authentication</p> <p>SSH / SSL – extends capability of password protection to add encryption of passwords and data as they cross the network</p> <p>Enable / disable ports – capability to disable ports so unauthorized devices can't connect to unused ports</p> <p>802.1Q VLAN – provides the ability to logically segregate traffic between predefined ports on switches</p>
Auditing: <i>(mechanisms used or available to record data processing and handling operations)</i>	System detailed operation is maintained on text log files.
Certification: <i>(applicable standards and sought certifications already in place or expected in the near future)</i>	All based on recently adopted EU General Data Protection Regulation

2.4.1 Outcome Analysis

The following table summarizes a preliminary analysis of the surveys returned from each pilot. Due to the generic nature of the questions and also, in most cases, the generic nature of the answers the colour code assessment only tries to identify the level of awareness perceived for each topic mentioned in the survey. In very broad terms, green means that the topic is well understood and addressed already; yellow means that, at least from our interpretation of the available information, the topic may require further consideration; grey means that the topic is not considered relevant.

Table 17. Preliminary Analysis of Cybersecurity and Privacy Survey

Question\Pilot	01	02	03	04	05	06	07	08	09	10
Data security (acquisition, transmission, storage, access): (mechanisms/protocols used or available to ensure secure data handling; certifications)	●	●	●	●	●	●	●	●	●	●
Personal data: (ways in which the collected or processed data can become personal or “sensitive” considering the recently adopted EU General Data Protection Regulation)	●	●	●	●	●	●	●	●	●	●
Data privacy (acquisition, transmission, storage, access): (mechanism/protocols used or available to ensure data privacy including encryption, anonymization, aggregation)	●	●	●	●	●	●	●	●	●	●
Auditing: (mechanisms used or available to record data processing and handling operations)	●	●	●	●	●	●	●	●	●	●
Certification: (applicable standards and sought certifications already in place or expected in the future)	●	●	●	●	●	●	●	●	●	●

Regarding the first topic (data security) it is worth noting that not all data paths are encrypted and some (legacy) proprietary protocols that are not intrinsically secure are still widely used. On the other hand, some administration accesses are protected by username/password credentials which may constitute a weakness if these credentials are not changed regularly and especially if are set to the default/factory settings.

Regarding personal data and privacy topics all pilot and data managers are aware of the fact that energy consumptions/usage collected on a small time scale may be considered personal or “sensitive” information. Furthermore they are also aware of the EU General Data Protection



Regulation (GDPR) that has entered into force last month or equivalent national legislation. Yet, in some cases, it is still not clear what needs to be done or what changes must be made to ensure compliance.

In relation to auditing, not many pilot managers recognize the need and benefit of deploying and exploring systems that include auditing mechanisms or rely on time consuming ones like log files. However, these mechanisms are very important to collect information that is required for troubleshooting and quality control assurance, besides, having commercial potential.

In terms of certification no specific certification is mentioned other than general quality management and GDPR. This might be indicative of a lack of a clear certification paths or regulatory impositions.

As final remark, it seems that there is no comprehensive legal framework or at least not one widely known and employed covering cybersecurity and privacy, which leads the pilot and data managers to refer to the use of best practices.

3.Description of Project Datasets

This section contains the dataset description as per the information flow identified in inteGRIDy at D1.6 level (Reference architecture) [IND16]. There is a dataset template describing the data collected.

3.1 Template: Dataset

Information about each pilot dataset has been collated by technology providers in the format presented below.

Table 18. Dataset Template

Data Manager	Data Manager who takes responsibility.
Dataset reference / name	Dataset number and name
Availability	Private, Consortium or Open, as defined in section 1.5.1
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Keyword(s) that categorize data to make it linked/searchable
Data set description	Data description, origin, nature, scale, if it underpins a publication, who useful to, existence of similar data, possibilities for reuse.
Standards	Reference to existing standards in topic area governing data collection, aggregation, storage and sharing. Adaptation of data set to community standards to maximize interoperability with other researchers. Potential license restrictions. Discoverability. Need for aggregation and anonymization.
Data sharing	How the data will be shared, identification of repository, existence of embargo period if any, identification of software or tools necessary for reuse. Data sets reused from other inteGRIDy tasks. Use of this dataset by third parties in the future.
Archiving and preservation (storage/backup):	The procedure for long-term preservation, length of preservation, an estimation of costs and how this will be covered.

The main goal of this release of the Data Management plan is to classify the available information into task/pilot level specifying for each demonstrator within inteGRIDy, the required information regarding each data item identified, assessing its confidentiality, describing its ownership and specifying if the data is to be made open access.

3.2 Isle of Wight

Table 19. Asset Data (IoW, M7)

Data Manager	M7
Dataset reference / name	Asset Data
Availability	Confidential
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Heat pump, PV, Storage capacity per system, and connected properties
Data set description	Heat pump – output, electrical demand, make PV – kW peak installed, supplier Inverter description, supplier Water tanks – size, temperature range, supplier Number of properties per system
Standards	N/A
Data sharing	Confidential to system owner.
Archiving and preservation (storage/backup)	Cloud based back up processes

Table 20. Asset Data (IoW, EMSc)

Data Manager	EMSc
Dataset reference / name	Asset Data
Availability	Confidential
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	Metering data, processing data (voltage. Current. Power, capacity, time, booking information)
Standards	NA

Data sharing	Internal Data, no shared
Archiving and preservation (storage/backup)	N/A

Table 21. Asset Data (IoW, UNEW)

Data Manager	UNEW
Dataset reference / name	Asset Data
Availability	Confidential
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Distribution network assets; transformers; generators; cables; busbars
Data set description	Data of all assets at the 33 kV and 11 kV distribution network (MS-Excel files containing the data of transformers, generators, cables, and busbars).
Standards	Data related to the IoW distribution network and collected by UNEW from SSEN is under a non-disclosure agreement (NDA) between UNEW and SSEN. The NDA limits the publication of the data but it can be used by UNEW for research purposes.
Data sharing	The re-use of distribution network data in IoW requires the approval of the Network operator (i.e. SSEN).
Archiving and preservation (storage/backup)	Data archiving and preservation is done through secured communication facilities of UNEW. The media used for data storage in our tool are archiving and backup appliances. Some of these data storages are connected and the others are isolated.

Table 22. DR points (IoW)

Data Manager	M7
Dataset reference / name	DR points
Availability	Restricted
Mandatory Metadata	European Union H2020

	integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Storage capacity
Data set description	Thermal stores Size Thermal storage (in kWh) Estimated time to depletion for a typical demand profile
Standards	N/A
Data sharing	Restricted to the system owner
Archiving and preservation (storage/backup)	Standard cloud based back up

Table 23. Generation profiles (IoW, M7)

Data Manager	M7
Dataset reference / name	Generation Profiles
Availability	Confidential
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	PV meta data
Data set description	Description of PV on site Yield profiles for each PV panel
Standards	N/A
Data sharing	System owner
Archiving and preservation (storage/backup)	Standard cloud based back up

Table 24. Generation profiles (IoW, UNEW)

Data Manager	UNEW
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Dataset reference / name	Generation Profiles
Availability	Confidential
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	Generation profiles; time series
Data set description	The generation profile of different distributed generations in the loW distribution network.
Standards	<p>Reference to existing standards in topic area governing data collection, aggregation, storage and sharing.</p> <p>Adaptation of data set to community standards to maximize interoperability with other researchers.</p> <p>Potential license restrictions. Discoverability. Need for aggregation and anonymization.</p>
Data sharing	<p>How the data will be shared, identification of repository, existence of embargo period if any, identification of software or tools necessary for reuse.</p> <p>Data sets reused from other inteGRIDy tasks.</p> <p>Use of this dataset by third parties in the future.</p>
Archiving and preservation (storage/backup)	<p>Data archiving and preservation can be done through secured communication facilities of UNEW.</p> <p>The media used for data storage in our tool are archiving and backup appliances. Some of these data storages are connected and the others are isolated. The amount of the data varies with the project progression.</p>

Table 25. Load / Consumption Data (loW, SIE)

Data Manager	SIE
Dataset reference / name	Load / Consumption Data
Availability	Confidential
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>

Dataset Specific Metadata	GHG, Kwh and £'s data.
Data set description	Energy Portfolio provides input to the associated asset reprogramming and various event lead interruption or load control requests are initiated and live data receivable.
Standards	Passwords – compliant with NERC guidelines including provision for RADIUS based authentication. SSH / SSL – extends capability of password protection to add encryption of passwords and data as they cross the network. Enable / disable ports – capability to disable ports so unauthorized devices can't connect to unused ports. 802.1Q VLAN – provides the ability to logically segregate traffic between predefined ports on switches. SNMPv3 – encrypted authentication and access security. HTTPS – for secure access to the web interface. 802.1x – to ensure only permitted devices can connect to the devices.
Data sharing	Via RESTFUL protocols
Archiving and preservation (storage/backup)	Amazon Work Spaces

Table 26. Load / Consumption Data (IoW, M7)

Data Manager	M7
Dataset reference / name	Load / Consumption Data
Availability	Confidential
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Residential
Data set description	Heat demand profile Electricity demand profile
Standards	SQL
Data sharing	System owner
Archiving and preservation (storage/backup)	Standard Cloud based

Table 27. Load / Consumption Data (IoW, EMSc)

Data Manager	EMSc
Dataset reference / name	Load / Consumption Data
Availability	Consortium
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	NA
Data set description	Consumption data to be used to is the management sytem. This include power demand (power level), load voltage, load, current, harmonics.
Standards	NA
Data sharing	Can be shared as a .csv file on request. Not shared with third party but can be share with customer (owner of the sytem).
Archiving and preservation (storage/backup)	Internal system server to store historical data for accurate management. There is a data window of 1 year.

Table 28. Load / Consumption Data (IoW, UNEW)

Data Manager	UNEW
Dataset reference / name	Load / Consumption Data
Availability	Confidential
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Demand profile; load consumption time series
Data set description	Demand data at different buses of the distribution systems of the IoW
Standards	Reference to existing standards in topic area governing data collection, aggregation, storage and sharing. Adaptation of data set to community standards to maximize interoperability with other researchers.

	Potential license restrictions. Discoverability. Need for aggregation and anonymization.
Data sharing	<p>How the data will be shared, identification of repository, existence of embargo period if any, identification of software or tools necessary for reuse.</p> <p>Data sets reused from other inteGRIDy tasks.</p> <p>Use of this dataset by third parties in the future.</p>
Archiving and preservation (storage/backup)	<p>Data archiving and preservation can be done through secured communication facilities of UNEW.</p> <p>The media used for data storage in our tool are archiving and backup appliances. Some of these data storages are connected and the others are isolated. The amount of the data varies with the project progression.</p>

Table 29. Network Model (IoW)

Data Manager	UNEW
Dataset reference / name	Network Model
Availability	Restricted
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	IoW distribution network model; single-line diagram
Data set description	<p>This data set include single line diagram of the IoW distribution network.</p> <p>The network model of distribution system of the IoW is in MATLAB and IPSA environment.</p>
Standards	A Specific standard needs to be adopted. The modified version of the model can be shared with the pilot partners after excluding the data included in the NDA.
Data sharing	A Specific standard needs to be adopted. The modified version of the model can be shared with the pilot partners after excluding the data included in the NDA.
Archiving and preservation (storage/backup)	Data archiving and preservation can be done through secured communication facilities of UNEW. The media used for data storage in our tool are archiving and backup appliances. Some of these data storages are connected and the others are isolated. The amount of the data varies with the project progression.

Table 30. Simulation Environment (IoW)

Data Manager	UNEW
Dataset reference / name	Simulation Environment
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Integrated Test Environment (ITE)
Data set description	Source code written in Java and Matlab of the Integrated Test Environment (ITE) developed by Newcastle University (UNEW).
Standards	Specific standards could be adopted to describe data. A request must be submitted to Newcastle University to have access to the ITE confirming the environment will not be used for commercial purpose (only for research purpose). Newcastle University must be acknowledged in each report, paper in which the environment was used.
Data sharing	ITE can be shared under request
Archiving and preservation (storage/backup)	Data archiving and preservation can be done through secured communication facilities of UNEW. The media used for data storage in our tool are archiving and backup appliances. Some of these data storages are connected and the others are isolated. The amount of the data varies with the project progression.

Table 31. Customer data and Residential Profiles (IoW, SIE)

Data Manager	SIE
Dataset reference / name	Customer data and Residential Profiles
Availability	Confidential
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	GHG, Kwh and £'s data.

Data set description	<i>Energy Portfolio provides input to the associated asset reprogramming and various event lead interruption or load control requests are initiated and live data receivable.</i>
Standards	<i>Passwords – compliant with NERC guidelines including provision for RADIUS based authentication. SSH / SSL – extends capability of password protection to add encryption of passwords and data as they cross the network. Enable / disable ports – capability to disable ports so unauthorized devices can't connect to unused ports. 802.1Q VLAN – provides the ability to logically segregate traffic between predefined ports on switches. SNMPv3 – encrypted authentication and access security. HTTPS – for secure access to the web interface. 802.1x – to ensure only permitted devices can connect to the devices.</i>
Data sharing	Via restful services
Archiving and preservation (storage/backup)	AWS

Table 32. Customer data and Residential Profiles (IoW, M7)

Data Manager	M7
Dataset reference / name	Customer data and Residential Profiles
Availability	Confidential
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Heat pump performance Thermal storage (temperature/volume) Control parameters Thermal demand
Data set description	<p>Here are a list of the digital inputs that are controlled</p> <pre> byte dig_outputs1 byte cs_pump Cold Store Pump byte hs_pump Hot Store Pump byte cs_valve Cold Store Valve byte hs_valve Hot Store Valve </pre>

byte coll_pump Collector Pump
 byte dist_pump Distribution Pump
 byte sol_valve1 Solar Valve 1
 byte sol_valve2 Solar Valve 2
 byte dig_outputs2
 byte heat_pump Heat pump
 byte heat_available Heat Available

The following meter readings/calculations are used

word current_KWhcoll 'Current KW heat from hot collection
 word current_KWccoll 'Current KW heat from cold collection
 word current_KWcond 'Current KW heat from Condenser
 word current_KWtotal 'Combined Condenser and Roof duty
 word cscoll_dt 'Tenths of Degree C temperature differential across cold roof exchanger
 word cs_exchange 'Rate of Heat flow W/hr transferred by heat exchanger – *Assumed Cold roof exchanger*
 word cond_dt 'Tenths of Degree C temperature differential across heat exchanger

Assumed cold roof exchanger

word hscoll_dt 'Tenths of Degree C temperature differential across hot roof exchanger
 word hs_exchange 'Rate of Heat flow W/hr transferred by heat exchanger
 long total_KWsep 'Lifetime total KW/hrs supplied by SEP
 long daily_KWsep 'Daily totaliser of KW/hrs supplied by SEP
 long daily_KWelec 'Daily totaliser of KW/hrs used by SEP

long total_KWelec 'Lifetime totaliser of KW/hrs used by SEP

word usage_timer 'Used for timing the storage rate of KWH readings

byte this_clkday 'used to detect end of day, for storing daily KW total

word energy_meter 'used to total W/Hrs being used

word energymeter_timer 'used to measure time between meter pulses

The following Meter Readings are used

word cs_tanktemp 'Current Cold store temperature

word hs_tanktemp 'Current Hot store temperature

word roof_temp 'Current Roof temperature

ch0 = 18 'Pulse input 1 (Cold store flowmeter)

ch1 = 19 'Pulse input 2 (Hot store flowmeter)

ch2 = 20 'Pulse input 3 (Collector flowmeter)

ch3 = 21 'Pulse input 4 (Heating flowmeter)

ch4 = 22 'Pulse input 5 (DHW flowmeter)

ch5 = 23 'Pulse input 6 (Energy meter)

eprsetpoint = 1129 'EPR valve opening temperature (0.03 DegC)

For Communication with the HTU and Smart Switch

byte house_demand1

byte house_demand2

byte house_demand3

byte house_demand4

byte house_demand5

byte house_demand_old

byte demand1_timer

byte demand2_timer

	byte demand3_timer byte demand4_timer byte demand5_timer For Smart Switch long house1_heat long house1_elec long house2_heat long house2_elec long house3_heat long house3_elec long house4_heat long house4_elec
Standards	SQL data base
Data sharing	System owner
Archiving and preservation (storage/backup)	Standard cloud based back up

Table 33. Customer data and Residential Profiles (IoW, EMSc)

Data Manager	EMSc
Dataset reference / name	Customer data and Residential Profiles
Availability	Confidential
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	NA
Data set description	Data will be collected from HMI and will provide information for booking system. This information will be used in the system optimisation algarhythm. These are not reusable data as evryday will have a different profile.
Standards	System aggregation.

Data sharing	Data is not shared.
Archiving and preservation (storage/backup)	NA

Table 34. ESS Data (IoW, EMSc)

Data Manager	EMSc
Dataset reference / name	ESS Data
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	NA
Data set description	Energy storage data to be used to is the management sytem. This include battery status, state of earth (SOE), state of charge, cells voltage and current levels (min and max). DC power level, temperature
Standards	Appropriate login detail will be required to obtain data.
Data sharing	Data can be download via an online human interface portal. They can be shared as .csv file when requested.
Archiving and preservation (storage/backup)	Data will be stored in a local internal storage system.

Table 35. ESS Data (IoW, UNEW)

Data Manager	UNEW
Dataset reference / name	ESS Data
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	ESS Data
Data set description	Placement of ESSs in the distribution network of IoW

Standards	It is a result of the analysis performed on the distribution network of the IoW. It is open to the project partners to use this results under request from the pilot leader.
Data sharing	Open to the project partners under request to the pilot leader
Archiving and preservation (storage/backup)	The media used for data storage in our tool are archiving and backup appliances. Some of these data storages are connected and the others are isolated. The amount of the data varies with the project progression.

Table 36. ESS charge/discharge schedules (IoW, EMSc)

Data Manager	EMSc
Dataset reference / name	ESS charge/discharge schedules
Availability	Confidential
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	NA
Data set description	This work in parallel with ESS data. The schedule will be calculated by the optimisation algorithm to establish the best use of ESS. Data collected from EV charger demand and other load usage along with other optimisation computation will determine when best to charge or discharge the batteries.
Standards	NA
Data sharing	These are internal data and are not shared.
Archiving and preservation (storage/backup)	NA

Table 37. ESS charge/discharge schedules (IoW, UNEW)

Data Manager	UNEW
Dataset reference / name	ESS charge/discharge schedules
Availability	Open
Mandatory Metadata	European Union H2020

	integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	ESS charge/discharge schedules
Data set description	ESS charge/discharge schedules
Standards	It is a result of the analysis performed on the distribution network of the IoW. It is open to the project partners to use this results under request from the pilot leader.
Data sharing	Open to the project partners under request to the pilot leader.
Archiving and preservation (storage/backup)	The media used for data storage in our tool are archiving and backup appliances. Some of these data storages are connected and the others are isolated. The amount of the data varies with the project progression.

Table 38. ESS and DR Set points (IoW, SIE)

Data Manager	SIE
Dataset reference / name	ESS and DR Set points
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	GHG, Kwh and £'s data.
Data set description	Energy Portfolio provides input to the associated asset reprogramming and various event lead interruption or load control requests are initiated and live data receivable.
Standards	Passwords – compliant with NERC guidelines including provision for RADIUS based authentication. SSH / SSL – extends capability of password protection to add encryption of passwords and data as they cross the network. Enable / disable ports – capability to disable ports so unauthorized devices can't connect to unused ports. 802.1Q VLAN – provides the ability to logically segregate traffic between predefined ports on switches. SNMPv3 – encrypted authentication and access security. HTTPS – for secure access to the web interface. 802.1x – to ensure only permitted devices can connect to the devices.

Data sharing	Restful services
Archiving and preservation (storage/backup)	AWS

Table 39. ESS and DR Set points (IoW, EMSc)

Data Manager	EMSc
Dataset reference / name	ESS and DR Set points
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	NA
Data set description	Set point are determined based on maximum capacity available at that current time and load demand levels.
Standards	NA
Data sharing	These are internal data and are nor shared.
Archiving and preservation (storage/backup)	NA

Table 40. ESS and DR Set points (IoW, UNEW)

Data Manager	UNEW
Dataset reference / name	ESS and DR Set points
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	ESS and DR Set points
Data set description	Set points of the ESSs and DRs. The set points of ESSs to be defined using UNEW tool, however the set points of DSs to be defined using seimens tool

Standards	It is a result of the analysis performed on the distribution network of the IoW. It is open to the project partners to use this results under request from the pilot leader.
Data sharing	Open to the project partners under request to the pilot leader.
Archiving and preservation (storage/backup)	The media used for data storage in our tool are archiving and backup appliances. Some of these data storages are connected and the others are isolated. The amount of the data varies with the project progression.

Table 41. RES set points and curtailment actions (IoW, EMSc)

Data Manager	EMSc
Dataset reference / name	RES set points and curtailment actions
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	NA
Data set description	RES set point and restrictions are determined by power generation prediction function. These will be based on battery size and local demand.
Standards	NA
Data sharing	These are internal data and are not shared.
Archiving and preservation (storage/backup)	NA

Table 42. RES set points and curtailment actions (IoW, UNEW)

Data Manager	UNEW
Dataset reference / name	RES set points and curtailment actions
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies

	inteGRIDy GA 731268
Dataset Specific Metadata	RES set points and curtailment actions
Data set description	Set points and curtailment actions of the RESs. These set points and actions will be the results of the optimal power flow performed by ITE.
Standards	It is a result of the analysis performed on the distribution network of the IoW. It is open to the project partners to use these results under request from the pilot leader.
Data sharing	Open to the project partners under request to the pilot leader.
Archiving and preservation (storage/backup)	The media used for data storage in our tool are archiving and backup appliances. Some of these data storages are connected and the others are isolated. The amount of the data varies with the project progression.

3.3 Terni

Table 43. Setpoints & DR commands (Terni)

Data Manager	ASM
Dataset reference / name	Setpoints & DR commands
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	Set points for the blocks of energy units within the microgrid and the general DR signals for the overarching goal of the DR campaign
Standards	Json files transferred by MQTT protocol
Data sharing	This data will be shared to other companies of the project, namely ENG and UNIROMA1.
Archiving and preservation (storage/backup)	Data will be stored in ASM premises and proper backup is carried out

Table 44. Power flexibility (Terni)

Data Manager	ASM
Dataset reference / name	Power flexibility
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	Power flexibility evaluated for the blocks of energy units within the microgrid that participate to the DR campaigns orchestrated by DSO
Standards	Json files transferred by MQTT protocol
Data sharing	This data will be shared to other companies of the project, namely ENG and UNIROMA1.
Archiving and preservation (storage/backup)	Data will be stored in ASM premises and proper backup is carried out

Table 45. DSO request (Terni)

Data Manager	ASM
Dataset reference / name	DSO request
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	A DSO request to microgrid energy manager in order to optimize power supply and reduce losses
Standards	csv files
Data sharing	This data will be shared to other companies of the project, namely ENG and UNIROMA1.

Archiving and preservation (storage/backup)	Data will be stored in ASM premises and proper backup is carried out
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Table 46. Monitoring Data (Terni)

Data Manager	ASM
Dataset reference / name	Monitoring Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	These data are collected from the field directly from the block of energy units in the microgrid.
Standards	Json files transferred by MQTT protocol
Data sharing	This data will be shared to other companies of the project, namely ENG and UNIROMA1.
Archiving and preservation (storage/backup)	Data will be stored in ASM premises and proper backup is carried out

Table 47. Device parameters & rated values (Terni)

Data Manager	ASM
Dataset reference / name	Device parameters & rated values
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	Main parameters enabling network description and component modelling
Standards	csv files

Data sharing	This data will be shared to other companies of the project, namely ENG and UNIROMA1.
Archiving and preservation (storage/backup)	Data will be stored in ASM premises and proper backup is carried out

Table 48. Generation Data (Terni)

Data Manager	ASM
Dataset reference / name	Generation Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	These data are collected from the field directly from the block of energy units in the microgrid.
Standards	Json files transferred by MQTT protocol
Data sharing	This data will be shared to other companies of the project, namely ENG and UNIROMA1.
Archiving and preservation (storage/backup)	Data will be stored in ASM premises and proper backup is carried out

Table 49. Consumption Data (Terni)

Data Manager	ASM
Dataset reference / name	Consumption Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	These data are collected from the field directly from the block of energy units in the microgrid.

Standards	Json files transferred by MQTT protocol
Data sharing	This data will be shared to other companies of the project, namely ENG and UNIROMA1.
Archiving and preservation (storage/backup)	Data will be stored in ASM premises and proper backup is carried out

Table 50. Weather Data (Terni)

Data Manager	ENG
Dataset reference / name	Weather Data
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	These are data about the weather data enabling evaluation of PV production
Standards	Not restrictive.
Data sharing	Not applicable since weather data are publicly available and shareable in all respects.
Archiving and preservation (storage/backup)	Data will be stored in ASM premises, as pilot leader, and proper backup is carried out

Table 51. Energy Prices (Terni)

Data Manager	ENG
Dataset reference / name	Energy Prices
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A

Data set description	These data are necessary to calculate monetary incentives for the microgrid energy manager that participate to DR campaign
Standards	Not restrictive.
Data sharing	Not applicable since energy prices are publicly available and shareable in all respects.
Archiving and preservation (storage/backup)	Data will be stored in ASM premises and proper backup is carried out

Table 52. Simulated Data (Terni)

Data Manager	ENG
Dataset reference / name	Simulated Data
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	In order to investigate how microgrid can support the network development and DSO operations, simulation will be carried out taking into account future scenarios (e.g., considering a certain EV penetration)
Standards	Not restrictive.
Data sharing	Simulation results are available to ASM and UNIROMA1.
Archiving and preservation (storage/backup)	Data will be stored in ASM premises and proper backup is carried out

3.4 San Severino Marche

Table 53. Customer Data (San Severino)

Data Manager	Massimo Fiori (ASSEM)
Dataset reference / name	Customer Data
Availability	Restricted
Mandatory Metadata	European Union H2020

	integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Users, contractual and connection data
Data set description	Data collected on residential and non-residential users involved in the project: contractual power, technology of local power plants, bus of connection to the network, etc.
Standards	Restricted data subject to anonymization.
Data sharing	Data stored locally in an Oracle database in the DSO's control center. Data shared only within the pilot's partners granting an access protected by username and password to the DB. No reuse planned for other inteGRIDy tasks or by third parties in the future.
Archiving and preservation (storage/backup)	Periodical manual backup of the Oracle database.

Table 54. ESS Data (San Severino)

Data Manager	Lorenzo Corghi (UNE)
Dataset reference / name	ESS Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Energy storage system
Data set description	Data regarding the design characteristics and data of use of the energy storage systems installed in the project: degradation, mean efficiency, rated parameters, alarms and warnings, etc.
Standards	Restricted data subject to anonymization.
Data sharing	Data stored in UNE's webserver and partially backed-up locally in an Oracle database in the DSO's control center. Data shared partially only within the pilot's partners granting an access protected by username and password to the DB. No reuse planned for other inteGRIDy tasks or by third parties in the future.

Archiving and preservation (storage/backup)	Periodical manual backup of data stored in the Oracle database.
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Table 55. ESS Power/Energy Profiles (San Severino)

Data Manager	Lorenzo Corgi (UNE)
Dataset reference / name	ESS Power/Energy Profiles
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Energy storage system, active power, energy, timeseries
Data set description	Active power profiles and state of charge collected on the residential users by the Zhero technology energy storage systems.
Standards	Restricted data subject to anonymization.
Data sharing	Data stored in UNE's webserver and backed-up locally in an Oracle database in the DSO's control center. Data shared only within the pilot's partners granting an access protected by username and password to the DB. No reuse planned for other inteGRIDy tasks or by third parties in the future.
Archiving and preservation (storage/backup)	Periodical manual backup of the Oracle database.

Table 56. ESS Setpoints (San Severino)

Data Manager	Lorenzo Corgi (UNE)
Dataset reference / name	ESS Setpoints
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Energy storage system, setpoint, timeseries
Data set description	Power setpoint generated by the MV distribution network management tools and sent to the energy storage systems to implement the coordinated ancillary services provision.

Standards	Restricted data subject to anonymization.
Data sharing	Data stored in UNE's webserver and backed-up locally in an Oracle database in the DSO's control center. Data shared only within the pilot's partners granting an access protected by username and password to the DB. No reuse planned for other inteGRIDy tasks or by third parties in the future.
Archiving and preservation (storage/backup)	Periodical manual backup of the Oracle database.

Table 57. Forecasted Algorithm Parameters (San Severino)

Data Manager	Massimo Fiori (ASSEM)
Dataset reference / name	Forecasted Algorithm Parameters
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Forecasts, random forest algorithm
Data set description	Numerical parameters used to perform the forecast of active power production of power plants: random forest algorithm constants, etc.
Standards	Open data.
Data sharing	Data stored locally in an Oracle database in the DSO's control center. Data publicly available through a web repository. Possible reuse for other inteGRIDy tasks or by third parties in the future.
Archiving and preservation (storage/backup)	Periodical manual backup of the Oracle database.

Table 58. Forecasted Load/Gen Profiles (San Severino)

Data Manager	Massimo Fiori (ASSEM)
Dataset reference / name	Forecasted Load/Gen Profiles
Availability	Restricted
Mandatory Metadata	European Union H2020

	integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Forecasts, active power, timeseries
Data set description	Active power production/absorption of passive and active users of San Severino Marche users. Timeseries over one year with hourly resolution.
Standards	Restricted data subject to anonymization.
Data sharing	Data stored locally in an Oracle database in the DSO's control center. Data shared only within the pilot's partners granting an access protected by username and password to the DB. No reuse planned for other inteGRIDy tasks or by third parties in the future.
Archiving and preservation (storage/backup)	Periodical manual backup of the Oracle database.

Table 59. Freq. Reg. Signal (San Severino)

Data Manager	Massimo Fiori (ASSEM)
Dataset reference / name	Freq. Reg. Signal
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Control signal, secondary frequency control, timeseries
Data set description	Control signal to perform secondary frequency regulation. Timeseries with 1-minute resolution in the range 0-100.
Standards	Open data.
Data sharing	Data stored locally in an Oracle database in the DSO's control center for the project's purposes. Data freely downloadable ex-post (historical data) from the Terna website. Possible reuse for other inteGRIDy tasks or by third parties in the future.
Archiving and preservation (storage/backup)	Periodical manual backup of the Oracle database.

Table 60. Generation Profiles (San Severino)

Data Manager	Massimo Fiori (ASSEM)
Dataset reference / name	Generation Profiles
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Active power, active users, timeseries
Data set description	Active power profiles measured or estimated on producers of San Severino Marche project. Timeseries with time resolution depending on the the application (from 1 min to 1 h).
Standards	Data subject to anonymization.
Data sharing	Data stored locally in an Oracle database in the DSO's control center. Data shared only within the pilot's partners granting an access protected by username and password to the DB. No reuse planned for other inteGRIDy tasks or by third parties in the future.
Archiving and preservation (storage/backup)	Periodical manual backup of the Oracle database.

Table 61. Grid Measurements (San Severino)

Data Manager	Massimo Fiori (ASSEM)
Dataset reference / name	Grid Measurements
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	MV network, active/reactive power, voltage, current timeseries
Data set description	Measurements collected on the MV network: active/reactive power, voltage, currents. Data used to perform the state estimation of network behaviour.

Standards	Data subject to anonymization.
Data sharing	Data stored locally in an Oracle database in the DSO's control center. Data shared only within the pilot's partners granting an access protected by username and password to the DB. No reuse planned for other inteGRIDy tasks or by third parties in the future.
Archiving and preservation (storage/backup)	Periodical manual backup of the Oracle database.

Table 62. Grid State Estimation (San Severino)

Data Manager	Massimo Fiori (ASSEM)
Dataset reference / name	Grid State Estimation
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	MV network, state estimation
Data set description	Electrical quantities relevant to the state estimation of the MV network behaviour, in real time and forecasted. Timeseries with hourly resolution.
Standards	Data subject to anonymization.
Data sharing	Data stored locally in an Oracle database in the DSO's control center. Data shared only within the pilot's partners granting an access protected by username and password to the DB. No reuse planned for other inteGRIDy tasks or by third parties in the future.
Archiving and preservation (storage/backup)	Periodical manual backup of the Oracle database.

Table 63. Load / Consumption Profiles (San Severino)

Data Manager	Massimo Fiori (ASSEM)
Dataset reference / name	Load / Consumption Profiles
Availability	Restricted
Mandatory Metadata	European Union H2020

	integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Active power, timeseries
Data set description	Active power profiles measured or estimated on the passive users of San Severino Marche project. Timeseries with time resolution depending on the the application (from 1 min to 1 h).
Standards	Data subject to anonymization.
Data sharing	Data stored locally in an Oracle database in the DSO's control center. Data shared only within the pilot's partners granting an access protected by username and password to the DB. No reuse planned for other inteGRIDy tasks or by third parties in the future.
Archiving and preservation (storage/backup)	Periodical manual backup of the Oracle database.

Table 64. Market Data (San Severino)

Data Manager	Massimo Fiori (ASSEM)
Dataset reference / name	Market Data
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Electricity market, timeseries
Data set description	Historical data of prices and quantities of energy and services traded on Day-Ahead and Ancillary Services Market.
Standards	Open data.
Data sharing	Data stored locally in an Oracle database in the DSO's control center for the project's purposes. Data freely downloadable ex-post (historical data) from the Gestore dei Mercati Energetici website. Possible reuse for other inteGRIDy tasks or by third parties in the future.

Archiving and preservation (storage/backup)	Periodical manual backup of the Oracle database.
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Table 65. MV Network Data (San Severino)

Data Manager	Massimo Fiori (ASSEM)
Dataset reference / name	MV Network Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	MV network, electric network parameters
Data set description	Dataset relevant to the MV network structure: MV grid topology, electrical parameters of MV lines and transformers, rated voltage, etc.
Standards	Data subject to anonymization.
Data sharing	Data stored locally in an Oracle database in the DSO's control center. Data shared only within the pilot's partners granting an access protected by username and password to the DB. No reuse planned for other inteGRIDy tasks or by third parties in the future.
Archiving and preservation (storage/backup)	Periodical manual backup of the Oracle database.

Table 66. Optimal Grid Topology (San Severino)

Data Manager	Massimo Fiori (ASSEM)
Dataset reference / name	Optimal Grid Topology
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	MV network, optimal topology, prediction
Data set description	Optimal grid topology in terms of open/close state of switching devices of MV network.

	Timeseries over 1 year with hourly resolution.
Standards	Open data.
Data sharing	Data stored locally in an Oracle database in the DSO's control center. Data publicly available through a web repository. Possible reuse for other inteGRIDy tasks or by third parties in the future.
Archiving and preservation (storage/backup)	Periodical manual backup of the Oracle database.

Table 67. Weather Data (San Severino)

Data Manager	Massimo Fiori (ASSEM)
Dataset reference / name	Weather Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Weather forecasts, timeseries
Data set description	Data collected from a web service provider, relevant to the Weather forecasts solar radiation, temperature
Standards	Data subject to licence to use.
Data sharing	Data stored locally in an Oracle database in the DSO's control center. Data shared only within the pilot's partners granting an access protected by username and password to the DB. No reuse planned for other inteGRIDy tasks or by third parties in the future.
Archiving and preservation (storage/backup)	Periodical manual backup of the Oracle database.

3.5 Barcelona

Table 68. MV Accounts Data (Barcelona)

Data Manager	SIEMENS SA
Dataset reference / name	Accounts Data

Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Account type Primary consumer for the account Account name Active/Inactive status of the Account
Data set description	Table holds information about billing accounts
Standards	Oracle database server
Data sharing	This data can be shared via normal SQL queries.
Archiving and preservation (storage/backup)	In order to provide flexibility in meeting data retention requirements and optimize storage costs DEMS supports a tiered storage approach. The data will be considered active since its deployment and during the pilot demonstration in tier 1 level storage.

Table 69. Baseline (Barcelona)

Data Manager	SIEMENS SA
Dataset reference / name	Baseline
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Baseline value calculated using a specific baseline_type for the interval. Consolidated consumption value for the interval. Source for the data.
Data set description	Time series data containing baseline values per Service Point.

Standards	Cassandra or Oracle
Data sharing	There is a Retrieve compute Data API to retrieve data from the common timeseries tables either in Cassandra or Oracle
Archiving and preservation (storage/backup)	The data will be considered active since its deployment and during the pilot demonstration in tier 1 level storage.

Table 70. Battery Data (including Capacity) (Barcelona)

Data Manager	TEES
Dataset reference / name	Battery Data (including Capacity)
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	State of charge (SoC) Time to charge/discharge the battery
Data set description	SoC information (The BMS connected to the battery and inverter has different functionalities which includes estimating SOC and SOH of the battery. NEMO will request and receive SO C from Inverter via Modbus protocol. Time needed to charge/discharge will depend on the energy price forecast, weather forecast as well as meter data
Standards	Modbus
Data sharing	Electric battery data can be shared in a csv format. NEMO Shall retrieve energy price forecast, weather forecast as well as meter data via API from Naturgy - RKW
Archiving and preservation (storage/backup)	Data will be stored on our password protected PC workstation.

Table 71. Common Time Series (Barcelona)

Data Manager	SIEMENS SA
Dataset reference / name	Common Time Series
Availability	Restricted
Mandatory Metadata	European Union H2020

	integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Program name Service Point id Measurement type Timestamp of the measurement
Data set description	Time series data plotted in the Inputs and Measurements graphs
Standards	Cassandra or Oracle
Data sharing	There is a CTS Data API to retrieve data from the common timeseries tables either in Cassandra or Oracle
Archiving and preservation (storage/backup)	The data will be considered active since its deployment and during the pilot demonstration in tier 1 level storage.

Table 72. Customer Data (Barcelona)

Data Manager	SIEMENS SA
Dataset reference / name	Customer Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Business or Individual Consumer name Consumer first name Consumer last name Consumer company name Active/Inactive status of the consumer Region consumer belongs to
Data set description	Consumer information
Standards	Oracle database server

Data sharing	This data can be shared via normal SQL queries.
Archiving and preservation (storage/backup)	The data will be considered active since its deployment and during the pilot demonstration in tier 1 level storage.

Table 73. Demand Response Events (Barcelona)

Data Manager	SIEMENS SA
Dataset reference / name	Demand Response Events
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Type of the event. Notification of the event. Status of the event, true means being notified. Required amount of load reduction. Start time of the event. Stop time of the event. ID of a Premise.
Data set description	Demand response event details for both parent and child events.
Standards	Oracle database server
Data sharing	This data can be shared via normal SQL queries.
Archiving and preservation (storage/backup)	The data will be considered active since its deployment and during the pilot demonstration in tier 1 level storage.

Table 74. Assets Data (Barcelona)

Data Manager	TEES
Dataset reference / name	Assets Data
Availability	Restricted
Mandatory Metadata	European Union H2020

	integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Asset status Asset load shed forecast Asset consumption forecast
Data set description	Optimal PV generation schedule SoC of battery storage system
Standards	Modbus, IEC 104
Data sharing	Data can be shared via API, and CSV file.
Archiving and preservation (storage/backup)	Data will be stored on our password protected PC workstation

Table 75. Distribution Grid Congestion data (Barcelona)

Data Manager	Naturgy
Dataset reference / name	Distribution Grid Congestion data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Pending
Data set description	Pending
Standards	Pending
Data sharing	Pending
Archiving and preservation (storage/backup)	Pending

Table 76. Equipment Status (Barcelona)

Data Manager	TEES
Dataset reference / name	Equipment Status
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	HVAC, dehumidifier, water pump, SCADA
Data set description	Control of asset operation setpoint via SCADA
Standards	Modbus, IEC 104
Data sharing	Asset status data is shared with DEMS via IEC 104
Archiving and preservation (storage/backup)	Data will be stored on our password protected PC workstation

Table 77. Forecasted Data (Barcelona)

Data Manager	Aiguasol / TEES
Dataset reference / name	Forecasted Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Swimming pool forecast; time series
Data set description	Load forecast of the swimming pool system for the next 24 hours.
Standards	Data is exposed through a REST service that will return data in JSON format.
Data sharing	Requests will be made with GET type. Data will be available with any HTTP client by entering the complete url with the input parameters and Token.

	Data will also be accessible using browser, a specific client type POSTMAN or using some command line application such as CURL.
Archiving and preservation (storage/backup)	NA

Table 78. Forecasted Electricity Price Data (Barcelona)

Data Manager	Naturgy
Dataset reference / name	Forecasted Electricity Price Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Energy prices forecast (€/MWh per hour)
Data set description	Energy prices forecast (€/MWh per hour)
Standards	Data is exposed through a REST service that will return data in JSON format.
Data sharing	Requests will be made with GET type. Input parameter is: - day: YYYY-MM-DD Data will be available with any HTTP client by entering the complete url with the input parameters and Token. Data will also be accessible using browser, a specific client type POSTMAN or using some command line application such as CURL.
Archiving and preservation (storage/backup)	To be done.

Table 79. Forecasted Weather Data (Barcelona)

Data Manager	Naturgy
Dataset reference / name	Forecasted Weather Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies

	inteGRIDy GA 731268
Dataset Specific Metadata	Weather forecast
Data set description	<p>Weather forecast (humidity, temperature, wind speed, irradiation). This data is obtained from Meteoblue service.</p> <p>Data will be used by Swimming Pool Model (Aiguasol), Swimming pool optimal configuration (CERTH) and NEMO (Teeside).</p>
Standards	Data is exposed through a REST service that will return data in JSON format.
Data sharing	<p>Requests will be made with GET type. Input parameters are:</p> <ul style="list-style-type: none"> - day: YYYY-MM-DD - rate: type of measure: <ul style="list-style-type: none"> • humidity • temperature • wind_speed • irradiation <p>Example: curl -v -H "Content-Type: application/json" -H "x-api-key: <TOKEN>" https://h7ierskxtg.execute-api.eu-west-1.amazonaws.com/dev/predict?day=2018-05-01&rate=humidity</p> <p>Data can be obtained with any HTTP client by entering the complete url with the input parameters and Token. Data can be also accessed using browser, a specific client type POSTMAN or using some command line application such as CURL.</p>
Archiving and preservation (storage/backup)	<p>Architecture implemented by using AWS Services (scalability issues could be easily solved).</p> <p>First cost approach: 35\$/month (On-demand cost) to 230\$/month (Serverless cost).</p>

Table 80. Current conditions (Indoor data) (Barcelona)

Data Manager	TEES
Dataset reference / name	Current conditions (Indoor data)
Availability	Restricted
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>

Dataset Specific Metadata	Swimming pool current (initial) conditions
Data set description	NEMO retrieves swimming pool current (initial) conditions of assets (Air temperature, Air humidity, water temperature) from SCADA and sends to Aiguasol and CERTH via API
Standards	Modbus
Data sharing	Data is sent to Aiguasol and CERTH through a REST service in JSON format.
Archiving and preservation (storage/backup)	Data will be stored on our password protected PC workstation

Table 81. Proposed setpoint per asset (Barcelona)

Data Manager	TEES
Dataset reference / name	Proposed setpoint per asset
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Set points
Data set description	Optimized set point received from CERTH and sent to SCADA
Standards	Modbus
Data sharing	Data is received from CERTH through a REST service in JSON format.
Archiving and preservation (storage/backup)	Data will be stored on our password protected PC workstation

Table 82. Market emulator (including Services Data) (Barcelona)

Data Manager	Naturgy
Dataset reference / name	Market emulator (including Services Data)
Availability	Restricted
Mandatory Metadata	European Union H2020

	integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Market Emulator Signals (ME)
Data set description	Market emulator signals (charge o discharge a certain amount of energy per hour).
Standards	Pending
Data sharing	Pending
Archiving and preservation (storage/backup)	To be done.

Table 83. Load / Consumption Data (Barcelona)

Data Manager	Naturgy
Dataset reference / name	Load / Consumption Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Meters data (electricity and gas consumption)
Data set description	Meters data (General electricity measurement, General gas measurement, Useful energy, Heat pump, Dehumidifier, ACS AT, ACS BT, Swimming pool, Swimming pool room) This data is shared with DEMS (SIEMENS), Aiguasol, CERTH and Teeside.
Standards	Data is exposed through a REST service that will return data in JSON format. When this data has to be sent to DEMS (SIEMENS), data is exposed through an XML, which is sent to an FTP.
Data sharing	Requests will be made with GET type. Parameters will be indicated through QueryParams. <ul style="list-style-type: none"> • date: YYYY-MM-DD • ieee: Id of the measurement: <ul style="list-style-type: none"> ○ 'OWAGNF_CLAROR_1':General electricity measurement

	<ul style="list-style-type: none"> ○ 'ELV0016003968_2295201' : General gas measurement ○ 'ELV0016003968_17692967' : Useful energy ○ 'ELV0016003968_84889' : Heat pump ○ 'ELV0016003968_84886' : Dehumidifier ○ 'ELV0016003968_17709595' : ACS AT ○ 'ELV0016003968_17692965' : ACS BT ○ 'ELV0016003968_17692964' : Swimming pool ○ 'ELV0016003968_17692879' : Swimming pool room <p>Example: <code>curl -v -H "Content-Type: application/json" -H "x-api-key: <TOKEN>" https://q0volspych.execute-api.eu-west-1.amazonaws.com/dev/get?date=2019-02-02&ieee=ELV0016003968_2295201</code></p> <p>Data can be obtained with any HTTP client by entering the complete url with the input parameters and token. Data can be also accessed using a specific client type POSTMAN or using some command line application such as CURL.</p>
Archiving and preservation (storage/backup)	<p>Architecture implemented by using AWS Services (scalability issues could be easily solved).</p> <p>First cost approach: 35\$/month (On-demand cost) to 230\$/month (Serverless cost).</p>

Table 84. Predicted Shed (Barcelona)

Data Manager	Aiguasol
Dataset reference / name	Predicted Shed
Availability	Restricted
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	Load shedding forecast
Data set description	A time series of load shedding forecast for the next 24 hours due to the flexibility of the swimming pool.
Standards	NA

Data sharing	Data is exposed through an XML file, which is sent to DEMS (SIEMENS) through an FTP.
Archiving and preservation (storage/backup)	Data will be stored in a local internal storage system and will be considered active since its deployment and during the pilot demonstration.

Table 85. Premises Data (Barcelona)

Data Manager	SIEMENS SA
Dataset reference / name	Premises Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Street name City name Postal code Latitude of the premise Longitude of the premise Premise region
Data set description	Premise address
Standards	Oracle database server
Data sharing	This data can be shared via normal SQL queries.
Archiving and preservation (storage/backup)	The data will be considered active since its deployment and during the pilot demonstration in tier 1 level storage.

3.6 St. Jean de Maurienne

Table 86. Asset Address (St Jean)

Data Manager	SOREA
Dataset reference / name	Asset Address
Availability	Confidential
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies

	inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	The Asset Address refers to the physical address of the pilot users and is only available to the Data Manager in order to organize the installation activities. No other project partner has access to this personal data there is no possibility of re-using it.
Standards	To ensure the security of the collected Asset Addresses, the data has been encrypted.
Data sharing	Under the GDPR definition, the Asset Address is considered to be personal data and therefore, it will not be shared with any partner or any third parties.
Archiving and preservation (storage/backup)	The Asset Address will be stored for the duration of the project and will be deleted afterwards. The information is kept in a dedicated server at the SOREA premises in France. The associated cost of storage has been considered within the InteGRIDy budget and no additional costs for storage are foreseen.

Table 87. Asset Flexibility (St Jean)

Data Manager	SOREA
Dataset reference / name	Asset Flexibility
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	The Asset Flexibility refers to the Demand Flexibility Profiles based on the thermal and visual comfort profiles calculated by the Demand Side Energy Profiling (DSEP) tool, derived by metered environmental and operational data. The purpose of the calculated flexibility profiles is to facilitate the application of personalized DR campaigns while maintaining the indoor ambient conditions at the comfort level of the users. There is no possibility of re-using the Asset Flexibility data.
Standards	As a security measure, the Asset Flexibility data is anonymized and JSON is used as a data exchange format in the DSEP tool.

Data sharing	The Asset Flexibility, regularly calculated for each pilot site, is considered to be personal data under the GDPR. According to this, it will not be shared with any project partner or any third parties.
Archiving and preservation (storage/backup)	The calculated Asset Flexibility will be stored for the duration of the project at the cloud server provided by TREK, at TREK premises in Athens, and will be deleted after the project's end. The related cost is considered in the InteGRIDy allocated budget. At the moment, no additional costs related to data storage are foreseen.

Table 88. Asset Location (St Jean)

Data Manager	SOREA
Dataset reference / name	Asset Location
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	The location of the Assets refers to the general geolocation of the pilot sites in order to represent the available flexibility per area and facilitate the DSO portfolio management with the VAE tool.
Standards	To ensure the security of the collected Asset Location, the data has been anonymized. The data representation on the map included in the VAE tool is very abstract and indicates the general area rather than the exact location of the Asset.
Data sharing	The Asset Location, is considered to be personal data and will not be shared with any partner or third parties.
Archiving and preservation (storage/backup)	The Asset Location will be stored for the duration of the project and will be deleted afterwards. The information is stored at a dedicated server at the SOREA premises and shared with TREK to incorporate the VAE tool. The associated cost of storage has been considered within the InteGRIDy budget and no additional costs for storage are foreseen.

Table 89. Environmental Data (St Jean)

Data Manager	SOREA
Dataset reference / name	Environmental Data
Availability	Restricted

Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	The environmental data refers to the information collected using sensors to monitor the ambient conditions at the pilot sites. These timeseries are used in combination with the operational data collected in order to calculate the thermal and visual profiles within the DSEP tool. There is no possibility of other partners re-using of this data.
Standards	As a security measure, the Asset Flexibility data is anonymized and JSON is used as a data exchange format in the DSEP tool for the calculation of the user comfort profiles.
Data sharing	The environmental data collected at the pilot sites in the duration of InteGRIDy provides information about the physiological preferences of the users and therefore, according to Art.4 of the GDPR, is also treated as personal data. According to this, the environmental data will not be shared with other project partners or any third parties.
Archiving and preservation (storage/backup)	The collected environmental data will be stored for the duration of the project at the dedicated cloud server provided by TREK, at TREK premises in Athens, and will be deleted after the project's end. The related cost is considered in the InteGRIDy allocated budget. At the moment, no additional costs related to data storage are foreseen.

Table 90. KPIs (St Jean)

Data Manager	SOREA
Dataset reference / name	KPIs
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	The various KPIs calculated for the pilot site are used to evaluate the performance of the installation and are further used for the trend analysis performed in the VAE tool.

	Although there is no such decision made at this point of the project, there is a possibility of re-using the calculated KPIs.
Standards	As a security measure, the KPIs calculated for each pilot site are anonymized and JSON is the used format for the data exchange.
Data sharing	The calculated KPIs at the St. Jean pilot sites could be potentially re-used for dissemination activities of the project such as scientific publications with the results of InteGRIDy.
Archiving and preservation (storage/backup)	The calculated KPIs will be stored for the duration of the project at the dedicated cloud server provided by TREK, at the TREK premises in Athens, and will be deleted after the project's end. The related cost is considered in the InteGRIDy allocated budget. At the moment, no additional costs related to data storage are foreseen.

Table 91. Load / Consumption Data (St Jean)

Data Manager	SOREA
Dataset reference / name	Load / Consumption Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Data source, Owner, Collection date
Data set description	The Load/Consumption data refers to the data collected at the pilot sites through monitoring equipment and will be used for the calculation of the Demand Flexibility and the related KPIs. The collected data sets are in the form of time-series and there is no possibility of re-use.
Standards	As a security measure, the collected Load/Consumption data is anonymized and JSON is used as a data exchange format in the DSEP tool for the calculation of the Demand Flexibility Profiles.
Data sharing	The data related to energy consumption and power load are considered to be personal data under the GDPR definition. Therefore, it will not be shared with other project partners or with any third parties.
Archiving and preservation (storage/backup)	The load/consumption data will be stored for the duration of the project and will be deleted after the project's end. It will be stored at the dedicated cloud server provided by TREK, at TREK premises in Athens, and the related cost is considered in the InteGRIDy allocated budget. At the

	moment, no additional costs related to data storage are foreseen.
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Table 92. Operational Data (St Jean)

Data Manager	SOREA
Dataset reference / name	Operational Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	Operational data refers to the information collected at the pilot sites concerning the operational status and mode of the installed and monitored equipment at the site. The collected information is in the form of timeseries and it is used for the calculation of the Thermal and Visual profiles, and subsequently for the calculation of Demand Flexibility. There is no possibility of reusing this data by other project partners or by third parties.
Standards	As a security measure, the Operational data collected at the pilot sites is anonymized and JSON is used as a data exchange format in the DSEP tool for the calculation of the profiles in the DSEP tool.
Data sharing	The data related to the operational status of the equipment installed at the pilot sites is defined as personal data under the GDPR and it will not be shared or used for any other purposes than the ones defined above.
Archiving and preservation (storage/backup)	The operational data collected will be stored for the duration of the project at the dedicated cloud server provided by TREK, at the TREK premises in Athens, and will be deleted after the project's end. The related cost is considered in the InteGRIDy allocated budget. At the moment, no additional costs related to data storage are foreseen.

Table 93. Thermal Profile (St Jean)

Data Manager	SOREA
Dataset reference / name	Thermal Profile
Availability	Restricted
Mandatory Metadata	European Union H2020

	<p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	N/A
Data set description	<p>The thermal profiles are calculated with a Bayesian algorithm developed by TREK based on temperature and humidity data combined with the operational status/mode of the HVAC systems installed at the analysed buildings. By setting human centric thermal comfort boundaries and combining them with the HVAC system DER models, the demand flexibility is calculated providing the necessary information for the calculation of human centric Demand Response strategies.</p> <p>The thermal profiles are in the form of a discomfort probability function indicating the degradation of the user's comfort incurred by deviations in the indoor temperature outside a lower and a higher comfort limit.</p> <p>There is no possibility of re-using this dataset.</p>
Standards	As a security measure, the thermal profiles calculated in the DSEP tool are anonymized and JSON is used as a data exchange format.
Data sharing	The user related thermal profiles calculated within InteGRIDy are considered as personal data under the GDPR definition and therefore, they will not be shared or used for any other purposes than the ones stated above.
Archiving and preservation (storage/backup)	The calculated thermal profiles will be stored for the duration of the project at the dedicated cloud server provided by TREK, at the TREK premises in Athens, and will be deleted after the project's end. The related cost is considered in the InteGRIDy allocated budget. At the moment, no additional costs related to data storage are foreseen.

Table 94. Visual Profile (St Jean)

Data Manager	SOREA
Dataset reference / name	Visual Profile
Availability	Restricted
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	N/A

Data set description	<p>The visual profiles generated within InteGRIDy are generated by the Bayesian algorithm developed by TREK based on luminance data and operational status/mode collected at the analysed buildings. This information functions as the basis of the indoor comfort in order to facilitate the Demand Flexibility calculation. In combination with the applied DER modelling, critical information is provided to facilitate the calculation of human centric demand response strategies.</p> <p>The visual profiles are in the form of a discomfort probability function indicating the degradation of the user comfort incurred by deviations of the indoor luminance below a lower comfort limit.</p> <p>There is no possibility of re-using this dataset.</p>
Standards	As a security measure, the visual profiles calculated in the DSEP tool are anonymized and JSON is used as a data exchange format.
Data sharing	The user-related visual profiles calculated within InteGRIDy are considered as personal data under the GDPR and therefore, they will not be shared or used for any other purposes than the ones defined above.
Archiving and preservation (storage/backup)	The calculated visual profiles will be stored for the duration of the project at the dedicated cloud server provided by TREK, at the TREK premises in Athens, and will be deleted after the project's end. The related cost is considered in the InteGRIDy allocated budget. At the moment, no additional costs related to data storage are foreseen.

3.7 Nicosia

Data Manager	EAC (DSO)
Dataset reference / name	Customer Data
Availability	Confidential
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	N/A
Data set description	<p>The customer data refers to the physical data of the pilot users and is only available to the Data Manager to manage energy management services. No other project partner has access to this personal data and hence, there is no possibility of re-using it.</p>

Standards	To ensure the security of the collected customer data, the data has been encrypted.
Data sharing	Under the GDPR definition, the customer data is personal data and therefore, it will not be shared with any partner or any third parties.
Archiving and preservation (storage/backup)	The customer data will be stored for offering the energy services to the end user and will be managed strictly in accordance with the Regulations of Cyprus. The information is kept in a dedicated server at EAC premises in Nicosia handling back up strictly with the confidentiality that is dictated by GDPR rules.

Table 95. DR points (Nicosia)

Data Manager	EAC (DSO) for prosumers and FOSS for university
Dataset reference / name	DR points
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	The location of DR assets refer to the general location of the DR resources in order to represent the available flexibility per area and facilitate the DSO and FOSS portfolio management tools.
Standards	To ensure the security of the collected DR Location, the data has been anonymized. The data included in the energy management tool is very abstract and indicates the general area rather than the exact location of the DR asset.
Data sharing	The DR asset is personal data and will not be shared with any partner or third parties.
Archiving and preservation (storage/backup)	The location of the DR asset will be stored for the duration of the project and will be deleted afterwards. The information is stored at dedicated servers at the EAC and FOSS premises.

Table 96. Energy Prices (Nicosia)

Data Manager	EAC
Dataset reference / name	Energy Prices
Availability	Open

Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	Publicly available tariffs that are detailed in how to implement by all users.
Standards	Not restrictive.
Data sharing	Not applicable since tariffs are publicly available and shareable in all respects.
Archiving and preservation (storage/backup)	Tariffs are publicly available and hence no need for archiving.

Table 97. Forecasted Data (Nicosia)

Data Manager	EAC (DSO) for prosumers and FOSS for the university microgrid
Dataset reference / name	Forecasted Data
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	Time series to satisfy energy management systems that are commercially available. Time stamp can vary to system and user needs.
Standards	Following open standard approach that is readable by commercially available management systems.
Data sharing	Specific data of end users is anonymised and openly shared as application data for analysis and reporting.
Archiving and preservation (storage/backup)	Forecasting data is archived in servers available at EAC (DSO) and FOSS with all useful information. When forecasted data is required to be shared it can be anonymised so as not violate any restrictions put on the data by the provider.

Table 98. Generation Data (Nicosia)

Data Manager	EAC (DSO) for prosumers and FOSS for the microgrid
Dataset reference / name	Generation Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	The generation data is site and system specific per area and is made available to facilitate the DSO and FOSS portfolio management tools.
Standards	To ensure the security of the collected generation data, the data has been anonymized. The data included in the energy management tool is very abstract and indicates the general area rather than the exact location and system used for the generation data.
Data sharing	The generation data is personal data and will not be shared with any partner or third parties.
Archiving and preservation (storage/backup)	The generation data will be stored for the duration of the project and will be deleted afterwards. The information is stored at dedicated servers at the EAC and FOSS premises.

Table 99. Microgrid Load Profile (Nicosia)

Data Manager	FOSS for microgrid load profile.
Dataset reference / name	Microgrid Load Profile
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	The microgrid load profile refers to the physical data of the pilot sites within the microgrid and is only available to the Data Manager to manage energy management services. No other project partner has access to this personal data and hence, there is no possibility of re-using it.

Standards	To ensure the security of the collected profiled data, the data has been encrypted.
Data sharing	Under the GDPR definition, the profiled data is personal data and therefore, it will not be shared with any partner or any third parties.
Archiving and preservation (storage/backup)	The profiled data will be stored for offering the energy services to the end user and will be managed strictly in accordance with the Regulations of Cyprus. The information is kept in a dedicated server at the University of Cyprus handling back up strictly with the confidentiality that is dictated by GDPR rules.

Table 100. Residential Load Profile (Nicosia)

Data Manager	EAC (DSO) for Residential load profiles
Dataset reference / name	Residential Load Profile
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	N/A
Data set description	The customer load profiles refer to the physical load data of the pilot users and is only available to the Data Manager to manage energy management services. No other project partner has access to this personal load data and hence, there is no possibility of re-using it.
Standards	To ensure the security of the collected customer load profiles, the data has been encrypted.
Data sharing	Under the GDPR definition, the load profiles are personal data and therefore, they will not be shared with any partner or any third parties.
Archiving and preservation (storage/backup)	The load profiles will be stored for offering the energy services to the end user and will be managed strictly in accordance with the Regulations of Cyprus. The information is kept in a dedicated server at EAC premises in Nicosia handling back up strictly with the confidentiality that is dictated by GDPR rules.

3.8 Lisbon

Table 101. DR Schedules (Lisbon)

Data Manager	ENOVA (Administration) with VPS (Technology)
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Dataset reference / name	DR Schedules
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	DR schedules
Data set description	DR schedules of specific flexible loads that result from the optimization algorithm
Standards	The dataset can be accessed via a RESTFull API using JSON objects
Data sharing	The information may only be used inside inteGRIDy consortium
Archiving and preservation (storage/backup)	Dataset will be kept for at least the previous ten years on the BEMS database for about 150€/yr (including all other pilot's datasets)

Table 102. Energy Prices (Lisbon)

Data Manager	ENOVA (Administration) with VPS (Technology)
Dataset reference / name	Energy Prices
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Wholesale market energy prices
Data set description	Wholesale market (OMIE) energy prices with an hourly resolution obtained from the market platform
Standards	The dataset can be accessed via a RESTFull API using JSON objects
Data sharing	This information may be used outside inteGRIDy consortium
Archiving and preservation (storage/backup)	Dataset will be kept for at least the previous ten years on the BEMS database for about 150€/yr (including all other pilot's datasets)

Table 103. EV Charging Data (Lisbon)

Data Manager	ENOVA (Administration) with VPS (Technology)
Dataset reference / name	EV Charging Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	EV charging data
Data set description	EV charging active and reactive energy consumptions with a 15 min sampling interval
Standards	The dataset can be accessed via a RESTFull API using JSON objects Data identification/classification based on IEC 62056-61 Data accuracy EN 50470-3, class B or equivalent
Data sharing	The information may only be used inside inteGRIDy consortium.
Archiving and preservation (storage/backup)	Dataset will be kept for at least the previous two years on the BEMS database for about 150€/yr (including all other pilot's datasets)

Table 104. EV Charging Profiles (Lisbon)

Data Manager	ENOVA (Administration) with VPS (Technology)
Dataset reference / name	EV Charging Profiles
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	EV charging profile
Data set description	EV charging active energy consumption profiles with hourly, monthly, and yearly resolution
Standards	The dataset can be accessed via a RESTFull API using JSON objects Data identification/classification based on IEC 62056-61

Data sharing	The information may only be used inside inteGRIDy consortium.
Archiving and preservation (storage/backup)	Dataset will be kept for at least the previous ten years on the BEMS database for about 150€/yr (including all other pilot's datasets)

Table 105. Ice Tanks Data (Lisbon)

Data Manager	ENOVA (Administration) with VPS (Technology)
Dataset reference / name	Ice Tanks Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Ice tanks charging
Data set description	Ice tanks charging data with a 15 min sampling interval
Standards	The dataset can be accessed via a RESTFull API using JSON objects
Data sharing	The information may only be used inside inteGRIDy consortium.
Archiving and preservation (storage/backup)	Dataset will be kept for at least the previous two years on the BEMS database for about 150€/yr (including all other pilot's datasets)

Table 106. Load / Consumption Data (Lisbon)

Data Manager	ENOVA (Administration) with VPS (Technology)
Dataset reference / name	Load / Consumption Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Building electrical consumption

Data set description	Building aggregate and disaggregate (blocks, HVAC, lifts) active and reactive energy consumptions with a 15 min sampling interval
Standards	The dataset can be accessed via a RESTFull API using JSON objects Data identification/classification based on IEC 62056-61 Data accuracy EN 50470-3, class B or equivalent
Data sharing	The information may only be used inside inteGRIDy consortium.
Archiving and preservation (storage/backup)	Dataset will be kept for at least the previous two years on the BEMS database for about 150€/yr (including all other pilot's datasets)

Table 107. Load / Consumption Forecast (Lisbon)

Data Manager	ENOVA (Administration) with VPS (Technology)
Dataset reference / name	Load / Consumption Forecast
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Building electrical consumption forecast
Data set description	Building aggregate and disaggregate active energy consumptions forecasts with a 15 min interval for the next 2 days or 48 hours
Standards	The dataset can be accessed via a RESTFull API using JSON objects
Data sharing	The information may only be used inside inteGRIDy consortium.
Archiving and preservation (storage/backup)	Dataset will be kept for at least the previous two years on the BEMS database for about 150€/yr (including all other pilot's datasets)

Table 108. Load / Consumption Profiles (Lisbon)

Data Manager	ENOVA (Administration) with VPS (Technology)
Dataset reference / name	Load / Consumption Profiles
Availability	Restricted

Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Building electrical profile
Data set description	Building aggregate and disaggregate (blocks, HVAC, lifts) active and reactive energy consumption profiles with hourly, monthly, and yearly resolution
Standards	The dataset can be accessed via a RESTFull API using JSON objects Data identification/classification based on IEC 62056-61
Data sharing	The information may only be used inside inteGRIDy consortium.
Archiving and preservation (storage/backup)	Dataset will be kept for at least the previous ten years on the BEMS database for about 150€/yr (including all other pilot's datasets)

Table 109. Production Data (Lisbon)

Data Manager	ENOVA (Administration) with VPS (Technology)
Dataset reference / name	Production Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	PV generation data
Data set description	PV energy production data with a 15 min sampling interval
Standards	The dataset can be accessed via a RESTFull API using JSON objects Data identification/classification based on IEC 62056-61 Data accuracy EN 50470-3, class B or equivalent
Data sharing	The information may only be used inside inteGRIDy consortium.

Archiving and preservation (storage/backup)	Dataset will be kept for at least the previous two years on the BEMS database for about 150€/yr (including all other pilot's datasets)
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Table 110. Production Forecast (Lisbon)

Data Manager	ENOVA (Administration) with VPS (Technology)
Dataset reference / name	Production Forecast
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	PV generation forecast
Data set description	PV production forecast with a 15 min interval for the next 2 days or 48 hours
Standards	The dataset can be accessed via a RESTFull API using JSON objects Data identification/classification based on IEC 62056-61
Data sharing	The information may only be used inside inteGRIDy consortium.
Archiving and preservation (storage/backup)	Dataset will be kept for at least the previous two years on the BEMS database for about 150€/yr (including all other pilot's datasets)

Table 111. Production Profile (Lisbon)

Data Manager	ENOVA (Administration) with VPS (Technology)
Dataset reference / name	Production Forecast
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	PV generation profile
Data set description	PV production profiles with hourly, monthly, and yearly resolution

Standards	The dataset can be accessed via a RESTFull API using JSON objects Data identification/classification based on IEC 62056-61
Data sharing	The information may only be used inside inteGRIDy consortium.
Archiving and preservation (storage/backup)	Dataset will be kept for at least the previous ten years on the BEMS database for about 150€/yr (including all other pilot's datasets)

Table 112. Weather Data (Lisbon)

Data Manager	ENOVA (Administration) with VPS (Technology)
Dataset reference / name	Weather Data
Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Weather forecasts
Data set description	Weather forecasts (temperature, wind speed, and irradiation) with a 15 min resolution for the next two days or 48 hours
Standards	The dataset can be accessed via a RESTFull API using JSON objects
Data sharing	This information may be used outside inteGRIDy consortium.
Archiving and preservation (storage/backup)	Dataset will be kept for at least the previous ten years on the BEMS database for about 150€/yr (including all other pilot's datasets)

3.9 Xanthi

Table 113. Battery Data (Xanthi)

Data Manager	Sunlight
Dataset reference / name	Battery Data
Availability	Restricted
Mandatory Metadata	European Union H2020

	integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Battery data, battery charge, battery discharge
Data set description	Measured battery charging/discharging current, battery voltage, power
Standards	OPC for communication between central and local systems. MQTT for communication with inteGRIDy's platform.
Data sharing	All data are stored in the SCADA system process database. The database is accessible through the SCADA system. Aggregated data will be available upon request. In case of research activities using the specific dataset then CERN/CERI and SUNLIGHT need to be informed and will collaborate with the interested members to derive a joint work.
Archiving and preservation (storage/backup)	All data will be stored in the SCADA system process database with additional offsite backup.

Table 114. Control Data (Xanthi)

Data Manager	Sunlight
Dataset reference / name	Control Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Control Data, device control
Data set description	Aggregated control data for the operation of the subsystems/devices. For example control data to the DC bus converters for energy exchange, to Battery management systems, to Hydrogen subsystems.
Standards	OPC for communication between central and local systems. MQTT for communication with inteGRIDy's platform.

Data sharing	All data are stored in the SCADA system process database. The database is accessible through the SCADA system. Aggregated data will be available upon request.
Archiving and preservation (storage/backup)	All data will be stored in the SCADA system process database with additional offsite backup.

Table 115. FC/ELEC Data (Xanthi)

Data Manager	Sunlight
Dataset reference / name	FC/ELEC Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Fuel Cell, Electrolyzer, current, voltage, hydrogen conversion
Data set description	This dataset includes aggregated data from the Fuel Cell/Electrolyzer operation, that is current, power, hydrogen consumption-production, FC/Electrolyzer operation periods.
Standards	OPC for communication between central and local systems. MQTT for communication with inteGRIDy's platform.
Data sharing	All data are stored in the SCADA system process database. The database is accessible through the SCADA system. Aggregated data will be available upon request.
Archiving and preservation (storage/backup)	All data will be stored in the SCADA system process database with additional offsite backup.

Table 116. Forecasted Data (Xanthi)

Data Manager	Sunlight
Dataset reference / name	Forecasted Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies

	inteGRIDy GA 731268
Dataset Specific Metadata	Microgrid forecasted energy data
Data set description	Data generated from simulations of the modelled pilot site.
Standards	N/A
Data sharing	There is no continuous generation of data. Aggregated data can be shared upon request.
Archiving and preservation (storage/backup)	Data are generated upon demand and stored in the machine the tools are running. External backup is supported.

Table 117. Hydrogen Storage (Xanthi)

Data Manager	Sunlight
Dataset reference / name	Hydrogen Storage
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Hydrogen Storage, Pressure
Data set description	Aggregated data from pressure of stored Hydrogen. (<u>This dataset will be merged with the FC/Elec dataset</u>)
Standards	OPC for communication between central and local systems. MQTT for communication with inteGRIDy's platform.
Data sharing	All data are stored in the SCADA system process database. The database is accessible through the SCADA system. Aggregated data will be available upon request.
Archiving and preservation (storage/backup)	All data will be stored in the SCADA system process database with additional offsite backup.

Table 118. Load / Consumption Data (Xanthi)

Data Manager	Sunlight
Dataset reference / name	Load / Consumption Data
Availability	Restricted

Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Electrical load, power consumption
Data set description	This dataset consists of aggregated data regarding electrical consumption of the connected devices on each node of the grid. It includes the external connected devices-loads as well as some internal subsystems that consume electricity like the hydrogen compressor.
Standards	OPC for communication between central and local systems. MQTT for communication with inteGRIDy's platform.
Data sharing	All data are stored in the SCADA system process database. The database is accessible through the SCADA system. Aggregated data will be available upon request.
Archiving and preservation (storage/backup)	All data will be stored in the SCADA system process database with additional offsite backup.

Table 119. Load / Consumption Profiles (Xanthi)

Data Manager	Sunlight
Dataset reference / name	Load / Consumption Profiles
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Load profile
Data set description	This dataset consists of data generated for prediction and simulation purposes. These data result from processed historical data. The profile is generated upon demand for a specific number of days.
Standards	N/A

Data sharing	There is no continuous generation of data. Aggregated data can be shared upon request.
Archiving and preservation (storage/backup)	Data are generated upon demand and stored in the machine the tools are running. External backup is supported.

Table 120. RES Data (Xanthi)

Data Manager	Sunlight
Dataset reference / name	RES Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	PV power, RES production, Wind Generator power production.
Data set description	Aggregated data from photovoltaic and wind power generation.
Standards	OPC for communication between central and local systems. MQTT for communication with inteGRIDy's platform.
Data sharing	All data are stored in the SCADA system process database. The database is accessible through the SCADA system. Aggregated data will be available upon request.
Archiving and preservation (storage/backup)	All data will be stored in the SCADA system process database with additional offsite backup.

Table 121. RES Profile (Xanthi)

Data Manager	Sunlight
Dataset reference / name	RES Profile
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268

Dataset Specific Metadata	RES Profile, PV profile, WG profile
Data set description	This dataset consists of data generated for prediction and simulation purposes. These data result from processed historical data. The profile is generated upon demand for a specific number of days.
Standards	N/A
Data sharing	There is no continuous generation of data. Aggregated data can be shared upon request.
Archiving and preservation (storage/backup)	Data are generated upon demand and stored in the machine the tools are running. External backup is supported.

Table 122. Set Points (Xanthi)

Data Manager	Sunlight
Dataset reference / name	Set Points
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Set Points
Data set description	Operational setpoints of the subsystems. <u>This Dataset will not be implemented as it describes constant values of the devices operation, that will not change through time, and there is not any value preserving them.</u>
Standards	OPC for communication between central and local systems. MQTT for communication with inteGRIDy's platform.
Data sharing	All data are stored in the SCADA system process database. The database is accessible through the SCADA system. Aggregated data will be available upon request.
Archiving and preservation (storage/backup)	All data will be stored in the SCADA system process database with external backup.

Table 123. Weather Data (Xanthi)

Data Manager	Sunlight
Dataset reference / name	Weather Data

Availability	Open
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Solar data, wind speed, weather data
Data set description	Solar irradiation, wind speed. Open access historical data available for the area of Xanthi or North Greece. This dataset will not be implemented and instead predicted weather data will be used.
Standards	N/A
Data sharing	Data available online
Archiving and preservation (storage/backup)	N/A

3.10 Ploiesti

Table 124. Consumer and Consumption Profile (Ploiesti)

Data Manager	SIVECO
Dataset reference / name	Consumer Profile
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	<p>We are using standardized metadata schemas and encoding schemes.</p> <p>The tables have similar structure, but the data depends on the time the cumulation of values is done.</p> <p>Data is stored in tables (consumption, DSO level):</p> <ul style="list-style-type: none"> • Cumul_dso_h, • Cumul_dso_d, • Cumul_dso_w, • Cumul_dso_m,

	<ul style="list-style-type: none"> • Cumul_dso_y <p>Data describing a consumer are stored in tables as follows (consumer profile):</p> <ul style="list-style-type: none"> • Smart_meter • Consumption_point • Consumer_client • Users
Data set description	<p>Data is computed in the moment the registrations comes from the smart meters. Data is cumulated in several tables, based on time (hour, day, week, month, year)</p> <p>Data is cumulated for the whole DSO, and for individual consumers.</p> <p>Each table enumerated before contains the following columns.</p> <p>The content differs, depending on the time the cumulated values are computed.</p> <p>They are cumulated for each hour (cumul_dso_h), day (cumul_dso_d), week(cumul_dso_w), month(cumul_dso_m) or year (cumul_dso_y)</p> <ul style="list-style-type: none"> • active_pow, • co2, • consumed_active_pow, • consumed_reactive_pow, • created_time, • day_cost, • device_number, • down_time, • energy_mismatch, • energy_mismatch_ratio, • night_cost, saidi, • phase_voltage, • reactive_pow, • send_interval, • thdd, up_time, • voltage_deviation, • idx12hours, • idx15minutes, • idx1day, • idx1hour, • idx1month, • idx1week, • idx1year, • idx3month, • idx6hours, • idx6month
Standards	<p>The dataset can be accessed via a RESTFull API using JSON objects</p>

	<p>ICT standards for data transmission (MQTT, 3G), ISO 9001 (quality management); ISO 14001 (environmental management);</p> <p>ICT security policy corresponding to SR EN ISO/IEC 27001 (SR ISO/IEC 27001:2013)</p>
Data sharing	<p>Data is accessible with DBLinks</p> <p>The data is accessible also via RS API on intranet.</p> <p>A data sharing agreement is required based on participant confidentiality, consent agreements or IPR (Intellectual Property Rights) agreement</p>
Archiving and preservation (storage/backup)	<p>The data will be preserved on-site, in SIVECO server databases, a Back-up process will be also in place.</p> <p>The data will be preserved for the entire project lifecycle.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 125. Consumption Prognosis (Ploiesti)

Data Manager	SIVECO
Dataset reference / name	Consumption Prognosis
Availability	Restricted
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	<p>We are using standardized metadata schemas and encoding schemes.</p> <p>Data structure defined by tables:</p> <ul style="list-style-type: none"> • Forecast_consumer • Forecast_dso
Data set description	<p>Prognosis is elaborated based on a Machine Learning system, trained on the past data.</p> <p>Data is placed in tables with structure similar with the tables used for data registration from smart meters.</p> <p>Each table enumerated before contains the following columns.</p> <p>The values are different, treating the whole dso or a consumer</p> <p>They are cumulated for each hour (cumul_dso_h), day (cumul_dso_d), week (cumul_dso_w), month (cumul_dso_m) or year (cumul_dso_y)</p>

	active_pow, co2, consumed_active_pow, consumed_reactive_pow, created_time, day_cost, device_number, down_time, energy_mismatch, energy_mismatch_ratio, night_cost, saidi, phase_voltage, reactive_pow, send_interval, thdd, up_time, voltage_deviation, idx12hours, idx15minutes, idx1day, idx1hour, idx1month, idx1week, idx1year, idx3month, idx6hours, idx6month
Standards	<p>The dataset can be accessed via a RESTFull API using JSON objects</p> <p>ICT standards for data transmission (MQTT, 3G), ISO 9001 (quality management); ISO 14001 (environmental management);</p> <p>ICT security policy corresponding to SR EN ISO/IEC 27001 (SR ISO/IEC 27001:2013)</p>
Data sharing	<p>Data is accessible with DBLinks</p> <p>The data is accesible also via RS API on intranet.</p> <p>A data sharing agreement is required based on participant confidentiality, consent agreements or IPR (Intellectual Property Rights) agreement</p>
Archiving and preservation (storage/backup)	<p>The data will be preserved on-site, in SIVECO server databases, a Back-up process will be also in place.</p> <p>The data will be preserved for the entire project lifecycle.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 126. Consumption Scenario Simulation (Ploiesti)

Data Manager	SIVECO
Dataset reference / name	Consumption Scenario Simulation
Availability	Restricted
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	<p>We are using standardized metadata schemas and encoding schemes.</p> <p>Data structure defined by tables:</p> <ul style="list-style-type: none"> • Whatif_consumer • Whatif_dso
Data set description	Data is created based on what if scenarios.

	<p>What if scenarios are using Monte Carlo simulation, having perturbations as input as well</p> <p>The structure of tables is similar with that used for data registration from smart meters.</p> <p>Each table enumerated before contains the following columns.</p> <p>The values are differend, treating the whole dso or a consumer</p> <p>They are comulated for each hour (cumul_dso_h), day (cumul_dso_d), week(cumul_dso_w), month(cumul_dso_m) or year (cumul_dso_y)</p> <p>active_pow, co2, consumed_active_pow, consumed_reactive_pow, created_time, day_cost, device_number, down_time, energy_mismatch, energy_mismatch_ratio, night_cost, saidi, phase_voltage, reactive_pow, send_interval, thdd, up_time, voltage_deviation, idx12hours, idx15minutes, idx1day, idx1hour, idx1month, idx1week, idx1year, idx3month, idx6hours, idx6month</p>
Standards	<p>The dataset can be accessed via a RESTFull API using JSON objects</p> <p>ICT standards for data transmission (MQTT, 3G), ISO 9001 (quality management); ISO 14001 (environmental management);</p> <p>ICT security policy corresponding to SR EN ISO/IEC 27001 (SR ISO/IEC 27001:2013)</p>
Data sharing	<p>Data I accessible with DBLinks</p> <p>The data is accesible also via RS API on intranet.</p> <p>A data sharing agreement is required based on participant confidentiality, consent agreements or IPR (Intellectual Property Rights) agreement</p>
Archiving and preservation (storage/backup)	<p>The data will be preserved on-site, in SIVECO server databases, a Back-up process will be also in place.</p> <p>The data will be preserved for the entire project lifecycle.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 127. DR Points (Ploiesti)

Data Manager	SIVECO
Dataset reference / name	DR Points
Availability	Restricted
Mandatory Metadata	European Union H2020

	<p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	<p>We are using standardized metadata schemas and encoding schemes.</p> <p>Consumer_notification,</p> <p>dso_notification</p>
Data set description	<p>As DR approach, notifications for dso and also for consumers are generated.</p> <p>The notifications are generated after applying optimization algorithms.</p> <p>The optimization algorithms are using a cost function based on peak reduction, and smoothing the shape of consumption.</p> <p>Consumer_notification:</p> <p>notif_code, severity, short_description, long_description, emitter, created_on, client_id, status, device_id</p> <p>dso_notification:</p> <p>notif_code, severity, short_description, long_description, emitter, created_on, status, dso_id</p>
Standards	<p>The dataset can be accessed via a RESTFull API using JSON objects</p> <p>ICT standards for data transmission (MQTT, 3G), ISO 9001 (quality management); ISO 14001 (environmental management);</p> <p>ICT security policy corresponding to SR EN ISO/IEC 27001 (SR ISO/IEC 27001:2013)</p>
Data sharing	<p>Data I accessible with DBLinks</p> <p>The data is accesible also via RS API on intranet.</p> <p>A data sharing agreement is required based on participant confidentiality, consent agreements or IPR (Intellectual Property Rights) agreement</p>
Archiving and preservation (storage/backup)	<p>The data will be preserved on-site, in SIVECO server databases, a Back-up process will be also in place.</p> <p>The data will be preserved for the entire project lifecycle.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 128. Energy Consumption (Ploiesti)

Data Manager	SIVECO
Dataset reference / name	Energy Consumption

Availability	Open
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	<p>We are using standardized metadata schemas and encoding schemes.</p> <ul style="list-style-type: none"> • Smart_meter, • Consumption_point, • Consumer_client
Data set description	<p>The data is registered as it is read from smart meters.</p> <p>Smart_meter:</p> <p>device_name, serial_no, device_type, validity_from, validity_to, consumption_point_id</p> <p>Consumption_point:</p> <p>point_name, point_type, client_id, address, validity_start, validity_end</p> <p>Consumer_client:</p> <p>user_id, full_name, consumer_type, billing_address, email, main_phone, created_on, last_updated_on, receive_recommendations</p>
Standards	<p>The dataset can be accessed via a RESTFull API using JSON objects</p> <p>ICT standards for data transmission (MQTT, 3G), ISO 9001 (quality management); ISO 14001 (environmental management);</p> <p>ICT security policy corresponding to SR EN ISO/IEC 27001 (SR ISO/IEC 27001:2013)</p>
Data sharing	<p>Data I accessible with DBLinks</p> <p>The data is accesible also via RS API on intranet.</p> <p>A data sharing agreement is required based on participant confidentiality, consent agreements or IPR (Intellectual Property Rights) agreement</p>
Archiving and preservation (storage/backup)	<p>The data will be preserved on-site, in SIVCO server databases, a Back-up process will be also in place.</p> <p>The data will be preserved for the entire project lifecycle.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 129. Energy Prices (Ploiesti)

Data Manager	SIVCO
Dataset reference / name	Energy Prices
Availability	Open
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	<p>We are using standardized metadata schemas and encoding schemes.</p> <ul style="list-style-type: none"> • Price_signal, • optimum_bill_consumer, • consumer_prices
Data set description	<p>The prices are registered from external sources.</p> <p>The optimum bill is computed as a result of optimization algorithm.</p> <p>Price_signal:</p> <p>price_source, start_period, end_period, price_type, created_on, dso_id</p> <p>Consumer_prices:</p> <p>price_def, start_time_period, end_time_period, price_val, created_on, validity_start, validity_end, price_type, observations, day_of_week, provider, id_provider, interval_type, default_price, price_code, night_price_val</p> <p>optimum_bill_consumer:</p> <p>bill_name, start_period, end_period, device_number, price_type, unit_price, cost, created_on</p>
Standards	<p>The dataset can be accessed via a RESTFull API using JSON objects</p> <p>ICT standards for data transmission (MQTT, 3G), ISO 9001 (quality management); ISO 14001 (environmental management);</p> <p>ICT security policy corresponding to SR EN ISO/IEC 27001 (SR ISO/IEC 27001:2013)</p>
Data sharing	<p>Data I accessible with DBLinks</p> <p>The data is accesible also via RS API on intranet.</p> <p>A data sharing agreement is required based on participant confidentiality, consent agreements or IPR (Intellectual Property Rights) agreement</p>

Archiving and preservation (storage/backup)	<p>The data will be preserved on-site, in SIVECO server databases, a Back-up process will be also in place.</p> <p>The data will be preserved for the entire project lifecycle.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>
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Table 130. Energy Production (Ploiesti)

Data Manager	SIVECO
Dataset reference / name	Energy Production (parameters registered)
Availability	Open
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	<p>We are using standardized metadata schemas and encoding schemes.</p> <p>Consumption_record</p>
Data set description	<p>active_pow, co2, consumed_active_pow, consumed_reactive_pow, created_time, day_cost, device_number, down_time, energy_mismatch, energy_mismatch_ratio, night_cost, saidi, phase_voltage, reactive_pow, send_interval, thdd, up_time, voltage_deviation, idx12hours, idx15minutes, idx1day, idx1hour, idx1month, idx1week, idx1year, idx3month, idx6hours, idx6month</p>
Standards	<p>The dataset can be accessed via a RESTFull API using JSON objects</p> <p>ICT standards for data transmission (MQTT, 3G), ISO 9001 (quality management); ISO 14001 (environmental management);</p> <p>ICT security policy corresponding to SR EN ISO/IEC 27001 (SR ISO/IEC 27001:2013)</p>
Data sharing	<p>Data I accessible with DBLinks</p> <p>The data is accesible also via RS API on intranet.</p> <p>A data sharing agreement is required based on participant confidentiality, consent agreements or IPR (Intellectual Property Rights) agreement</p>
Archiving and preservation (storage/backup)	<p>The data will be preserved on-site, in SIVECO server databases, a Back-up process will be also in place.</p> <p>The data will be preserved for the entire project lifecycle.</p>

	Since there is already an infrastructure in place, there will be no extra cost.
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Table 131. Forecasted Data (Ploiesti)

Data Manager	SIVCO
Dataset reference / name	Forecasted Data
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	We are using standardized metadata schemas and encoding schemes. <ul style="list-style-type: none"> • Data structure defined by tables: • Forecast_consumer • Forecast_dso
Data set description	Data is forecasted using Monte carlo simulation, based on the registered data for a previous period. Each table enumerated before contains the following columns. The values are different, treating the whole dso or a consumer They are cumulated for each hour (cumul_dso_h), day (cumul_dso_d), week (cumul_dso_w), month (cumul_dso_m) or year (cumul_dso_y) active_pow, co2, consumed_active_pow, consumed_reactive_pow, created_time, day_cost, device_number, down_time, energy_mismatch, energy_mismatch_ratio, night_cost, saidi, phase_voltage, reactive_pow, send_interval, thdd, up_time, voltage_deviation, idx12hours, idx15minutes, idx1day, idx1hour, idx1month, idx1week, idx1year, idx3month, idx6hours, idx6month
Standards	The dataset can be accessed via a RESTFull API using JSON objects ICT standards for data transmission (MQTT, 3G), ISO 9001 (quality management); ISO 14001 (environmental management); ICT security policy corresponding to SR EN ISO/IEC 27001 (SR ISO/IEC 27001:2013)

Data sharing	<p>Data is accessible with DBLinks</p> <p>The data is accessible also via RS API on intranet.</p> <p>A data sharing agreement is required based on participant confidentiality, consent agreements or IPR (Intellectual Property Rights) agreement</p>
Archiving and preservation (storage/backup)	<p>The data will be preserved on-site, in SIVECO server databases, a Back-up process will be also in place.</p> <p>The data will be preserved for the entire project lifecycle.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 132. Indoors Data (Ploiesti)

Data Manager	SIVECO
Dataset reference / name	Indoors Data
Availability	Restricted
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	We will use standardized metadata schemas and encoding schemes.
Data set description	This dataset is not yet implemented in the pilot. Once the functional logic is in place, the details will be provided. To be further described in the next release of the Data Management Plan.
Standards	This dataset is not yet implemented in the pilot. Once the functional logic is in place, the details will be provided. To be further described in the next release of the Data Management Plan.
Data sharing	This dataset is not yet implemented in the pilot. Once the functional logic is in place, the details will be provided. To be further described in the next release of the Data Management Plan.
Archiving and preservation (storage/backup)	This dataset is not yet implemented in the pilot. Once the functional logic is in place, the details will be provided. To be further described in the next release of the Data Management Plan.

Table 133. KPIs (Ploiesti)

Data Manager	SIVECO
Dataset reference / name	KPIs

Availability	Restricted
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	<p>We are using standardized metadata schemas and encoding schemes.</p> <p>Data structure defined by tables:</p> <ul style="list-style-type: none"> • Peak_dso_d • Peak_dso_w • Peak_dso_m • Peak_dso_y • Dso_meter • Optimum_consumer • Optimum_dso
Data set description	<p>The main KPI is peak optimization.</p> <p>Peak optimization is computed using an algorithm having as cost function the minimization of peaks.</p> <p>Peak_dso_d, Peak_dso_w, Peak_dso_m, Peak_dso_y contains:</p> <p>device_number, peak_start_time, peak_midle_time, peak_end_time, peak_type, peak_value, value_type, created_time</p> <p>optmimum_consumer, optimum_dso</p> <p>active_pow, co2, consumed_active_pow, consumed_reactive_pow, created_time, day_cost, device_number, down_time, energy_mismatch, energy_mismatch_ratio, night_cost, saidi, phase_voltage, reactive_pow, send_interval, thdd, up_time, voltage_deviation, idx12hours, idx15minutes, idx1day, idx1hour, idx1month, idx1week, idx1year, idx3month, idx6hours, idx6month</p>
Standards	<p>The dataset can be accessed via a RESTFull API using JSON objects</p> <p>ICT standards for data transmission (MQTT, 3G), ISO 9001 (quality management); ISO 14001 (environmental management);</p> <p>ICT security policy corresponding to SR EN ISO/IEC 27001 (SR ISO/IEC 27001:2013)</p>
Data sharing	<p>Data I accessible with DBLinks</p> <p>The data is accesible also via RS API on intranet.</p>

	A data sharing agreement is required based on participant confidentiality, consent agreements or IPR (Intellectual Property Rights) agreement
Archiving and preservation (storage/backup)	<p>The data will be preserved on-site, in SIVECO server databases, a Back-up process will be also in place.</p> <p>The data will be preserved for the entire project lifecycle.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 134. Load / Consumption Data (Ploiesti)

Data Manager	SIVECO
Dataset reference / name	Load / Consumption Data
Availability	Restricted
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	<p>We are using standardized metadata schemas and encoding schemes.</p> <p>Data structure defined by tables:</p> <p>Consumption_record</p>
Data set description	<p>The data is registered as it comes from smart meters.</p> <p>The following data elements are registered:</p> <p>active_pow, co2, consumed_active_pow, consumed_reactive_pow, created_time, day_cost, device_number, down_time, energy_mismatch, energy_mismatch_ratio, night_cost, saidi, phase_voltage, reactive_pow, send_interval, thdd, up_time, voltage_deviation, idx12hours, idx15minutes, idx1day, idx1hour, idx1month, idx1week, idx1year, idx3month, idx6hours, idx6month</p>
Standards	<p>The dataset can be accessed via a RESTFull API using JSON objects</p> <p>ICT standards for data transmission (MQTT, 3G), ISO 9001 (quality management); ISO 14001 (environmental management);</p> <p>ICT security policy corresponding to SR EN ISO/IEC 27001 (SR ISO/IEC 27001:2013)</p>
Data sharing	<p>Data I accessible with DBLinks</p> <p>The data is accesible also via RS API on intranet.</p>

	A data sharing agreement is required based on participant confidentiality, consent agreements or IPR (Intellectual Property Rights) agreement
Archiving and preservation (storage/backup)	<p>The data will be preserved on-site, in SIVECO server databases, a Back-up process will be also in place.</p> <p>The data will be preserved for the entire project lifecycle.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 135. Weather data (Ploiesti)

Data Manager	SIVECO
Dataset reference / name	Weather Data
Availability	Open
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	<p>We are using standardized metadata schemas and encoding schemes.</p> <ul style="list-style-type: none"> • Data structure defined by tables: • Whatif_parameters
Data set description	<p>What if parameters are used to describe perturbations expected in the consumption.</p> <p>They are defined on time and type basis</p> <p>They can reflect weather consitions, holidays, special events, force majeure, etc.</p> <p>Whatif_parameters:</p> <p>param_name, param_dval, last_updated_on, scenario_id, start_time, end_time, day_of_week</p>
Standards	<p>The dataset can be accessed via a RESTFull API using JSON objects</p> <p>ICT standards for data transmission (MQTT, 3G), ISO 9001 (quality management); ISO 14001 (environmental management);</p> <p>ICT security policy corresponding to SR EN ISO/IEC 27001 (SR ISO/IEC 27001:2013)</p>
Data sharing	<p>Data I accessible with DBLinks</p> <p>The data is accesible also via RS API on intranet.</p>

	A data sharing agreement is required based on participant confidentiality, consent agreements or IPR (Intellectual Property Rights) agreement
Archiving and preservation (storage/backup)	<p>The data will be preserved on-site, in SIVECO server databases, a Back-up process will be also in place.</p> <p>The data will be preserved for the entire project lifecycle.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

3.11 Thessaloniki

Table 136. BESS Dis-/Charge Schedules (Thessaloniki)

Data Manager	CERTH (Research Centre), WVT (Utility)
Dataset reference / name	BESS Dis-/Charge Schedules
Availability	Restricted
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	BESS Schedule
Data set description	<p>A timeseries over a specific time-period, e.g. a day, demonstrating when the battery is charging, i.e. retrieving power from the electric grid, discharging, i.e. inducing power to the electric grid, or standing idle, and how much power does it retrieves, or induces. It is the output of the optimization implemented in either the residential, or the commercial case of the Thessaloniki Pilot, where a BESS system is involved.</p>
Standards	OpenADR 2.0
Data sharing	<p>The BESS Schedule data produced are stored on the inteGRIDy RKW, hosted on an Influx Database on the CERTH server (located at CERTH premises). The corresponding data required for the operation on site (i.e. on the residential or commercial building) are fetched from the CERTH server and handled locally on a Raspberry Pi board, deployed in each building. They are only temporary stored on-site on the Raspberry Pi board.</p> <p>The following tools will handle and exchange among them those data:</p> <ul style="list-style-type: none"> Intelligent Building Control & Flexibility Prediction and Forecasting

	<ul style="list-style-type: none"> • Integrated Decision, Support Supervisory System EMS tools • Supervisory Model Predictive Control for Energy Systems, and, • Plant/Process/System Data Exchange Tool (DET) <p>The communication exchanges between the CERTH server and the distributed R.Pis at each building will occur using *.json files format.</p> <p>These data will further be accessed for visualization purposes from the corresponding Integrated Visualization Platform layer tool, used in Thessaloniki pilot, i.e:</p> <ul style="list-style-type: none"> • <i>Visual Analytics Tool for Flexibility Analysis, Aggregation and Forecasting</i>, for presenting the data to both the aggregator (WVT) and the end-user/consumer, in case of the residential buildings, and • <i>Facility Management web-based Interface tool</i> for presenting the data to the facility manager, in case of the commercial building. <p>Load Forecasting data, provided by T4.3 operation and analysis framework, and BESS profiling data, provided by T4.2 modelling and profiling layer related to the respective layers of the inteGRIDy reference Architecture, are used as the basis to produce these data.</p> <p>For this particular data set, no third parties are involved.</p>
Archiving and preservation (storage/backup)	<p>In case of the Residential buildings, the data will be preserved on the CERTH server database, where a Back-Up process will take place on a regular basis.</p> <p>In the case of the Commercial building, the data will be preserved both on-site and the CERTH server database, where they will be sent in periodically and a Back-up process will be also in place.</p> <p>The data will be preserved at least until the completion of the project.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 137. Commercial User Measurements (Thessaloniki)

Data Manager	CERTH, WVT
Dataset reference / name	Commercial User Measurements
Availability	Restricted
Mandatory Metadata	European Union H2020

	integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Load Measurements, Motion/Temperature sensor measurements
Data set description	Load measurements time-series referring to appliances measured, or sensors.
Standards	OpenADR 2.0
Data sharing	<p>The data are handled locally on a Raspberry Pi board and further stored on-site in an Influx Database deployed on the R.Pi.</p> <p>The following tools will handle those data:</p> <ul style="list-style-type: none"> Intelligent Building Control & Flexibility Prediction and Forecasting <p>These data will be used for visualization from the Integrated Visualization Platform layer tool, used in Thessaloniki pilot, i.e:</p> <ul style="list-style-type: none"> Facility Management web-based Interface tool for presenting the data to the facility manager. <p>The exchanges will occur using *.json files format.</p> <p>For this particular data set, no third parties are involved.</p>
Archiving and preservation (storage/backup)	<p>The data will be preserved on-site, in WVT and the CERTH server databases, where they will be sent periodically and a Back-up process will be also in place.</p> <p>The data will be preserved at least until the completion of the project.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 138. Commercial User Profile (Thessaloniki)

Data Manager	CERTH
Dataset reference / name	Commercial User Profile
Availability	Confidential
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	Facility's layout and appliances' specifications.

Data set description	Facility's layout and appliances' specifications.
Standards	OpenADR 2.0
Data sharing	<p>The data are handled locally on a Raspberry Pi board, and are further stored on-site in an influx Database deployed on the Raspberry Pi board.</p> <p>The following tool will handle those data:</p> <ul style="list-style-type: none"> • Building Occupancy & Energy Consumption Simulation Tool. <p>The exchanges with other tools will occur using *.json files format.</p> <p>For this particular data set, no third parties are involved.</p>
Archiving and preservation (storage/backup)	<p>The data will be preserved both on-site and the CERTH server database, where they will be sent periodically and a Back-up process will be also in place.</p> <p>The data will be preserved at least until the completion of the project.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 139. Demand Response Point System (Thessaloniki)

Data Manager	CERTH
Dataset reference / name	Demand Response Point System
Availability	Restricted
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	Gamification Points, Demand Response engagement
Data set description	Gamification points as reward for the end-user/consumer for his/her participation in the Demand Response scheme suggested by the aggregator.
Standards	OpenADR 2.0
Data sharing	<p>These data will be produced and stored on the inteGRIDy RKW, deployed on the CERTH Server on an Influx Database.</p> <p>The following tools will handle and exchange among them those data:</p>

	<ul style="list-style-type: none"> Intelligent Building Control & Flexibility Prediction and Forecasting <p>The exchanges will occur using *.json files format.</p> <p>These data will be used for visualization from the Integrated Visualization Platform layer tool, used in Thessaloniki pilot, i.e:</p> <ul style="list-style-type: none"> Visual Analytics Tool for Flexibility Analysis, Aggregation and Forecasting, for presenting the data to both the aggregator (WVT) and the end-user/consumer. <p>The exchanges will occur using *.json files format.</p> <p>For this particular data set, no third parties are involved.</p>
Archiving and preservation (storage/backup)	<p>The data will be preserved on the CERTH server database, where a Back-Up process will take place on a regular basis.</p> <p>The data will be preserved at least until the completion of the project.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 140. Demand Response Schedules (Thessaloniki)

Data Manager	CERTH, WVT
Dataset reference / name	Demand Response Schedules
Availability	Restricted
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Demand Response Schedules, Demand Response messages, Demand Response signals
Data set description	Demand Response suggestions, i.e. time-set points, send to the end-users/consumers by the aggregator in order for them to participate to Demand Response scheme for that day.
Standards	OpenADR 2.0
Data sharing	These data will be produced and stored on the inteGRIDy RKW, deployed on the CERTH Server on an Influx Database. These correspond to the information required to be communicated to the end-users, concerning the incentivised DR schedules calculated and needed to be followed by each end-user, based on the load forecast produced and the gamification points calculated.

	<p>The following tools will handle and exchange among them those data:</p> <ul style="list-style-type: none"> Intelligent Building Control & Flexibility Prediction and Forecasting <p>The exchanges will occur using *.json files format.</p> <p>These data will be used for visualization from the Integrated Visualization Platform layer tool, used in Thessaloniki pilot, i.e:</p> <ul style="list-style-type: none"> Visual Analytics Tool for Flexibility Analysis, Aggregation and Forecasting, for presenting the data to both the aggregator (WVT) and the end-user/consumer. <p>The exchanges will occur using *.json files format.</p> <p>For this particular data set, no third parties are involved.</p>
Archiving and preservation (storage/backup)	<p>The data will be preserved on the CERTH server database, where a Back-Up process will take place on a regular basis.</p> <p>The data will be preserved at least until the completion of the project.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 141. Energy Prices (Thessaloniki)

Data Manager	CERTH, WVT
Dataset reference / name	Energy Prices
Availability	Open
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	Energy Prices, Electricity Prices, forecast
Data set description	Electricity Prices daily forecast time-series.
Standards	OpenADR 2.0
Data sharing	<p>They are downloaded on a daily basis from an online service (more specifically the energy exchange group - http://www.enexgroup.gr/) to the CERTH Server, in an *.xls format, then transformed and stored in an Influx Database on the CERTH Server.</p>

	<p>The following tools will handle and exchange among them those data:</p> <ul style="list-style-type: none"> Intelligent Building Control & Flexibility Prediction and Forecasting <p>The exchanges will occur using *.json files format.</p> <p>These data will be used for visualization from the Integrated Visualization Platform layer tool, used in Thessaloniki pilot, i.e:</p> <ul style="list-style-type: none"> Visual Analytics Tool for Flexibility Analysis, Aggregation and Forecasting, for presenting the data to both the aggregator (WVT) and the end-user/consumer, and Facility Management web-based Interface tool for presenting the data to the facility manager. <p>For this particular data set, no third parties are involved.</p>
Archiving and preservation (storage/backup)	<p>The data will be preserved both on-site and the CERTH server database, where they will be sent periodically and a Back-up process will be also in place.</p> <p>The data will be preserved at least until the completion of the project.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 142. Facility/Residential Profile (Thessaloniki)

Data Manager	CERTH, WVT
Dataset reference / name	Facility/Residential Profile
Availability	Confidential
Mandatory Metadata	European Union H2020 integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies inteGRIDy GA 731268
Dataset Specific Metadata	Facility's/Residential Historical Consumption data
Data set description	Facility's/Residential Historical Consumption data
Standards	OpenADR 2.0
Data sharing	In case of the commercial aspect (Facility building): The data are handled locally on a Raspberry Pi board. They are stored on-site in an influx Database, on the Raspberry Pi board.

	<p>In case of the residential buildings:</p> <p>The data are handled within the CERTH server database.</p> <p>They are stored in the CERTH Server database.</p> <p>In both cases, the following tool will handle those data:</p> <ul style="list-style-type: none"> • Building Occupancy & Energy Consumption Simulation Tool. <p>The exchanges with other tools will occur using *.json files format.</p> <p>For this particular data set, no third parties are involved.</p>
Archiving and preservation (storage/backup)	<p>In case of the Residential buildings, the data will be preserved on the CERTH server database, where a Back-Up process will take place on a regular basis.</p> <p>In the case of the Commercial building, the data will be preserved both on-site and the CERTH server database, where they will be sent in periodically and a Back-up process will be also in place.</p> <p>The data will be preserved at least until the completion of the project.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 143. Forecasted Data (Thessaloniki)

Data Manager	CERTH
Dataset reference / name	Forecasted Data
Availability	Open
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	Load Forecast, Energy Forecast, Consumption Forecast
Data set description	A timeseries of load forecast for the next day.
Standards	OpenADR 2.0
Data sharing	<p>The data are handled within the CERTH server database.</p> <p>They are stored in an influx Database within the CERTH server database.</p>

	<p>There, the following tools will handle and exchange among them those data:</p> <ul style="list-style-type: none"> Intelligent Building Control & Flexibility Prediction and Forecasting <p>These data will be used for visualization from the Integrated Visualization Platform layer tool, used in Thessaloniki pilot, i.e:</p> <ul style="list-style-type: none"> Visual Analytics Tool for Flexibility Analysis, Aggregation and Forecasting, for presenting the data to both the aggregator (WVT) and the end-user/consumer. <p>The exchanges will occur using *.json files format.</p> <p>For this particular data set, no third parties are involved.</p>
Archiving and preservation (storage/backup)	<p>In case of the Residential buildings, the data will be preserved on the CERTH server database, where a Back-Up process will take place on a regular basis.</p> <p>In the case of the Commercial building, the data will be preserved both on-site and the CERTH server database, where they will be sent in periodically and a Back-up process will be also in place.</p> <p>The data will be preserved at least until the completion of the project.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 144. Residential User Measurements (Thessaloniki)

Data Manager	CERTH, WVT
Dataset reference / name	Residential User Measurements
Availability	Restricted
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	Load Measurements
Data set description	Load Measurements time-series from the point of connection between the residence and the rest of the electricity grid.
Standards	OpenADR 2.0

Data sharing	<p>From on-site energy meters, the data are aggregated in the WVT server database and forwarded to the CERTH server database.</p> <p>There, the following tools will handle and exchange among them those data:</p> <ul style="list-style-type: none"> Intelligent Building Control & Flexibility Prediction and Forecasting <p>These data will be used for visualization from the Integrated Visualization Platform layer tool, used in Thessaloniki pilot, i.e:</p> <ul style="list-style-type: none"> Visual Analytics Tool for Flexibility Analysis, Aggregation and Forecasting, for presenting the data to both the aggregator (WVT) and the end-user/consumer. <p>The exchanges will occur using *.json files format.</p> <p>For this particular data set, no third parties are involved.</p>
Archiving and preservation (storage/backup)	<p>The data will be preserved in WVT and the CERTH server databases, where they will be sent periodically and a Back-up process will be also in place.</p> <p>The data will be preserved at least until the completion of the project.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 145. User Data (Thessaloniki)

Data Manager	CERTH
Dataset reference / name	User Data
Availability	Confidential
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	<p>End-user/Consumer DR engagementment,</p> <p>End-user/Consumer DR responsiveness</p>
Data set description	These data reflect the responsiveness of the end-user towards a suggested DR schedule provided by the aggregator.
Standards	OpenADR 2.0

Data sharing	<p>The data are handled within the CERTH server database.</p> <p>They are stored in a Database within the CERTH server database.</p> <p>The following tools will handle and exchange among them those data:</p> <ul style="list-style-type: none"> Intelligent Building Control & Flexibility Prediction and Forecasting <p>These data will be used for visualization from the Integrated Visualization Platform layer tool, used in Thessaloniki pilot, i.e:</p> <ul style="list-style-type: none"> Visual Analytics Tool for Flexibility Analysis, Aggregation and Forecasting, for presenting the data to both the aggregator (WVT) and the end-user/consumer. <p>The exchanges will occur using *.json files format.</p> <p>For this particular data set, no third parties are involved.</p>
Archiving and preservation (storage/backup)	<p>The data will be preserved on the CERTH server database, where a Back-Up process will take place on a regular basis.</p> <p>The data will be preserved at least until the completion of the project.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

Table 146. Weather Data (Thessaloniki)

Data Manager	CERTH
Dataset reference / name	Weather Data
Availability	Open
Mandatory Metadata	<p>European Union</p> <p>H2020</p> <p>integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies</p> <p>inteGRIDy GA 731268</p>
Dataset Specific Metadata	Weather data
Data set description	Weather Data, referring to ambient temperature timeseries.
Standards	Webservice Restful API, OpenADR 2.0
Data sharing	They are downloaded from an online service, more specifically https://www.weatherbit.io/ to the CERTH Server

	<p>in *.json files format, and then transformed and stored in an Influx Database on the CERTH Server.</p> <p>The following tools will handle and exchange among them those data:</p> <ul style="list-style-type: none"> • Intelligent Building Control & Flexibility Prediction and Forecasting <p>The exchanges will occur using *.json files format.</p> <p>These data will be used for visualization from the Integrated Visualization Platform layer tool, used in Thessaloniki pilot, i.e:</p> <ul style="list-style-type: none"> • Facility Management web-based Interface tool for presenting the data to the facility manager. <p>For this particular data set, no third parties are involved.</p>
<p>Archiving and preservation (storage/backup)</p>	<p>The data will be preserved on the CERTH server database, where a Back-Up process will take place on a regular basis.</p> <p>The data will be preserved at least until the completion of the project.</p> <p>Since there is already an infrastructure in place, there will be no extra cost.</p>

4. Conclusions

This document is an updated Data Management plan for the inteGRIDy project. The initial data management plan identified the datasets that will be collected or generated and described how they will be stored and shared. It specified which data will be open access and which will be confidential within the consortium, as far as it is possible to do so at this stage. In addition, repositories and resources for sharing data are identified.

It is anticipated that the most significant datasets are the quantitative and qualitative datasets produced by the Overall Evaluation and Impact assessment (WP8). The datasets related to WP8 will validate both the impact of the project and the conclusions drawn in scientific publications arising. It is intended that where possible these data will be made available through open access repositories. The dissemination process has started in September 2017. Furthermore, all project deliverables which are flagged with the dissemination level '**PUBLIC**' will be published on **CORDIS** portal. These datasets will be evaluated in the next release of this report, expected for December 2020.

A generic cyber security and privacy survey was conducted on all pilot sites. Results show that there is no comprehensive, legal framework, or at least not one that is widely common. Hence, pilot and data managers tend to refer to the use of best practices.

The updates of this fourth release of the DMP has focused on the reusability of previously existing datasets and the specification of individual pieces of information being used at pilot level, as pilots are the main source of data for inteGRIDy. With this extended information, the content is now consistent and aligned with the final reference architecture provided by the project (as per D1.6 deliverable [IND16]) and all necessary data regarding each data item on the information flow is described.



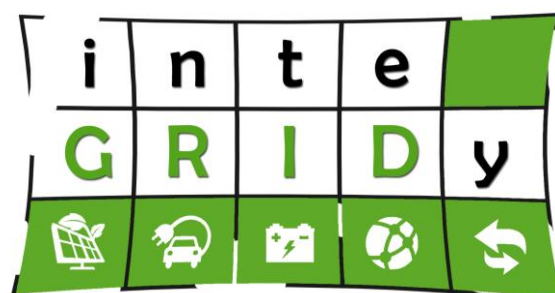
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