

D11.15 Data Management Plan 6

+CityxChange | Work Package 11, Task 11.6

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31.10.2023	v.02	Dirk Ahlers, Kelly Riedesel, all respective partners	Updates on sections 4.1 and 4.2 on available and pending data and systems, based on partner status.

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List of Acronyms

CA	Consortium Agreement
CC	Creative Commons
CSIRT	Computer Security Incident Response Team
DMP	Data Management Plan
DoA	Description of Action
DPIA	Data Privacy Impact Assessment
DPO	Data Protection Officer
EB	Executive Board
EC	European Commission
EEAB	External Expert Advisory Board
EU	European Union
GA	Grant Agreement
GA	General Assembly
GDPR	General Data Protection Regulation
IPR	Intellectual Property Rights
KPI	Key Performance Indicator
MS	Milestone
NCP	National Contact Point
NAT	National Advisory Teams
ORD	Open Research Data
PM	Project Manager
PO	Project Officer
RRI	Responsible Research and Innovation
SCIS	Smart Cities Information System
SLA	Service-level agreement
TB	Technical Board
WP	Work Package
WPL	Work Package Lead

Executive Summary

This deliverable constitutes the final version of the Data Management Plan for the +CityxChange project. It specifies Data Governance and handling of data in the project, types of data expected to be generated in the project, and if and how it will be made open and accessible for verification and re-use. It will also specify curation and preservation, with details such as ethical, privacy, and security issues.

All beneficiaries are informed of the applicable regulations around human participation, informed consent, data processing, data security, and the pertinent regulations such as GDPR or H2020 Ethics or FAIR guidelines. When personal data collection or processing is started, the DMP information will be updated accordingly to include updated data summaries, consent forms, compliance, and institutional approval where necessary. Processing of personal data will respect the Data Protection Principles. This document provides an overview of data handling in the project and provides the initial guidelines for the project. The project will support openness according to the EU FAIR approach and the principle "as open as possible, as closed as necessary" together with the project ambition of "Open by Default".

This document is an update of D11.5: Data Management Plan - Initial Version, D11.7 Data Management Plan 2, D11.16 Data Management Plan 3, D11.10 Data Management Plan 4, D11.13 Data Management Plan 5 and supersedes those documents. Changes to previous versions are detailed in the introduction section.

1 Introduction

This section is mainly unchanged, apart from versioning and the update list at the end.

This deliverable is the final version of the Data Management Plan (DMP) for the +CityxChange project and an update to D11.13: Data Management Plan 5. It describes overall Data Governance in the project, including the lifecycle of data to be collected, generated, used, or processed within the project and the handling of data, including methodologies, data sharing, privacy and security considerations, legal and regulatory requirements, informed consent, open access, for during and after the project. The Deliverable is part of Task 11.6: Delivery of Data Management Plan and is linked with Task 11.2: Delivery of Consortium Plan, and Task 11.1: Project Management. It is further linked to Ethics Deliverables D12.1: H - Requirement No. 1 on Human Participants and D12.2: POPD - Requirement No. 2 on Protection of Personal Data. Some content from D11.5, D11.7, D11.16, D11.10, D11.13, D12.1, D12.2, and the Description of Action (DoA) is reiterated here.

+CityxChange has a strong commitment in place for maximising dissemination and demonstration of the value of the implemented targets and measures. Strong dissemination of results, sharing of data, communication, and replication are a key success factor in making the project results more accessible, attractive, evaluable, replicable, and implementable for a broad set of stakeholders. The project aims to make research data findable, accessible, interoperable and re-usable (FAIR) in line with the H2020 Guidelines on FAIR Data Management¹. +CityxChange participates in the Pilot on Open Research Data (ORD) and thus delivers this Data Management Plan to define how the project will implement data management, dissemination, and openness according to the principle "as open as possible, as closed as necessary" together with the project ambition of "open by default".

The consortium will provide Open Data and Open Access to results arising from the project to support a number of goals, namely: benchmarking with other projects and comparison of developed measures; improving dissemination, contribution to the Smart Cities Information System (SCIS), and exploitation of data and results; improving access and re-use of research data generated within the project; and knowledge sharing with citizens, the wider public, interested stakeholders, cities, industry, and the scientific community.

The project is built around transparency and openness. 86% of 148 deliverables are open, only 18 are confidential (2 were made public by the partners and published on the project website, while originally being coded as confidential), which is a great support for outreach and replication. Deliverables are expected to be used both internally and externally, to both inform the project and its team members about activities and results, and to inform

¹ "Guidelines on Data Management in Horizon 2020",
http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-da-ta-mgt_en.pdf

external stakeholders and potential collaborators and replicators. This means that documentation is written with a focus on usefulness for the project and the European Cities and other stakeholders. Such outreach will also be supported through the inter- and extra-project collaboration between SCC1 projects in WP9 and dissemination in WP10.

In addition, +CityxChange aims to fulfil all ethical requirements and acknowledges that compliance with ethical principles is of utmost importance within H2020 and within Smart Cities and Communities projects that involve citizens and other actors, especially regarding human participants and processing of personal data. As such, the beneficiaries will carry out the action in compliance with: ethical principles (including the highest standards of research integrity); and applicable international, EU and national law. Beneficiaries will ensure respect for people and for human dignity and fair distribution of the benefits and the burden of research, and will protect the values, rights and interests of the participants. All partners are aware of the H2020 Rules of Participation² (Sections 13, 14) and the Ethics clauses in Article 34 of the Grant Agreement and the obligation to comply with ethical and research integrity principles set out therein and explained in the annotated Model Grant Agreement³. The project will respect the privacy of all stakeholders and citizens and will seek free and fully informed consent where personal identifiable data is collected and processed. Processing of personal data will respect the Data Protection Principles.

Data provided by the project will support a range of goals, such as improving dissemination and exploitation of data and results; improving access and reuse of research data; and knowledge sharing with citizens, the wider public, interested stakeholders, and the scientific community. Documentation and research data repositories will follow the H2020 best practice, with a focus on open access, peer-reviewed journal articles, conference papers, and datasets of various types.

This document is based on the main formal project description of the Grant Agreement and additional documentation built so far in the project. The +CityxChange project is part of the H2020 SCC01 Smart Cities and Communities Programme. The related documents for the formal project description are the Grant Agreement Number 824260 - CityxChange "Positive City ExChange" (Innovation Action) entered into force 01.11.2018, including the core contract, Annex 1 Part A (the Description of Action, DoA: beneficiaries, work packages, milestones, deliverables, budget), Annex 1 Part B (Description of project, work, background, partners), Annexes (Supporting documentation, SEAPs, BEST tables, Dataset mapping, etc.), and Annex 2 - Budget. In addition, the Consortium Agreement of +CityxChange, entered into force 01.11.2018, details the Consortium Governance and relations of beneficiaries towards each other. It includes IP-relevant background, including existing data sources. The parts about open data, security, and privacy processes are taken from the internal living documentation on ICT governance.

² REGULATION (EU) No 1290/2013 (Rules for participation and dissemination in H2020)
https://ec.europa.eu/research/participants/data/ref/h2020/legal_basis/rules_participation/h2020-rule-s-participation_en.pdf

³ EU Grants: H2020 AGA — Annotated Model Grant Agreement: V5.0 – 03.07.2018 General MGA



For the role of the Data Manager, the Coordinator has appointed the Project Manager. As part of the responsibilities of the Project Management Team, the Data Manager will review the +CityxChange Data Management Plan and revise it annually or when otherwise required with input from all partners.

This public document describes the final status of the DMP at the end of the project in October 2023.

This version is mostly unchanged from the previous one. As a long-term impact of the Covid-19 situation, work was delayed, and even in cases where it is completed, documentation and dissemination is still taking further time. New systems and data are internally becoming available in this period as noted below. In many cases, these are still confidential or proprietary by the partners, in some cases, appropriate anonymisation mechanisms are not yet defined, or data is not being made yet open for other reasons. For a few other cases, preparation takes more time, and data is expected to be published after the project end.

This document represents the current state of the DMP document and supersedes the previous document, D11.13 Data Management Plan 5, to which this is an update. Specific changes to the previous version are as follows:

- Small updates on overall status
- Updates to Section 4 on available or planned data and systems:
 - Updates to M&E system and KPI data availability
 - Trondheim Brattøra LFM added
 - Finance Models added
 - +CityxChange Game described
 - Other datasets noted that may still become available

2 Ethics, Privacy, and Security Considerations

This part is repeated from D11.13.

+CityxChange is an innovation action. It is a complex, cross-sectoral, and interdisciplinary undertaking that involves stakeholders from widely varying backgrounds. Furthermore, it is a city-driven project, putting cities and their citizens in the focus.

This means that a majority of data collection and human participation happens through activities around automated data collection in energy and mobility scenarios, monitoring and evaluation, as well as citizen participation, stakeholder engagement, events or peer-to-peer exchanges in developing and co-creating innovative solutions. The approach and structure of the project leads to diverse data being collected and generated using a range of methodologies. As the data is heterogeneous, a number of methodologies and approaches can be used.

Ethics Considerations

Most of the 11 Demonstration Projects in the +CityxChange Lighthouse Cities will require data processing and most require evaluation involving human research subjects and the collection of personal data. The ethics self-assessment and Ethics Summary Report identified three ethical issues: 1) human participation, 2) personal data collection of data subjects, and 3) potential tracking or observation of participants. Details on these are given in D12.1 and D12.2 and summarised below.

The details for each demonstration case are summarised in the following table (from D12.1).

Identified Demonstration Projects	Human Participants	Collection of personal data	Tracking or observation of participants
Residential, office, multi-use buildings, Norway	X	X	X
Energy data, building level, Norway	X	X	X
Energy data, system level, Norway	X	X	X
Transport data (and mobility data), Norway	X	X	X
Community Engagement, Norway	X	X	X

Residential, office, multi-use buildings, Ireland	X	X	X
Energy data, building level, Ireland	X	X	X
Energy data, system level, Ireland	X	X	X
Transport data (and mobility data), Ireland	X	X	X
Community Engagement, Ireland	X	X	X

All activities within +CityxChange will be conducted in compliance with fundamental ethical principles and will be underpinned by the principle and practice of Responsible Research and Innovation (RRI)⁴. RRI is important in the Smart City context where projects work to transform processes around cities and citizens. Through the +CityxChange approaches of Open Innovation and Quadruple Helix collaboration, societal actors and stakeholders will work together to better align the project outcomes with the general values, needs and expectations of society (see D9.1: Framework for Intra-Project Collaboration). This will be done throughout the project, with a focus within WP9 and WP10 and the city Work Packages. The project uses open data and openness as part of Open Innovation 2.0 and for stakeholder participation through measures such as open data, open licenses, public deliverables, hackathons, outreach, living labs, and existing innovation labs.

The consortium confirms that the ethical standards and guidelines of Horizon 2020 will be rigorously applied, regardless of the country in which the research will be carried out, and that all data transfers will be permissible under all necessary legal and regulatory requirements. This was detailed in D12.1 and D12.2 and will be followed up in the following section. No major changes from the previous DMPs have taken place.

All proposed tasks are expected to be permissible under the applicable laws and regulations, given proper observance of requirements. Where appropriate information and consent of all stakeholders and citizens is mandated, the consortium will ensure that all necessary procedures are followed, particularly with regard to the signing, collation, and storing of all necessary Informed Consent Forms prior to the collection of any data. All involved stakeholders and citizens will be informed in detail about measures and the consortium will obtain free and fully informed consent.

All necessary actions will be taken within the project management and by all beneficiaries to ensure compliance with applicable European and national regulations and professional codes of conduct relating to personal data protection. This will include in particular Directive 95/46/EC regarding data collection and processing, the General Data Protection

⁴ EU H2020 Responsible research & innovation
<https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation>



Regulation (GDPR, 2016/679), and respective national requirements, ensuring legal and regulatory compliance. Ethics considerations will feed into research and data collection protocols used in the project. This will include collection and processing of personal data as well as surveys and interviews. For all identified issues, in line with the above standards, ethical approvals will be obtained from the relevant national data protection authorities and/or institutional boards.

In line with existing regulations by the university partners relevant for social science research, the mapping of the ID and the person will be safeguarded and will not be available to persons other than the ones working with the data. This will minimise the risks of ethical violations. Since data stemming from other kinds of research might be de-anonymized and reconnected to a person, discipline-specific study designs aim to mitigate or remove this risk as well for different types of data collection. Results may be used in anonymised or aggregated form for analysis and subsequent publication in project reports and scientific papers. All beneficiaries will handle all material with strict care for confidentiality and privacy in accordance with the legal and regulatory requirements, so that no harm will be done to any participants, stakeholders, or any unknown third parties. NTNU as the coordinator has internal guidelines that comply with GDPR and these will be followed in its data management.

In addition to relevant national data protection authorities, the university partners have separate institutional ethics boards or respective national research boards, which will ensure the correct implementation of all human participation and data protection procedures and protocols around social science research. In detail, this includes for Ireland the University of Limerick Research Ethics Governance and respective Faculty Research Ethics Committees, and for Norway the Norsk samfunnsvitenskapelig datatjeneste (NSD) - National Data Protection Official for Research.

As an example for NTNU processes, we describe sample guidelines for interviews: Let's assume that the interviewees' quotations will include their role and the date of interviews. Before interviews will be conducted, the interviewees will be asked to sign a letter of consent, in which they certify that they are aware that the interview will be recorded, and the resulting report will reflect their role and the date of interviews, unless interviewees wish to say something off the record. Those parts will be quoted as anonymous.

In addition, the researchers will store the collected data in a safe place and in the personal computer, which is secured with a passcode. The interviewees will also be informed that the information would be kept secret and inaccessible. In Norway, any individual researcher is obliged to familiarize himself/herself with the Research Ethics Act, research ethics guidelines and information from the Norwegian Social Science Data Services (NSD) concerning the Data Protection Official scheme and processing personal data and must submit the respective notification form at least 30 days prior to commencing data collection. Therefore, the NSB report will be provided before the data collection process.

The Lighthouse Cities Limerick (IE) and Trondheim (NO) will closely collaborate with their local universities. The Follower Cities Alba Iulia (RO), Písek (CZ), Smolyan (BG), Sestao (ES), and Võru (EE) will follow similar procedures for any potential replication of demonstration

projects. Details will be developed within the respective tasks, initially in WP3 and as part of publications in WP10, and input into ongoing versions of this DMP.

Ethics Requirements and Confirmations

Recruitment and informed consent procedures for research subjects will fulfil the following requirements (cf. D12.1). These have been suggested by the EC/INEA as part of the Grant Agreement Preparation and are adopted by the project.

- a) The procedures and criteria that will be used to identify/recruit research participants.
- b) The informed consent procedures that will be implemented for the participation of humans.
- c) Templates of the informed consent/assent forms and information sheets (in language and terms intelligible to the participants).
- d) The beneficiary currently foresees no participation of children/minors and/or adults unable to give informed consent. If this changes, justification for their participation and the acquisition of consent of their legal representatives will be given in an update of the DMP and relevant documentation within the respective tasks.

In addition, for the processing of personally identifiable data the following requirements will be observed (cf. D12.2):

- a) The contact details of the host institution's DPO are made available to all data subjects involved in the research. Data protection policy for the project will be coordinated with the DPO.
- b) A description of the technical and organisational measures that will be implemented to safeguard the rights and freedoms of the data subjects/research participants as well as a description of the anonymisation/pseudonymisation techniques that will be implemented.
- c) Detailed information on the informed consent procedures linked to the above in regard to data processing.
- d) Templates of the informed consent forms and information sheets (in language and terms intelligible to the participants) linked to the above regarding data processing.
- e) The project currently does not foresee profiling. In case this changes, the beneficiary will provide explanation on how the data subjects will be informed of the existence of the profiling, its possible consequences and how their fundamental rights will be safeguarded in an update of the DMP.
- f) The beneficiaries will explain how all of the data they intend to process is relevant and limited to the purposes of the research project (in accordance with the 'data minimisation' principle).
- g) The project does not foresee the case of further processing of previously collected personal data. In case this changes, an explicit confirmation that the beneficiary has a lawful basis for the data processing and that the appropriate technical and organisational measures are in place to safeguard the rights of the data subjects will be submitted in an update to the DMP.

Recruitment of Participants and Informed Consent Procedures

The project will engage with a multitude of participants and stakeholders in different Work Packages and Tasks. This runs from open to highly targeted activities, co-creation workshops, citizen engagement, outreach activities, stakeholder and citizen groups, and other activities. The Deliverable on Human Participants D12.1 H - Requirement No. 1 has described general guidelines on the processes to be used. The current drafts of informed consent forms are shown in the Annex of D12.1. The updates to these will be included in future versions of this DMP.

More detailed requirements and documentation will be generated before the start of any activity involving participation of humans being the subjects of the study, while fully operating within local, national, and EU regulations. These forms will be detailed and tailored to the individual demonstration projects within the Lighthouse cities, in the official language of the country/city where the demonstration takes place, and include demonstration-specific aspects and referring to the relevant regulations on data protection and/or other legislation if applicable.

For all applicable physical meetings and consortium events we will inform participants if or that pictures will be taken, and participants will have to actively consent, with an option to opt out from pictures being used in project specific communication. It also concerns photographic evidence of events, demonstrations, etc. that is done throughout the project and may be needed for documentation of task and milestone completion. This will also be taken up with WP10 on communication and WP9 on inter-project collaboration with regards to documentation of events.

For events with registration or similar collection of personal data, usually one owner of the event will be clear, who will be the data controller. Other project partners can participate in the events, usually with no further implications. If other partners need to use this data for their own purposes in the project, they may become a data processor under GDPR. In that case, they should check with their own DPO, as this document can only give limited guidance. In the case of joint data needs for events and research, the research partners should work on the process jointly with the other partners.

Human participation considerations such as research ethics consent is usually only needed for work initiated by the universities if it is linked to specific research activities. In those cases, the universities will use their existing and adapted consent forms. In cases where research partners are only assisting or facilitating an event organised by another partner, consent procedures usually do not apply.

Data Privacy and Personal Data

Detailed requirements and descriptions of the technical and organisational measures that will be implemented to safeguard the rights and freedoms of the data subjects/research participants will be described by tasks that implement them. Where necessary, data will be anonymised or pseudonymised.

Data minimisation principles will be followed in line with applicable legislation. The relevance of data collected for tasks will be considered^{5,6}.

As the project will include the participation of numerous cities requiring multiple data measurements per city, the actual project beneficiaries, external stakeholders and citizens involved will vary between tasks. The project will respect the privacy of all stakeholders and citizens and will seek free and fully informed consent where personally identifiable data is collected and processed as described above, implementing suitable data handling procedures and protocols to avoid potential identification of individuals. This process will include participants' data in activities that use techniques such as questionnaires, interviews, workshops, or mailing lists as well as automatic building, energy, and mobility data collection.

The +CityxChange consortium is aware of potential issues arising from data aggregation from different sources, scales, flows, and devices. Data collected in the project will thus be anonymised and aggregated as close to the source as possible. In certain cases, personal data avoidance and minimisation can eliminate and/or reduce identifiability. For example, energy consumption with a high temporal resolution can be used to identify personal daily patterns and routines when gathered at an individual household level. Aggregate data either with lower temporal resolution (e.g. once a day) or with a lower geographical resolution (e.g. energy consumption on a district level as is directly available for energy providers) mitigates this risk. The same approach will be implemented for mobility data, which can incorporate a much higher level of personal information and will need to be treated with adequate anonymisation and aggregation methods.

Data Protection Officers and GDPR compliance

As Coordinator and host institution, NTNU confirms that it has appointed a Data Protection Officer (DPO) and the contact details of the DPO will be made available to all data subjects involved in the research (see D12.2).

Respective partners will also follow their internal data protection and European GDPR⁷ regulations. In line with GDPR, individual beneficiaries are responsible for their own data processing, so the respective beneficiaries are to involve their own DPOs, who will ensure the implementation and compliance of the procedures and protocols in line with internal processes and national regulations. This also includes options to withdraw consent and procedures that must be in place to deal with privacy violations in a timely manner.

⁵ H2020 Ethics and Data Protection

http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/ethics/h2020_hi_ethics-data-protection_en.pdf

⁶ EU, Principles of the GDPR: What data can we process and under which conditions?

https://ec.europa.eu/info/law/law-topic/data-protection/reform/rules-business-and-organisations/principles-gdpr/what-data-can-we-process-and-under-which-conditions_en

⁷ General Data Protection Regulation (GDPR, EU 2016/679)

Processing of personal data will respect the Data Protection Principles as set out: Lawfulness, fairness and transparency; Purpose limitation; Data minimisation; Accuracy; Storage limitation; Integrity and confidentiality; accountability.

Each beneficiary is reminded that under the General Data Protection Regulation 2016/679, the data controllers and processors are fully accountable for the data processing operations, which means that every beneficiary is ultimately responsible for their data collection and processing. Any violation of the data subject rights may lead to sanctions as described in Chapter VIII, article 77-84.

GDPR also describes processes and information requirements in case of security breaches. In addition to those, project partners are asked to also inform the project in case of any breaches related to project data, and potentially describe mitigation measures in respective deliverables. Such situations should also be updated in the project risk and mitigation registry and in the periodic reporting to the EU (cf. D11.6: Risk Mitigation Registry 2).

Data Security

The beneficiaries are expected to implement technical and organisational measures to ensure privacy and data protection rights in the project.

Further discussion on data governance and security initiatives (for example in WP2/WP3/WP4/WP5/WP7 systems, or the specific IOTA energy marketplace implementation align with their motivation and security features), are available in D1.2: Report on the architecture for the ICT ecosystem, Section 7.1, A.1, and A.10 respectively.

All ICT systems were designed to safeguard collected data against unauthorized use and to comply with all national and EU regulations. Engineering best practices and state-of-the-art data security measures were incorporated as well as GDPR considerations, and respective guidelines and principles. Ultimately, each partner is responsible for their own information security in developed systems, but for overall guidelines, replication blueprints, and documentation, the ICT ecosystem architecture (WP1, T1.1/T1.2) will incorporate this aspect in the overall development as part of data governance in D1.2: Report on the architecture for the ICT ecosystem⁸; and D1.3: Report and catalogue on the ICT data integration and interoperability⁹, both due in M24 and currently under development.

Information security management, which is central to the undertaking of the project, will follow the guidelines of relevant standards, e.g., ISO/IEC 27001 and 27002 (Code of practice

⁸ D1.2 Report on the Architecture for the ICT Ecosystem. +CityxChange project deliverable. Sobah Abbas Petersen, Anthony Junior Bokolo, Dirk Ahlers, Armin Shams, Markus Helfert, Iyas Alloush, Zohreh Pourzolfaghar.

<https://cityxchange.eu/knowledge-base/d1-2-report-on-the-architecture-for-the-ict-ecosystem/>

⁹ D1.3: Report and Catalogue on the ICT Data Integration and Interoperability. +CityxChange project deliverable. Armin Shams, Markus Helfert, Zohreh Pourzolfaghar, Iyas Alloush, Anthony Junior Bokolo, Sobah Abbas Petersen, Dirk Ahlers.

<https://cityxchange.eu/knowledge-base/d1-3-report-and-catalogue-on-the-ict-data-integration-and-interoperability/>

for information security management), to ensure confidentiality, integrity, and availability. It will additionally include the Directive on security of network and information systems ('Cybersecurity directive', NIS-Directive 2016/1148) on the security of critical infrastructures and the ePrivacy Directive 2002/58, as well as European Union Agency for Network and Information Security (ENISA) guidance. In addition, data storage will fully comply with the national and EU legal and regulatory requirements. Partners will ensure and document that used cloud infrastructure complies with applicable regulations.

Additional details were covered in the respective upcoming Deliverables on the ICT architecture (D1.2: Report on the architecture for the ICT ecosystem; and D1.3: Report and catalogue on the ICT data integration and interoperability, for example Section 5), as well as the respective Deliverables of WP2 on the energy systems, and their deployment in WP4/5/6.

City Processes on Privacy and Security

All project beneficiaries have existing and operational policies regarding potential ethics issues as well as privacy and security regulations or will ensure their provision for the tasks where they are necessary.

In addition to the cities, the solution providers in +CityxChange have their own data protection routines established in their existing operations and in their development and test activities of the project. They are responsible to establish compliance with GDPR and other data protection and security regulations. They will further support and implement guidelines from/with the ICT tasks in WP1 and this DMP.

In the following, we discuss overall city procedures.

TK is establishing a formal privacy policy. It uses internal tools to ensure internal control and audit and to keep track of all processes around personal data. TK will ensure that it has legal consent, updated routines, valid risk and vulnerability analysis, in compliance with EU and Norwegian law. It has a Data Protection Officer (DPO) responsible for the municipality and an assistant DPO in each business area, following National Datatilsynet¹⁰ regulations. Following these regulations, TK has a project under the municipal director of organization to ensure compliance with GDPR, and future Norwegian personal data privacy act regulations; TK continuously aims to maintain compliance.

TK has a strong focus on privacy and security when it comes to ICT systems, including IoT, encryption, etc. Work is based on ISO 27001 and it complies with all relevant national and EU policies. It has a dedicated role of Security Architect and relies on an operational provider for the internal cloud, who is bound by SLAs. TK is one of the initiators and is participating in the Norwegian municipal sector (KS) investigation by municipal-CSIRT (Computer Security Incident Response Team). CSIRT is one of the key elements of the NIS directive.

¹⁰ Norwegian Data Protection Authority, Norway, <https://www.datatilsynet.no/en/>

LCCC has updated its Data Protection Policy to one that is in line with GDPR and the Data Protection Act 2018. A new role has been created for GDPR compliance for the Data Protection Officer - DPO. An existing staff member with auditing experience has been appointed to the full time role and will ensure compliance with the requirements of the Irish Data Protection Commissioner¹¹. The DPO is currently auditing the organisation for GDPR compliance. This work is being carried out in conjunction with the Digital Strategy Programme Manager. LCCC is currently reviewing its Data Processors Agreements with all its suppliers that access data. A database of data sets, access, security, business processes, anonymisation etc. is being documented through this audit and captured into the organisation's CRM system. LCCC has strict security policies to protect its systems and data, handled by the ICT Network Team. LCCC complies with the NIS directive by taking appropriate technical and organisational measures to secure network and information systems; taking into account the latest developments and consider the potential risks facing the systems; taking appropriate measures to prevent and minimise the impact of security incidents to ensure service continuity; and notifying the relevant supervisory authority of any security incident having a significant impact on service continuity without undue delay.

Alba Iulia Municipality is compliant with the Data Protection Regulation (EU) 2016/679. It implemented the process of a formal privacy policy. The municipality elaborated privacy policy notifications for every employee regarding the new Data Protection Regulation and dedicated a section in the official web page. Internal tools will ensure internal control and audit and to keep track of all processes around personal data. Alba Iulia will ensure that it has legal consent, updated routines, valid risk and vulnerability analysis, in compliance with EU and Romanian law. A Data Protection Officer (DPO) is appointed for all the municipality departments in line with GDPR and ensures compliance with national regulations by the National supervisory Authority for personal data processing¹². AIM follows its security policy for ICT use within the municipality organized by the IT team and the head of IT, with outsourced contracts for server management and maintenance, and the latest audit carried out in 2018. The NIS Directive was transposed into local law, aligning Romania with the common European framework for responding to cyber security incidents.

Písek has developed an analysis of municipal processes and its compliance with GDPR. The City Council approved an inner policy directive for GDPR on 2018-10-05 (decision no. 290/18). A role of DPO is assigned since 01.03.2018 in the City Bureau, in line with the national Office for Personal Data Protection¹³ and the Act No. 101/2000 Coll., on the Protection of Personal Data (currently amended to meet the GDPR conditions). The Security Policy and IS Security Management Plan is handled by the IT department and the IT Management Committee in reference to Act No. 365/2000 Coll., On Public Administration Information Systems, by the IT Management Committee. The NIS Directive is reflected in Act No. 181/2014 Coll., on Cyber Security, the Decree of the National Security Authority (NBÚ) No. 316/2014 Coll., the Cyber Security Order; Decree of NBÚ and Ministry of the interior (MVČR) No. 317/2014 Coll., on Important Information Systems and their Criteria.

¹¹ Data Protection Commission, Ireland, <https://www.dataprotection.ie/>

¹² Autoritatea Națională de Supraveghere a Prelucrării Datelor cu Caracter Personal, Romania, <https://www.dataprotection.ro/>

¹³ Úřad pro ochranu osobních údajů, Czech Republic, <https://www.uoou.cz/en/>

The Municipality of Sestao and Sestao Berri are complying with all relevant regional, national, and European legislation around data security and privacy in line with the Spanish data protection authority AGPD¹⁴ and the Basque data protection authority AVPD¹⁵. The latter is working on guides for the adaptation of public administrations to the General Data Protection Regulation (GDPR) for the Basque municipalities. The respective Spanish regulations are followed (Organic Law 3/2018, of December 5, on the Protection of Personal Data and guarantee of digital rights¹⁶).

The data protection role (Delegado de Protección de Datos) is taken by the General Register of the City of Sestao (Registro General del Ayuntamiento de Sestao). Detailed data handling for different data sources of the municipality is described in an extensive list on data use, justification, and rights.¹⁷

In Smolyan, the policies for information security management are part of the Integrated Management System of the Municipality; they comply with the international standards ISO 9001: 2008, ISO 14001: 2004 and ISO 27001: 2013 for which the municipality is certified. They are implemented by the Information Security Working Group. A Personal Data Protection System, complying with Regulation (EC) 2016/679 of the European Parliament and of the Council of 27 April 2016 has been adopted by the Municipality of Smolyan. The system has been documented, implemented and maintained through 9 procedures/policies that include internal regulations, technical and organizational measures, which the Municipality of Smolyan applies. The system for protection of personal data is approved by Order № ПД - 0455 / 23.05.2018 of the Mayor of Smolyan Municipality. It is constantly improving both in the case of significant changes in the legal framework and in other related circumstances.

A DPO has been appointed, following regulations from the Commission for Personal Data Protection¹⁸ and working with the Information Security Working Group. The Personal Data Administrator is responsible for the compliance of the processing of personal data, as required by European and national legislation.

It links with the Bulgarian Law for protection of personal data (The Privacy Act) and the Act for Access to Public Information. A Network Security Management and Remote Access Policy is based on ISO 27001:2013 with respect to the protection of the information on the network, the supporting infrastructure and the establishment of rules for configuring the internal servers owned and managed by the municipality of Smolyan. It connects to the Management Policy of the Municipality of Smolyan as well as a total of nine Information Security Management Policies, which are part of the Integrated Management System of the Municipality.

Vöru follows its own privacy policy with its ISKE working group and data protection working group. Specialists have additional tasks to supervise implementation of the privacy policy in

¹⁴ Agencia Española de Protección de Datos - AGPD, Spain, <https://www.aepd.es/>

¹⁵ Agencia Vasca de Protección de Datos - AVPD, Basque Country, <http://www.avpd.euskadi.eus/s04-5213/es/>

¹⁶ Ley Orgánica 3/2018, de 5 de diciembre, de Protección de Datos Personales y garantía de los derechos digitales, <https://www.boe.es/buscar/doc.php?id=BOE-A-2018-16673>

¹⁷ <http://www.sestao.eus/es-ES/Institucional/Paginas/informacion-adicional.aspx>

¹⁸ Комисия за защита на личните данни, Bulgaria, <https://www.cpdp.bg/en/>

the organisation, following the rules of the Estonian Data Protection Inspectorate¹⁹. The DPO has mapped the current situation, and works with documentation and suggests changes if needed. The national principles are observed, in the coordination of the respective draft law, including recommendations from the Information Systems Authority.

Building and energy data collection

In all cities, historic and current data on buildings and energy consumption is being collected. This has the aim of supporting feasibility studies for refurbishment and retrofit actions, as well as to feed data into different prediction and modelling tools. This data is collected and shared by project partners under their own data governance frameworks. In the majority of cases, it has no privacy implications, but rather issues around data ownership and sharing of data. So far, this has mostly been done under the conditions of the Grant Agreement and the Consortium Agreement, so no separate agreements needed to be drawn up. This is also discussed in 'Access Rights and Procedures' in Section 3.

Only some of this data is already publicly available, but may need to be processed or aggregated, while the majority of datasets are internal data of municipalities or building owners. It is currently not foreseen to make this data publicly available through the project, but it will be used for future work and deliverables.

Specific processes around privacy related data collection are described below.

Project-Specific Partner Processes on Privacy and Security

Building data and stakeholder/citizen engagement

For a number of tasks within the PEB for Limerick, data from building owners is needed, for example yearly or monthly energy bills, and floorplans or detailed blueprints of buildings. At later stages, detailed personal data may be needed as well. Data has been difficult to obtain from the building owners, and the level of approvals required from different parties was at a level not previously anticipated. In addition, these activities needed to be aligned with plans and actions for citizen engagement, so that building owners were not surprised by the request and can react positively to it, in line with overall stakeholder engagement by the project and overall alignment. This also shows that collecting data is a part of overall interaction with the communities and needs to be integrated into those plans. An overall MoU is being developed for interactions with building owners (see D4.12: Community Grid Implementation Guide, D4.13: Limerick Energy Trading Market - Implementation Report). Information such as energy bills is shared under that for building/energy modelling and PEB building selection. Collecting this data is a part of interaction with the communities. Further details may also be discussed in the confidential Limerick management reports D4.16, D4.18. However, since some of these measures could not be implemented, little data is forthcoming.

¹⁹ Andmekaitse Inspektsioon, Estonia, <https://www.aki.ee/en>

Relevant risks on data availability and GDPR compliance in collecting data have been added to the project risk table.

For tasks within PEBs in Trondheim, energy data is exchanged based on agreements with the building owners as direct project beneficiaries, or through additional contracts for additional buildings. These are modelled as a framework agreement between the relevant stakeholders of, for example, Trondheim Kommune, Trønderenergi as DSO, ABB as provider of hardware and software installations, building owners as PEB and flexibility market participants, etc. Details are explained for example in D5.6: Trondheim Flexibility Market Deployment Report, and D5.11: Trondheim DPEB Demonstration.

Data Privacy Impact Assessments

As part of the project work, Limerick carried out a Data Privacy Impact Assessment (DPIA) for WP4 and in particular its energy related subtasks early on in the project.

Main questions included:

- Is personal data protected?
- How can we manage this?
- In what scenarios will we collect data?
- What Smart Grid application are we building?
- Status of a Data Controller or a Data Processor needs to be clarified with energy partners

This work was based on the EC Data Protection Impact Assessment Template for Smart Grid and Smart Metering systems (2018)²⁰. Specifically, for the Smart Grid applications, non-exhaustive examples of Personal Data which gives rise to conduct a DPIA are: Consumer registration data, Usage data (energy consumption, in particular household consumption, demand information and time stamps), as these provide insight in the daily life of the data subject, Amount of energy and power provided to grid (energy production), as they provide insight into the amount of available sustainable energy resources of the Data Subject, Profile of types of consumers, as they might influence how the consumer is approached, Facility operations profile data (e.g. hours of use, how many occupants at what time and type of occupants), Frequency of transmitting data (if bound to certain thresholds), as these might provide insight in the daily life of the data subject, Billing data and consumer's payment method.

This process was also important for LCCC, as it is the project owner, but does not hold all the data, which is collected and processed by specific partners with specific needs for interaction and exchange.

The process consisted of 8 steps, and was conducted through a series of meetings over May and June 2020. The potential data process partners were identified to be LCCC, UL, IOTA, MPower, ESB, SE, IES, ISOCARP, 4C, FAC, ARUP, POW, ABB, OV, GKIN, COL, and ESNB.

²⁰ <https://ec.europa.eu/energy/en/topics/markets-and-consumers/smart-grids-and-meters/smart-grids-task-force/data-protection-impact-assessment-smart-grid-and-smart-metering-environment>

- Step 1 Pre-assessment 06/11/2019
- Step 2 Initiation: Decision to initiate DPIA for WP4 28/04/2020
- Step 3 Analysis of Use Cases 22/05/2020
- Step 4 Assessment of Threats 29/05/2020
- Step 5 Data Protection Risk Assessment 05/06/2020
- Step 6 Management of Risk and Final Resolution 13/06/2020
- Step 7 Documentation of DPIA Report 20/06/2020
- Step 8 Annual Reviewing and Update 2021, 2022, 2023

The process identified 66 Risks across 11 Risk Categories:

- 13 Risks are in the High Risk Category
- 35 Risks are in the Medium Risk Category
- 18 Risks are in the Low Risk Category
- 66 Total Risks in High/Medium/Low Categories

The detailed DPIA Risk Register is available as an internal document for the project work.

Use Cases were identified under the headings:

- Event Registration
- Academic Research
- Citizen Engagement with Digital Tools
- Positive Energy Champions
- Demand Profiling
- Energy Consumption Data

For the exchange of data, the DPIA was fed into a contract process that led to an agreement signed by all local partners as named above. The DPIA process is detailed in the document: "*Data Protection Policy & Guidance on how to Carry out a Data Protection Impact Assessment (DPIA) where Required*". This document is available internally to project partners.

Workshop on Privacy and Smart City Data Model Structure

At the Consortium Meeting in Limerick on 23rd of October 2019, a workshop was held on privacy and Smart City Data Model Structure. It focused on knowledge sharing, challenges, and identification of possible solutions.

During this workshop 6 main points were discussed in relation to data management and interoperability of the systems developed as part of the project:

1. Enterprise Architecture,
2. Data integration,
3. City Data, Open data portals, APIs,
4. Data Protection Impact Assessments
5. Informed consent
6. DMP and open research data

During the project multiple partners will be creating new services, which need to use data. How do we ensure data exchange between partners in the long term: maybe responsibility

can be fortified by data exchange contracts? We also need to create a story for citizens to understand how the enterprise architecture is applied in order to protect their personal data and interests. The new services and solutions developed by +CityxChange for the LHCs will further have to be replicated to the FCs. As stated above, the project will follow the EU rules on GDPR. The legal basis for Personal Data Processing must always be identified. Details on the discussion of DPIAs have been detailed in the subsection above.

3 Data Management, Sharing and Open Access

This part is repeated from D11.7 without significant changes. Publication numbers are updated in subsection “Open Access to publications”.

+CityxChange will distinguish four key categories of data arising from the project:

- **underlying research data:** data necessary for validation of results presented in scientific papers, including associated metadata, which works hand in hand with the general principle of openness of scientific results. The consortium will provide timely open access to research data in project-independent repositories and link to the respective publications, to allow the scientific community to examine and validate the results based on the underlying data. +CityxChange has a commitment to publish results via Gold Open Access and has allocated a budget for it. The deposition of research data will depend on the type and channel of publication, ranging from associating data with a publication at the publisher, university or national research data repositories, or the use of the OpenAIRE infrastructure, following the H2020 best practice, with particular focus on peer-reviewed journal articles, conference papers, and datasets of various types.
- **operational and observational data:** This category includes curated or raw data arising from the implementation, testing, and operation of the demonstrators (operational data), and data from related qualitative activities, such as surveys, interviews, fieldwork data, engagement activities (observational data). +CityxChange will make this data available in coordination with the ICT ecosystem and respective partner repositories, opening it up for project partners and stakeholders, and to citizens and interested third parties to support engagement and innovation (WP3), where possible and allowed under regulations and privacy issues.
- **monitoring and evaluation data:** This data will specifically be captured to track KPIs of the project performance in WP7 and will be regularly reported and published to the Smart Cities Marketplace (who took over the Smart Cities Information System (SCIS))²¹ in a clearly defined and open way. In addition, monitoring data will be available in the project’s M&E system (for system and data description, see D7.3: Data Collation, Management and Analysis Methodology Framework; D7.4: Monitoring and Evaluation Dashboard; ongoing reporting will be described in D7.5: Data Collection and Management Guideline Reports 1; D7.6: Reporting to the SCIS system 2; and the subsequent Deliverables).
- **documentation, instruments, and reusable knowledge:** This concerns general and specific documentation of the project and demonstration/implementation projects, including tools, methods, instruments, software, and underlying source code needed to replicate the results. A number of collaboration and document management tools will be used, ranging from collaboration solutions, source code repositories (e.g. git) over document stores to the project website (WP10). Clean and consistent documentation and publication will support dissemination impact. All

²¹ EU Smart Cities Marketplace <https://smart-cities-marketplace.ec.europa.eu/>

public Deliverables will be published on the project website²² in Open Access with open licenses.

Data Handling Descriptions

Apart from other mechanisms within the project, such as communication, outreach, citizen participation, peer-to-peer learning workshops and networks, measures such as sharing of data, documentation, and results will be an important contributing factor to the project goals. The project will ensure that research data is *'findable, accessible, interoperable and reusable'* (FAIR), in line with the H2020 Guidelines on FAIR Data Management.

The following describes the guidelines and expectations for relevant data sets along with detailed description, metadata, methodology, standards, and collection procedure. Further details are types of data, data formats and vocabularies, storage, deadlines for publication, data ownership rules, and detailed decisions regarding data management and protection. Issues to be defined will be, for example, the confidentiality needs of utility providers, the privacy needs of citizens, commercialisation and cybersecurity issues, together with general ethical, legal, and regulatory considerations and requirements.

At the time of delivery, most tasks have not yet fully defined the type and structure of the data that they need or will generate or can make available, or data publication was not followed for a range of reasons (see Introduction and Section 4).

Part of these tasks is also considered and documented in the overall ICT ecosystem architecture and interface Tasks (T1.1 and T1.2) and in the KPI development and data collection in WP7 on Monitoring and Evaluation. Regarding data governance, main areas of concern are Open data, Open data models, Clear definitions of data ownership and accessibility, Data audit process to support transparency, Change management guidelines to track the data changes, Standardised rules and guidelines.

As part of the DMP, storage, processing, protection, dissemination, retention, destruction will be collected and documented.

For this, individual Tasks within the Work Packages will specify and implement approaches related to data collection, management, and processing measures that are most appropriate based on data avoidance, especially concerning personally identifiable aspects of data sets, in coordination with Task T11.6 for the DMP.

Individual data collection will be handled by the involved partners and cities in the Work Packages, keeping much data processing close to the source and within the originating partners, while providing a loosely coupled overall architecture through suitable architecture choices and guidelines. Some architectural details will be described by the ICT ecosystem Tasks T1.1, T1.2 in WP1 (D1.2: Report on the architecture for the ICT ecosystem, and D1.3: Report and catalogue on the ICT data integration and interoperability).

To ensure maximum use and quality of open research data and re-use of existing data for example from city Open Data Portals, the project will base much of the internal collaboration on structured research data sets collected in standardized formats in

²² +CityxChange Knowledge Base: <https://cityxchange.eu/knowledge-base/>

collaboration with WP1/2/3, WP7 and WP10/11. This will help ensure that deposited datasets can be evaluated internally as well regarding their use for the scientific community ('dogfooding', an organisation using its products and services also internally. In this case, also avoiding duplicate work by making as much data as possible available in structured formats for internal use and external dissemination). Such an approach should also support outreach activities such as hackathons, by enabling low-barrier access for external stakeholders. Where possible, research data and associated metadata (standardised as Dublin Core, W3C DCAT, or CSVW) will be made available in common standard machine-readable formats such as Linked Open Data (LOD) in coordination with T1.2, enabling it to be linked to other public datasets on the Web and to facilitate discovery and automatic processing. Example approaches include the ESPRESSO framework²³, Open ePolicy Group, and others, to be detailed in WP1. In addition, data must also be interoperable to facilitate ease of access and exchange. As set out in the new EU 'Interoperability Framework'²⁴, this is vital to the functioning of pan-European business and to impact for H2020 projects.

For all tasks, digital copies of all research or public data will be stored for a minimum of three years after the conclusion of the grant award or after the data is released to the public, whichever is later. All information and data gathered and elaborated will be suitably described in the respective Deliverables. All public Deliverables will be made available and archived on the project website and through the EU Community Research and Development Information Service (CORDIS) for the project²⁵. The project aims to make research data and publications freely available through Open Access and suitable repositories.

Pending detailed descriptions, the following table shows the data handling summary template for use within the DMP and within Tasks for documentation:

²³ Espresso – systEmic standardisation apProach to Empower Smart citieS and cOMmunities
<http://espresso.espresso-project.eu/>

²⁴ The New European Interoperability Framework | ISA² - Promoting seamless services and data flows for European public administrations, 2017, https://ec.europa.eu/isa2/eif_en

²⁵ Positive City ExChange | Projects | H2020 | CORDIS | European Commission, <https://cordis.europa.eu/project/rcn/219210/factsheet/en>

Template for data handling and management summary (to be made into a table in the shared document space when examples are available)

Task/Demo/Activity	Task Name/Demo Name/Task Links
Description (Data and/or System)	
Purpose and relevance of data collection and relation to objectives	
Methodology	
Data source, data ownership	
Standards, data formats, vocabularies	
Storage	
Security & Privacy considerations	
License	
FAIR considerations	<p>'findable, accessible, interoperable and reusable'</p> <p>See also OpenAIRE on principles and minimal requirements: https://www.openaire.eu/how-to-make-your-data-fair</p> <p>See also H2020 guidelines: https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-data-mgt_en.pdf</p> <p>See also well-described sub-requirements here: https://www.go-fair.org/fair-principles/</p>
Exploitation/Dissemination	
Dissemination Level, Limitations, Approach, Justification	
Stakeholders	
URL for data / URL for info	

Access Rights and Procedures

In line with the Consortium Agreement and the Grant Agreement, research results are owned by the partner that generates them. However, the stated aim is to make data and



results publicly available, whenever possible. Further access rights and regulations are set forth in the Consortium Agreement as rights and obligations of partners. In particular, Consortium partners will give each other access to data that is needed to carry out the project. Partners will furthermore give each other access under fair and reasonable conditions to exploit their results. For other affiliated entities, access can be granted under fair and reasonable conditions for data and research output, as long as it is not covered by the Open Access conditions, provided such access is in line with the project goals and confidentiality agreements. Data published or otherwise released to the public will include disclaimers and/or terms of use as deemed necessary.

The protection of intellectual property rights, detailed terms for access rights, and collective and individual exploitation of IP are agreed upon in the Consortium Agreement (Section 8 page 19, Section 9 page 21, Section 10 page 26) and Grant Agreement (Section 3, page 43). Some Deliverables will include project internals which do not need to be public. Some others will include detailed specifications for the software tools and methodologies; these will remain confidential as per the Deliverable designation as they contain potentially patentable information. Alternatively, some public Deliverables may have confidential annexes.

Any data relating to the demonstration sites, e.g. metered data, utility bills will remain the property of the demonstration sites and will only be shared with the permission of the demonstration site owner. Aggregated data for purposes of Monitoring and Evaluation will be shared under open licenses (cf. Section Dissemination).

Software licenses will be aimed to be as open as possible, with Creative Commons for documentation and GNU-style licenses for software as a default. For example, GPLv3 (GNU General Public License)²⁶, MIT²⁷, or Apache²⁸ are open and permissible licenses, with GPL additionally using a share-alike model for sharing only under the original conditions (reciprocal license).

Adaptations are expected for commercial partners to be aligned with their IPR strategy. A balance is needed for openness and need for marketability, patenting, and other IPR issues. This will be handled by the industry partners together with the cities, and is also linked to WP8 on Replication and the Innovation Manager in the Project Management Team.

The project overall has 148 Deliverables that are to be submitted by the end of the project. All those that are public are available on the project website's knowledge base²⁹. It should be noted that some originally confidential Deliverables will be made public: currently, this applies to three published reports. Additionally, public Deliverables accepted by the EC are available on the EU CORDIS site³⁰.

²⁶ GPL 3.0 <https://www.gnu.org/licenses/gpl-3.0.en.html>

²⁷ MIT License <https://opensource.org/licenses/MIT>

²⁸ Apache License, Version 2.0 <https://www.apache.org/licenses/>

²⁹ <https://cityxchange.eu/article-categories/deliverables/>

³⁰ <https://cordis.europa.eu/project/id/824260/results>

Open Access to publications

The dissemination activities within the project will include a number of scientific and other publications. +CityxChange is committed to dissemination and the principle of Open Access for scientific publications arising from the project, in line with the H2020 Guidelines to Open Access³¹. It further aims to make research data open as described above. A budget has been set aside for the academic partners to support gold open access publishing.

Publication of scientific papers will be encouraged by the +CityxChange consortium. For cases where it may interfere with seeking protection of IPR or with publication of confidential information, a permission process for publishing any information arising from the project is put in place in the Consortium Agreement. Notification needs to be given at least 45 days before the publication, with objections subject to the rules of the Consortium Agreement.

The project aims for Gold Open Access publication of scientific peer-reviewed papers where possible and will adopt a Green Open Access strategy as a fallback. At the minimum, this will include self-archiving of publications in known centralised or institutional repositories, for example the NTNU institutional archive NTNU Open³² the UL Institutional Repository³³, or OpenAIRE³⁴. Authors will ensure appropriate bibliographic metadata is published as well, where possible. It will be in a standard format and include the terms "European Union (EU)" & "Horizon 2020"; the name of the action, acronym & grant number as below; publication date, length of the embargo period, if applicable; and a persistent identifier. These requirements are also codified in Article 29.2 of the Grant Agreement on Open Access.

Authors will aim to retain copyright and usage rights through open licenses, such as Creative Commons Attribution License (CC-BY 4.0³⁵/CC-BY-SA) or otherwise publisher agreements to a similar effect will be pursued. Project participants will ensure that all publications acknowledge the EU H2020 funding and the name and grant number of the project, including the standard disclaimer as is also found on the title page of this document (+CityxChange, project number 824260). Deliverables are public by default through a Creative Commons CC-BY4.0 license. Other CC licenses can be applied after consultation. External third-party material will be labelled as such, to clearly identify such content and exclude it from the free use given for consortium-generated material. This can

³¹ H2020 Online Manual, Open access
http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/open-access_en.htm

³² <https://www.ntnu.edu/ub/research-support/open-access>

³³ <https://ulir.ul.ie/>

³⁴ <https://www.openaire.eu/>

³⁵ Creative Commons License Attribution 4.0 International (CC BY 4.0)
<https://creativecommons.org/licenses/by/4.0/>

be done by excluding such content in the general license statement and by identifying copyright information next to third-party material included in documents³⁶.

Details on the scientific dissemination strategy are found in D10.8: Plan for dissemination and exploitation of +CityxChange project results 3, and D10.9: Plan for dissemination and exploitation of +CityxChange project results. Publication outcomes are tracked internally, reported to the EU Portal, and disseminated on the project website as a dedicated subsection of the knowledge base³⁷.

Currently, at October 2023, 30 works are fully published, out of which 13 are under Green and 17 are under Gold Open Access. Others are under development or waiting for a final publication into repositories.

Open Research Data and Open City Data

Quality-assured data is a cornerstone of scientific research and of industry and city developments. Research data should be freely, publicly, and permanently available where possible and appropriate to support validation of results and re-use of data for example in research, development, and open or citizen science as well as Open Innovation. +CityxChange participates in the Pilot on Open Research Data (ORD)³⁸ and will thus aim to provide open access to raw and aggregated curated datasets. The project aims to make research data findable, accessible, interoperable and re-usable (FAIR) in line with the H2020 Guidelines on FAIR Data Management.

Data will be made accessible for verification and reuse through appropriate channels and repositories. Limits of access and availability are to be given in individual data descriptions and will be further developed within the project with the aim of greater openness.

Where research data is made available, it will be made available in recognized repositories such as OpenAIRE or Zenodo, as attachments to publications in venues that support it, or in local repositories of universities or national research institutes, with possible assistance from national OA desks.

Apart from research data repositories, the partner cities in +CityxChange are working on or running their own City Open Data Portals, where general data arising from the project should also be made available. Data may also be federated into research repositories or

³⁶ For example, in the license label at the beginning: "CC-BY4.0 Creative Commons Attribution, except where otherwise noted." and a full copyright and attribution next to third-party content in the document.

See also the CC guidelines:

https://wiki.creativecommons.org/wiki/Marking/Creators/Marking_third_party_content

³⁷ Available at: <https://cityxchange.eu/article-categories/research-outcomes/>

³⁸ H2020 Programme Guidelines to the Rules on Open Access to Scientific Publications and Open Access to Research Data in Horizon 2020

http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf

other systems. The Lighthouse Cities have a strong interest in this and will focus on open data through existing or new projects.

Insight.Limerick.ie is the Limerick Data as a Service platform that integrates data about Limerick from multiple sources and provides open access to linked open data and open APIs at <http://insight.limerick.ie/>. Data is available for viewing in charts and maps and also as open format downloads. While no formal open data policy is being enforced, the concept of making data available as open data is being encouraged throughout the workforce. Open data published here will also become available in the national open data portal www.data.gov.ie.

Trondheim has set up an open data portal based on CKAN. It is available at <https://data.trondheim.kommune.no>. In TK, there is a general drive towards making more data available. TK has a wealth of data, and is in the process of opening up as much non-personally-identifiable data as possible, even though much data is unfortunately locked in vendors' systems without a proper API to get the data out. TK is part of a national research project – SamÅpne – that looks into the barriers of opening up municipal data, and is working on a solution. Data is and will also be made available in the national open data portal <http://data.norge.no/>

The Follower Cities are working towards Open Data, and are already using a variety of processes and tools to make data available.

Smolyan uses the National Portal for Open Data, as required by the Access to Public Information Act. The Open Data Portal is a single, central, public web-based information system that provides for the publication and management of re-use information in an open, machine-readable format, along with relevant metadata:

<https://opendata.government.bg/?q=smolyan>

Písek follows the national level guideline for Open Data publishing and is preparing its publication plan as part of Smart Písek. Initial solutions are implemented for new information systems: <https://smart.pisek.eu/portal.html>

Alba Iulia is building an open data portal as one component of its smart city portfolio. It is being tested and will be published when sufficient data is available. Regarding the fact that Open data underpins innovation and out-of-the-box solutions in any area, Alba Iulia is an early partner in the Open Energy project, developed by one of the Alba Iulia Smart City Pilot Project - CivicTech (IT-based NGO). This is the first open energy consumption data platform in public institutions, having the purpose to monitor this consumption transparently, which will enable the identification of better patterns of consumption prediction, facilitate the transfer of good institutional practices, encourage investment in the efficiency of energy consumption and in the future will support the taking of responsible consumption of electricity among the whole society. At this point the open data platform is not published yet as the partner found some difficulties in funding the development of this solution. Being a pilot project and with no financial involvement on behalf of Alba Iulia Municipality, it is dependent entirely on local partners' team efforts.

Sestao and Võru currently have no own portals.

The project aims to make anonymised data sets public, but will aim to strike a balance between publication of data and privacy and confidentiality issues. When in doubt, the

consortium will refrain from publishing raw datasets and only report aggregate measures. Decisions will be made on a case-by-case basis by senior researchers to ensure that privacy, anonymity, and confidentiality are not breached by publication of datasets or any other type of publication. In addition, ongoing consultation with the relevant Data Protection Offices will be ensured during the lifetime of the project.

This will also ensure that data is preserved, available, and discoverable. In any case of data dissemination, national and European legislation will be taken into account. To ensure free and open access with clear licensing, the project will mostly adopt Creative Commons licenses ranging from attribution to share-alike licenses (such as CC-BY 4.0/CC-BY-SA 4.0).

As above, publications will have bibliographic metadata attached where possible, which is extended to research data. Where possible, research data and associated metadata will be made available in common standards and possibly as Linked Open Data. Annotations will be at minimum at the dataset level, to support interoperability of data. There is currently no separate operating budget for this, as it will be taken as part of the budget for website and platform management, use existing infrastructure at the Coordinator, and the cities will for example achieve this through their Open Data portals (see previous section), other partners, or will use free and open repositories.

Document Management

As noted in the overall consortium plan (D11.1), documents in the consortium are handled in one overall platform for easy collaboration and findability of overall project documentation. The project has set up a shared file repository in the form of an Enterprise installation of Google Drive, including collaborative editing tools for documents, spreadsheets, and presentations. The instance is made available by Trondheim Kommune and is compatible with all applicable regulations. The repository is accessible by invitation. Access will be granted to registered members of the consortium. Generally, it is not recommended to share highly sensitive data on this system.

The handling of sensitive documents will be coordinated with the DPO or current regulations of the host partner. The partners have internal repositories and processes for dealing with such sensitive data and how it can be shared for research (see also next section on archiving).

Additional sharing and development tools can be set up by specific tasks if needed, such as version control software that is outside the scope of the overall platform, but will be documented and linked there.

Archiving and Preservation

Deliverables will be archived on the project website³⁹ and will be available through the EC at CORDIS⁴⁰. The internal datasets will be backed up periodically so that they can be recovered

³⁹ <https://cityxchange.eu/article-categories/deliverables/>

⁴⁰ <https://cordis.europa.eu/project/id/824260/results>

(for re-use and/or verifications) in the future. Published datasets, raw or aggregated, will be stored within internal and external repositories and thereby ensure sustainability of the data collection. Records and documentation will be in line with common standards in the research fields to ensure adherence to standards, practices, and data quality. Data will be retained for three years after the conclusion of the grant award or after the data are released to the public, whichever is later.

The LHCs LCCC and TK together with NTNU as the Coordinator will ensure long-term data curation and preservation beyond the project period. It will partially be implemented as sustainability of the monitoring and evaluation platform and data. This is linked to WP7 and prepared in T7.6 on migration of the monitoring system, and as sustainability of the project documentation and website, linked to WP10 and WP11.

4 Dissemination and Exploitation

This section is mainly unchanged from the previous version, except for updates on the available data and systems on the following items:

- Updates to M&E system and KPI data availability
- Trondheim Brattøra LFM added
- Finance Models added
- +CityxChange Game described
- Other datasets noted that may still become available

Disseminating and exploitation of the project outputs and results are an important step to achieve the project goals. This is done in cooperation with WP10 on Dissemination and Communication, WP9 on Inter- and Intra Project Collaboration, WP11 on Project Coordination, and all partners. As detailed above, data will be made as open as possible. All consortium partners, together take responsibility for exploitation and dissemination of results and to ensure visibility and accessibility of results. Implementing FAIR data principles will support the openness and re-use of data and therefore dissemination and replication. Different dissemination channels are estimated to be used and maintained during and after the project as shown in the following table:

Dissemination type	Usage	Policy
Website	Main reference point for project dissemination and data description	Creative Commons where applicable. External rights clearly marked.
Deliverables	Deliverables to the EU and the public. Disseminated through the project website cityxchange.eu and the EU CORDIS system. ⁴¹	Dissemination level set per deliverable, public by default and open with Creative Commons Attribution CC-BY4.0. 86% of 148 deliverables are public, 20 are confidential, with three of these already also made public.
Social Media	Support of communication and dissemination activities. Operation handled mainly by WP10.	Creative Commons where applicable.
Newsletters	Regular updates and links to website and other channels	Creative Commons where applicable.

⁴¹ <https://cordis.europa.eu/project/id/824260/results>

<p>Videos</p>	<p>Videos as dissemination and visualisation tools; directly prepared by the project or indirectly by project partners as project support. Dissemination handled by WP10. Project youtube channel⁴² for dissemination, selected videos embedded into website</p>	<p>Licenses chosen per case, Creative Commons where possible.</p>
<p>Publications</p>	<p>Scientific and other publications arising from the project</p>	<p>Open Access to publications as detailed above.</p>
<p>Benchmarking, Monitoring & Evaluation, KPIs</p>	<p>Monitoring of indicators for project and city performance</p>	<p>Aggregate KPI data can be openly and publicly reported to SCIS, in line with the overall SCIS policy and license (updated with the updated SCIS license for dissemination). Limitations due to privacy and data policies may apply. General data governance issues around this will be followed up in future versions of the DMP and in WP1 and WP7. The license for KPI data inside the +CityxChange M&E system and the data to be reported into SCIS will be under a CC-BY4.0 Creative Commons Attribution (https://creativecommons.org/licenses/by/4.0/) Raw data or supporting data and documentation for achieving targets (for example for survey-based indicators or detailed personally identifiable data from single areas) will be kept confidential. This will be detailed in the WP7 methodology.</p>

⁴² <https://www.youtube.com/channel/UCm1plsLkDtYzFOEhLnZXRvg>



Research data as laid out in Data Management section	Underlying research data of the project	Open Access with limitations due to privacy, as detailed above, in accordance with the FAIR guidelines on Data Management in H2020.
Any other data	TBD	Wherever possible, open through Creative Commons or other open licenses. 'As open as possible, as closed as necessary'; and 'open by default'.

4.1 Available Data and Systems (open source, open access, open data, etc.)

Task/Demo/Activity	Task Name/Demo Name/Task Links
Description (Data and/or System)	System/Software: IOTA data verification service
Purpose and relevance of data collection and relation to objectives	Software to ensure data verification service. Currently being utilised by Volue/TE/ABB in the energy trading demo, see D2.7: Local DPEB trading market demonstration tool; D2.6: Framework for Community Grid Implementation; and forthcoming Deliverables in WP4 and WP5.
Methodology	
Data source, data ownership	Volue agreed trades; ABB devices energy data. Data is owned by their sources
Standards, data formats, vocabularies	Data is stored according to the format decided by the data source. Volue trades data and ABB energy metrics. See metadata formats in documentation (https://github.com/iotaledger/data-logging-verification)
Storage	IOTA Tangle
Security & Privacy considerations	Data are encrypted; no personal data included
License	System: Open Source SW (Apache 2.0).



	Data is internal to partners, encrypted data is in the tangle with no license
FAIR considerations	N/A, software
Exploitation/Dissemination	
Dissemination Level, Limitations, Approach, Justification	public
Stakeholders	IOTA, energy partners
URL for data / URL for info	Source code and documentation available at https://github.com/iotaledger/data-logging-verification

Task/Demo/Activity	Task Name/Demo Name/Task Links
Description (Data and/or System)	Software: NTNU Energy Optimisation models . Optimization models for smart controlling at NTNU campus: energy asset, heat panel and heat tank. See details in D5.3 Campus Microgrid Model Prototype
Purpose and relevance of data collection and relation to objectives	N/A Data for the system is currently handled internally. Potential later publication of energy measurements TBD.
Methodology	Software development
Data source, data ownership	N/A; Collected data may be made available linked with future publications.
Standards, data formats, vocabularies	
Storage	
Security & Privacy considerations	Security is handled through the building management system this connects to. No privacy implications foreseen, the system works on the level of energy assets on the campus.
License	AGPL-3.0 License
FAIR considerations	N/A, software
Exploitation/Dissemination	



Dissemination Level, Limitations, Approach, Justification	public
Stakeholders	NTNU, Building and microgrid operators
URL for data / URL for info	Code available: https://github.com/Erik135135/CityxChange-D5.3

Task/Demo/Activity	Task Name/Demo Name/Task Links
Description (Data and/or System)	Data/System: Limerick PEB and city model (IES)
Purpose and relevance of data collection and relation to objectives	Visualisation of the energy modelling for the PEB in Limerick (tool developed by IES) through embedding in the website. 3D visualisation is made public. Backend for model development is internal to IES and Limerick.
Methodology	Visualisation of an underlying energy and city model for Limerick. Details are described in D4.1: Limerick DST (Integrated Modelling and Decision Support Tool) including training manuals/videos (https://cityxchange.eu/knowledge-base/d4-1-limerick-dst-integrated-modelling-and-decision-support-tool-including-training-manuals-videos/)
Data source, data ownership	IES, LCCC
Standards, data formats, vocabularies	-
Storage	IES systems
Security & Privacy considerations	Detailed data or the backend access, or the tool itself will not be made available at this point.
License	-
FAIR considerations	-
Exploitation/Dissemination	Use for outreach locally and as a demo. Internal systems at higher detail available.
Dissemination Level, Limitations, Approach, Justification	Visualisation through the website and use in the Limerick Citizen Observatories. Further access to be assessed later. Internal versions for other CxC cities exist.
Stakeholders	IES, LCCC

URL for data / URL for info	System: https://www.limerick.ie/cityxchange/ies-cityxchange
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Task/Demo/Activity	Task Name/Demo Name/Task Links
Description (Data and/or System)	System/Software & Data: M&E online system - MERT and aggregated KPI data
Purpose and relevance of data collection and relation to objectives	Purpose of the data collection is to monitor and evaluate KPI progress. In addition, the MERT makes KPI data collected available for other systems in the +CxC ICT Ecosystem and aggregate data in downloadable formats for public access. Details are found in D7.1 for KPI definitions, in D7.3 for data management, in D7.4 for the online system itself, and in the regular updates of WP7 on further system development and data collection, with the latest upcoming as D7.17: Data Collection and Management Guideline Reports 5, and D7.18: Reporting to the SCIS system 10.
Methodology	Data collection by Manual Form submission or through API (once made available by KPI Owner). See Deliverables noted above for details.
Data source, data ownership	Data source - KPI Owners Data Ownership - KPI Data Owners and other +CxC ICT systems
Standards, data formats, vocabularies	File Formats - csv, pdf
Storage	Cloud Database - MongoDB Atlas. Details in D7.3: Data Collation, Management and Analysis Methodology Framework in Section 2.3: MERT Database Structure
Security & Privacy considerations	Security of data is managed by User level access through MERT Online Portal There are no privacy aspects foreseen as the system explicitly asks for no privacy-related data to be input and all submitted data to be potentially publishable. Details are described in D7.3: Data Collation, Management and Analysis Methodology Framework
License	Data: CC-BY4.0 Creative Commons Attribution (https://creativecommons.org/licenses/by/4.0/)
FAIR considerations	The MongoDB NoSQL database and data within can be mirrored or re-hosted by partners. A migration task was completed as T7.5 and detailed in D7.18



	The data resides within the tool and not yet shared into any external or public repositories. This will be completed at the conclusion of the project. Data download button per KPI is active on MERT.
Exploitation/Dissemination	The MERT has been transferred to LCCC and will continue to be supported by LCCC as part of the sustainability of the project.
Dissemination Level, Limitations, Approach, Justification	Approach: The KPI data that is captured and displayed in the MERT is made available for download to enable external use. The data is made available to the public domain to comply with the EC regulations and the CxC Data Management Plan. Aggregated KPI data is public. FAIR details forthcoming The system itself is closed source at this point.
Stakeholders	LHCs, FCs and all partners of +CityxChange project
URL for data / URL for info	https://mert.cityxchange.eu/ Data download possible on aggregated data on a per-KPI level. Repository of all KPI data will be provided after submission of the deliverables.

Task/Demo/Activity	Task Name/Demo Name/Task Links
Description (Data and/or System)	Data: EU SCM (previously part of SCIS), Self Reporting Tool (SRT), selected +CityxChange KPI data submitted into the SCM SRT See details in D7.1, Section 4, and updated reporting, latest in D7.18: Reporting to the SCIS system 10
Purpose and relevance of data collection and relation to objectives	Aggregate KPI data collected in MERT can be openly and publicly reported to SCIS, in line with the overall SCIS policy. Initial structure and limited data is shared, details are described in D7.16 and D7.18.
Methodology	Data submission by Manual Submissions out of data in the MERT, for those indicators that match with the SCIS/SCM system.
Data source, data ownership	Data Source - KPI data collected in the MERT and KPI Owners



Standards, data formats, vocabularies	SCM/SCIS defined in the SRT. Export currently only as csv.
Storage	SCM/SCIS Database
Security & Privacy considerations	No privacy relevant data should be submitted, as this is an aggregation of MERT data (see above)
License	Submitted data made available as “open data” with no specific license attached, as per https://smart-cities-marketplace.ec.europa.eu/scis-kpis and https://smart-cities-marketplace.ec.europa.eu/projects-and-sites/self-reporting-tool
FAIR considerations	Aggregated KPI data is public.
Exploitation/Dissemination	Aggregated KPI data is public.
Dissemination Level, Limitations, Approach, Justification	The SRT is an EC funded tool that is used for multiple smart energy projects across Europe. Data is partly publicly available.
Stakeholders	EC
URL for data / URL for info	Link to download data (and run visualisations) at SCM: https://smart-cities-marketplace.ec.europa.eu/scis-kpis

Task/Demo/Activity	Task Name/Demo Name/Task Links
Description (Data and/or System)	Data: Collaborative Mapping tool data for Limerick
Purpose and relevance of data collection and relation to objectives	The Mapping Tool has been developed as part of the engagement activity of +CityxChange, particularly D3.3 Framework for Innovation Playgrounds. It is used to access ideas and information (data) from public participants in LHCs and FCs. In addition, stories as qualitative data have been made available.
Methodology	Can be used by city teams or deployed for use by citizen project users.
Data source, data ownership	Data source is the public. Data is currently hosted by GISCloud, which hosts the tool as a data processor. Ownership of data (and data controller, see section on DPIA) is with the licensee of the tool, in this case Limerick City & County Council. Space Engagers are data coordinators. A specific agreement was made with SE



	and LCCC on this. Export of mapped points are available on the CIL site.
Standards, data formats, vocabularies	No specific data formats. .csv files from the default GISCloud export (also possible as ESRI Shapefile, MapInfo, KML, DXF, see https://manual.giscloud.com/knowledge-base/how-to-export-a-layer/)
Storage	Data is currently hosted by GIS Cloud. A number of local project partners are planning local hosting and display of data.
Security & Privacy considerations	No private or personally-identifiable data is hosted.
License	Creative Commons Attribution License "CC BY", to be fully annotated.
FAIR considerations	Data gathered in GIS Cloud is downloadable in multiple formats, can be mirrored or re-hosted. Findable, accessible, reusable is not yet given, as the data is not yet accessible publicly and metadata is not managed. Data resides within the tool and is not yet shared into repositories. Interoperability depends on tool use. This will be followed further with possible local hosting and possible research being done based on the data.
Exploitation/Dissemination	Dissemination of data is planned at project level through WP10 and the +CityxChange website. At city level each city is encouraged to host and disseminate mapping tool data openly. Plans are underway in some cities for this, but at present all data is hosted centrally by GIS Cloud.
Dissemination Level, Limitations, Approach, Justification	Public
Stakeholders	SE current mapping tool coordinators; cities.
URL for data / URL for info	Within https://pluscities.giscloud.com/ Also for Limerick at the new Citizen Innovation Lab site at: https://citizeninnovationlab.ie/ Detailed stories of the mapping are now available. These also count as quantitative data. In addition, CSV exports of map points are available for download: <ul style="list-style-type: none"> • https://citizeninnovationlab.ie/stories/anne-cronin/ • https://citizeninnovationlab.ie/stories/aoife-mckeown/



	<ul style="list-style-type: none"> • https://citizeninnovationlab.ie/stories/una-walsh/
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Task/Demo/Activity	Task Name/Demo Name/Task Links
Description (Data and/or System)	Data/System: Brattøra LFM visualization (Trønderenergi/Aneo)
Purpose and relevance of data collection and relation to objectives	Visualisation of the Flexibility Market and live trades and KPIs in the Trondheim Brattøra PEB Demo Area. Will be shown on a public screen in the PEB. Underlying data is so far internal to the market, and will be made available through the visualisation. Public web access option was added, with the same view as for the public screen.
Methodology	Visualisation. Details described in D5.6: Trondheim Flexibility Market Deployment Report.
Data source, data ownership	TE, market participants.
Standards, data formats, vocabularies	-
Storage	TE systems
Security & Privacy considerations	Detailed data will not be made available at this point. Aggregated data may be made available later, after further internal analysis of the data and further optimisation. Considerations of confidentiality and competition need to be further assessed. Aggregated data may then be linked to a potential publication.
License	-
FAIR considerations	-
Exploitation/Dissemination	Use for outreach locally and as a demo in other material. Internal systems at higher detail available.
Dissemination Level, Limitations, Approach, Justification	Visualisation through public screens. System also available publicly online
Stakeholders	TE, Brattøra partners, market participants, TK
URL for system	Dashboard - live energy trades at Brattøra Dashboard - summary of energy trades at Brattøra

Task/Demo/Activity	Task Name/Demo Name/Task Links
Description (Data and/or System)	Data/System: Finance Models (OV/Cities)
Purpose and relevance of data collection and relation to objectives	Supporting models and data for the finance models developed for the cities. These are specific Excel models for the developed finance models that are made available as annexes to the Deliverables: D4.15: Limerick Energy Investment Models White Paper ⁴³ D5.16: +Trondheim sustainable investment and business concepts and models ⁴⁴ D6.4: Report on Investment Pipelines and Novel Business Models for FCs ⁴⁵ (no separate annexes, but detailed data described within the Deliverable)
Methodology	Finance Models, Excel
Data source, data ownership	OV, Cities, other partners
Standards, data formats, vocabularies	-
Storage	Internal, public in online project knowledge base
Security & Privacy considerations	-
License	CC-BY4.0
FAIR considerations	-
Exploitation/Dissemination	Use for outreach and replication.
Dissemination Level, Limitations, Approach, Justification	Public files as annexes to Deliverables, see list above.
Stakeholders	OC, Cities, other partners
URL for data	- (see links for Deliverables)

⁴³ <https://cityxchange.eu/knowledge-base/d4-15-limerick-energy-investment-models-white-paper/>
⁴⁴ <https://cityxchange.eu/knowledge-base/d5-16-trondheim-sustainable-investment-and-business-concepts-and-models/>
⁴⁵ <https://cityxchange.eu/knowledge-base/d6-4-report-on-investment-pipelines-and-novel-business-models-for-fcs/>

Task/Demo/Activity	Task Name/Demo Name/Task Links
Description (Data and/or System)	System/Software: enerXchange services: API (MPower)
Purpose and relevance of data collection and relation to objectives	Software to ensure collection of data on voltage, power and current readings from network of metering devices (SLUs). Used for reporting and trade simulation. Currently being utilised to collect readings from 5 PEB 1 buildings
Methodology	
Data source, data ownership	Devices energy data. Data is owned by their sources
Standards, data formats, vocabularies	Data is temporarily stored on local server where SLUs connect and is synchronized with cloud database for permanent storage and API access. Synchronization is done through secure channel – where client certificate and mutual authentication is performed between local and cloud server.
Storage	Postgres database
Security & Privacy considerations	No personal data included. Access to all services requires client certificate issued by MPower. Each partner can access only data about its own metering devices network.
License	Linux, Open Source SW (Apache 2.0). Data is internal to partners.
FAIR considerations	
Exploitation/Dissemination	
Dissemination Level, Limitations, Approach, Justification	Available over public Internet for partners
Stakeholders	MPower
URL for data	https://github.com/SmartMpower2023/CityXchange/blob/main/CityxchangePartnerAPI.pdf

4.2 Planned/Pending Available Data and Systems (selection)

Some outputs are still pending:

The +CityxChange board game (PositiCity⁴⁶) was created earlier in the project and then adapted into versions for each of the 7 cities. Efforts are underway to package the individual files, instructions, CAD drawings etc. into a publishable and adaptable version, depending on availability of key people after the project end.

The Coordinator is working with WP7 to have the KPI data published as a full dataset, instead of only the individual views available in the online system (see above). It will be shared and placed in a repository after the conclusion of the project.

As noted above, aggregated energy data for Trondheim and linked to its LFM may be made available at a later time.

Currently no such output was available for the Limerick case. However, MPower created an initial simulation of trade through enerXchange. Efforts are underway to create realistic simulation models based on the data actually collected.

The BEST tables of the Lighthouse cities are currently made available as Annexes to the respective city reports, and the Trondheim ones have also been submitted to the Smart City Marketplace Self-Reporting Tool SRT (the data there does not seem to be individually publicly available, but aggregated data is⁴⁷). It is not yet decided if the BEST tables will be separately published outside the SRT and the project Deliverables.

In addition, the project has some data available for its overall project and city descriptions on the Smart City Marketplace.⁴⁸

⁴⁶ <https://cityxchange.eu/knowledge-base/positicity/>

⁴⁷ <https://smart-cities-marketplace.ec.europa.eu/scis-kpis>

⁴⁸ <https://smart-cities-marketplace.ec.europa.eu/projects-and-sites/projects/cityxchange>

5 Conclusion

This deliverable constitutes the final DMP for +CityxChange with the status of October 2023.

At this time, some data/systems have been made available with a small increase from the previous year (see Sec 4.1). This was expected to increase in the fifth year, while catching up with project delays. Progress was made on completing the demonstrators within the extended deadlines, and this has led to further systems/data being available or being close to being made public.

A brief summary is given as a guideline for project partners. This is not complete and more details are in this document and external sources.

- Research data should be made publicly available if possible (under FAIR principles)
- As far as possible, open licenses should be used
- The project uses data processing that potentially raises ethical concerns. Partners must understand these before starting any respective work
- Research protocols, procedures for informed consent, and for human participants must be followed.
- Data security in IT systems is important and needs to be followed in use and development of systems by each partner
- Privacy-related data is processed in some tasks in the project. This implies the need for GDPR compliance, which is a responsibility of each partner for themselves and cannot be delegated to another partner or the project. This means each partner needs to ensure GDPR compliance for the data they collect, store, exchange, or process.
- Ongoing assessment, for example through DPIAs, is a good assessment strategy to be done jointly with partners exchanging data

The Project Manager (as T11.6 Task Lead) or the Technical Board, as well as to the university and ICT partners remain available for questions and processes. These may give some further practical implementation guidelines, support in making Open Data available or choosing the right licenses for data or software, or refer to the respective DSOs who can ensure compliance with the legal framework.

Some datasets may still become available after the project conclusion, as noted above in Section 4.2.