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"Draft Data Management Plan"

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PU	Public	
CO	Confidential, only for members of the consortium (including the Commission Services)	X

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Summary
In this deliverable the way AD ASTRA manages the data feeding into and generated by the project is described: data creation, use, analysis, storage, sharing and reuse. This document addresses the requirements of an Open Data Research Pilot and identifies and classifies all knowledge generated in AD ASTRA for maximum effectiveness and ease of use, also after project conclusion, for the benefit of European scientific and technological progress in the field.

The deliverable deals with Data accessibility and security, which hinges around the AD ASTRA database. This database is deposited on a dedicated server of the organization coordinating the project (ENEA), located in the Research Centre of Casaccia. The project web site (https://www.ad-astra.eu) is hosted on a generic ENEA server, and has a link embedded to the so-called Private Area where the database server is located (https://www.db.ad-astra.eu/AdAstra, with all the security measures inherent to the ENEA server) which has been developed by partner IEES. It is accessed by partner-specific credentials that have been distributed confidentially within the project.

Finally, estimated required resources for FAIR Data management are given and detailed tables identify for each partner both existing data and knowledge feeding into the project as well as a preliminary set of data to be expected. |

Key words **Data management, data accessibility, data safety, intellectual property**

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1. INTRODUCTION

1.1. Description of the deliverable content and purpose

The purpose of this deliverable is to describe the way AD ASTRA manages the data feeding into and generated by the project: data creation, use, analysis, storage, sharing and reuse. This document addresses the requirements of an Open Data Research Pilot and identifies and classifies all knowledge generated in AD ASTRA for maximum effectiveness and ease of use, also after project conclusion, for the benefit of European scientific and technological progress in the field.

The deliverable deals with Data accessibility and security, estimates required resources for FAIR Data management, and identifies for each partner both existing data and knowledge feeding into the project as well as a preliminary set of data to be expected.

1.2. Deviation from objectives

None.

2. THE AD ASTRA DATA REPOSITORY

2.1. Server, users and accessibility

The AD ASTRA database is deposited on a dedicated server of the organization coordinating the project (ENEA), located in the Research Centre of Casaccia. The project web site (https://www.ad-astra.eu) is hosted on a generic ENEA server, and has a link embedded to the so-called Private Area where the database server is located (https://www.db.ad-astra.eu/AdAstra, with all the security measures inherent to the ENEA server) and accessed by partner-specific credentials that have been distributed confidentially within the project.

The Data Base is structured as an internal communication tool with 6 database levels ("Book of Samples", "Data Bank", "Handbook of Protocols", "Knowledge Pool", "Modeling Data", "Project Resources Pool"). Partner 1 (ENEA) is responsible for hosting the server, the IP monitoring and data management. Partner 6 (IEES) is responsible for the generation and maintenance of a structured database (registration of users, access, changes, updating etc.). To this effect, IEES has been granted administrator access to the ENEA server location. A Web server SSL certificate has been installed for the domain name to allow secure access by partners using the database.

2.1.1 Conditions, methods and software tools needed to access data

Since the AD ASTRA database is developed as internal communication tool, it acts as accumulation and storage of information and data connected with the implementation of the project. Thus all data from project activities (experiments, presentations, participation in events, organization of internal and external meetings, collection of important external information, exchange of samples and internal information for preparation of reports, milestones, deliverables etc.) are collected and stored.

Every Partner organization has the right to access database information. The selection of the persons who have free access to the Data Base is done by every Partner's coordinator. A list with the names and e-mail address is given to the Data Base Administrator (authorized member of IEES team) who creates every access account (based on user name and initial password). The user may change only the password.

For every operation in the Data Base (entering, downloading, uploading etc.) a Notification is sent to the Data Base Administrator. The users receive Notification from some Sections of the Data Base (important for the project implementation). There is an option to stop receiving Notifications.

There are no restrictions for the users to upload or download data in the 6 levels of the Data Base. The software used to programme the Data Base is open source, but no specific programmes need to be installed by the Data Base users (project partners).

2.1.2 Nomenclature, naming conventions and interoperability of data

For easier operation in the Data Base, Internal Nomenclature and Conventions are accepted. These have been agreed within the project consortium and are mainly for internal communication and operation.

The 6 levels of the Data Base are structured for user-friendly internal communication during the implementation of the project and thus they use standards and formats of available (open) software applications, most often used by the producers of the experimental equipment. The users (members of the Consortium) are from different Institutions and countries. For internal interoperability some project-specific conventions are introduced, but they do not go out of the standard data sets (for Instance SEM images have selected obligatory magnifications which ensure comparison of images from different internal sources, i.e. SEM experiments performed in different laboratories). Proposed changes of the initial (equipment) data formats, for facilitation of the data exchange, can be communicated by the partners via internal communication (with email notification to all users). This is also stored in the Data Base.

The introduction of generalized formatting of electrochemical testing experimental data coming from large numbers of single experiments can be beneficial both for the project and the scientific community. An attempt will be made to introduce Data storage in single "large structured files (LSF)" created directly during the measurements, instead of operation with big number of single files and re-formatting. Since this procedure will be developed not only for the Consortium members, it will be supported by detailed description. The initial formatting (ASCII, or similar) which is usually used by the equipment producers, will nevertheless be kept.

Every Data Base level has a Glossary, List of abbreviations and Help for clarification of nomenclature.

2.2 Data re-use and accessibility after the project

The Data Base is currently for internal usage only, but part of it will be collected and developed for use by third parties via the external web site after clearance by all partners. The level of open access will follow the Data and Intellectual property Management Plan (DIMP) and the Plan for the effective dissemination and exploitation of the results (PEDER), which will permit the widest possible re-use. The open access data can be available after the termination of the project via the external web site whish should continue its operation for at least 3 years more (pre-paid from the project). Taking into account the innovative character of some of the Data Base levels, the open access Data which should be a common decision introduced in the present DIMP and realized following the PEDER, will have long term impact. For the same reason the re-use of data generated in AD ASTRA will be governed by a preliminary consultation within the project Consortium where the class of data for public re-use will be agreed on and the specific datasets identified.

The main form of data re-usage will be via publication activities and especially via the selected public deliverables (Workshop and partnering event for dissemination to stakeholders; Review of SOC degradation mechanisms & modelling approaches; Review Paper on SOC degradation submitted to a high-impact Journal).

2.3 Data security

The entire ICT infrastructure of ENEA, that hosts – among many other platforms – the AD ASTRA servers, is hosted in a centre for data elaboration with controlled access by authorized personnel only. The entire system is based on the virtual infrastructure VmWare, that all ENEA research centres use according to similar principles. The main server services are replicated (automatically and constantly) in remote centres: when a centre for data elaboration has problems the service/server can be accessed at such a remote centre. All servers are backed up, maintaining daily copies of all data for up to a month. The storage of data, servers, back-ups and replications and all other features of the data infrastructure are SAN/iCSI type and are not certified for long term conservation. Servers that contain personal data are accessed only by authorized personnel, and all accesses (also by administrators) are logged.

3. RESPONSIBILITY AND ALLOCATION OF RESOURCES

The coordinator (ENEA) is responsible for the data management, and €3000 plus the required person-months have been reserved for the management and safeguard of the server that will host the AD ASTRA Data Base.

In general the resources for long term preservation of the project data will follow the Consortium Agreement. For more precise and up-to-date formulation in accordance with the project implementation, the DIMP and PEDER, which are structured as living documents for efficient and effective direct and indirect exploitation of the results, will be periodically updated.

4. PARTNER-SPECIFIC DATASETS

ENEA

Knowledge & Data owned by Partner re-used for the project		
Data sets	*Origin/Patents/References*	*How existing data will be used*
SOC Interconnect behaviour in dual atmosphere	BALANCE project (H2020, Grant 731224), NELLHI project (FCH JU, Grant 621227)	All information on sample preparation, test conditions and characterization and post-test analysis will serve as reference for samples tested in AD ASTRA
SOC single cell behaviour over fuel electrode surface	NELLHI project (FCH JU, Grant 621227)	All information on sample preparation, test conditions and characterization and post-test analysis will serve as reference in case single cells will be tested for local gas composition and temperature distribution in AD ASTRA (TBD)
Cell process deconvolution and ECM	qSOFC project (FCH JU, Grant 735160)	All information on sample preparation, test conditions and characterization and post-test analysis will serve as reference for button cell samples tested in AD ASTRA for the identification of the Distribution of Relaxation Times (DRT) peaks and equivalent circuit modelling (ECM)

Knowledge produced and shared by partner during the project						Tools for access to knowledge created by the project			
Data set identifier	*Type (literature, experiments, analysis, modelling, etc.), format and expected size*	*Purpose and relation to project objectives*	*Metadata (Standards, references, Digital Object Identifiers)*	*Restrictions (Specify: patents, IP, voluntary reasons – else open!)*	*Key words*	*Data storage and accessibility means*	*Data publication channels (specify gold/green open access)*	*Other tools (reports, website)*	*Events (seminars, workshops, Conferences, fairs)*

SEM images	Commented images in pdf report, 100MB	Comparison of tested samples in accelerated conditions with field-operated samples	According to AD ASTRA Protocols (Deliverable 4.1) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Interconnects, cells, active layers	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP3 and WP4, References to publications on AD ASTRA website	Conferences, workshops
IV Curves	Commented curves in Excel, 1 MB	Comparison of cell performance and ASR in various conditions	According to AD ASTRA Protocols (Deliverable 2.2) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Button and Single Cells	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP3 and WP4, References to publications on AD ASTRA website	Conferences, workshops
EIS + DRT curves	Commented curves in ZPlot, Excel and pdf, 10 MB	Comparison of cell processes and polarization resistance in various conditions	According to AD ASTRA Protocols (Deliverable 2.2) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during, all cleared data published after the project	Button cells, half-cells and symmetrical cells	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP3 and WP4, References to publications on AD ASTRA website	Conferences, workshops

CEA

Knowledge & Data owned by Partner re-used for the project		
Data sets	*Origin/Patents/References*	*How existing data will be used*
Aged samples and 3D Ni-YSZ reconstructions	ENDURANCE project: European Union's Seventh Framework Programme (FP7/2007-2013) Fuel Cells and Hydrogen Joint Undertaking (FCH-JU-2013-1) under grant agreement n° 621173	The 3D reconstructions will be analysed to investigate the impact of Ni agglomeration and volatilisation on performances
Algorithms for µstructural computations	INSIGHT project: European Horizon 2020 – Research and Innovation Framework program (H2020-JTI-FCH-2015-1) under grant agreement n°735918.	The protocols and algorithms for µstructural computation will be used in AD ASTRA project.
SOC tested under high pressure	SOPHIA project: European Union's Seventh Framework Programme (FP7/2007-2013) Fuel Cells and Hydrogen Joint Undertaking (FCH-JU-2013-1) under grant agreement n° 621173	All information and expertise on cell preparation, experimental conditions and pressure management will serve as reference for cell testing in AD ASTRA.
Oxygen electrode modelling	ECO project: European Horizon 2020 – Research and Innovation Framework program (H2020-JTI-FCH-2015-1) under grant agreement n°699892	The O2 electrode model will be used as a reference to build the full elementary model in AS ASTRA.

Knowledge produced and shared by partner during the project						Tools for access to knowledge created by the project			
Data set identifier	*Type (literature, experiments, analysis, modelling, etc.), format and expected size*	*Purpose and relation to project objectives*	*Metadata (Standards, references, Digital Object Identifiers)*	*Restrictions (Specify: patents, IP, voluntary reasons – else open!)*	*Key words*	*Data storage and accessibility means*	*Data publication channels (specify gold/green open access)*	*Other tools (reports, website)*	*Events (seminars, workshops, Conferences, fairs)*

SEM image	Commented images	Comparison of tested samples in aggravated conditions compared to the standard conditions	According to AD ASTRA Protocols (Deliverable 4.1) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Electrodes	AD ASTRA Database	Green open access for published data	Deliverables in WP4, References to publications on AD ASTRA website	Conferences, workshops
Modelled and experimental EIS	Commented diagrams	Comparison of modelled and experimental EIS before/after ageing	According to AD ASTRA Protocols (Deliverable 2.2) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Electrodes	AD ASTRA Database	Green open access for published data	Deliverables in WP3 and WP5, References to publications on AD ASTRA website	Conferences, workshops
Modelled and experimental i-V curve	Commented polarisation curves	Comparison of modelled and experimental EIS before/after ageing	According to AD ASTRA Protocols (Deliverable 2.2) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Electrodes, cell	AD ASTRA Database	Green open access for published data (as much as possible)	Deliverables in WP3 and WP5, References to publications on AD ASTRA website	Conferences, workshops

Predictive model for density of micro cracks	Analysis and modelling report	Electrode mechanical damaging after mechanical loading (e.g. redox cycling)	According to AD ASTRA proposal in WP5	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Electrodes	AD ASTRA Database	Green open access for published data (as much as possible)	Deliverables in WP3 and WP5, References to publications on AD ASTRA website	Conferences, workshops

DTU

Knowledge & Data owned by Partner re-used for the project		
Data sets	*Origin/Patents/References*	*How existing data will be used*
Deconvolution of EIS on cell and stack level	A series of publications and project results (EU and national)	Application to cells/stack testing in this project to explain and understand short and long term behavior
Degradation phenomena evaluated using electrochemical and micro structural tools on cell/stack level, including potential means of accelerating them	A series of publications and project results (EU and national)	Application to cells/stack testing in this project to explain and understand short and long term behavior

Knowledge produced and shared by partner during the project						Tools for access to knowledge created by the project			
Data set identifier	Type (literature, experiments, analysis, modelling, etc.), format and expected size	Purpose and relation to project objectives	Metadata (Standards, references, Digital Object Identifiers)	Restrictions (Specify: patents, IP, voluntary reasons – else open!)	Key words	Data storage and accessibility means	Data publication channels (specify gold/green open access)	Other tools (reports, website)	Events (seminars, workshops, Conferences, fairs)
SEM images	Commented images in pdf report, 100MB	Comparison of tested samples in accelerated conditions with field-operated samples and/or lab tested samples	According to AD ASTRA Protocols (Deliverable 4.1) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Cells, active layers	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP3 and WP4, References to publications on AD ASTRA website	Conferences, workshops
IV Curves	Commented curves in Excel, 1 MB	Comparison of cell performance and ASR in various conditions	According to AD ASTRA Protocols (Deliverable 2.2) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Cells and stacks	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP3 and WP4, References to publications on AD ASTRA website	Conferences, workshops

EIS + DRT curves	Commented curves in ZPlot, Excel and pdf, 10 MB	Comparison of cell processes and polarization resistance in various conditions	According to AD ASTRA Protocols (Deliverable 2.2) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Cells, stacks	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP3 and WP4, References to publications on AD ASTRA website	Conferences, workshops

EIFER

Knowledge & Data owned by Partner re-used for the project		
Data sets	*Origin/Patents/References*	*How existing data will be used*
Algorithms for advanced control systems	SAPPHIRE project (FCH JU, Grant 325275)	The protocols and algorithms developed will be used in the AD ASTRA project
Prognostics methods	PROPICE project (ANR-12-PRGE-0001)	Prognostics and health management methods develop to assess the health state of a fuel cell system will be used in the AD ASTRA project
Long-term degradation phenomena	Project results and publications	The data will be used within AD ASTRA as reference for accelerated degradation and the development of the prognostics methods for SOFC/SOEC

Knowledge produced and shared by partner during the project	Tools for access to knowledge created by the project

Data set identifier	Type (literature, experiments, analysis, modelling, etc.), format and expected size	Purpose and relation to project objectives	Metadata (Standards, references, Digital Object Identifiers)	Restrictions (Specify: patents, IP, voluntary reasons – else open!)	Key words	Data storage and accessibility means	Data publication channels (specify gold/green open access)	Other tools (reports, website)	Events (seminars, workshops, Conferences, fairs)
V =f (t) I = f(t)	Commented diagrams	Comparison of model and experimental data	According to AD ASTRA protocols [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Cells and stack	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP5 and WP3, References to publications on AD ASTRA website	Conferences, workshops

EPFL

Knowledge & Data owned by Partner re-used for the project		
Data sets	Origin/Patents/References	How existing data will be used
SOFC interconnect behaviour in oxidizing atmosphere and in stacks	SCoReD 2:0 project (H2020, Grant 325331)	All information on sample preparation, test conditions and characterization and post-test analysis will serve as reference for samples tested in AD ASTRA.

	Knowledge produced and shared by partner during the project					Tools for access to knowledge created by the project			
Data set identifier	Type (literature, experiments, analysis, modelling, etc.), format and expected size	Purpose and relation to project objectives	Metadata (Standards, references, Digital Object Identifiers)	Restrictions (Specify: patents, IP, voluntary reasons – else open!)	Key words	Data storage and accessibility means	Data publication channels (specify gold/green open access)	Other tools (reports, website)	Events (seminars, workshops, Conferences, fairs)
SEM+FIB images	Commented images in pdf report, 100MB	Comparison of tested samples in accelerated conditions with field-operated samples. Understanding of degradation phenomena at nanolevel (FIB). Modelling of cell microstructure evolution.	According to AD ASTRA Protocols (Deliverable 4.1) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Interconnects, cells, active layers	AD ASTRA Database on ENEA server (3TB total space)	Gold open access for published data	Deliverables in WP3 and WP4, References to publications on AD ASTRA website	Conferences, workshops
IV curves	Commented curves in Excel, 1 MB	Comparison of cell performance	According to AD ASTRA Protocols (Deliverable 2.2	Confidential within the Consortium,	Single Cells and Stacks	AD ASTRA Database on ENEA	Gold open access for published	Deliverables in WP3 and WP4,	Conferences, workshops

		and ASR in various conditions. Validation of the modelling of cell microstructure evolution	Deliverable 3.2) [DATABASE NOMENCLATURE]	selected data published during the project, all cleared data published after the project		server (3TB total space)	data	References to publications on AD ASTRA website	
EIS + DRT curves	Commented curves in Excel, 1 MB	Comparison of cell performance and ASR in various conditions. Validation of the modelling of cell microstructure evolution	According to AD ASTRA Protocols (Deliverable 2.2 Deliverable 3.2) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Single Cells and Stacks	AD ASTRA Database on ENEA server (3TB total space)	Gold open access for published data	Deliverables in WP3 and WP4, References to publications on AD ASTRA website	Conferences, workshops
ASR curves	Commented curves and images in pdf report, 100 MB	Comparison of interconnects tested in accelerated conditions with samples operated in nominal conditions	According to AD ASTRA Protocols (Deliverable 2.2 Deliverable 3.2) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Interconnects	AD ASTRA Database on ENEA server (3TB total space)	Gold open access for published data	Deliverables in WP3 and WP4, References to publications on AD ASTRA website	Conferences, workshops

IEES

Knowledge & Data owned by Partner re-used for the project		
Data sets	*Origin/Patents/References*	*How existing data will be used*
I/V curves and DRA on SOFC	ENDURANCE: FCH JU2 Project (GA 621207) / Recommendation for Measurements of Volt-Ampere Characteristics of Fuel Cells for Diagnostic Purposes/ http://www.durablepower.eu/images/downloads/hoe/03_01_09.pdf	All information on test procedures and conditions and DRA will serve as reference for button cells (SOC) tested in AD ASTRA (pristine and with preliminary aged components)
EIS + gas permeability of anode sample	ENDURANCE:FCH JU2 Project (GA 621207)	All information on test conditions, characterization and post-test analysis will serve as reference for testing of anode micro-samples sintered at different temperatures (artificial aging) in AD ASTRA

Knowledge produced and shared by partner during the project						Tools for access to knowledge created by the project			
Data set identifier	*Type (literature, experiments, analysis, modelling, etc.), format and expected size*	*Purpose and relation to project objectives*	*Metadata (Standards, references, Digital Object Identifiers)*	*Restrictions (Specify: patents, IP, voluntary reasons – else open!)*	*Key words*	*Data storage and accessibility means*	*Data publication channels (specify gold/green open access)*	*Other tools (reports, website)*	*Events (seminars, workshops, Conferences, fairs)*
I/V Curves	Experimental data in ASCII code and Origin graphics, 1 MB	Comparison of cell performance in various conditions and data base for DRA	According to AD ASTRA Protocols (Deliverables 2.2 and 2.3)	Confidential within the Consortium, selected data published during the project's	Button cells; I/V curves	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP2 and WP3, References to publications on AD	Conferences, workshops

		performance		implementation and after its termination				ASTRA website	
DRA	Analyzed data from I/V curves; calculated data in ASCII code and Origin graphics of the DRA dependencies (Differential Resistance (R_d)/current (I) and the corresponding spectral presentation), 5 MB	Calculation of $R_{d,min}$ as performance indicator; introduction of criterion for state of health evaluation	According to AD ASTRA Protocols (Deliverable 2.2 and 2.3) and planned experiments (Deliverable 3.3).	Confidential within the Consortium, selected data published during the project's implementation and after its termination .	Differential Resistance, Button cells, cells, stacks ,	AD ASTRA Database on ENEA server (3TB total space)	Gold open access for published data	Deliverables in WP3 and WP4, References to publications on AD ASTRA website	Conferences, workshops
EIS	Experimental data in ASCII code and Origin graphics, 1 MB	Testing of single anodes sintered at different temperatures for evaluation of this approach for artificial aging. Comparison of cells behaviour in	According to AD ASTRA Protocols (Deliverables 2.2 and 2.3, 3.3)	Confidential within the Consortium, selected data published during the project's implementation and after its termination	EIS, anodes, button cells	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP2 and WP3, References to publications on AD ASTRA website	Conferences, workshops

		various conditions							

SolidPower

Knowledge & Data owned by Partner re-used for the project		
Data sets	*Origin/Patents/References*	*How existing data will be used*
Implementation of a new coating on short stacks	SCoReD 2:0 project (H2020, Grant 325331)	Internal protocols for single cells and stack testing will be used. Published information on stack materials will be used.
New material integration on stacks	ENDURANCE project: European Union's Seventh Framework Programme (FP7/2007-2013) Fuel Cells and Hydrogen Joint Undertaking (FCH-JU-2013-1) under grant agreement n° 621173	Internal protocols for single cells and stack testing will be used. Published information on stack materials will be used.
Improved stack materials for SOE and Co-SOE operation	SOPHIA project: European Union's Seventh Framework Programme (FP7/2007-2013) Fuel Cells and Hydrogen Joint Undertaking (FCH-JU-2013-1) under grant agreement n° 621173	Internal protocols for single cells and stack testing will be used. Published information on stack materials will be used.

Knowledge produced and shared by partner during the project						Tools for access to knowledge created by the project			
Data set identifier	*Type (literature, experiments, analysis, modelling, etc.),*	*Purpose and relation to project objectives*	*Metadata (Standards, references, Digital*	*Restrictions (Specify: patents, IP, voluntary*	*Key words*	*Data storage and accessibility*	*Data publication channels (specify*	*Other tools (reports, website)*	*Events (seminars, workshops, Conferences,*

	format and expected size		Object Identifiers)	reasons – else open!)		means	gold/green open access)		fairs)
Samples from cells, interconnectors and stacks	Text (200kB)	Aged and new samples delivered to the project partner	According to AD ASTRA protocols (deliverable D2.1)	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Interconnects, cells and stack	AD ASTRA Database on ENEA server (3TB total space)	Gold open access for published data	Deliverables in WP3 and WP4, References to publications on AD ASTRA website	Conferences, workshops
IV Curves	Commented curves in Excel, 20 MB	Comparison of cell performance and ASR in various conditions.	According to AD ASTRA protocols (deliverable D2.1-D6.2)	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Interconnects, cells and stack	AD ASTRA Database on ENEA server (3TB total space)	Gold open access for published data	Deliverables in WP3 and WP4, References to publications on AD ASTRA website	Conferences, workshops
EIS curves	Commented curves in Excel, 20 MB	Comparison of cell performance in various conditions.	According to AD ASTRA protocols (deliverable D2.1-D6.2)	Confidential within the Consortium, selected data published during the project, all	Interconnects, cells and stack	AD ASTRA Database on ENEA server (3TB total space)	Gold open access for published data	Deliverables in WP3 and WP4, References to publications on AD	Conferences, workshops

				cleared data published after the project				ASTRA website	

University of Genoa

Knowledge & Data owned by Partner re-used for the project		
Data sets	*Origin/Patents/References*	*How existing data will be used*

Knowledge produced and shared by partner during the project						Tools for access to knowledge created by the project			
Data set identifier	*Type (literature, experiments, analysis, modelling, etc.), format and expected size*	*Purpose and relation to project objectives*	*Metadata (Standards, references, Digital Object Identifiers)*	*Restrictions (Specify: patents, IP, voluntary reasons – else open!)*	*Key words*	*Data storage and accessibility means*	*Data publication channels (specify gold/green open access)*	*Other tools (reports, website)*	*Events (seminars, workshops, Conferences, fairs)*
Theoretical and empirical correlations	Modelling, commented equations in pdf report, 1 MB	Interpretation of phenomena occurring in SOFC and SOEC	According to AD ASTRA Protocols (Deliverables in WP5) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data	Cell and stack	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP5, References to publications on AD ASTRA website	Conferences, workshops

				published after the project					
Simulated IV curves	Modelling, commented curves in Excel, 1 MB	Comparison with SOFC and SOEC experimental data for model validation and performance prediction	According to AD ASTRA Protocols (Deliverable 5.3) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Cell and stack	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP5, References to publications on AD ASTRA website	Conferences, workshops
Lifetime performance	Modelling, commented curves in Excel, 1 MB	Comparison with SOFC and SOEC experimental data for model validation and performance prediction	According to AD ASTRA Protocols (Deliverable 5.3) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Cell and stack	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP5, References to publications on AD ASTRA website	Conferences, workshops
Simulated 3D distribution of chemical-physical properties	Modelling, commented graphics in Excel, 1 MB	Comparison with SOFC and SOEC experimental data for model validation	According to AD ASTRA Protocols (Deliverable 5.3) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all	Cell and stack	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP5, References to publications on AD ASTRA	Conferences, workshops

		and performance prediction		cleared data published after the project				website	

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Knowledge & Data owned by Partner re-used for the project		
Data sets	**Origin/Patents/References**	**How existing data will be used**
SOFC stack and system model	DIAMOND project: Diagnosis-aided control for SOFC power systems, FCHJU FP7 G.A. 621208	The model will be used to develop SOC stack lumped model within WP5.
Multiscale approach and degradation modelling	PUMA MIND project: Physical bottom Up Multiscale Modelling for Automotive PEMFC Innovative performance and Durability optimisation, FCHJU FP7 G.A. 303419	The approach will be used to develop degradation models and implement a simplified version within the SOC lumped model in WP5.

Knowledge produced and shared by partner during the project						Tools for access to knowledge created by the project			
Data set identifier	*Type (literature, experiments, analysis, modelling, etc.), format and expected size*	*Purpose and relation to project objectives*	*Metadata (Standards, references, Digital Object Identifiers)*	*Restrictions (Specify: patents, IP, voluntary reasons – else open!)*	*Key words*	*Data storage and accessibility means*	*Data publication channels (specify gold/green open access)*	*Other tools (reports, website)*	*Events (seminars, workshops, Conferences, fairs)*

Stochastic and statistical models	Modelling, mathematical relationships and/or commented curves in pdf report, 1 MB	Development of degradation stochastic models from measured data for lifetime and reliability estimation of SOFC/SOEC units	According to AD ASTRA Protocols (Deliverable 5.4) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Cell and stack	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP5, References to publications on AD ASTRA website	Conferences, workshops
DoE for accelerated tests	Modelling, mathematical relationships and/or commented curves in pdf report, 1 MB	Support of the definition of DoE for accelerated tests	According to AD ASTRA Protocols (Deliverables 2.2, 2.3 and 2.4) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Cell and stack	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP2, References to publications on AD ASTRA website	Conferences, workshops
Generation of regression transfer functions	Modelling, mathematical relationships and/or commented curves in pdf report, 1 MB	Support to the selection of suitable life-stress relationships for measured data	According to AD ASTRA Protocols (Deliverable 5.6) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published	Cell and stack	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP5, References to publications on AD ASTRA website	Conferences, workshops

				after the project					
Stack Lumped Model	Modelling (MATLAB/Simulink), <1 MB	Support to design of performance model for durability estimation and AST transfer function definitions	According to AD ASTRA Protocols (Deliverables in WP5) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Cell and Stack	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP5, References to publications on AD ASTRA website.	Conferences, workshops
Degradation grey-box models	Modelling (MATLAB/Simulink), <1 MB	Support to mathematical reduction of complex degradation models and implementation in stack lumped model	According to AD ASTRA Protocols (Deliverables in WP5) [DATABASE NOMENCLATURE]	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Cell, Stack and System	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP5, References to publications on AD ASTRA website.	Conferences, workshops

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Knowledge & Data owned by Partner re-used for the project

Data sets	Origin/Patents/References	How existing data will be used

Knowledge produced and shared by partner during the project						Tools for access to knowledge created by the project			
Data set identifier	Type (literature, experiments, analysis, modelling, etc.), format and expected size	Purpose and relation to project objectives	Metadata (Standards, references, Digital Object Identifiers)	Restrictions (Specify: patents, IP, voluntary reasons – else open!)	Key words	Data storage and accessibility means	Data publication channels (specify gold/green open access)	Other tools (reports, website)	Events (seminars, workshops, Conferences, fairs)
IV Curves	Commented curves in Excel, 1 MB	Comparison of cell performance and ASR in various conditions	According to AD ASTRA Protocols (Deliverable 2.2)	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Stack test	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP3 and WP4, References to publications on AD ASTRA website	Conferences, workshops
Vt Curves	Commented curves in Excel, 10 MB	Comparison of cell performance and ASR in various conditions	According to AD ASTRA Protocols (Deliverable 2.2)	Confidential within the Consortium, selected data published during the	Stack test	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP3 and WP4, References to publications	Conferences, workshops

				project, all cleared data published after the project				on AD ASTRA website	
selected details of samples (cells, interconnect, stack)	Plain text (100kB)	Delivery of virgin and "old" cells, interconnect, stacks to AdAstra partners	According to AD ASTRA Protocols (Deliverable 2.2)	Confidential within the Consortium, selected data published during the project, all cleared data published after the project	Cells, Interconnects, Stacks	AD ASTRA Database on ENEA server (3TB total space)	Green open access for published data	Deliverables in WP3 and WP4, References to publications on AD ASTRA website	Conferences, workshops