# FWO DMP Template - Flemish Standard Data Management Plan

# Version KU Leuven

Project supervisors (from application round 2018 onwards) and fellows (from application round 2020 onwards) will, upon being awarded their project or fellowship, be invited to develop their answers to the data management related questions into a DMP. The FWO expects a **completed DMP no later than 6 months after the official start date** of the project or fellowship. The DMP should not be submitted to FWO but to the research co-ordination office of the host institute; FWO may request the DMP in a random check.

At the end of the project, the **final version of the DMP** has to be added to the final report of the project; this should be submitted to FWO by the supervisor-spokesperson through FWO’s e-portal. This DMP may of course have been updated since its first version. The DMP is an element in the final evaluation of the project by the relevant expert panel. Both the DMP submitted within the first 6 months after the start date and the final DMP may use this template.

The DMP template used by the Research Foundation Flanders (FWO) corresponds with the Flemish Standard Data Management Plan. This Flemish Standard DMP was developed by the Flemish Research Data Network (FRDN) Task Force DMP which comprises representatives of all Flemish funders and research institutions. This is a standardized DMP template based on the previous FWO template that contains the core requirements for data management planning. To increase understanding and facilitate completion of the DMP, a standardized **glossary** of definitions and abbreviations is available via the following [link](https://www.fwo.be/media/1024841/glossary-flemish-standard-data-management-plan.pdf).

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| 1. **General Project Information** | |
| Name Grant Holder & ORCID | Zouhir Bouchaar **(https://orcid.org/0000-0002-6587-7204)** |
| Contributor name(s) (+ ORCID) & roles |  |
| Project number & title | Thermochemical processing of complex multi-phase and non-recyclable waste streams  (**1SHGJ24N)** |
| Funder(s) GrantID | FWO (**1SHGJ24N**) |
| Affiliation(s) | KU Leuven  ROR identifier KU Leuven: 05f950310 |
| Please provide a short project description | Among many plant operators and engineers within the waste-to-energy industry, critical corrosion problems have been observed causing plants to shutdown unexpectedly at the expense of consistent throughput and energy recovery.  The project therefore focuses on thermochemical processing of municipal solid waste during incineration on industrial grate furnaces. Focusing on chlorine and sulphur release during combustion, the project aims to find effective measures to control the release of these compounds with physical process variables.  In this project, the release of chlorine and sulphur gasses is studied by investigating incineration by means of multi-scale computer modelling with computational fluid dynamics software and experimental validation.  The outcome of this research will consist of a sophisticated protocol to diminish the release of chlorinated and sulphuric compounds while maximizing energy outputs. Additionally, the purpose of this project is to publish three journal papers and a manuscript as partial requirement for a PhD degree. |

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| 1. **Research Data Summary** | |
| List and describe all datasets or research materials that you plan to generate/collect or reuse during your research project. For each dataset or data type (observational, experimental etc.), provide a short name & description (sufficient for yourself to know what data it is about), indicate whether the data are newly generated/collected or reused, digital or physical, also indicate the type of the data (the kind of content), its technical format (file extension), and an estimate of the upper limit of the volume of the data.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | |  | | | | *Only for digital data* | *Only for digital data* | *Only for digital data* | *Only for physical data* | | Dataset Name | Description | New or Reused | Digital or Physical | Digital Data Type | Digital Data Format | Digital Data Volume (MB, GB, TB) | Physical Volume | | ANSYS Fluent models | Input and outputs from models  Reuse of results which have been created within research group | Generate new data  Reuse existing data | Digital  Physical | Audiovisual  Images  Sound  Numerical  Textual  Model  Software  Other: | .cas  .dat  .c source | < 1 GB  < 100 GB  < 1 TB  < 5 TB  > 5 TB  NA |  | | XRF data files | XRF analysis of samples about composition | Generate new data  Reuse existing data | Digital  Physical | Audiovisual  Images  Sound  Numerical  Textual  Model  Software  Other: | .csv  Excel | < 1 GB  < 100 GB  < 1 TB  < 5 TB  > 5 TB  NA |  | | EPMA/SEMEDS  data | SEM-EDS or EPMA-EDS  measurements of samples | Generate new data  Reuse existing data | Digital  Physical | Audiovisual  Images  Sound  Numerical  Textual  Model  Software  Other: | .tif  .jpeg  .bmp  .txt | < 1 GB  < 100 GB  < 1 TB  < 5 TB  > 5 TB  NA |  | | XRD results | XRD analysis of samples | Generate new data  Reuse existing data | Digital  Physical | Audiovisual  Images  Sound  Numerical  Textual  Model  Software  Other: | XRDML  (raw  format)  .csv  Excel | < 1 GB  < 100 GB  < 1 TB  < 5 TB  > 5 TB  NA |  | | ICP-OES  and AAS  results | consist of ICP-OES and AAS  measurements (calibration  curve and samples) | Generate new data  Reuse existing data | Digital  Physical | Audiovisual  Images  Sound  Numerical  Textual  Model  Software  Other: | pdf  .csv  Excel | < 1 GB  < 100 GB  < 1 TB  < 5 TB  > 5 TB  NA |  | | Reports and  notes | reporting of experimental results  and literature study | Generate new data  Reuse existing data | Digital  Physical | Audiovisual  Images  Sound  Numerical  Textual  Model  Software  Other: | Word  pdf  PowerPoint  .csv  Excel | < 1 GB  < 100 GB  < 1 TB  < 5 TB  > 5 TB  NA |  | | Physical  samples | collected and sorted samples to  be combusted  combustion ashes  samples in preparation for  analytical techniques | Generate new data  Reuse existing data | Digital  Physical | Audiovisual  Images  Sound  Numerical  Textual  Model  Software  Other: Ashes and samples |  | < 1 GB  < 100 GB  < 1 TB  < 5 TB  > 5 TB  NA | 100 kg | | |
| *Guidance:*  *The data description forms the basis of your entire DMP, so make sure it is detailed and complete. It includes digital and physical data and encompasses the whole spectrum ranging from raw data to processed and analysed data including analysis scripts and code. Physical data are all materials that need proper management because they are valuable, difficult to replace and/or ethical issues are associated.* *Materials that are not considered data in an RDM context include your own manuscripts, theses and presentations; documentation is an integral part of your datasets and should described under documentation/metadata.*  [*RDM Guidance on data*](https://www.kuleuven.be/rdm/en/guidance/data-standards) | |
| If you reuse existing data, please specify the source, preferably by using a persistent identifier (e.g. DOI, Handle, URL etc.) per dataset or data type. | An existing model for packed bed combustion within our research group will be used as starting point or reference. These are stored on the internal J-drive that are only accesible by our research group in the following pathway: *J:\SET-GroepT-Units-DI0350\ChEMaRTS-0005* |
| Are there any ethical issues concerning the creation and/or use of the data  (e.g. experiments on humans or animals, dual use)? If so, refer to specific datasets or data types when appropriate and provide the relevant ethical approval number. | Yes, human subject data; provide SMEC or EC approval number:  Yes, animal data; provide ECD reference number:  Yes, dual use; provide approval number:  No  Additional information: |
| Will you process personaldata? If so, please refer to specific datasets or data types when appropriate and provide the KU Leuven or UZ Leuven privacy register number (G or S number). | Yes (provide PRET G-number or EC S-number below)  No  Additional information: |
| Does your work have potential for commercial valorization (e.g. tech transfer, for example spin-offs, commercial exploitation, …)?  If so, please comment per dataset or data type where appropriate. | Yes  No  If yes, please comment:  The valorisation of this project lies in a combustion protocol, and, if such an  opportunity presents itself, this will be discussed with the (co)promotors involved in the  project. The conclusions of that discussion will be included to this data management  plan. |
| Do existing 3rd party agreements restrict exploitation or dissemination of the data you (re)use (e.g. Material/Data transfer agreements, research collaboration agreements)?  If so, please explain to what data they relate and what restrictions are in place. | Yes  No  If yes, please explain: |
| Are there any other legal issues, such as intellectual property rights and ownership, to be managed related to the data you (re)use?  If so, please explain to what data they relate and which restrictions will be asserted. | Yes  No  If yes, please explain: |

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| 1. **Documentation and Metadata** | |
| Clearly describe what approach will be followed to capture the accompanying information necessary to keep **data understandable and usable**, for yourself and others, now and in the future (e.g. in terms of documentation levels and types required, procedures used, Electronic Lab Notebooks, README.txt files, Codebook.tsv etc. where this information is recorded).  [*RDM guidance on documentation and metadata*](https://www.kuleuven.be/rdm/en/guidance/documentation-metadata)*.* | 1. ANSYS Fluent model will be saved along with a script (C source) in the same folder in which explanatory comments are included. Additional calculations (with relevant input data) will be made in Excel and saved in the corresponding folder. 2. XRF data files will be saved with date and sample type. An overview Excel will be set-up with relevant data, on which further reporting can be done. 3. EPMA/SEM-EDS data will be saved in folders with date of measurement, and subfolders with the sample type. Here, a text file is included of the element analysis, jpg files of the images and color mappings, and bmp files of the settings (magnification factor, applied voltage, scaling bar etc.). The semi-quantitative results will be further processed in an overview Excel file. 4. XRD data will be gathered and saved in folders according to the sample ID. This sample ID will be shown in an overview Excel file for all the experimental runs, together with the operating conditions and date. 5. ICP-OES and AAS data will be saved in folders according to date of the measurements. An overview Excel file will be set-up with the processed results. 6. For the experimental results a logbook will be kept, where the date and operating conditions are mentioned. The Excel files will be saved according to this date and the operating conditions. In addition, data will be stored in a folder per experimental setup, the operating conditions and the corresponding date. A ReadMe file describing the goal of the experiment and the analysis procedure will be stored in the folder where the data is saved. 7. Reports and notes: regular reports will be generated using Microsoft Word/LaTeX. PowerPoint for presentations for internal meeting with the (co)promotors and researcher involved in the project. In these documents, the file names of the raw data files will be included. |
| Will a metadata standard be used to make it easier to **find and reuse the data**?  If so, please specify which metadata standard will be used. If not, please specify which metadata will be created to make the data easier to find and reuse.  *Repositories could ask to deliver metadata in a certain format, with specified ontologies and vocabularies, i.e. standard lists with unique identifiers.* | Yes  No  If yes, please specify (where appropriate per dataset or data type) which metadata standard will be used:  If no, please specify (where appropriate per dataset or data type) which metadata will be created:  In the relevant research field, there is no formal metadata standard. However, the  standardized steps described in previous section will ensure that the data is easy to  find. This working method obviates the need for a separate INFO.txt file in each  directory to ensure that the data can be understood by the research unit and can be  reused in the future. |

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| 1. **Data Storage & Back-up during the Research Project** | |
| Where will the data be stored?  *Consult the*[*interactive KU Leuven storage guide*](https://icts.kuleuven.be/storagewijzer/en)*to find the most suitable storage solution for your data.* | Shared network drive (J-drive)  Personal network drive (I-drive)  OneDrive (KU Leuven)  Sharepoint online  Sharepoint on-premis  Large Volume Storage  Digital Vault  Other: |
| How will the data be backed up?  *What storage and backup procedures will be in place to prevent data loss?* | Standard back-up provided by KU Leuven ICTS for my storage solution  Personal back-ups I make (specify)  Other (specify) |
| Is there currently sufficient storage & backup capacity during the project? If yes, specify concisely. If no or insufficient storage or backup capacities are available, then explain how this will be taken care of. | Yes  No  Storage capacity is resp. 50 GB and 0.99 TB at personal and shared network drive of  KU Leuven which is automatically backed-up. The network drives can also be  accessed at drives.kuleuven.be. KU Leuven has concluded an agreement with the  online cloud storage provider Box. Here, an additional capacity of 100 GB can be  stored with a maximum file size of 15 GB, and, when necessary, storage capacity can  be extended to 400 GB. Moreover, standard every KU Leuven user has 2 TB with a  maximum file size of 100 GB on OneDrive for Business, and an option to extend the  capacity to 5 TB without costs.  The VSC servers also provide dedicated servers for data storage in different drives: VSC\_DATA and VSC\_SCRATCH. The former allows storage up to 100 GB for permanent storage but does not provide sufficient I/O performance, whereas the VSC\_SCRATCH directory guarantees better performance at the expense of storage duration (4 weeks) at increased storage all the way to 500 GB.  If no, please specify: |
| How will you ensure that the data are securely stored and not accessed or modified by unauthorized persons?  *clearly describe the measures (in terms of physical security, network security, and security of computer systems and files) that will be taken to ensure that stored and transferred data are safe.*  [*Guidance on security for research data*](https://icts.kuleuven.be/storagewijzer/en) | Only the (co)promotors and involved researchers (e.g. thesis students) have access to  the shared folders where the data, analysis files and reports will be stored on  OneDrive for Business. Additionally, the two factor authentication of KU Leuven provides secure storage against unauthorized persons. |
| What are the expected costs for data storage and backup during the research project? How will these costs be covered? | The amount of data that will be generated in this project should not exceed a few hundred of GBs, which can be stored (with automatic back-up) on the current  university's central servers without extra cost. |

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| **5. Data Preservation after the end of the Research Project** | |
| Which data will be retained for at least five years (or longer, in agreement with other retention policies that are applicable) after the end of the project? In case some data cannot be preserved, clearly state the reasons for this  (e.g. legal or contractual restrictions, storage/budget issues, institutional policies...).  [*Guidance on data preservation*](https://icts.kuleuven.be/storagewijzer/en) | All data will be preserved for 10 years according to KU Leuven RDM policy  All data will be preserved for 25 years according to CTC recommendations for clinical trials with medicinal products for human use and for clinical experiments on humans  Certain data cannot be kept for 10 years (explain) |
| Where will these data be archived (stored and curated for the long-term)?  [*Dedicated data repositories*](https://www.kuleuven.be/rdm/en/policy)*are often the best place to preserve your data. Data not suitable for preservation in a repository can be stored using a KU Leuven storage solution, consult the*[*interactive KU Leuven storage guide*](https://www.kuleuven.be/rdm/en/guidance/data-sharing)*.* | KU Leuven RDR  Large Volume Storage (longterm for large volumes)  Shared network drive (J-drive)  Other (specifiy): |
| What are the expected costs for data preservation during the expected retention period? How will these costs be covered? | The amount of data that will be generated in this project should not exceed a few hundred of GBs, which can be stored (with automatic back-up) on the current  university's central servers without extra cost. |

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| **6. Data Sharing and Reuse** | |
| Will the data (or part of the data) be made available for reuse after/during the project?  Please explain per dataset or data type which data will be made available.  *Note that ‘available’ does not necessarily mean that the data set becomes openly available, conditions for access and use may apply. Availability in this question thus entails both open & restricted access. For more information:* [*https://wiki.surfnet.nl/display/standards/info-eu-repo/#infoeurepo-AccessRights*](https://wiki.surfnet.nl/display/standards/info-eu-repo/#infoeurepo-AccessRights) | Yes, as open data  Yes, as embargoed data (temporary restriction)  Yes, as restricted data (upon approval, or institutional access only)  No (closed access)  Other, please specify:  All data can be made available on an Open Access repository, for example when  requested by the editor or publisher of a scientific journal or via restricted access upon  request of an individual (e.g. a researcher who intends to reproduce an experiment). |
| If access is restricted, please specify who will be able to access the data and under what conditions. |  |
| Are there any factors that restrict or prevent the sharing of (some of) the data (e.g. as defined in an agreement with a 3rd party, legal restrictions)? Please explain per dataset or data type where appropriate. | Yes, privacy aspects  Yes, intellectual property rights  Yes, ethical aspects  Yes, aspects of dual use  Yes, other  No  If yes, please specify: |
| Where will the data be made available?  If already known, please provide a repository per dataset or data type. | KU Leuven RDR  Other data repository (specify)  Other (specify) |
| When will the data be made available? | Upon publication of research results  Specific date (specify)  Other (specify) |
| Which data usage licenses are you going to provide? If none, please explain why.  *A data usage license indicates whether the data can be reused or not and under what conditions. If no licence is granted, the data are in a grey zone and cannot be legally reused. Do note that you may only release data under a licence chosen by yourself if it does not already fall under another licence that might prohibit that.*  *Check the*[*RDR guidance on licences*](https://www.kuleuven.be/rdm/en/rdr/licenses)*for data and software sources code or consult the*[*License selector tool*](https://ufal.github.io/public-license-selector/)*to help you choose.* | CC-BY 4.0 (data)  Data Transfer Agreement (restricted data)  MIT licence (code)  GNU GPL-3.0 (code)  Other (specify) |
| Do you intend to add a PID/DOI/accession number to your dataset(s)? If already available, please provide it here.  *Indicate whether you intend to add a persistent and unique identifier in order to identify and retrieve the data.* | Yes, a PID will be added upon deposit in a data repository  My dataset already has a PID  No |
| What are the expected costs for data sharing? How will these costs be covered? | Freeware such as WeTransfer can be used to transfer and share the files. |

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| **7. Responsibilities** | |
| Who will manage data documentation and metadata during the research project? | The PI and promotor of the project. |
| Who will manage data storage and backup during the research project? | The PI and promotor of the project, together with the IT service that is responsible for  the implementation of the storage and regular back up on the shared drivers. |
| Who will manage data preservation and sharing? | The PI and promotor of the project. |
| Who will update and implement this DMP? | The PI bears the end responsibility of updating & implementing this DMP (day-to-day  management), while the promotor will be responsible for overall data management. |