CO_2 Human Emissions

Dissemination and Exploitation Plan

Daniel Thiemert

che-project.eu

Co-ordinated by ECMWF

D7.3 Dissemination and Exploitation Plan

Dissemination Level:	Public
Author(s):	Daniel Thiemert (ECMWF)
Date:	28/12/2017
Version:	1.0
Contractual Delivery Date:	31/12/2017
Work Package/ Task:	WP7/ T7.4
Document Owner:	ECMWF
Contributors:	All Partners
Status:	Final

CHE: CO2 Human Emissions Project

Coordination and Support Action (CSA)
H2020-EO-3-2017 Preparation for a European capacity to monitor CO2 anthropogenic emissions

Project Coordinator: Dr Gianpaolo Balsamo (ECMWF)
Project Start Date: 01/10/2017
Project Duration: 39 months

Published by the CHE Consortium

Contact:
ECMWF, Shinfield Park, Reading, RG2 9AX,
gianpaolo.balsamo@ecmwf.int

The CHE project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776186.

Table of Contents

1 Executive Summary 5
2 Introduction 6
2.1 Background 6
2.2 Scope of this deliverable 7
2.2.1 Objectives of this deliverables 7
2.2.2 Work performed in this deliverable 7
2.2.3 Deviations and counter measures 7
3 Dissemination Plan 7
3.1 Dissemination Instruments 8
3.1.1 CHE Website 8
3.1.2 CHE Workshops 9
3.1.3 Journals, Conferences and Workshops 9
3.1.4 Scientific Committees 10
3.1.5 SRA/ Policy Briefs/ Newsletters 10
3.1.6 Other Instruments 11
3.2 Dissemination Milestones 11
4 Exploitation Plan 12
4.1 Exploitation Targets 12
4.2 Exploitation Activities and Routes 12
5 Conclusion 14

Figures

Figure 1: CHE Project Website 9
Figure 2: Dissemination Milestones 11

Tables

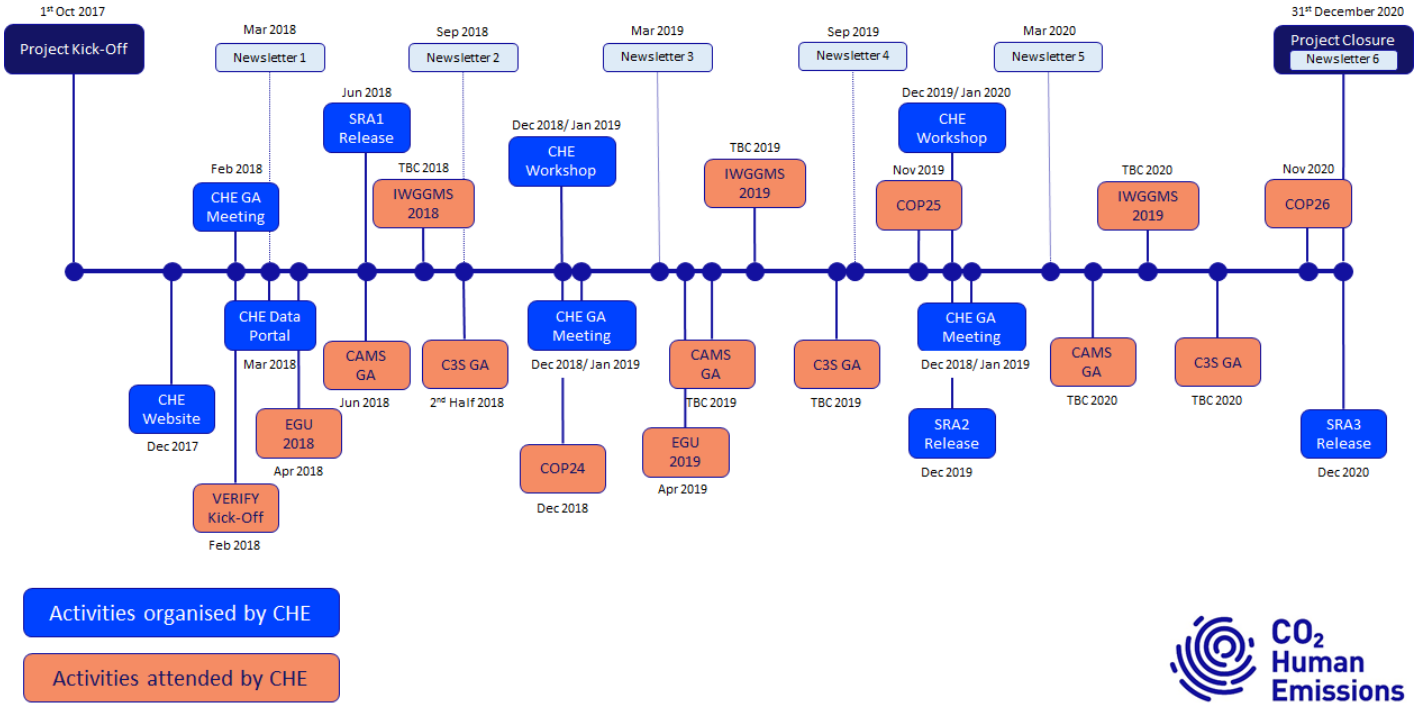
Table 1: Dissemination Targets 8
Table 2: Summary of Exploitation Findings 13

1 Executive Summary

Dissemination and exploitation activities present a crucial element in the success of the CHE project, as they ensure that results are taken up by the wider community and are sustainable beyond the initial funding period, thus providing value for money.

D7.3 provides the starting point for both dissemination and exploitation in the project.

The dissemination plan identifies instruments and targets. These include activities organised by CHE (including workshops, website, newsletters, etc.) as well as important events attended by CHE (workshops, conferences, fairs, etc.), and an overview is given in the figure below:



The present deliverable also provides the potential exploitation avenues in terms of products as well as respective exploitation activities during and after the end of the project, thus fulfilling the requirements of the DoA.

An overview of the exploitation aspects is given in the table below:

Exploitable Products	• A high-resolution inverse modelling framework using state-of-the art input • Emission and emission uncertainty gridmaps • XCO_2 retrieved from OCO-2 satellite mission • Methods to exploit Sentinel Carbon • Model outputs for designing observation system simulation experiments • Recommendations for the construction of a future prototype including roadmap to implementation and cost assessment of the service elements of a future CO_2 anthropogenic emission monitoring system. • Space-borne CO_2 monitoring instrument/mission concepts needed to fill the gap in terms of revisit time and observational performance and considering current CO_2 operational missions and those in development • A proposal of space based infrastructure for future Carbon Human Emission monitoring

Exploitation Activities during the Project	• Incorporating results into existing modelling framework. • Scientific papers • Review state-of-the art • Competitive/ benchmark analysis • Contribution to IG3IS implementation plan, which outlines observation and modelling requirements for top-down emission estimation and how such a system could be implemented, due in 2018 • To make, as soon as possible, proposal for low cost system of measurements fitting requirements and agenda of next generation of space based instrument for Carbon Human Emission measurements
Exploitation Activities after the end of the Project	• Expand the approach developed in CHE to a broader geographic area post-CHE, and upscale it so it's able to handle the masses of data that will become available. • Use of the OCO-2 data product by CHE inverse modellers • Scientific papers • Develop the regional CO_2 modelling system into a quasi-operational system supporting the operation of a Swiss CO_2 observing system with low-cost CO_2 sensors, high-precision instruments and possibly remote sensing. • Productisation/operationalisation, further developments, integration into other services • To develop low cost system of Carbon Human Emission measurements
Consortium-wide/Joint Exploitation	• Suite of modelling systems able to sensibly address the problem, potentially able to contribute to an ensemble estimation approach. • Develop a strategy to operationalise functional parts of the modelling system described above • Longer-term goal would be operationalisation for Copernicus Climate Change Service (C3S) • Definition of a global CO_2 monitoring system of systems • End to End system of Carbon Human Emission measurements

Both dissemination and exploitation plans are to be considered living documents as new avenues might become important to the project over its lifetime. Thus both will be updated regularly as the need arises.

A final Dissemination and Exploitation Report with detailed descriptions of dissemination activities, exploitable results and related activities will be produced towards the end of the project.

2 Introduction

2.1 Background

CHE, as a Coordination and Support Action, is bringing together European expertise and a consolidated approach to building an operational CO_2 emission monitoring capacity. CHE partners are at the forefront of developments in the compilation of emission inventories, the observation of the carbon cycle from ground-based and satellite measurements, the process modelling of the carbon cycle, atmospheric transport modelling, and data assimilation and

inversion systems. There will be four main areas of work covering: observations, emission inventories, modelling and inversion systems.

The central questions that CHE will address are:

- What does it take to have a combined bottom-up and top-down estimation system capable of distinguishing the anthropogenic part of the CO_2 budget from the natural fluxes?
- How can we make the first steps towards such a system that can use the high spatial and temporal resolution of satellite observations to monitor anthropogenic emissions at the required time scales?
- And what does it take to transform a research system into a fully operational monitoring capacity?

CHE will support a large community by providing a library of realistic CO_2 simulations from global to city scale to examine the capacity for monitoring future fossil fuel emissions and to adequately dimension space mission requirements.

2.2 Scope of this deliverable

2.2.1 Objectives of this deliverables

D7.3 provides the outline dissemination and exploitation plan.

The Dissemination Plan complements the Media and Communication Plan and identifies instruments and targets for dissemination, including important conferences, journals, and events.

The Exploitation Plan initiates the exploitation work within the CHE project by identifying initial exploitation routes and innovation ideas. The deliverable collects, in a first version, the feedback from CHE partners on their exploitation intentions as well as ideas for joint exploitation, where possible.

2.2.2 Work performed in this deliverable

As per the DoA, D7.3 should “outline the dissemination activities as well as identify the potential for exploitation and their routes”.

The work to create the plans included collection of feedback from the partners in form of questionnaires and the identification of the relevant aspects pertaining to both dissemination and exploitation.

2.2.3 Deviations and counter measures

No deviations have been encountered.

3 Dissemination Plan

Dissemination activities are designed around providing/disseminating information to the scientific communities and relevant stakeholders in three areas:

1. Scientific and technical results through
    a. Scientific Publications
    b. Conference Talks
    c. Organised Workshops, providing updates on the project results
    d. Reports to and feedback from Committees and Boards
2. Products through dissemination of
    a. Datasets and accompanying material (e.g. descriptions, meta data)
    b. Algorithms

c. Graphics and animations

3. Progress information through provision of
    a. Newsletters (digital and print)
    b. Public Deliverables
    c. Dissemination Materials (brochures, posters, flyers)

The following table provides information on the CHE Dissemination (and Communication) Targets.

Table 1: Dissemination Targets

Target audience	Dissemination Means	Responsibility
Intermediaries, Task Forces, member states (incl. policy makers)	• Workshops and resulting reports • Strategic Research Agendas • Policy briefs • Project news/ Newsletters • Tailored updates on the results • CHE website	ECMWF Project International Liaison with support from all partners
Scientific community	• Peer-reviewed scientific papers • CHE data portal • Workshops • Conferences • Strategic Research Agendas • Newsletters	All partners
Satellite agencies, technology providers	• Targeted publication material • Link with relevant H2020 and other initiatives • Representation at relevant conferences and fairs • Newsletters	All partners (with focus on industrial partners)
General public	• General Information Material • CHE website • Project news/ Newsletters • Dissemination Material • Press releases	ECMWF with support from all partners

3.1 Dissemination Instruments

This subsection provides an overview of the instruments used for dissemination.

3.1.1 CHE Website

The CHE website (www.che-project.eu) serves as the main dissemination instrument for the project. It contains various sections both for the general public as well as specifically targeted towards stakeholders including the scientific community.

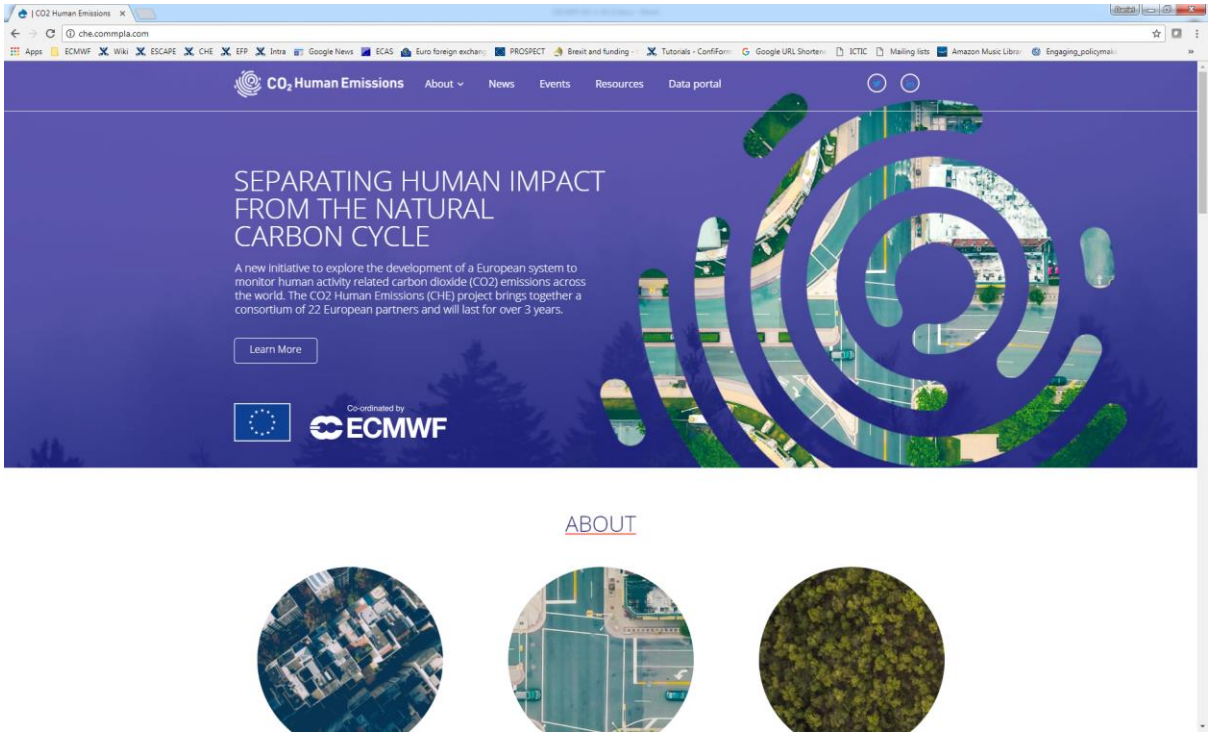


Figure 1: CHE Project Website

Events as well as resources will be published on the website together with regular news updates and access to data sets. Further details will be provided in the CHE deliverable D7.2 Project Website.

The website will also host the data portal, to be released in March 2018 (D7.8) which will provide an interface to the distributed data and products made available by the project and is therefore also a major dissemination instrument in itself.

3.1.2 CHE Workshops

CHE will organise two workshops open to the wider community to discuss, document and learn from the various efforts outside the project. The workshops will address the open questions for an emission monitoring capacity involving worldwide experts. The CHE External Expert Group will ensure active participation of experts from around the world, and the workshops will be open to the entire community. The workshops will be organised in coordination with the project assemblies around project months 15 (December 2018) and project month 27 (December 2019).

3.1.3 Journals, Conferences and Workshops

Strong engagement with the academic sector will promote the work performed in CHE and at the same time follow the scientific developments taking place outside the consortium. This exchange of information and knowledge will be realised through attendance of scientific conferences, organisation of sessions devoted to CHE and related topics at the annual meeting of the European Geophysical Union, and by the general process of CHE scientists attending and presenting seminars and engaging in discussion at universities and research institutes.

Conferences and Workshops of interest for CHE include:

- European Geoscience Union General Assembly: https://www.egu2018.eu/ and beyond

- International Workshop on Greenhouse Gas Measurements from Space (IWGGMS): http://iwggms13.fmi.fi/
- American Geophysical Union Fall Meetings: https://fallmeeting.agu.org/2017/future-meetings/
- 3rd ICOS Science Conference: https://www.icos-ri.eu/news-and-events
- UN Climate Change Conference: https://cop23.unfccc.int/
- ESA Conferences
- CNES Conferences
- Global Emissions Initiative (GEIA) conference

Publication in scientific journals will play a major role as this allows a rigorous peer-review to take place, ensuring that CHE results are relevant to the community. Relevant Journals include:

- Atmospheric Chemistry and Physics (ACP) https://www.atmospheric-chemistry-and-physics.net/
- Geoscientific Model Development (GMD) https://www.geoscientific-model-development.net/index.html
- Earth System Science Data (ESSD) https://www.earth-system-science-data.net/
- Biogeosciences (BG) https://www.biogeosciences.net/
- Earth System Dynamics (ESD) https://www.earth-system-dynamics.net/

It is envisaged that over the course of the project plus one year at least ten peer-reviewed, co-authored (journal) publications will be produced covering the topics of the scientific-technical work packages of the CHE project (WPs 1 to 5). In addition, regular conference and workshop publications and attendance with talks on topics from CHE will complement these publications.

3.1.4 Scientific Committees

The representation of ECMWF and project partners in international committees will be used as a channel for disseminating CHE results and output in the weather and climate prediction communities. Scientific results from CHE will also be conveyed to international programmes and bodies such as the Global Climate Observing System (GCOS), the World Climate Research Programme (WCRP), the Integrated Carbon Observation system (ICOS), the Global Carbon Project (GCP), as well as the Swiss Commission for Remote Sensing, and the WMO Integrated Global Greenhouse Gas Information System (IG3IS). In this regard, there is also a key role envisaged for the CHE External Advisory Board and External Experts Group, which consists of many European and international experts. Apart from providing feedback on the CHE developments, these experts will also establish the link with many other international initiatives related to the future monitoring of CO_2 emissions. Finally, progress and results will be directly shared with the European Commission and its two Task Forces that support the Commission with planning the development of a future CO_2 emission monitoring system. This will be facilitated by the close involvement of several CHE partners in the work of such programmes and the Task Forces. This will directly and indirectly ensure that the advice resulting from the CHE project (e.g. the Strategic research agendas) will inform policy makers in Europe and beyond. The close interaction with the Task Forces will also ensure that any guidance coming from these can be taken into account during the CHE project.

3.1.5 SRA/ Policy Briefs/ Newsletters

Newsletters will be produced on a 6-monthly basis, with the first newsletter to be released in March 2018, covering the start-up phase of the project and introducing the project to the wider community. The newsletters will provide updates on the progress of the project and provide selected highlights in more detail.

Policy briefs will be released in conjunction with the release of the Strategic Research Agendas developed in WP6 and provide policy stakeholders with the relevant guidance.

3.1.6 Other Instruments

Other instruments used by the CHE project to disseminate its results include:

- Tradeshows
- Exhibitions
- Web / wiki pages
- Press releases, Dissemination of information through print, TV and radio media,
- Overview of project results in partners' newsletter.
- Lunch lecture at policy DG (DG GROW, DG CLIMA)
- Open house day and other Company dissemination tools

Other instruments also include ad-hoc and planned interactions and liaison with relevant international research activities, such as the H2020-funded projects VERIFY and SCARBO, as well as the Copernicus Services relevant, CAMS and C3S with their annual General Assemblies.

3.2 Dissemination Milestones

The dissemination milestones are provided in the Figure 2.

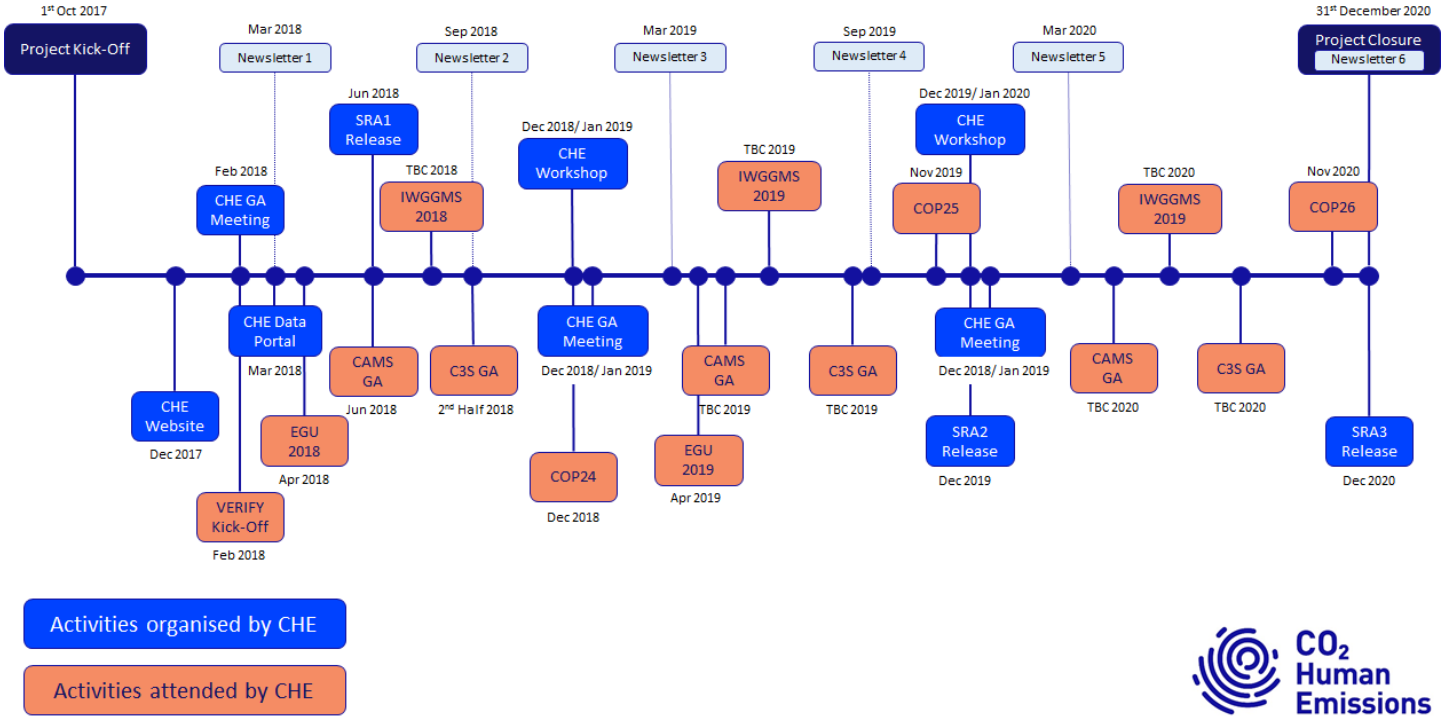


Figure 2: Dissemination Milestones

4 Exploitation Plan

Exploitation has various aims:

- It should maximise the impact of the funding granted in the market;
- It should ensure sustainable growth, more and better jobs, as well as industry competitiveness, especially in the case of SMEs;
- Partners and stakeholders should get value or use from a project, where "Use" is defined as

  "direct or indirect utilisation of foreground in further research activities other than those covered by the project, or for developing, creating and marketing a product or process, or for creating and providing a service"[1].

4.1 Exploitation Targets

The CHE DoA states the following with respect to exploitation:

"CHE will use existing modelling and inversion infrastructure (after further improvement where needed) to scope and provide guidelines for a future emission monitoring system. The important outputs of CHE are therefore the various detailed reports, especially from WP5 and WP6, which will be made available through the web site to all stakeholders and other interested parties. In addition, various data sets will be created in WP2, and these will be provided on data servers without any restrictions, as described above. Therefore the wider science community as well as the policy makers will be exploitation targets. Science communities include those related to CO2 monitoring, atmospheric monitoring, as well as the wider weather and climate modelling communities. Policy makers include those on regional, national as well as European level. This is especially relevant for any parallel or future studies related to the development of the future CO_2 emission monitoring system as initiated by the European Commission and/or the European Space Agency. There may in addition be some exploitation of CHE products in the other activities undertaken by partners in the consortium operating CHE, in particular at the national level."

4.2 Exploitation Activities and Routes

In attempting to gather an overview of the exploitation intentions of the partners, and to identify potential exploitation actions, a questionnaire was circulated and responded to by each partner.

The following questions where included:

Exploitable Results

Which deliverables from CHE do you intend to exploit?
Which specific output(s) from the deliverable(s) do you intend to exploit?
Is this output owned by you/another Partner/joint?
At what TRL (Technology Readiness Level) do you expect this output to be at the end of the project (if applicable)?
What further work will be required (post-CHE) to take the CHE output from this TRL into a product?
What assessments/ evaluations do you plan within CHE to test whether outputs are exploitable?

Products resulting from Exploitation

What final product do you have in mind as the result of the exploitation?
What are the key functions of this product?
What is the Unique Selling Point (USP) for this product?

[1] See also http://ec.europa.eu/research/participants/data/ref/fp7/89593/ipr_en.pdf

What proportion of this product will have been funded by CHE?
Who are the customers for this product?
What similar systems are already in the marketplace offered by other suppliers?
How do you think the market will change over the next 5 years?

Exploitation Activities during the CHE project

What exploitation activities do you plan to perform in CHE and when?

Exploitation Activities after the CHE project

What exploitation activities do you plan to perform post-CHE and when?

Consortium-wide Exploitation

What would be a consortium-wide results and product to be exploited?
How might the Consortium work at a collective level to exploit the CHE proposition?
Can you describe a commercial model?
Would your organisation take a part in this, and in what role?
Which additional stakeholders be needed to operate the model?

Naturally, at this early stage in the project (month 3 of 39) not all questions can be answered by all partners. Therefore the questionnaire also serves the purpose of reminding partners of the importance of exploitation in a project such as CHE, and to start thinking of potential routes and related exploitation activities.

Based on the above responses to the questionnaire, the following table summarises the findings (Table 2).

Table 2: Summary of Exploitation Findings

Exploitable Products	• A high-resolution inverse modelling framework using state-of-the art input • Emission and emission uncertainty gridmaps • XCO_2 retrieved from OCO-2 satellite mission • Methods to exploit Sentinel Carbon • Model outputs for designing observation system simulation experiments • Recommendations for the construction of a future prototype including roadmap to implementation and cost assessment of the service elements of a future CO_2 anthropogenic emission monitoring system. • Space-borne CO_2 monitoring instrument/mission concepts needed to fill the gap in terms of revisit time and observational performance and considering current CO_2 operational missions and those in development • A proposal of space based infrastructure for future Carbon Human Emission monitoring
Exploitation Activities during the Project	• Incorporating results into existing modelling framework. • Scientific papers • Review state-of-the art • Competitive/ benchmark analysis • Contribution to IG3IS implementation plan, which outlines observation and modelling requirements for top-down emission estimation and how such a system could be implemented, due in 2018 • To make, as soon as possible, proposal for low cost system of measurements fitting requirements and

	agenda of next generation of space based instrument for Carbon Human Emission measurements
Exploitation Activities after the end of the Project	• Expand the approach developed in CHE to a broader geographic area post-CHE, and upscale it so it's able to handle the masses of data that will become available. • Use of the OCO-2 data product by CHE inverse modellers • Scientific papers • Develop the regional CO_2 modelling system into a quasi-operational system supporting the operation of a Swiss CO_2 observing system with low-cost CO_2 sensors, high-precision instruments and possibly remote sensing. • Productisation/operationalisation, further developments, integration into other services • To develop low cost system of Carbon Human Emission measurements
Consortium-wide/Joint Exploitation	• Suite of modelling systems able to sensibly address the problem, potentially able to contribute to an ensemble estimation approach. • Develop a strategy to operationalise functional parts of the modelling system described above • Longer-term goal would be operationalisation for Copernicus Climate Change Service (C3S) • Definition of a global CO_2 monitoring system of systems • End to End system of Carbon Human Emission measurements

The activities during the project will now be taken up by the relevant work packages to ensure that exploitation is pursued and maximised. However, it is to be noted that a complete consortium-wide exploitation of results (e.g. through structures such as a Joint Venture or Association) after the end of the project are somewhat less likely, due to the nature of the project. Nevertheless, a number of items (especially the operationalisation of a CO_2 Monitoring Support Capacity) have been identified and will be further investigated as to the possibilities for direct joint exploitation.

The Exploitation Plan will be revisited regularly, and is thus to be understood as a living document, as developments during the course of the project may open up new avenues for exploitation.

5 Conclusion

In this deliverable, the CHE dissemination and exploitation has been defined.

For dissemination a set of instruments have been identified, namely a website, workshops, newsletters and numerous scientific conference and workshop involvements.

Initial exploitation ideas from all partners have been collected in this document, complemented by the identification of exploitation activities. Project Office and Work Package leader can now use this information to steer the activities towards innovation realisation within the various work packages and the project as a whole.

An updated Exploitation Plan, with more detailed exploitation routes and activities, as well as IPR register, will be developed during the remainder of the project, to be delivered at the end of the lifetime. This will ensure that the results are sustainable and realised into innovations.

Document History

Version	Author(s)	Date	Changes
0.1	Daniel Thiemert (ECMWF)	05/12/2017	Initial Version of Dissemination Plan
0.2	Daniel Thiemert (ECMWF)	06/12/2017	Added Exploitation Plan
1.0	Daniel Thiemert (ECMWF)	28/12/2017	Final Version

Internal Review History

Internal Reviewers	Date	Comments
Pascal Prunet (SPASCIA)	20/12/2017	Approved with comments
Thomas Kaminski (iLab)	20/12/2017	Approved with comments

Estimated Effort Contribution per Partner

Partner	Effort
ECMWF	0.15
Total	**0.15**