

Please check our [wiki](#) for help on navigating the form.

Horizon 2020

Call: H2020-LC-CLA-2018-2019-2020

(Building a low-carbon, climate resilient future: climate action in support of the Paris Agreement)

Topic: LC-CLA-02-2019

Type of action: RIA

Proposal number: SEP-210579569

Proposal acronym: LANDMARC

Deadline Id: H2020-LC-CLA-2019-2

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How to fill in the forms

The administrative forms must be filled in for each proposal using the templates available in the submission system. Some data fields in the administrative forms are pre-filled based on the steps in the submission wizard.

1 - General information

Topic LC-CLA-02-2019

Type of Action RIA

Call Identifier H2020-LC-CLA-2018-2019-2020

Deadline Id H2020-LC-CLA-2019-2

Acronym

Proposal title

Note that for technical reasons, the following characters are not accepted in the Proposal Title and will be removed: < > " &

Duration in months

Fixed keyword 1

Fixed keyword 2

Fixed keyword 3

Fixed keyword 4

Fixed keyword 5

Fixed keyword 6

Free keywords

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym **LANDMARC**

Abstract

Roughly 30% of Nationally Determined Contributions (NDCs) under the Paris Agreement (PA) include land-based mitigation measures, but there are still significant uncertainties in their effectiveness to deliver negative emissions. Aside from the expected shortfall of all current NDCs to deliver on the below 2 oC ambition, this uncertainty adds to the risks to human wellbeing as a result of climate change. Land-use based mitigation technologies (LMTs) can play a crucial role in the global efforts to meet the PA goals and the Sustainable Development Goals (SDGs). Considering the land-climate-development interface, LANDMARC aims to assess the impacts of LMTs as net sinks for greenhouse gas (GHGs) by applying unique mixed-methods approach. LANDMARC assesses the potential and feasibility of LMTs in the AFOLU sector by: a) quantitatively assessing environmental, social-economic, co-benefits and trade-offs identified through a suite of monitoring tools and model system (including land use, climate and economic models) complemented by; b) qualitative assessments guided by stakeholder engagement. This mixed-method approach allows us to provide more detailed insights on the effectiveness and climate resilience of LMTs at different spatial scales (e.g. scaling up from local/national level to the regional/global level). These tools, services and approaches will contribute to land-based LMT decision support in the private sector and by policy makers. LANDMARC is an interdisciplinary consortium with expertise from ecology, engineering, climate sciences, global carbon cycle, soil sciences, satellite earth observation sciences, agronomy, economics, social sciences, and business. There is a balanced representation of partners from academia, SMEs, and NGOs from the EU, Africa, Asia and the Americas, which ensures a wide coverage of LMTs operating in different contexts (e.g. climates, land-use practices, socio-economic etc.) and spatial scales.

Remaining characters

42

Has this proposal (or a very similar one) been submitted in the past 2 years in response to a call for proposals under Horizon 2020 or any other EU programme(s)?

Yes No

Please give the proposal reference or contract number.

XXXXXX-X

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym **LANDMARC**

Declarations

1) The coordinator declares to have the explicit consent of all applicants on their participation and on the content of this proposal.	<input checked="" type="checkbox"/>
2) The information contained in this proposal is correct and complete.	<input checked="" type="checkbox"/>
3) This proposal complies with ethical principles (including the highest standards of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity — and including, in particular, avoiding fabrication, falsification, plagiarism or other research misconduct).	<input checked="" type="checkbox"/>
4) The coordinator confirms:	
- to have carried out the self-check of the financial capacity of the organisation on http://ec.europa.eu/research/participants/portal/desktop/en/organisations/lfv.html or to be covered by a financial viability check in an EU project for the last closed financial year. Where the result was “weak” or “insufficient”, the coordinator confirms being aware of the measures that may be imposed in accordance with the H2020 Grants Manual (Chapter on Financial capacity check); or	<input checked="" type="radio"/>
- is exempt from the financial capacity check being a public body including international organisations, higher or secondary education establishment or a legal entity, whose viability is guaranteed by a Member State or associated country, as defined in the H2020 Grants Manual (Chapter on Financial capacity check); or	<input type="radio"/>
- as sole participant in the proposal is exempt from the financial capacity check.	<input type="radio"/>
5) The coordinator hereby declares that each applicant has confirmed:	
- they are fully eligible in accordance with the criteria set out in the specific call for proposals; and	<input checked="" type="checkbox"/>
- they have the financial and operational capacity to carry out the proposed action.	<input checked="" type="checkbox"/>
The coordinator is only responsible for the correctness of the information relating to his/her own organisation. Each applicant remains responsible for the correctness of the information related to him and declared above. Where the proposal to be retained for EU funding, the coordinator and each beneficiary applicant will be required to present a formal declaration in this respect.	

According to Article 131 of the Financial Regulation of 25 October 2012 on the financial rules applicable to the general budget of the Union (Official Journal L 298 of 26.10.2012, p. 1) and Article 145 of its Rules of Application (Official Journal L 362, 31.12.2012, p.1) applicants found guilty of misrepresentation may be subject to administrative and financial penalties under certain conditions.

Personal data protection

The assessment of your grant application will involve the collection and processing of personal data (such as your name, address and CV), which will be performed pursuant to Regulation (EC) No 45/2001 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data. Unless indicated otherwise, your replies to the questions in this form and any personal data requested are required to assess your grant application in accordance with the specifications of the call for proposals and will be processed solely for that purpose. Details concerning the purposes and means of the processing of your personal data as well as information on how to exercise your rights are available in the [privacy statement](#). Applicants may lodge a complaint about the processing of their personal data with the European Data Protection Supervisor at any time.

Your personal data may be registered in the Early Detection and Exclusion system of the European Commission (EDES), the new system established by the Commission to reinforce the protection of the Union's financial interests and to ensure sound financial management, in accordance with the provisions of articles 105a and 108 of the revised EU Financial Regulation (FR) (Regulation (EU, EURATOM) 2015/1929 of the European Parliament and of the Council of 28 October 2015 amending Regulation (EU, EURATOM) No 966/2012) and articles 143 - 144 of the corresponding Rules of Application (RAP) (COMMISSION DELEGATED REGULATION (EU) 2015/2462 of 30 October 2015 amending Delegated Regulation (EU) No 1268/2012) for more information see the [Privacy statement for the EDES Database](#).

2 - Participants & contacts

#	Participant Legal Name	Country	Action
1	STICHTING JOINT IMPLEMENTATION NETWORK	NL	
2	EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZUERICH	CH	
3	AMBIENTA INGENIERIA Y SERVICIOS AGRARIOS Y FORESTALES S.L.U.	Spain	
4	AGROINSIDER LDA	PT	
5	BARCELONA SUPERCOMPUTING CENTER - CENTRO NACIONAL DE SUPERCOMPUTACION	Spain	
6	ELEAF BV	Netherlands	
7	UNIVERSITAET KASSEL	DE	
8	BIOCLEAR EARTH BV	NL	
9	CAMBRIDGE ECONOMETRICS LIMITED	UK	
10	STIFTELSEN THE STOCKHOLM ENVIRONMENT INSTITUTE	SE	
11	KONINKLIJK NEDERLANDS METEOROLOGISCH INSTITUUT-KNMI	Netherlands	
12	OEKO-INSTITUT E.V. - INSTITUT FUER ANGEWANDTE OEKOLOGIE	DE	
13	BIORECRO AB	Sweden	
14	PT SUSTAINABILITY AND RESILIENCE	ID	
15	THE UNIVERSITY OF SUSSEX	UK	
16	ALCES Landscape and Land-Use Ltd.	CA	

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **JIN**

2 - Administrative data of participating organisations

PIC	Legal name
994451858	STICHTING JOINT IMPLEMENTATION NETWORK

Short name: *JIN*

Address of the organisation

Street MEERKOETLAAN 27

Town PATERSWOLDE

Postcode 9765 TC

Country Netherlands

Webpage <http://www.jiqweb.org>

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno	Legal personyes
Non-profityes	
International organisationno	
International organisation of European interestno	Industry (private for profit).....no
Secondary or Higher education establishmentno	
Research organisationyes	

Enterprise Data

SME self-declared status.....03/11/1994 - yes

SME self-assessment unknown

SME validation sme.....03/11/1994 - yes

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **JIN**

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

not applicable

Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **JIN**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

Male

Female

First name **Eise**

Last name **SPIJKER**

E-Mail **eise@jin.ngo**

Position in org.

Senior Researcher

Department

STICHTING JOINT IMPLEMENTATION NETWORK

Same as
organisation name

Same as proposing organisation's address

Street

Ubbo Emmiusingel 19

Town

Groningen

Post code

9711

Country

Netherlands

Website

www.jin.ngo

Phone

+31(0)628064653

Phone 2

+31(0)507620930

Fax

+xxx xxxxxxxxx

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **ETH Zürich**

PIC 999979015 **Legal name** EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZUERICH

Short name: ETH Zürich

Address of the organisation

Street Raemistrasse 101

Town ZUERICH

Postcode 8092

Country Switzerland

Webpage www.ethz.ch

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyyes

Legal personyes

Non-profityes

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentyes

Research organisationyes

Enterprise Data

SME self-declared status.....06/01/2009 - no

SME self-assessment unknown

SME validation sme.....06/01/2009 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **ETH Zürich**

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

not applicable

Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **ETH Zürich**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Sex Male Female

First name **Michael**

Last name **Stauffacher**

E-Mail **michael.stauffacher@usys.ethz.ch**

Position in org.

Department Same as organisation name

Same as proposing organisation's address

Street

Town

Post code

Country

Website

Phone

Phone 2

Fax

Other contact persons

First Name	Last Name	E-mail	Phone
Jenny	Lieu	jenny.lieu@usys.ethz.ch	+xxx xxxxxxxxx
Johan	Six	jsix@ethz.ch	+xxx xxxxxxxxx

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **AMBIENTA**

PIC

935188835

Legal name

AMBIENTA INGENIERIA Y SERVICIOS AGRARIOS Y FORESTALES S.L.U.

Short name: AMBIENTA

Address of the organisation

Street **PLAZA CONSTITUCIÓN, 2**

Town **MONTEHERMOSO (CACERES)**

Postcode **10810**

Country **Spain**

Webpage **www.ambientaing.es**

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....31/12/2017 - yes

SME self-assessment31/12/2017 - yes

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **AMBIENTA**

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

not applicable

Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **AMBIENTA**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

Male

Female

First name **Federico**

Last name **Julian**

E-Mail **fjulian.ambienta@gmail.com**

Position in org.

Director

Department

AMBIENTA INGENIERIA Y SERVICIOS AGRARIOS Y FORESTALES S.L.U

Same as organisation name

Same as proposing organisation's address

Street

PLAZA CONSTITUCIÓN, 2

Town

MONTEHERMOSO (CACERES)

Post code

10810

Country

Spain

Website

www.ambientaing.es

Phone

+34666169888

Phone 2

+34927675524

Fax

+XXX XXXXXXXXX

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **AGROINSIDER LDA**

PIC

916942456

Legal name

AGROINSIDER LDA

Short name: AGROINSIDER LDA

Address of the organisation

Street RUA CIRCULAR NORTE EDIFICIO NERE SAL

Town EVORA

Postcode 7005 841

Country Portugal

Webpage www.agroinsider.com

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....24/10/2016 - yes

SME self-assessment24/10/2016 - yes

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **AGROINSIDER LDA**

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

not applicable

Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **AGROINSIDER LDA**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Sex

Male Female

First name **Jose Rafael Marques**

Last name **da Silva**

E-Mail **rafael@agroinsider.com**

Position in org.

Department



Same as organisation name

Same as proposing organisation's address

Street

Town

Post code

Country

Website

Phone

Phone 2

Fax

Other contact persons

First Name	Last Name	E-mail	Phone
Mário	Luis	marioluis@agroinsider.com	+351927506135

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **BSC**

PIC

999655520

Legal name

BARCELONA SUPERCOMPUTING CENTER - CENTRO NACIONAL DE SUPERCOMPUTACION

Short name: BSC

Address of the organisation

Street Calle Jordi Girona 31

Town BARCELONA

Postcode 08034

Country Spain

Webpage www.bsc.es

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyyes

Legal personyes

Non-profityes

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentno

Research organisationyes

Enterprise Data

SME self-declared status.....01/03/2005 - no

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **BSC**

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

not applicable

Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **BSC**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex

Male Female

First name **Raffaele**

Last name **Bernardello**

E-Mail **raffaele.bernardello@bsc.es**

Position in org. Researcher

Department Earth Science Department

Same as organisation name

Same as proposing organisation's address

Street NEXUS II building, Jordi Girona 29

Town Barcelona

Post code 08034

Country Spain

Website <https://www.bsc.es/>

Phone +34 934137566

Phone 2 +xxx xxxxxxxxx

Fax +xxx xxxxxxxxx

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **eLEAF bv**

PIC

998872827

Legal name

ELEAF BV

Short name: eLEAF bv

Address of the organisation

Street **HESSELINK VAN SUCHTELENWEG 6**

Town **WAGENINGEN**

Postcode **6703 CT**

Country **Netherlands**

Webpage **www.eleaf.com**

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....31/12/2014 - yes

SME self-assessment31/12/2014 - yes

SME validation sme.....06/08/2008 - yes

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **eLEAF bv**

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

not applicable

Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **eLEAF bv**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Ms

Sex

Male

Female

First name **Annemarie**

Last name **Klaasse**

E-Mail **annemarie.klaasse@eleaf.com**

Position in org.

Project Manager

Department

ELEAF BV

Same as organisation name

Same as proposing organisation's address

Street

Hesselink van Suchtelenweg 6

Town

Wageningen

Post code

6703CT

Country

Netherlands

Website

www.eleaf.com

Phone

+31 317 729 000

Phone 2

+xxx xxxxxxxxx

Fax

+xxx xxxxxxxxx

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **UNI KASSEL**

PIC

999852624

Legal name

UNIVERSITAET KASSEL

Short name: UNI KASSEL

Address of the organisation

Street MONCHEBERGSTRASSE 19

Town KASSEL

Postcode 34125

Country Germany

Webpage www.uni-kassel.de

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyyes

Legal personyes

Non-profityes

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentyes

Research organisationyes

Enterprise Data

SME self-declared status.....26/10/1971 - no

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **UNI KASSEL**

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

not applicable

Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **UNI KASSEL**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Sex Male Female

First name **Ruediger**

Last name **Schaldach**

E-Mail **schaldach@usf.uni-kassel.de**

Position in org.

Department

Same as organisation name

Same as proposing organisation's address

Street

Town

Post code

Country

Website

Phone

Phone 2

Fax

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **BIOCLEAR EARTH BV**

PIC

996843490

Legal name

BIOCLEAR EARTH BV

Short name: BIOCLEAR EARTH BV

Address of the organisation

Street **ROZENBURGLAAN 13**

Town **GRONINGEN**

Postcode **9727 DL**

Country **Netherlands**

Webpage **www.bioclearearth.nl**

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....31/12/2009 - yes

SME self-assessment unknown

SME validation sme.....31/12/2009 - yes

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **BIOCLEAR EARTH BV**

Department(s) carrying out the proposed work

No department involved

Department name not applicable

Same as proposing organisation's address

Street

Town

Postcode

Country

Dependencies with other proposal participants

Character of dependence	Participant
<input type="text"/>	<input type="text"/>

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **BIOCLEAR EARTH BV**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Sex

Male Female

First name **Emiel**

Last name **Elferink**

E-Mail **elferink@bioclearearth.nl**

Position in org.

Department



Same as organisation name

Same as proposing organisation's address

Street

Town

Post code

Country

Website

Phone

Phone 2

Fax

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **CE**

PIC

987098094

Legal name

CAMBRIDGE ECONOMETRICS LIMITED

Short name: CE

Address of the organisation

Street **COVENT GARDEN**

Town **CAMBRIDGE**

Postcode **CB1 2HT**

Country **United Kingdom**

Webpage **www.camecon.com**

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....28/05/1985 - yes

SME self-assessment unknown

SME validation sme.....28/05/1985 - yes

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **CE**

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

not applicable

Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **CE**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

Male

Female

First name **Hector**

Last name **Pollitt**

E-Mail **hp@camecon.com**

Position in org.

Director and the Head of Modelling at Cambridge Econometrics

Department

CAMBRIDGE ECONOMETRICS LIMITED

Same as organisation name

Same as proposing organisation's address

Street

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Town

Cambridge

Post code

CB1 2HT

Country

United Kingdom

Website

Phone

+441223 533100

Phone 2

+xxx xxxxxxxxx

Fax

+xxx xxxxxxxxx

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **SEI**

PIC 999450268 **Legal name** STIFTELSEN THE STOCKHOLM ENVIRONMENT INSTITUTE

Short name: SEI

Address of the organisation

Street BOX 24218

Town STOCKHOLM

Postcode 104 51

Country Sweden

Webpage www.sei-international.org

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profityes

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentno

Research organisationyes

Enterprise Data

SME self-declared status.....01/01/1997 - no

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **SEI**

Department(s) carrying out the proposed work

No department involved

Department name not applicable

Same as proposing organisation's address

Street

Town

Postcode

Country

Dependencies with other proposal participants

Character of dependence	Participant	
<input type="text"/>	<input type="text"/>	

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **SEI**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

Male Female

First name **Oliver**

Last name **Johnson**

E-Mail **oliver.johnson@sei.org**

Position in org. Head of Climate, Energy and Society Unit

Department STIFTELSEN THE STOCKHOLM ENVIRONMENT INSTITUTE



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Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **KNMI**

PIC

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Legal name

KONINKLIJK NEDERLANDS METEOROLOGISCH INSTITUUT-KNMI

Short name: KNMI

Address of the organisation

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Town DE BILT

Postcode 3731 GA

Country Netherlands

Webpage www.knmi.nl

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyyes

Legal personyes

Non-profityes

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentno

Research organisationyes

Enterprise Data

SME self-declared status.....15/05/2008 - no

SME self-assessment unknown

SME validation sme.....15/05/2008 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **KNMI**

Department(s) carrying out the proposed work

No department involved

Department name not applicable

Same as proposing organisation's address

Street

Town

Postcode

Country

Dependencies with other proposal participants

Character of dependence	Participant	
<input type="text"/>	<input type="text"/>	

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **KNMI**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

Male

Female

First name **Folkert**

Last name **Boersma**

E-Mail **boersma@knmi.nl**

Position in org.

Research Scientist

Department

KNMI - R&D Satellite Observations

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Same as proposing organisation's address

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Phone 2

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Fax

+xxx xxxxxxxxx

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **OEKO-INSTITUT E.V. - INSTITUT FUER AN**

PIC

999519817

Legal name

OEKO-INSTITUT E.V. - INSTITUT FUER ANGEWANDTE OEKOLOGIE

Short name: OEKO-INSTITUT E.V. - INSTITUT FUER ANGEWANDTE OEKOLOGIE

Address of the organisation

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Postcode 79100

Country Germany

Webpage <http://www.oeko.de>

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profityes

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentno

Research organisationyes

Enterprise Data

SME self-declared status..... unknown

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **OEKO-INSTITUT E.V. - INSTITUT FUER AN**

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

not applicable

Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **OEKO-INSTITUT E.V. - INSTITUT FUER AN**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex

Male

Female

First name **Hannes**

Last name **Boettcher**

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Senior Researcher

Department

Energy and Climate

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Same as proposing organisation's address

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Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **BIORECRO AB**

PIC

936843073

Legal name

BIORECRO AB

Short name: BIORECRO AB

Address of the organisation

Street **FREJGATAN 1**

Town **STOCKHOLM**

Postcode **11420**

Country **Sweden**

Webpage **www.biorecro.com**

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....06/02/2018 - yes

SME self-assessment31/12/2016 - yes

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **BIORECRO AB**

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

not applicable

Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **BIORECRO AB**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

Male Female

First name **Henrik**

Last name **Karlsson**

E-Mail **henrik.karlsson@biorecro.se**

Position in org.

CEO

Department

BIORECRO AB



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Same as proposing organisation's address

Street

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STOCKHOLM

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Other contact persons

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Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **PT SUSTAINABILITY AND RESILIENCE**

PIC

911113241

Legal name

PT SUSTAINABILITY AND RESILIENCE

Short name: PT SUSTAINABILITY AND RESILIENCE

Address of the organisation

Street **GEDUNG PASAR RAYA KUTA JL.RAYA TUBA**

Town **BADUNG**

Postcode **80361**

Country **Indonesia**

Webpage **www.su-re.co**

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profitno

International organisationno

International organisation of European interestno

Industry (private for profit).....yes

Secondary or Higher education establishmentno

Research organisationno

Enterprise Data

SME self-declared status.....28/02/2018 - yes

SME self-assessment28/02/2018 - yes

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **PT SUSTAINABILITY AND RESILIENCE**

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

not applicable

Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **PT SUSTAINABILITY AND RESILIENCE**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Dr.

Sex

Male

Female

First name **Takeshi**

Last name **Takama**

E-Mail **ttak003@gmail.com**

Position in org.

CEO

Department

PT SUSTAINABILITY AND RESILIENCE

Same as organisation name

Same as proposing organisation's address

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Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **UOS**

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999852721

Legal name

THE UNIVERSITY OF SUSSEX

Short name: UOS

Address of the organisation

Street SUSSEX HOUSE FALMER

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Postcode BN1 9RH

Country United Kingdom

Webpage <http://www.sussex.ac.uk>

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyno

Legal personyes

Non-profityes

International organisationno

International organisation of European interestno

Industry (private for profit).....no

Secondary or Higher education establishmentyes

Research organisationyes

Enterprise Data

SME self-declared status.....19/09/2008 - no

SME self-assessment unknown

SME validation sme.....19/09/2008 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **UOS**

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

not applicable

Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **UOS**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Ms

Sex

Male

Female

First name **Guadalupe**

Last name **AlvarezTinoco**

E-Mail **r.alvarez-tinoco@sussex.ac.uk**

Position in org.

Research Fellow

Department

University of Sussex Business School, SPRU - Science Policy Research Unit

Same as organisation name

Same as proposing organisation's address

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Fax

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Other contact persons

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Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **ALCES Landscape and Land-Use Ltd.**

PIC

Legal name

907736768

ALCES Landscape and Land-Use Ltd.

Short name: ALCES Landscape and Land-Use Ltd.

Address of the organisation

Street PO Box 61196

Town Calgary

Postcode T2N 4S6

Country Canada

Webpage www.alces.ca

Legal Status of your organisation

Research and Innovation legal statuses

Public bodyunknown

Legal personyes

Non-profitunknown

International organisationunknown

International organisation of European interestunknown

Industry (private for profit).....unknown

Secondary or Higher education establishmentunknown

Research organisationunknown

Enterprise Data

SME self-declared status..... unknown

SME self-assessment unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **ALCES Landscape and Land-Use Ltd.**

Department(s) carrying out the proposed work

No department involved

Department name

Name of the department/institute carrying out the work.

not applicable

Same as proposing organisation's address

Street

Please enter street name and number.

Town

Please enter the name of the town.

Postcode

Area code.

Country

Please select a country

Dependencies with other proposal participants

Character of dependence	Participant	

Proposal Submission Forms

Proposal ID **SEP-210579569**

Acronym

LANDMARC

Short name **ALCES Landscape and Land-Use Ltd.**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title

Mr.

Sex

Male

Female

First name **Brad**

Last name **Stelfox**

E-Mail **bstelfox@alces.ca**

Position in org.

Founder

Department

ALCES Landscape and Land-Use Ltd.

Same as organisation name

Same as proposing organisation's address

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Post code

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Country

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Proposal ID **SEP-210579569**

Acronym **LANDMARC**

3 - Budget

Total requested EU contribution for the proposal/ €

7 000 000

LANDMARC: LAND use based MitigAtion for Resilient Climate pathways

1. Excellence

1.1 Objectives

With the 2015 Paris Agreement (PA), the international community agreed to limit the rise in global temperature to below 2°C.¹ Roughly 30% of Nationally Determined Contributions (NDCs) under the PA include land-based mitigation but there are still profound risks to human wellbeing due to uncertainties in their effectiveness². However, even for ambitious mitigation scenarios, there will likely be a significant overshoot that needs to be followed by negative emissions and the response of the natural carbon cycle is largely unknown for these scenarios. Land-use based mitigation technologies (LMTs), therefore, has a role in the global efforts to meet the PA goals and the Sustainable Development Goals (SDGs). LMTs involve practices in agriculture, forestry and other land use (AFOLU) sectors, as well as negative emissions technologies (e.g. enhanced weathering and bio-energy based carbon capture and storage (BECCS)³). The forthcoming IPCC special report on climate change and land considers land degradation and food security to fall in the land-climate-development interface. Climate change and transformations in landscapes are impacting vulnerable populations and affecting adaptive capacity. Land use is strongly linked to the problems and potential solutions for climate change⁴.

Considering the land-climate-development interface, LANDMARC aims to better understand the impacts of *LMTs as net sinks for greenhouse gas* (GHGs) by applying unique mixed-methods approach that includes: a) combining satellite and in-situ *monitoring tools*; b) models combining climate, earth system, land use, and socio-economic systems; and c) qualitative methods aiding *stakeholder engagement*⁵. Our approach provides a more comprehensive assessment of *quantifiable* and *non-quantifiable* environmental, and socio-economic *trade-offs* and *co-benefits* of LMTs. To address this call, we set the following objectives:

Objective 1: Monitor the effectiveness of LMTs through a *suite of monitoring tools*: Beyond state-of-the-art *Earth Observation* (EO) tools will be used to monitor the ecological and climatic impacts of LMTs and their ability to provide net carbon sinks across case studies. We will apply an innovative approach to assess changes in land and climatic conditions through: a) *in-situ monitoring* via *chemical and biological soil analysis*, b) *satellite monitoring data* (Sentinel2, Copernicus S5P-TROPOMI⁶, OCO-2) on soil, water, atmosphere, vegetation, GHG concentrations and air quality, at the best available spatial resolutions.

Objective 2: Assess the climate vulnerability of LMT solutions. The need to adjust to a changing climate also applies to LMTs. Each case study will generate stakeholder knowledge, locally available data and new earth observations to assess *climate vulnerability* of LMTs as a net sink in different contexts. The climate vulnerability of LMTs in case study contexts can be assessed by analysing the results from the Coupled Model Intercomparison Project, phase 6 (CMIP6, Eyring et al. 2016⁷); which can contribute to the next IPCC (AR6). LANDMARC will assess climate risk exposure by analysing how changes in climate patterns might impact LMTs, providing essential information for planning future *effective large-scale implementation*.

Objective 3: Assess the co-benefits and trade-offs of LMTs as a net sink for GHGs at the local level considering environmental and human systems. Aside from ecosystem and climatic trade-offs/co-benefits of LMT on the environment, we also assess (non)quantifiable *socio-economic impacts* informed by stakeholder linked to local development goals and wider SDGs (SDG7-9,11,14 &15). LANDMARC partners will co-develop *new LMT narratives at the (sub)national level* with stakeholders through participatory processes. The narratives will be quantitatively assessed with a *model system* that combines *land use models* (DayCent⁸, ALCES⁹, LandSHIFT¹⁰) with a *macro-econometric model* (E3ME¹¹).

Objective 4: Improve current methodologies to estimate emissions and removals and support a more feasible assessment for scaling up LMTs. The results from *monitoring* (objective 1) and *modelling* (objective 3) will be combined to derive improved (negative) emissions estimates for LMT activities. This will aid countries to move from an IPCC Tier 1 approach towards Tier 3 for national inventory accounting for LMTs. Our combined suite of tools and methods can increase the accuracy of emissions estimates

¹ Jones, C. D. et al (2016). Simulating the Earth system response to negative emissions, Environmental Research Letters. IOP Publishing,11(9), 95012

² Calvin, K. et al (2016). Implications of uncertain future fossil energy resources on bioenergy use and terrestrial carbon emissions. Climatic change,136(1),57-68

³ EASAC (2018) Negative emission technologies: What role in meeting Paris Agreement targets?.EASAC policy report 35

⁴ Popp, A., et al (2017). Land use futures in the shared socio-economic pathways. Global Environmental Change, 42, 331-345

⁵ Stakeholder (SH) identified in LMT value chain (e.g. technological providers, end-users) and SH in the policy areas of LMTs

⁶ Veeffkind, J. P., et al. (2012) TROPOMI on the ESA Sentinel-5 Precursor" Remote Sensing of Environment 120: 70-83

⁷Eyring, V., et al (2016) Overview of the CMIP6 experimental design & organization, Geosci.Model Dev., 9

⁸ Parton et al (1998) DAYCent and its land surface submodel: description and testing. Global & Planetary Change,19(1-4) p.35-48

⁹ALCES (2017) ACLES on-line user guide available at: <https://alces.ca/media/files/420.pdf>

¹⁰Schaldach R. et al.(2011)An integrated approach to modelling land use change on continental & global scales Environmental Modelling & Software

¹¹Cambridge Econometrics (2014). E3ME Technical Manual, Version 6.0 available at: <http://tinyurl.com/y3lcyo4x>

through improvements of the models to better represent GHG dynamics based on collected data. The higher temporal and spatial resolution data can be used to calibrate and validate process-based models¹². We will then compare the negative emission estimates from bottom-up (e.g. DayCent) and top-down approaches (e.g. E3ME using Earth Observation (EO) and also improve data inputs between the different types of models.

Objective 5: Promote science in practice through collaborating and supporting the scaling up of LMT to the global level. Scaling of selected LMTs is needed to assess their global impact and potential. The constraints for implementing scaled up LMTs will be derived from the case study work where the **LANDMARC consortium** and (local) **stakeholders** collaborate by **sharing existing data and information** and good practices. While LANDMARC provides targeted supporting services and information to case study stakeholders (e.g. LMTs impact, see objectives 1-4), stakeholders also provide LANDMARC with valuable information for LMT implementation and (regional/global) scaling scenarios; which we will model with land use (LandSHIFT) macro-econometric (E3ME) and Earth System models (EC-Earth¹³).

Objective 6: Develop new tools and services for land-based LMT decision support. To ensure that the LANDMARC project has a lasting impact, a suite of tools and services will be developed to support (public and private) stakeholders in decision making at multiple scales. New tools can involve qualitative instruments to perform and embed **climate risk assessments** in conventional risk assessment and management practices, while new EO data and monitoring services are developed. Guidance for transparent **national inventory reporting** on LMTs can be feed into global initiatives (e.g. Global Stocktake of the PA).

1.2 Relation to the work programme

We directly address part b “Land-based mitigation” of the call LC-CLA-02-2019. With this proposal we aim to provide a comprehensive analysis of various LMTs at the global and regional level by learning from local LMT activities. We will apply a range of activities (section 1.3) to case studies (see Table 1).

Table 1: LMT solutions and proposed case studies

Land management (crop, grass & wetlands)	Forestry/ Agroforestry	BECCS
EU region and country focuses		
Spain: grasslands ¹⁴ ; Germany: wetlands & agriculture; Switzerland: organic farming, reduced tillage; Netherlands: livestock and grasslands ¹⁵ , wetlands ¹⁶ , paludiculture	Spain: Forest management in Extremadura; Spain & Portugal: mixed farming (forestry, live-stock grazing) in Dehesa & Montados; Netherlands: perennial and annual crops ¹⁷ ; Germany: forestry	Scandinavia: on-going municipal waste to heat and power ¹⁸
African region: East Africa (EA) and Sub-Saharan Africa (SSB) and country focuses		
EA: agriculture, pastoral land, soil erosion; SSB & Kenya: Integrated soil fertility management ¹⁹ ; Mozambique: cotton	EA: Afforestation EA: Agroforestry	
Asia: South-East and East Asia, Himalayan region (HR) & Mekong Delta (MD)		
Indonesia: wetlands, rice (Java); Compost and waste management (Bali); Nepal (HR): Agriculture	Nepal (HR): community forestry, conservation; Vietnam (MD): Forestry, highlands; Indonesia: agro-forestry, palm oil, agroforestry, palm coconut	
North America region and country focuses		
Canada: management of peatlands	Canada: forestry residue management	Canada: forestry residue USA: BECCS ethanol-based plant ²⁰
Community of Latin American and Caribbean States (CELAC) region and country focuses		
<i>Agriculture in:</i> Guatemala: Avocado; El Salvador: sugar cane; Costa Rica: pineapple; Venezuela & Colombia arable land	Amazon region: tropical forests management	

¹² For process base model see Olander et al (2011) Using Biogeochemical Process Models to Quantify GHG Mitigation from Agricultural Management Projects. Nicholas Institute for Environmental Policy Solutions Report NI R 11-03.

¹³ Hazeleger, W. et al. (2010). Bull. Am. Meteorol. Soc. 91, 1357–1363.

¹⁴ Through Operational Group Ecopraderas

¹⁵ Link with Soil Health North Netherlands project

¹⁶ Link with INTERREG projects ‘Carbon Connects’ and ‘CANAPE’

¹⁷ Link with LIFE project ‘Farm LIFE – Farming the Future – Building Rural Networks for Climate Adaptive Agriculture’

¹⁸ BECCS in Oslo: <https://www.fortum.com/media/2018/11/full-scale-carbon-capture-and-storage-ccs-project-initiated-norway>

¹⁹ Integrated soil fertility management for intensification of maize-based cropping systems in Kenya (Swiss NSF): <http://tinyurl.com/y6s3lsdu>

²⁰ The only full scale project from carbon capture to storage in in Decatur, Illinois: <http://tinyurl.com/y4g698mw>

LANDMARC will assess the *potential* and *effectiveness of LMTs* by employing a wide range of modelling tools in our *model system*. They will be used for projecting carbon stocks and GHG emissions from sinks and sources under different management systems and climate scenarios to identify effective mitigation options and construct optimal pathways. The project will further address environmental, social and economic *trade-offs* and *co-benefits* of LMT *as net sinks for GHGs* at the local and global scale across the medium to long term.

Our efforts will provide direct contribution to improving (inter)national spatially explicit monitoring systems by integrating sensing technologies of different scales, ranging from in-situ measurements to remote sensing and modelling. The project will further provide data for *improving methodologies for reporting emissions and removals* related to LMTs by providing consistent and detailed activity data on land use change and improved emission factors that countries can use for inventory reporting (i.e. from Tier 1 towards Tier 3).

We will also develop a *decision support tool* for policy makers and private actors to take informed and science driven decisions. The *climate vulnerability assessment* (objective 2) and the *co-benefit and trade-off assessment* (objective 3) for LMTs provide important insights on their implementation and realistic scalability (i.e. after considering their socio-economic constraints and weighing the benefits and disadvantages of large scale LMT implementation). This directly contributes to (inter)national climate policy (e.g. LMTs in NDCs). LANDMARC *will enhance international cooperation on monitoring and modelling systems* for assessing potentials and impacts of LMTs.

1.3 Concept and methodology

(a) Concept

LANDMARC assesses the **potential, feasibility and impacts of LMTs as net sinks** in the **AFOLU sector** by: a) **quantitatively assessing** environmental, social-economic, **co-benefits** and **trade-offs** identified through a suite of monitoring tools and model systems complemented by; b) **qualitative assessment** guided by **stakeholder engagement** to identify co-benefits and trade-offs that cannot be quantified. This **mixed-method approach** allows us to use a range of tools and to provide more **detailed insights at national levels** to represent a **range of different climatic zones** to support feasible **scaling up** of LMTs **globally**. LANDMARC is an **interdisciplinary** consortium with expertise from ecology, engineering, climate sciences, global carbon cycle, soil sciences, satellite earth observation sciences, agronomy, economics, social sciences, and business. Partners come from academia, SMEs, and NGOs from the EU, Africa, Asia and the Americas ensures a wide coverage of LMTs operating in different contexts (e.g. climates, land-use practices, socio-economic etc.).

Figure 1: LANDMARC project – Five key activities

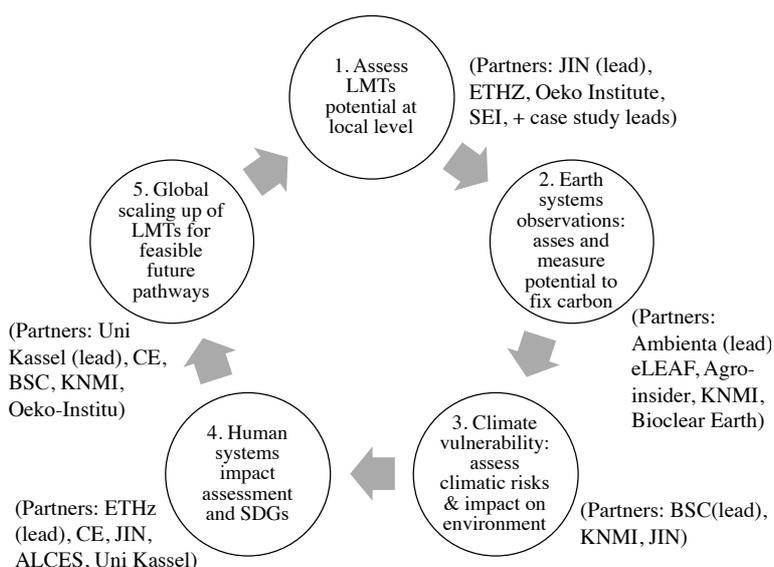


Figure 1 depicts the basic concept of LANDMARC with its five key activities. Activity 1 enables the assessment of the potential and impacts of LMTs at the local level, while activity 2 provides in-situ and satellite earth observation services. Activity 3 builds on that by generating new spatially explicit climate scenarios to assess the climate vulnerability of LMTs in the case study regions. Activity 4 expands the scope by also including land use and macro-econometric modelling to enable the assessment of co-benefits and trade-offs of LMTs at local, national and regional scales. Activity 5 adds to EO by running LMT scaling up scenarios at the global level through climate, land use and economic modelling. These activities are described in more detail in 1.3b.

Our tools and models (See Table 2) cover a wide spatial and temporal scale including in-situ and satellite monitoring

tools, climate models, land use models (local to global level) as well as a macro-econometric model and earth systems models with global coverage and projections to end of the century.

Activity 1: Assess LMT potential at the local level

This activity ensures proper engagement of LANDMARC with the local stakeholders working on LMT implementation and supports the execution of activities 2-5.

Component 1 (Stakeholder engagement and narrative construction): This component co-ordinates the collaboration with external case study stakeholders. Stakeholder engagement is an iterative process, that requires careful planning of communications and selection of participatory methods (e.g. system mapping, multiple-criteria decision analysis) to obtain the relevant inputs (e.g. data, training, co-development of narratives, and dissemination). This component supports the modelling work in activities 3-5.

Component 2 (Collecting complementary data): This component structures the gathering of complementary data from: scientific literature, databases and grey literature, and local/national data and information sources. The EO monitoring (activity 2) and modelling work (activities 3-5) require different sets of complementary data as inputs, including in-situ monitoring, land use/management, weather and socio-economic data. To streamline this process, an integrated data collection format will be developed and used by case study leaders to efficiently collect, exchange and interpret data/information. Where possible, new data gathered/generated will be shared on existing platforms (e.g. 'GEOSS in-situ EO resources' or open access publications).

Component 3 (Creation of (inter)national LMT learning & dissemination networks): This component will enable the establishment of a) *local LMT alliances*, b) an *EU-international LMT network*, and c) provide decision support to promote learning, knowledge diplomacy and policy strategy development. The LMT decision support platform integrates our tools, methods, results and lessons (from all components) to support policy and decision making for LMT implementation. The alliances will be set up by case study leaders and will link our activities with existing local LMT networks to enable learning as well as sharing data and methods. The network will also link to relevant EU and Horizon 2020 projects (e.g. Copernicus Climate Change Service, C3S²⁴, JoinData²⁵, CONVERGE²⁶) existing global platforms, such as GEOSS²⁷, the Global Centre on Adaptation (GCA)²⁸, the SDG knowledge hub and existing research initiatives.

Activity 2: Improving earth system observations

This activity takes the case studies and their stakeholders as a starting point and uses satellite and in-situ based earth observation instruments to monitor the impact of LMTs as net sinks at the local level. The information collected will improve our understanding of earth system dynamics, provide key information on the distribution and dynamics of GHGs, and quantitatively assess LMT impacts.

Component 1 (EO monitoring): Remote sensing technologies (e.g. radar and optical) provide historical and up-to-date operational data to establish the baseline and measure change at a wide range of spatial and temporal scales in order to measure LMTs and their impact as net sinks. For example, the new Copernicus Sentinel missions provides both radar and optical data at different spatial resolutions to: monitor vegetation characteristics including chlorophyll, water in leaf, biomass, biodiversity, structure; monitor land use (change), for instance anomalies alerts for invasive water species; model biomass production (GPP, NPP, etc) using Monteith type parametric models; quantify carbon stocks using radar; and monitor CO₂, CH₄, CO and NO_x emissions from space and other GHGs fluxes²⁹.

Component 2 (In-situ measurements): New and existing in-situ data will be collected to add to the inventory of EO variables and will have a strong geospatial component (what was measured where and when) to connect with the satellite data. It includes the following:

- Software/hardware for computer-aided field data collection, data processing & reporting for precise land use characteristics assessment and/or used with remote sensing (UAV, airborne, satellite) products.
- Land-use mapping methods: flexible database structure, field navigation, data validation, user-developed extensions, data processing tools (calculate missing tree heights, export to industry standard format etc.)
- Soil sampling with DNA next generation sequencing for soil biology, on top of soil chemical/physical analysis on carbon storage, fixation and mineralization in the soil, soil biodiversity, etc.
- Measurements of GHGs using Eddy Covariance techniques³⁰

²⁴ <https://climate.copernicus.eu/>

²⁵ <https://www.join-data.nl/?lang=en>

²⁶ <https://cordis.europa.eu/project/rcn/218230/factsheet/en>

²⁷ <http://www.geoportal.org/>

²⁸ <https://gca.org/home>

²⁹ Schwandner, F. M., et al (2017). Spaceborne detection of localized carbon dioxide sources. *Science*, 358(6360), eam5782.

³⁰ Refer to: <http://www.europe-fluxdata.eu>, European Eddy Fluxes Database Cluster, etc.

Component 3 (Calibration and validation of satellite-based emission estimates): The integration of in-situ and EO satellite data should result in a better understanding on the processes monitored by the satellite. A mixed, well-designed use of the monitoring and variable tracking systems of land-use management, offers great possibilities in transferring information in the field to variables that are required by the models (e.g. carbon storage capacities of soil and vegetation).

Component 4 (Measure the effectiveness LMT and improve current methodologies to estimate emissions): The effectiveness of LMTs in AFOLU sectors will be addressed by analysing EO satellite and in-situ data from existing and new sources and by using the process-based DayCent model. The importance of LMTs in contributing to soil carbon sequestration under changing climate is an innovative aspect of the project. We will use the time series of in-situ experimental data collected in the case studies (e.g., in long-term experiments in Kenya) to thoroughly calibrate this model and validate DayCent across a range of conditions. The dynamic model will subsequently be used for simulating the impact of LMT scenarios at the regional and national scale across a range of soils and climates representative of the particular region using approaches³¹. The regional models for LMT assessment will be developed by intersecting the spatial datasets with a GIS. This component enables a better estimation of (negative) emissions of LMTs and thereby LANDMARC will help countries to advance from Tier 1 level to Tier 2 and Tier 3 level inventory reporting for LMT activities. We will develop guidance and provide support for better GHG inventory reporting in relation to LMT actions based on the DG Clima- project, Transparent Monitoring³².

Activity 3: Assessment of climate vulnerability/risk and potential effectiveness

This activity will explore and analyse output from IPCC-class climate models to identify common projected patterns of climate risk and vulnerability for LMT activities. This will be supported by a more qualitative and participatory process that enables local case study stakeholders to perform better climate risk assessment and management for their LMT solutions.

Component 1 (Qualitative climate risk assessment): This component enables a participatory process where, together with local stakeholders (activity 1), a climate risk assessment will be performed. This (qualitative) assessment aims to highlight the main (perceived) climate vulnerabilities for LMT activities in their region. Component 2 will provide the scientific data and future climate scenarios to better understand the magnitude of climate risks. This feedback enables local stakeholders to make their LMT activities more climate-resilient. The aim is to better link climate risk assessment with the more conventional risk management practices, so that results from climate scenario modelling can be better considered by companies, societies and governments for informed decision making and strategy planning. This participatory process will follow for selected case studies the basic steps described in the Guidebook for Climate Vulnerability Assessment³³.

Component 2 (Spatially disaggregated climate vulnerability assessments): The analysis of climate vulnerability and risk of these regions will be based on the output of the models participating in The Coupled Model Intercomparison Project Phase 6³⁴. The activity will start from identifying areas that could potentially host large-scale LMTs implementations as net sinks based on information provided from activities 1 and 2. The analysis could detect, for example, regions that will experience: reduced rainfall and increase in extended drought periods and wild fires; increased risk of flooding; increased frequency of heat waves; increased frequency of extreme wind storms; and localized sea-level rise anomalies. We will evaluate the projected changes in SPI and SPEI as proxies for fire danger for those areas that could potentially host large-scale reforestation.

Activity 4: Human system impact assessment of LMT solutions and SDGs

We combine macro-economic models (E3ME) and (regional) land use change simulation models considering different climatic zones (LandSHIFT, DayCent, ALCES) to quantify socio-economic and environmental impacts of LMTs. Complementary local contextual data / information will be collected (activity 1). We use these models to assess the impacts (e.g. co-benefits, trade-offs and possible contribution to SDGs) of LMTs as net sinks also on human systems (e.g. economies, sectors), as well as environmental (earth) systems.

³¹De Gryze et al.(2011).Assessing the potential for GHG mitigation in intensively managed annual cropping systems at the regional scale.Agriculture, Ecosystems & Environment.144(1):p.150-58; Lee J.,et al (2012). Simulating switchgrass biomass production across ecoregions using the DAYCENT model. GCB Bioenergy,4(5): p.521-33; Lee J, et al(2015).Potential regional productivity and GHG emissions of fertilized and irrigated switchgrass in a Mediterranean climate.Agriculture,Ecosystems&Environment.212: p.64-74.

³² Carried out by Oeko-Institute: see <https://www.oeko.de/>

³³JIN is developing on behalf of the Netherlands Enterprise Agency; RVO) a guidebook for sustainable water projects that receive funding via the Netherlands Sustainable Water Fund (FDW).

³⁴The Coupled Model Intercomparison Project: see <https://www.wcrp-climate.org/wgcm-overview>

Component 1 (Qualitative assessment of co-benefits and trade-offs of LMT solutions): Supported with a range of participatory methods (e.g. scenario integration, soft systems methodology)³⁵, the case study stakeholders (activity 1) will be consulted to map anticipated environmental, socio-economic co-benefits and trade-offs of LMTs, considering local priorities and wider national goals and SDGs. Expected results can provide guidance to local/national governments for LMT implementation strategies (i.e. social acceptance).

Component 2 (Local land use and macro-economic modelling of LMT solutions): Based upon the (local) narratives developed (activity 1), and the qualitative assessment of co-benefits and trade-offs, specific phase-in trajectories (including investment, operational cost data as well as land use change dynamics) for LMTs will be developed for land use and macro-econometric modelling. The modelling in this component will mainly be done at the national and/or sectoral level. In order to properly develop and model the narratives and assess the co-benefits and trade-offs, we anticipate that a few model runs are needed. More complete scenarios will be developed based on feedback from stakeholder and the results will be used for wider regional a global LMT scaling in activity 5.

Activity 5: Upscaling of LMTs solutions to the global level

Based on insights from activities 1-4, global scenarios for the large-scale LMT implementation will be constructed and assessed regarding their mitigation and sequestration potential and effects on land use change. For this we will implement a model system that soft-couples a global land use model, an economic model and an earth system model. This model system will run a set of scenario simulations to provide new insights into LMTs' potential while considering future climate and socio-economic development constraints.

Component 1 (Development of a model system): We will develop a software framework to harmonize and to facilitate information exchange between the global land use model LandSHIFT, the economic model E3ME and the Earth System model EC-Earth (soft-coupling approach). LandSHIFT will be enhanced by a new model component to spatially allocate LMTs (e.g. afforestation areas) to suitable locations (based on case studies and considering climate change effects).

Component 2 (Develop LMT scaling narratives): Together with the case study leaders, the modelling team will jointly develop narratives for upscaling selected LMTs to the global level. The team will explore key socio-economic and environmental/climatic minimum requirements as well as constraints that have an influence on the regional and/or global scaling potential of LMTs.

Component 3 (Global LMT land use scenario modelling): Based upon the narratives from component 2, a set of global scenarios will be developed that combine assumptions of large-scale LMT net sink implementation worldwide with other SDG related targets such as nature protection and socio-economic development trends (e.g. based on SSPs). Any additional data that is required for modelling will be sourced from existing databases or will be collected by case study leaders, locally. Changing land-use patterns as a result of changing demands (e.g. food production and areas for LMT) and climate change (in this step without the potential effects of LMT) will be calculated with the model system developed in component 1).

Component 4 (Global LMT climate scenario modelling): The effectiveness of global scaling of LMTs must be assessed while taking into account climate change and variability. This will be done using the EC-Earth ESM that couples the physical climate to a complete description of the carbon cycle. EC-Earth will be feed with the results from the land use scenario modelling that include regional/global scaling of LMTs. These 'LMT-inclusive' climate scenarios provide input for policy makers to help meet PA goals and SDGs.

Component 5 (Implications for LMT policy making at different levels): This component will help convey results to policy making processes at local, national, regional (e.g. EU and climatic zones) and global levels. We will provide policy makers with stronger evidence to support existing or develop new LMT policies.

1.4 Ambition

LANDMARC deploys a combination of different EO monitoring technologies (satellite and in-situ) as well as a combination of land use, climate and economic models. We complement this with qualitative participatory methods to engage with relevant stakeholder groups (e.g. for co-development, risk analysis, data gathering and dissemination). LANDMARC starts with a LMT literature review, and assessment at the case study level. Next, it takes lessons and insights from these case studies to develop robust regional and global LMT scaling-up scenarios. The latter enables regional/global land use, economic and climate modelling that contributes to various economic and environmental assessments (e.g. IPCC global stocktake, IPBES, EU-level agricultural, climate and forestry policies) of co-benefits and trade-offs of LMTs and feeds into (inter)national policy frameworks (e.g. NDCs, SDGs).

³⁵ TdLab Toolbox, ETHz <http://www.tdlab.usys.ethz.ch/toolbox.html>

State of the art:

Combining in-situ and satellite data: Within LANDMARC activity 2, relevant in-situ data (e.g. vegetation, soil physical/chemical properties, etc.) from existing sources will be coupled with satellite data to further improve and validate EO algorithms.

Mainstreaming climate risk assessment in conventional risk assessment practices: Within activity 3 the climate vulnerability of LMT activities will be assessed qualitatively (with stakeholders) and quantitatively (with models). The main aim is to ensure that climate change risk assessments and the latest climate change scenario results are embedded into conventional risk assessment and management practices of actors.

Working at different spatial and time dimensions: The case study work is carried out on more limited spatial scales and the regional and global assessments have a wider spatial scale and time dimension. Because of their technical features, we anticipate possible mismatches between the different models that require tailored methodological fixes. Our modelling partners have extensive experience in addressing such challenges.

Co-development: LANDMARC will link participatory qualitative methods (and processes) with quantitative assessments, for land use, economic and climate modelling, as well as EO monitoring.

Beyond state of the art:

Coupling in-situ soil biology data with satellite data: In addition to the conventional soil physical and chemical analyses, LANDMARC will go beyond state of the art by coupling data about soil microbiology (based on next generation sequencing; DNA NGS) with satellite data on GHG fluxes, climate, soil management and vegetation. Soil microbiological properties can consistently predict processes of C and N cycling across land use systems and geographic locations, and in some cases can be better predictors of these processes than land use³⁶. By coupling soil biodiversity with global models, we will improve the accuracy of explaining soil-related GHG negative emissions.

Further development of EO data services: Development of new EO data and information services based on NPP (and GPP, etc) to provide information on carbon sequestration in vegetation which can be applied at field-scale but also scaled up to other areas or to the national or continental scale. The mapping of vegetation response helps (international) investments on carbon sequestration to (1) identify good projects (technologies/practices), (2) monitor project implementation, and (3) evaluate project impact.

Systematic integration of economic, land use and climate modelling along different spatial and time dimensions: The different types and classes of economic, land use and climate models used in LANDMARC often operate at different levels of spatial aggregation with different classification systems. For land use models, specific soil categories and land uses determine aggregation (e.g. LUH2), economic models aggregate based upon classifications of economic activity (NACE, ISO), while climate models tend to spatially aggregate areas with similar geophysical, weather and climatic conditions. Ensuring that data inputs and outputs from the three model classes are carried out robustly and transparently, LANDMARC will contribute to method advancements in furthering the integration of earth and human systems modelling.

2. Impact**2.1 Expected impacts**

In order to ensure that LANDMARC will meet the expected impacts of the call - in addition to the 5 key activities - a dedicated scientific coordination, communication, networking and dissemination strategy will be developed. With this LANDMARC will ensure that the outputs (results and findings) will be embedded in the relevant (inter)national networks and fora. LANDMARC will deliver contributions and will have impacts on *science*, *society* and *policy* throughout the five key activities. Table 3 lists LANDMARC'S main outputs and their expected impact in relation to this call topic (H2020-LC-CLA-2018-2019-2020, subtopic b).

The project results are expected to contribute to:

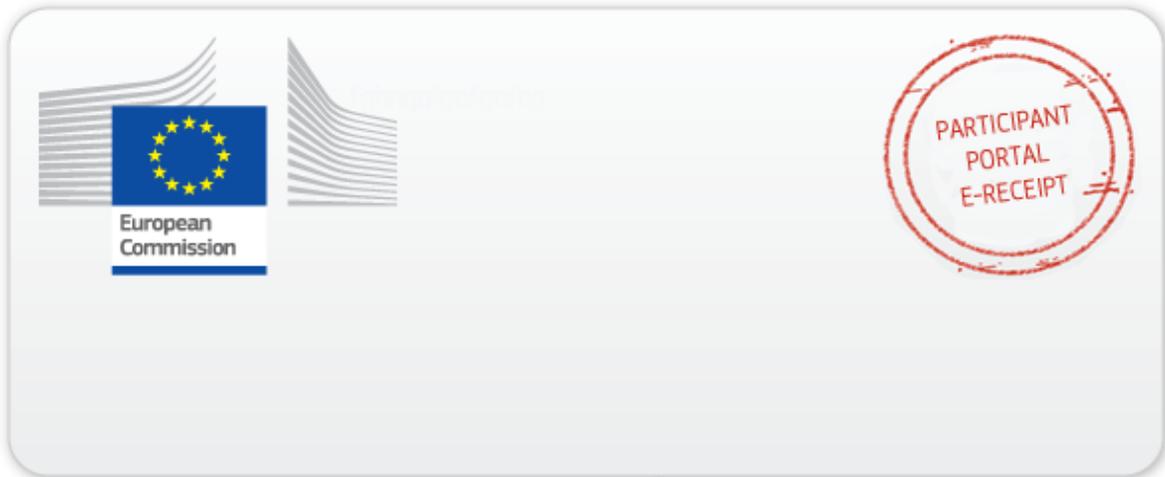
1. “Major international scientific assessments such as the IPCC reports and the IPBES [...]”;
2. Developing a comprehensive medium-to-long term vision and analytical framework on pathways to achieve climate neutrality [...]”;
3. Improved ex-post, spatially explicit monitoring of the mitigation performance of the land sector;
4. Enhanced international cooperation”

³⁶ de Vries, F. T. *et al.* (2013) ‘Soil food web properties explain ecosystem services across European land use systems’, *Proceedings of the National Academy of Sciences*, 110(35), p. 14296 LP-14301. doi: 10.1073/pnas.1305198110.

Table 3 LANDMARC activities and its expected impacts

				Main outputs	Impact description
1	2	3	4	Activity 1: LMT potential at local level	
				Establishment of local LMT assessment, learning and dissemination alliances (1 per case study)	Local LMT alliances at case study level are established to foster data/information/knowledge exchange of local and national actors with the LANDMARC consortium. These alliances will be linked to local fora and networks (e.g. national NDC platforms) and the international LMT network established by LANDMARC (below).
1	2	3	4	Activity 1: LMT potential at local level (continued)	
				Establishment of international LMT learning network (learning, capacity building, and knowledge/data sharing program)	The EU-international learning LMT network will establish linkages and clustering activities with other relevant EU/H2020 projects and international networks/platform (e.g. GEOSS, Global Centre on Adaptation, SDG knowledge hub) to ensure regional and global uptake of LMT related results, tools and methods from LANDMARC and other initiatives.
1	2	3	4	Activity 2: Improving earth system monitoring	
				Target area specific EO monitoring (in-situ, satellite) for LMTs	For the case studies, a dedicated EO monitoring program is set up with case study stakeholders to ensure higher reliability of (ex-post) LMT impact monitoring on e.g. quantifying the impact of soil carbon enhancement practices on LMTs GHGs fluxes (CH ₄ , CO ₂ , a& N ₂ O), and validation of satellite based EO services with in-situ data as well as trade-off estimates of LMTs (e.g. soil, biology, -physics and -chemistry, vegetation, water and atmosphere).
				Target area specific feedback reports on LMT effectiveness and environmental co-benefits and trade-offs (5 articles)	EO monitoring reports on climate effectiveness, and co-benefits and trade-offs in earth systems (food, energy, water, biodiversity, air quality) aid in better uptake of ex-post LMT impact monitoring as well as development of more feasible medium- to long-term LMT net sink strategies , as part of NDCs and PA climate goals .
				New EO data/information services for LMT solutions (2 novel EO services)	Calibration/validation of satellite based EO data with in-situ data, will enable further development of a) existing EO information services (PiMapping®, AGROMAP); and b) development of new EO information products and services for assessing LMT climate impact and other land use activities; ensuring that our findings will have lasting impacts on international efforts to provide food, energy, water security and combat climate change. Also, based on geoanalytical tools, we will offer our data and results to the community through (existing) public access (geo)portals.
				Improve methods to estimate (negative) emissions, for national inventory reporting	Move from Tier 1 up towards Tier 3 methods for LMTs to improve (negative) emissions estimates. Compare emission estimates of bottom up and top down models at the case study level and improve aggregated models for more accurate assessment of LMTs impacts.
1	2	3	4	Activity 3: Climate vulnerability assessment	
				Target area specific qualitative (participatory) climate risk assessments (in 10 case study regions)	Conventional risk management practices show that climate change related risks are not properly considered in land use related activities. Performing qualitative climate risk assessments with local actors helps to develop more robust sectoral or national adaptation strategies (NDCs) and embed climate change related risks more in ongoing risk management practices.
				Assessment of present and future climate vulnerability risk for geographically diverse large-scale LMT applications for project areas (10 reports and regional guidelines on developing adaptation strategies & 5 scientific articles)	Within the CMIP6 ensemble, the scenarios simulations and the suite of decadal projections will provide medium-term insights for decisions-makers. The vulnerability assessment at a region-specific level and time scales meaningful for stakeholders will help them to be more informed about the likelihood, severity and frequency of climate change risks. Region-specific climate risk analysis will also provide valuable input for regional and global scientific & impact assessments . Based on the assessments, we will develop regional guidelines to develop adaptation strategies to build resilience .

1	2	3	4	Activity 3: Climate vulnerability assessment (continued)	
				Climate risk management support; guidance + training for local LMT stakeholders (1 guidance document, 10 local training/support programs and 1 scientific article)	Ensuring that LMT actions remain effective over time and resulting in large net reduction of GHGs in the atmosphere, requires LMT solutions in different regions around the world (with different climate vulnerability profiles) to properly assess and apply ‘climate change proof’ risk management practices. These findings have direct relevance for <i>(inter)national level policies and strategies (e.g. NDC)</i> to make land based mitigation activities more climate resilient.
1	2	3	4	Activity 4: Human system impact assessment	
				Qualitative (participatory) assessment of socio-economic and environmental co-benefits and trade-offs for LMT (in 10 case study regions)	These assessments enable LMT proponents and other societal stakeholders to evaluate and weigh the advantages (co-benefits) and disadvantages trade-offs) relative to the other. This provides the basis for discussions of LMT solutions at the national level (NDCs) and as such provide input for <i>informed investment and policy decision making</i> for climate action and meeting wider regional (EU climate policy) and international (1.5°C, SDGs) goals.
				Target area specific reports from macro-economic and regional land-use modelling on (socio-economic and environmental) co-benefits & trade-offs of LMTs 10 non-expert result reports + info material and 5 scientific articles)	The qualitative assessments are supported by scenario modelling. A combination of macro-economic and (regional) land use models (e.g. E3ME, LandSHIFT, ALCES, DayCENT) are used to assess a range of (quantifiable) impacts resulting from the expected implementation trajectories for LMTs at the sectoral or national level. The results will enhance the regional understanding of trade-offs and co-benefits (e.g. competing (economic) land uses) to assess the viability of LMT strategies as part of NDC and SDG policies. Associated scientific publications contribute a) to <i>developing new mid- and end century policy strategies</i> and b) to <i>(inter)national scientific assessments</i> .
1	2	3	4	Activity 5: Upscaling of LMTs to global level	
				Regional / global LMT technologies scaling narrative reports (4-5 background reports with data/information)	Based upon the insights gained in LANDMARC and case study qualitative <i>narratives</i> as well as <i>boundary conditions for global upscaling of LMTs</i> . Narratives will be prepared to enable global land use change and climate scenario modelling. Preliminary results will be validated in different for (e.g. scientific conferences, workshops, in the LMT alliances).
				Results / reports from land use, and economic modelling for LMT solutions at the global level. (4-5 scientific articles) to estimates the global technical potential of selected LMTs	Associated journal articles will contribute to <i>(inter)national scientific assessments (e.g. IPCC AR6, IPBES)</i> and impact assessments on earth system and human system dynamics and provide land use scenario modelling results on regional/global net GHG impact of LMT solutions and quantified results on expected co-benefits and trade-offs from LMT in terms of e.g. food, water, energy security and biodiversity.
				Results from climate change scenario modelling for LMT at the global level, (4-5 scientific articles) support a more feasible assessment of the effectiveness of LMTs in light of increasing global climate variability and possible feedbacks	Associated articles will contribute to <i>international scientific assessments on earth system and human system dynamics</i> and provide climate scenario modelling results on regional/global net GHG impact (i.e. potential) of LMT solutions and quantified results on expected co-benefits and trade-offs from LMT in terms of e.g. food, water, energy security and biodiversity. This work will contribute to the science of future climate scenario modelling (i.e. IPCC ARs) as well as future policymaking for LMT deployment.



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