D5.2 e.s. Guide on the financial social and technical aspects of the sustainable development of MLs, and report on the potentialities of emerging stock exchange markets for carbon transactions and proposed policies. Executive summary

***MAIL**:* Identifying Marginal Lands in Europe and strengthening their contribution potentialities in a CO2 sequestration strategy

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Editor	Dzhaner Emin (IABG), Charalampos Georgiadis (AUTH)
Authors	Charalampos Georgiadis (AUTH), Fernando Bezares Sanfelip (CESEFOR), Zoi Touloudi (AUTH), Francisco Gallego (CESEFOR), Vassilios Tsioukas (AUTH)
Contributors	All Project Partners
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[1] **R** = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other

[2] **PU** = Public, **PP** = Restricted to other programme participants (including the Commission Services), **RE** = Restricted to a group specified by the consortium (including the Commission Services), **CO** = Confidential, only for members of the consortium (including the Commission Services).

MAIL CONSORTIUM

Aristotle University of Thessaloniki (AUTH) Greece	Industrieanlagen Betriebsgesellschaft MBH (IABG) Germany
Gounaris N. – Kontos K. OE (HOMEOTECH) Greece	Centrum Badan Kosmicznych Polskiej Akademii Nauk (CBK PAN) Poland
Universitat Politecnica de Valencia (UPV) Spain	Fundacion Centro De Servicios Y Promocion FOrestral Y de su Industria De Castilla y Leon (CESEFOR) Spain

ABBREVIATIONS

Term	Explanation
AAUs	Assigned Amount Units
ACCUs	Australian Carbon Credit Units
AEA	Annual Emission Allocations
AFOLU	Agriculture, Forestry and Other Land Use
ARR	Afforestation, Reforestation, and revegetation
ARP	Afforestation/Reforestation Project
CAP	Common Agricultural Policy
CAT	Climate Action Tracker
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CEC	Cation-Exchange Capacity
CEE	Central Eastern Europe
CER	Certified Emission Reduction
DEM	Digital Elevation Model
DOE	Designated Operational Entity
DOP	Domestic Offset Projects
DG CLIMA	Directorate General for Climate Action
DG JRC	Directorate
EAFRD	European Agricultural Fund for Rural Development
EC	European Commission
EFFIS	European Forest Fire Information System

EIAH	European Investment Advisory Hub
ER	Emission Reductions
ERDF	European Regional Development Fund
ERUs	Emission Reduction Units tone of CO2
EU	European Union
EUAs	European Union Allowances
EU ETS	European Union Emission Trading System
FAO	Food and Agriculture Organization of the United Nations
FCPF	Forest Carbon Partnership Facility
FISE	Forest Information System for Europe
FMP	Forest Management Plan
GDP	Gross Domestic Product
GEE	Google Earth Engine
GFCF	Gross Fixed Capital Formation
GHG	Greenhouse Gases
GS	Gold Standard
GSD	Ground Sampling Distance
GVA	Gross Value Added
HESC	Human Environment
ICAP	International Carbon Action Partnership
ICAO	International Civil Aviation Organization
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change

ITEA	International Emissions Trading Association
ITMO	Internationally Transferrable Mitigation Outcomes
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation of Nature
JI	Joint Implementation
JRC	Joint Research Centre
LAU	Local Administrative Units
LCl	Labour Cost level
LULUCF	Land Use, Land-Use Change and Forestry
MDG	Millennium Development Goals
MSI	Multispectral Instrument
MRV	Monitoring Reporting Verification
MtCO2e	Metric tons of carbon dioxide equivalent
NDC	Nationally Determined Contributions
NE	North Europe
NGO	Non-Governmental Organization
NWG	Non-Wood Goods
NWP	Non-Wood Products
OECD	Organization for Economic Co
PAP/RAC	Priority Actions Programme/Regional Activity Centre
PDD	Project Design Document
PEBLDS	Pan-European Biological and Landscape Diversity Strategy
PES	Paid for Ecosystem Services

PoA	Program of activities
PVC	Plan Vivo Certificate
QA/QC	Quality Assessment/Quality Control
RBCF	Results-Based Climate Financing
REDD+	Reduce Emissions from Deforestation and forest Degradation
RMU	Removal Units
SBSTA	Subsidiary Body for Scientific and Technological Advice
SDGs	Sustainable Development Goals
SE	Southern Europe
SFM	Sustainable Forest Management
SoEF	State of Europe's Forests
SWD	Staff Working Document
tCO2e	Tonnes of carbon dioxide equivalent
TOA	Top Of Atmosphere
UN	United Nation
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nation Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests
USDA	United States Department of Agriculture
WCED	Western Cape Education Department

VCS	Verified Carbon Standard
VCU	Verified Carbon Unit
VER	Verified Emission Reduction
VVB	Validation and Verification Body
WE	Western Europe
WWF	World Wildlife Fund

CONTENTS

EXECUTIVE SUMMARY

This document is a guide to the financial, social, environmental and technical aspects of Marginal Lands (MLs) sustainable development. Its purpose is to identify and analyse the indicators and aspects of sustainable development of MLs and to suggest development strategies to increase the carbon sequestration capacity in marginal lands. The second half of the document (Chapter 12 onwards) describes the potentialities of emerging stock exchange markets for carbon transaction and proposed policies There is plethora of definitions about sustainable development as well as definitions related to forest and carbon sequestration. Furthermore, criteria and indicators for forest sustainable management are listed. European guidelines for afforestation and reforestation and European and international programmes for Carbon Emission trading are described.

In order develop a methodology for assessing sustainable development of MLs as carbon sink, the selection of a suitable area for a carbon sequestration project is required. This area should be refined and the eligibility of the area should be assessed. Following the eligibility assessment, a final sustainability analysis should be conducted to determine whether the chosen location can be used to undertake a carbon sequestration project and create a long-term management strategy. The technological, financial, social, and environmental aspects of the project's implementation must be considered in the final assessment and management plan. The technological component encompasses all parts of the sustainability assessment and management plan, giving insight and tools to aid in the design and implementation of a sustainable management plan.

An Economical afforestation model is developed in this task based on specific factors indicating a European average price of 11,000 euros for planting one thousand trees in one hectare.

Moreover, a temporal analysis of the sustainability variables using Eurostat as the database reference to reflect those key variables was undertaken. Once related each variable with a dataset we evaluated the evolution of each variable/indicator over time for four European regions: Northern Europe, central- Eastern Europe, southern Europe and Western Europe.

Concerning the strategies for increasing carbon sequestration, the forest plantation should occur in the correct area. The land cover, the geomorphology and the soil

properties are some of the factors that should be considered. The species selection is also a critical strategy to consider as well as the long-term management and the monitoring of the afforested area.

Giving a price on the effects from the use of fossil fuels releasing CO_2 and other greenhouse gases (GHG) into the atmosphere was one of the most important actions of the United Nations (UN) joint action to tackle the problem of global warming. International conventions, notably the Kyoto Protocol and the Paris Agreement, have established the foundations for the principle of recording both GHG emissions from large industrial installations and many polluting human activities in order to be offset by their absorption from the natural environment processes and mainly from forests.

Experts have set the goal of reducing the planet's temperature by 1.5^{o}C compared to a past reference year, and most parts of the UN have accepted their responsibility. The first steps to tackle Climate Change were carbon pricing. Climate Change cannot be mitigated unless the economic consequences of offsetting the negative impact of fossil fuels is not calculated. Thus, any process that produces CO_2 emissions must record what amount (in absolute values) of CO_2 or other GHG generates in order to be sequestrated by Offset Projects. One such action is tree planting but not so simplistic as it seems. Carbon markets were created to trade CO_2 emissions or in other words allowances to produce CO_2 emissions equal to those sequestrated from the atmosphere by other procedures. These procedures (Carbon Offset Projects) can therefore permit emissions and can be investment or ecological actions such as tree planting. Reforestation that mitigates CO_2 emissions can be applied to Marginal Lands.

The latter part of this document (MAIL Task 5.3 Chapter 12 onwards) deals with existing carbon markets. The carbon markets are divided into two categories. The compliance or obligatory and the voluntary markets. The compliance markets began after the Kyoto Protocol and the first to be created with the most significant emission rate covered is the European Trade System (ETS). The operation of markets is based on cap-and-trade concept. Each industry or polluting entity has a cap for a certain amount of emissions and if it exceeds this cap, they must purchase the respective allowances from someone else who has not exceeded their allowances. In case of non-compliance, the state imposes fines. The operating conditions of the markets vary from country to country, as well as the cost of a metric unit which is a ton of equivalent CO_2 (tCO_2e). The prices for 1 tCO_2e is varying among the separate public entities who are running the markets. The

average price for 1 tCO_2e is currently about 14.51€/tCO_2e and at the last update of September 2021 the price was 64,32€/tCO_2e (ICAP,2021). Specialists from all around the world have calculated that the price of 40$/$tCO_2e$ is the minimum to achieve the Paris Agreement reduction of the temperature by 1.5^oC. It is described below the concept of Carbon Offset Projects as well as the Kyoto Protocol mechanisms that were created to apply carbon trade to other regions. Countries not belonging to the European Union could not participate in ETS, therefore other CO_2 trading mechanisms had to be created. One of them and very effective was the Clean Development Mechanism (CDM). It operated under the Kyoto Protocol and many of the CO_2 absorption programs involved forestation of Marginal Lands. The Joint Implementation (JI) Mechanism it has also similar characteristics but involving countries from the former Soviet Union.

Apart from compliance markets, there are also the voluntary markets which involve companies that were not obliged to but invest in Offset Projects to mitigate their CO_2 emissions. Usually, the obtain a certificate of environment friendly company. The voluntary markets are numerous, and many financial organizations publish annual reports on them giving their CO_2 trade volume and tCO_2e price. This report is dedicated to the description of the European Trade System (ETS) and the future mechanism of EU which is the Effort Sharing mechanism and its connection with LULUCF. It is also dedicated to accounting standards of CO_2 emissions and allowances and is devoted to public offset projects that are operating in Germany, Spain, Greece and Poland and private offset projects (mostly applying voluntary accounting standards). This report gives other actions that cannot be categorized as compliance or voluntary markets but can be combined with Carbon Offset Projects. Carbon Offsetting and Reduction Scheme for International Aviation - CORSIA is one such major initiative that will begin its operation in the near future and will cover emissions from the international aviation sector. These actions are not directly referred to the Marginal Lands but they can be related to them and moreover these private initiatives show the current trend. The process of a project's integration into the voluntary carbon market is described as well as the role of stakeholders in the project from the development to implementation, and the steps and stages that the project must go through to enter the carbon market.