

# Soil Carbon Accumulation and potentials for Carbon Trading







### 01

Relevance of soil carbon accumulation ( $e_{sca}$ )

## 02

 $\mathbf{e}_{\text{sca}}$  in the EU regulatory framework

### 03

ISCC on  $e_{sca}$ 

## 04

Potentials of soil carbon accumulation in the carbon offsetting market

"Soil is a major carbon storage system, essential for sustainable agriculture and climate change mitigation. Embracing sustainable practices for soil management is key to realize the full potential of soils for carbon sequestration (...)"

United Nations, Word Soil Day 2017

The REDII and the COM 2010/C 160/10 set the legislative framework to account GHG savings due to soil carbon accumulation

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THE ELIM FLAN UN Harting r skry, and damoof is Harting r	on the premotion of the use of energy from re- reputing Discoverse Size (For with II) ONLY PARLIMENT AND THE COUNCIL OF THE LURO- DY, and to the Trany enablishing the European Commo- in- panticular Analis 17(1) thread and Analis 49 endation to Article 17, 18 and 19 of this Dencities,	newable Hi(77)EC EA releva	sources and a and 2009/30/E not) reduce its depe not, in which th acute, and infi-	ngar best eshanol wheat oshanol (process fiell not specified) wheat oshanol (lights at process fiel in CHP plant) wheat oshanol (totatal gas as process fiel in contex bolist)	61 % 52 % 52 %	52 % 16 % 16 %
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THE ELB PLAN LN Harting 7 hity, and thansof is Harting 7	OTANY PARLIARENT AND THE COLOCIL OF THE ILIBO- OTAN PARLIARENT AND THE COLOCIL OF THE ILIBO- rationale Article 1710(1) thread, and Article 91 relation to Article 17, 18 and 19 of the Denoting.		reduce its depe sor, in which th acute, and infli	wheat othanol (lignite as process feel in CHP plant) wheat othanol (natural gas as process feel in conver- bolics)	32%	16.5
THE EUR PEAN EN Harring 1 nity, and thereof is Harring 1	OPLAN PARLIARDET AND THE COLDER, OF THE LURO- CON, gand to the Theory establishing the European Commu- in particular Atticle 17(1); thereof, and Article 95 relation to Articles 17, 18 and 19 of this Direction,		reduce its depe too, in which th scatte, and infli	wheat ethanol (natural gas as process fuel in conver- boller)		
Having r nity, and thereof is Having r	rgant to the Treasy establishing the European Commu- im particular Atricle 175(1) thereof, and Atricle 95 relation to Atricles 17, 18 and 19 of this Directive,		stars, and one		nomai 43 h	1
thereof is	relation to Articles 17, 18 and 19 of this Directive,			wheat othanol (natural gas as process fied in CHP plant	515	
Staring 1		101	The opportun	wheat orhanol (straw as process fud in CHP plant)	67X .	0
	rgard to the proposal from the Commission,		policy have be renewable sour	corn (maize) ethanol, Community produced (natural ; process fuel in CHP plant)	an	
Horing 1 Social Co	rgard to the opinion of the European Economic and manifese (%).		and medium-o for growth an	sugar care othanol	. 80	71%
Staring a	gard to the opinion of the Committee of the Regions (%).		and local prod bring about in important. The	the part from renewable sources of ethyl-re- (ETH)	N 1 March	nel production pathway
Acting in of the To	accordance with the procedure laid-down in Article 211 nety (%		surve in those , tices in produ-	the part from renewable sources (CAE)	equal to that of the other used	nei production pathway
			promote the u	tape and bindend	45.%	38 %
N DEFILLS				sufferer ha	58.75	51.5
<ol> <li>(1) 11 in</li> </ol>	e control of European energy consumption and the reased use of energy from tenewable sources, together	10	When favourin	sophean bisale	40 N	31 %
50	with energy savings and increased energy efficiency, con- stitute important parts of the package of muscules model to indice generalized gas emissions and comply with the Ryoto Protocol to the United Nations Francework Conven- tion on Clinaux Change, and with further Community and international generalized are emission reduction commit-		positive impact	pain of biodiced specified	36 %	19.%
10 82			ment opportu-	pains oil biodiesel (process with methane capture at oil	mil) 62%	56 N
in			marpenant ti	waste vegetable er animal () oll biodiesel	88.55	83 N
1	it to play in promoting the security of energy supply.		the sector of the	hydromunad wegetable oil from rape seed	\$1.%	47 %
P	omoting secturological development and innovation and ording opportunities for employment and regional	00	In order to no Community an	hydrotocated vegetable oil from sunflower	65 %	62.%
4	velopment, especially in rural and isolated areas.		be closely links	lipibotesatol segatable oil from palm oil (process not spe	offed) 40%	26 N
(2) In in	particular, increasing technological improvements, centives for the use and expansion of public transport, a use of ensure efficiency technologies and the use of	10	h is second.	hydrotecaned vegetable of from pulm oil (process with ane capture at oil mill)	meth- 63 %	65 %
67 10	mergy from somewable sources in transport are some of the most effective tools by which the Community can		mercialisation technologies. T	pure vegetable oil from rape seud	58 S	37 %
() Opini	n of 17 September 2008 (OJ C 77, 31.5.2009, p. 43).		duction has ma emergy sources	biogas from municipal organic wante as comproved a gas	unual 80%	73%
Cl C 121, 19.12.2008, p. 12. Shorw transp     Cl Opinion of the European Barlament of 17 December 2008 (see yes     So		biogas from wet manure as compressed natural gas	84 N	81 N		
2009	and in our course proved and counce counsel of a April		and creating jo	biogas from dry manure as compressed natural gas	86 %	82 N

#### **Renewable Energy Directive (EU 2018/2001)**

#### EC Communication on the practical implementation of the EU biofuels and bioliquids sustainability scheme (COM 2010/C 160/10)

Communication from the Commission on the p biologuids nostainability scheme a	eractical implementation of the EU nd on counting rules for biofuels	ANNEX II				
(2010)C	160(02)	Medicately an exterior methods are investigated at the				
		Methodology to calculate provisione gas impact; further elements				
1. THE EU SUSTAINABLITY SCHEDE FOR BOPLES AND BIOLIQUEDS	2. are used for compliance with gations (%)	Emission saving from soil carbon accumulation via improved agricultural management (Annex V, part C, point 3)				
With the EU's new renewable energy policy the EU has	0.01202.020	"improved agricultural management" could include practices such as				
introduced the most comprehensive and advanced binding metalishility scheme of its kind accurates in the world, h	3. receive financial support for their	- shifting to reduced or zero-tillage				
will apply equally to domestically produced and imported biofaels and bioligaids. These sustainability criteria are set out		improved crop rotations and/or cover crops, including crop residue management				
in the Renewable Energy Directive, adopted in 2009 (%). For biofada, communications othering and and in the End Challey	4, are counted towards the target of	- instead feeling or manual management				
Directive ().	for reducing greenhouse gas emit	- improve measure of manufernese,				
		use of soil improver (e.g. composi).				
This Communication sets out how Member States and	5. receive investment and/or operat					
economic operators can implement the sustainability otheria and the Renewable Energy Directive's counting rules for	the Community pudelines on 5 protection (biofuels only) (7):	Entiteion surings from such improvements can be taken into account if pre- increased, or solid and verifiable evidence is provided that it can reasonable and the solid and verifiable evidence to provide that it can reasonable and the solid sector of the pre-				
biofuels in practice. This Communication has no binding character. It is designed to assist Member States and to facilitate		in which the new materials concerned were californial ().				
a consistent implementation of the sustainability criteria. It is	6. are taken into account under the					
default values and by Commission guidelines for the calculation	fuel vehicles of the Regulation of (EES) bioschussel collet (%).	The emission surings in terms of g CO2-ogM cost and an indicated in point 7 of method, welfstigs the distance 200 he the seried				
of land carbon stocks.	(int 111)					
	This Communication is accommunical	California point 6				
1.1. Introduction to this Communication	for the calculation of land carbo	The inpun/variables that offeren and the second				
The sustainability criteria apply to biofaels,bioliquids produced	Renewable Energy Directive; and	N <sub>1</sub> O emissions from the second secon				
in the EC and to imposite instantification	voluntary schemes and default value					
Nuclear Research for a first section of the section	The Commission of the second	The methy atoms - as an alternative to actual values - for the use of averages for smo				
ability criteria are not when biofuels/bioliquide.	Energy Directive to refer to spec	grographical control of the decaderion of the default values. The default values were (with one exception calculated for the decaderion of the UL, the Directive places restrictions on their use. These restrictions				
	indicates where corresponding pr found in the fuel Quality Dire	operate at the lob and ATS 2 areas (5. B scenss to follow that within the EU; the averages should be for NUTS 2 areas for a more fine-proceed level. A similar level would logically also be appropriate outside the EU.				
t an anna anna dha anna tha anna an ta ta	Communication to the Directive					
<ol> <li>are counted towards they reservane energy targets under the Renewable Energy Directive (%);</li> </ol>	corresponding provision, they apply	N.O. emission linear fit				
Table Acticles and Anneres art	and as in this Communication	An appropriate way to take into account NAO emissions from softs is the IPCC methodology, including w				
		described there as both idence and indirect N <sub>2</sub> D emissions (% All three IPCC tiers could be used by economic operate. Ther 3, which others on detailed measurement and/or modelling, serving more relevant for the calculation of vegin				
Reservable Unergo Devatore	Bud Quality Dimense	cultivation values (cf. Section 3.3 of this Communication) than for other calculations of actual values.				
Article 2: Definitions	not included					
Article 3: Calculation of the share of energy from	not included	Land use change (points 7 and 10)				
		Land-use change should be understund as referring to changes in terms of land cover between the six land categories us by the IPCC (forest land, gravuland, cropland, wedands, seriements and other land) plus a seventh category of perent				
Article 17: Surainability criteria for biofuels and biologida	Article 7h: Summinability criteria for biofast	coups, i.e. multi-annual crops whose stem is usually not annually harvested such as doort sotation coppies and radm P. This means, for mample, that a change from president to created in a heat-one change, while a change from president as complete a solution of the solut				
		from one crup jusch as mainty to another (such as raproted) is not. Cropland includes fallow land its, land set for one or around more being chinese distance distance of monocomment of monocomment.				
() Article 17 of Directive 2004(1880)	(*) Article 17(1)(b): As defined in Article Directive.	input practice is not considered land-use change.				
(1) Article 76 of Directive \$10/70/EC as amended by Directive 2009/10/EC	(7) Article 17(2)(4). Typically as part of P5 Article 24 of the final Quality Di-	(7) Wassements of oil others are constitute such endered, e.g. by a first measurement in phones of the coloration and advance				
(7) Article 127(104). Following from the acope of Youd marger	() () ( 82, 1.4.2008, p. 1.	ones at regular intervels several years spart. In such case, before the second measurement is available, morease in sed carbon wood estimated using a relevant scientific basis. From the second measurement serverade, the measurements would constitute the basis				
bioluch used in international aviation (when sold in a Member	(5 GL 111, 17,6,2010, p. 18.	determining the estimates of an increase in soil carbon and its magnitude. (1) Article 19(2) and (2), These regions are specified in Annes 1 in Regulation (0C) No 1019(2003, Interactive maps of the regions				
start, on on it mentations matters transport.	C is one holds a on one concern instance.	avalidite at http://www.puirestationscituteshone.epione.elution/ (*) CL 2004 IPCC guildines for National Generalizate Gas Investments, Yulante 4, Chapter 11 detty://www.puireggipi.ges.or.jp/jod				
		200mgladil4 Valame4V4 11 Ch11 N20AC00.48				

## REDII Annex V provides the GHG calculation formula where **soil** carbon accumulation ( $e_{sca}$ ) is accounted as GHG savings

$$E = e_{ec} + e_l + e_p + e_{td} + e_u - e_{sca} - e_{CCS} - e_{CCR} - e_{ee}$$

- **E** Total GHG emissions from supply and use of the fuel (in g CO<sub>2eq</sub>/MJ)
- **e**<sub>ec</sub> GHG emissions from the extraction or cultivation of raw materials
- **e**<sub>I</sub> Annualized (over 20 years) GHG emissions from carbon stock change due to land use change
- **e**<sub>p</sub> GHG emissions from processing
- etd GHG emissions from transport and distribution
- **e**<sub>u</sub> GHG emissions from the fuel in use (shall be taken to be zero)
- **e**<sub>sca</sub> GHG emissions savings from soil carbon accumulation via improved agricultural management
- **e**<sub>ccs</sub> GHG emissions savings from carbon capture and geological storage
- **e**<sub>ccr</sub> GHG emissions savings from carbon capture and replacement
- eee GHG emissions savings from excess electricity from cogeneration

Source: Renewable Energy Directive (2009/28/EC) and RED recast (2018/2001/EU)



## Improved agricultural management practices leading to soil carbon accumulation, as defined by COM 2010/C 160/10



• Shifting to reduced or zero tillage



 Improved crop rotations and/or cover crops, including crop residues management



Improved fertilizers or manure management



• Use of soil improver (e.g. compost)



# **Requirements for claiming** GHG emissions savings from soil carbon accumulation via improved agricultural management ( $e_{sca}$ )



- e<sub>sca</sub> can be claimed if evidence is provided that:
- agricultural management practices potentially leading to soil carbon accumulation were adopted after January 2008,
- those are implemented in best practice, so that an increase in soil carbon can be expected over the period in which the raw materials concerned were cultivated,

Measurement of soil carbon could also serve as **additional** evidence.



# The carbon stock (CS) associated with reference $(CS_R)$ and actual $(CS_A)$ status is influenced by **different soil factors**\*



In the  $e_{sca}$  calculation, 3 options are possible to determine carbon stock:

1. Use of standard values of IPCC(2006) guidelines approach

#### **2.** Field measurements

 Other appropriate methods, provided that they take into account climate, soil type, land cover, land management and inputs (e.g. modelling + field measurement)



The Commission Decision 2010/335 gives further guidance for the definition of soil factors in calculating carbon stocks

### **Requirements and restrictions** for applying e<sub>sca</sub> savings under ISCC

#### ISCC Recent Sytem Updates

- e<sub>sca</sub> emissions savings have to be calculated as actual values mirroring what happens in the field (i.e. individual farm level).
- The actual values <u>cannot</u> be calculated by averaging emissions values of farmers who use e<sub>sca</sub> with farmers who do not use e<sub>sca</sub>.
- Regional approach is not allowed.
- Carbon Stocks (CS<sub>R</sub> and CS<sub>A</sub>) must be verifiable and can be determined:
  - Using IPCC standard values.\*
  - Via calculation approaches other than IPCC, but a report with the complete calculation methodology must be provided to the ISCC. When field measurements/modelling methods are used, the first field measurement defines CS<sub>R</sub> and CS<sub>A</sub> is measured periodically.
- **Reference** Carbon Stock (CS<sub>R</sub>) **must be set before** the improved agriculture management is applied.

https://www.iscc-system.org/update/10-march-2021

\*ISCC System Document 205 "Greenhouse Gas Emissions"

## ISCC is developing a Guidance Document for the Calculation and Verification of Emission Savings from Soil Carbon Accumulation



#### Main issues tackled in the upcoming ISCC Guidance

- Extended general provisions
- **Recommendations** to calculate e<sub>sca</sub> as **actual values**.
- Requirements and restrictions to IPCC approach to determine carbon stocks and respective changes
- Detailed recommendations on how to conduct field measurments on representative soil sample, to determine carbon accumulation in soil
- Requirements for the use of field measurements combined with soil modelling (still to be confirmed)
- Guidelines for forwarding and verifying e<sub>sca</sub> values

## Work in progress...



#### The carbon compensation or offsetting

- Carbon compensation is a policy instrument to enhance sustainability by reducing GHG emissions
- Carbon offsetting means buying carbon credits from emissions reduction/prevention projects in one location, in order to compensate for an equivalent amount of emissions in another location



## Sustainable agriculture and forestry projects have currently a great potential for carbon offsetting. Many of those focus on **soil carbon accumulation**

	General requirements*							
Project types Agriculture, Land management, agroforestry	Additionality	Verifiability	Avoidance of double counting	Effective	Prevention of leakage	Not harmful	Legal	
Improved agricultural practices for soil carbon accumulation								
- Improved crop rotation schemes (e.g. differentiation of crop patterns)	х	х	х	х	Х	х	х	
- Introduction of cover crops	х	х	х	х	х	х	х	
- Measures to prevent/reduce soil erosion	х	х	х	х	x	х	х	
- Measures to improve soil fertility	х	х	х	х	х	х	х	
Measures to improve soil health and soil biodiversity		х	х	х	х	х	х	
- Improved management of agricultural residues (e.g. no removal, no burning)	х	х	х	х	х	х	х	
- Switch to zero/reduced tillage	х	х	х	х	х	х	х	
Sustainable and climate smart agricultural practices								
- Practices that increase the resilience of farming systems			х	х	x	х	х	
- Measures to improve water use efficiency			х	х	х	х	х	
- Introduction of resistant crop varieties			х	х	х	х	х	
Sustainable Agroforestry								
- Increase forest cover of non-forest land	х	Х	х	Х	х	Х	х	

\* As defined by the most diffused Standards on the market



Any other ideas? Please contact us!

## ISCC is investigating on a **carbon trading platform** focusing on the voluntary market and allowing GHG emission compensation



The **functions** of a carbon trading platform are:

- Buying carbon credits directly from project developers
- Selling carbon credits to the interested stakeholder
- Ensuring that ecosystem services provision and biodiversity conservation are addressed by carbon offsetting projects
- Providing additional functions to support and promote emission reduction (e.g. carbon footprint calculation, needs of carbon credits estimate, etc)

ISCC is looking for partners to conduct pilot projects





### Many thanks for your attention!



Meo Carbon Solutions GmbH Hohenzollernring 72, 50672 Cologne, Germany Email: bulgheroni@meo-carbon.com

