



European
Commission

Horizon Prize

CO₂ REUSE

RULES OF THE CONTEST



1. THEME: HORIZON PRIZE FOR CO₂ REUSE

1.1 Objectives pursued

Preventing dangerous climate change is a key priority for the European Union (EU). The EU is committed to reduce its greenhouse gas emissions by 20% by 2020 and by 40% by 2030 compared to 1990 levels. Europe is working hard to cut its greenhouse gas emissions substantially while encouraging other nations and regions to do likewise. The EU has adopted a robust set of policies to promote renewable energy, energy efficiency and low carbon technologies such as carbon dioxide capture and storage. Carbon dioxide utilisation (CDU) technologies can also play a role in delivering Europe's climate change objectives, by using anthropogenic carbon dioxide (CO₂) as a feedstock in making industrial and consumer products, such as chemicals, building materials and substitute fuels. This can reduce emissions to the atmosphere, replace fossil-based feedstocks and products, and support renewable energy deployment through energy storage techniques. CDU technologies can also drive industrial innovation and contribute towards the circular economy by converting what was previously waste to useful material. More effort is needed to enhance and realise the potential of these technologies.

The objective of this prize is to enhance the CO₂ emission reduction of CO₂ utilisation products so they make a genuine contribution to the European Union's emission reduction targets. The prize also aims to mobilise and enhance private R&I investment, attract non-traditional players, create new partnerships and incentivise researchers and innovators to enhance efforts to abate emissions of anthropogenic CO₂ to the atmosphere.

1.2 Expected results

The prize winner will be the entrant that has developed a product demonstrating, over the duration of the contest, the most significant and measurable improvements in the mass of CO₂ utilised in it while overcoming technical, commercial and/or financial barriers. Efforts shall be replicable and scalable in order that the processes and products can be rolled out in the future. Clear commercialisation plans that are key to assuring medium-term benefits of the activities undertaken towards the prize will also have to be presented.

It is expected that the prize will accelerate innovation in CO₂ utilisation technologies, also in SMEs; facilitate discovering the real potential of CO₂ utilisation to contribute to climate mitigation; increase transparency about technology readiness, barriers, costs, environmental performance and innovation needs; increase leverage of private finance for innovation; provide with new business models and value chains in the CO₂ utilisation sector.

2. PRIZE AMOUNT¹: 1.500.000 EUR

3. DEADLINES:

Deadlines	
Opening of the submission:	5 July 2016
Closing date for submission:	3 April 2019 at 17h:00:00 CET ²
Award decision	4th quarter 2019

Applications must be submitted via the Participant Portal 'Submission Service', accessible via the contest page.

Applications must be readable, accessible and printable. Incomplete applications may be considered inadmissible if essential elements are missing (see General Annex B to the Main Work Programme).

The page-limit for this prize is: 50 pages (without annexes).

Participants can moreover declare their intention to participate by registering as 'contestants' via the functional mailbox EC-CO2REUSE-PRIZE@EC.EUROPA.EU before 31 March 2017 with a short summary of their application including a brief description of the CDU technology employed and envisaged activities in the pursuit of the prize aim (no more than 2000 characters).

4. ELIGIBILITY:

4.1 Eligibility criteria

The contest is open to all legal entities (including natural persons) or groups of legal entities regardless of its place of establishment.

Please note however that special rules apply for Israeli entities³ and for Crimean legal persons and that entities from non-EU Member States that are covered by Council sanctions are not eligible to participate⁴ (see General Annex C to the Main Work Programme).

Contestants that have already received an EU or Euratom prize cannot receive a second prize for the same activities.

Only technologies that utilize CO₂ in the manufacture/fabrication of industrial or consumer products may participate.

¹ The budget amount is subject to the availability of the appropriations provided for in the draft budget for 2019 after the adoption of the budget 2019 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

² Central European Time = Brussels local time

³ See Commission Guidelines on the eligibility of Israeli entities and their activities in the territories occupied by Israel since June 1967 for grants, prizes and financial instruments funded by the EU from 2014 onwards (OJ C 205 of 19.7.2013, pp. 9-11).

⁴ For the list of persons, groups and entities subject to EU financial sanctions, see http://eeas.europa.eu/cfsp/sanctions/consol-list_en.htm.

4.2 Exclusion criteria

Contestants will be excluded if they (or for points (a)(b) a natural or legal person that assumes unlimited liability for the debts of the contestant; or for points (c)(d)(e)(f) a natural person who is a member of the administrative, management or supervisory body of the contestant, or who has powers of representation, decision or control with regard to that contestant⁵):

- a) it is bankrupt, subject to insolvency or winding up procedures, its assets are being administered by a liquidator or by a court, it is in an arrangement with creditors, its business activities are suspended or it is in any analogous situation arising from a similar procedure provided for under national legislation or regulations;
- b) it has been established by a final judgement or a final administrative decision that the applicant is in breach of its obligations relating to the payment of taxes or social security contributions in accordance with the law of the country in which it is established, with those of the country in which the authorising officer is located or those of the country of the performance of the contract;
- c) it has been established by a final judgement or a final administrative decision that the applicant is guilty of grave professional misconduct by having violated applicable laws or regulations or ethical standards of the profession to which the applicant belongs, or by having engaged in any wrongful conduct which has an impact on its professional credibility where such conduct denotes wrongful intent or gross negligence, including, in particular, any of the following:
 - (i) fraudulently or negligently misrepresenting information required for the verification of the absence of grounds for exclusion or the fulfilment of selection criteria or in the performance of a contract, a grant agreement or a grant decision;
 - (ii) entering into agreement with other persons with the aim of distorting competition;
 - (iii) violating intellectual property rights;
 - (iv) attempting to influence the decision-making process of the [Commission] [Agency] during the award procedure;
 - (v) attempting to obtain confidential information that may confer upon it undue advantages in the award procedure;
- d) it has been established by a final judgement that the applicant is guilty of any of the following
 - (i) fraud, within the meaning of Article 1 of the Convention on the protection of the European Communities' financial interests, drawn up by the Council Act of 26 July 1995;
 - (ii) corruption, as defined in Article 3 of the Convention on the fight against corruption involving officials of the European Communities or officials of EU

⁵ Article 105a, paragraphs 1 to 4, 6 and 7, except point (b) of the first subparagraph and the second subparagraph of that paragraph, paragraphs 8, 9, 11 and 13 to 17 of Article 106 and Article 108 of the Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council of 25 October 2012 on the financial rules applicable to the general budget of the Union and repealing Council Regulation (EC, Euratom) No 1605/2002 (OJ L 218, 26.10.2012, p.1) shall apply to participants and winners. Article 107 shall apply to participants.

Member States, drawn up by the Council Act of 26 May 1997, and in Article 2(1) of Council Framework Decision 2003/568/JHA, as well as corruption as defined in the legal provisions of the country where the authorising officer is located, the country in which the applicant is established or the country of the performance of the contract;

- (iii) participation in a criminal organisation, as defined in Article 2 of Council Framework Decision 2008/841/JHA;
 - (iv) money laundering or terrorist financing, as defined in Article 1 of Directive 2005/60/EC of the European Parliament and of the Council;
 - (v) terrorist-related offences or offences linked to terrorist activities, as defined in Articles 1 and 3 of Council Framework Decision 2002/475/JHA, respectively, or inciting, aiding, abetting or attempting to commit such offences, as referred to in Article 4 of that Decision;
 - (vi) child labour or other forms of trafficking in human beings as defined in Article 2 of Directive 2011/36/EU of the European Parliament and of the Council.
- a) it has shown significant deficiencies in complying with the main obligations in the performance of a contract, a grant agreement or a grant decision financed by the Union's budget, which has led to its early termination or to the application of liquidated damages or other contractual penalties, or which has been discovered following checks, audits or investigations by an Authorising Officer, OLAF or the Court of Auditors.
 - b) it has been established by a final judgment or final administrative decision that the applicant has committed an irregularity within the meaning of Article 1(2) of Council Regulation (EC, Euratom) No 2988/95.
 - c) for the situations of grave professional misconduct, fraud, corruption, other criminal offences, significant deficiencies in the performance of the contract or irregularity, the applicant is subject to:
 - (i) facts established in the context of audits or investigations carried out by the Court of Auditors, OLAF or internal audit, or any other check, audit or control performed under the responsibility of an authorising officer of an EU institution, of a European office or of an EU agency or body;
 - (ii) non-final administrative decisions which may include disciplinary measures taken by the competent supervisory body responsible for the verification of the application of standards of professional ethics;
 - (iii) decisions of the ECB, the EIB, the European Investment Fund or international organisations;
 - (iv) decisions of the Commission relating to the infringement of the Union's competition rules or of a national competent authority relating to the infringement of Union or national competition law.
 - (v) decisions of exclusion by an authorising officer of an EU institution, of a European office or of an EU agency or body.

Contestants will also be excluded if they misrepresent the information required as a condition for participating in the procedure or fail to supply that information or they were previously involved in the preparation of prize documents where this entails a distortion of competition that cannot be remedied otherwise.

However contestants will not be excluded where:

- a) they have taken remedial measures⁶, thus demonstrating their reliability. This point shall not apply in the case referred to in point (d) above;
- b) such an exclusion would be disproportionate⁷.

4.3 Evidence upon request

Whenever requested by the contracting authority and where this is necessary to ensure the proper conduct of the procedure, the candidate or tenderer, as well as the entity on whose capacity the candidate or tenderer intends to rely, shall provide appropriate evidence that the contestant or a natural or legal person that assumes unlimited liability for the debts of the contestant; a natural person who is a member of the administrative, management or supervisory body of the contestant, or who has powers of representation, decision or control with regard to that contestant is not in one of the exclusion situations referred to in paragraph 4.2.

5. AWARD CRITERIA:

The prize will be awarded, after closure of the contest, to the contestant who in the opinion of the jury demonstrates a solution that best addresses the following essential cumulative criteria, further specified below:

- Improvement in net CO₂ emissions (max 15 points)
- Demonstrated effort to overcome barriers (max 15 points)
- Exploitation plans (max 10 points)
- Environmental impacts and sustainability (max 10 points)

1. Improvement in net CO₂ emissions (max 15 points)

Innovations undertaken in pursuit of the prize objective must result in reductions in net CO₂ emissions attributed to industrial or consumer products. This must be quantified and expressed as a percentage improvement over the prize duration.

Actions that may contribute towards the prize aim include:

- The use of, or increased use of, various sources of CO₂ in the process;
- The increased integration of CO₂ in product;

⁶ The measures which remedy the exclusion situation may include, in particular: measures to identify the origin of the situations giving rise to exclusion and concrete technical, organisational and personnel measures within the relevant business area of the economic operator, appropriate to correct the conduct and prevent its further occurrence; proof that the economic operator has undertaken measures to compensate or redress the damage or harm caused to the Union's financial interests by the underlying facts giving rise to the exclusion situation; proof that the economic operator has paid or secured the payment of any fine imposed by the competent authority or of any taxes or social security contributions.

⁷ In particular taking into account the seriousness of the situation, including the impact on the Union's financial interests and image, the time which has elapsed since the relevant conduct, its duration and its recurrence, the intention or degree of negligence, the limited amount at stake for point (b) above or any other mitigating circumstances, such as the degree of collaboration of the economic operator with the relevant competent authority and its contribution to the investigation as recognised by the contracting authority, or the disclosure of the exclusion situation by means of the declaration.

- Improvements in process efficiency to reduce CO₂ emissions and energy requirements;
- The decarbonisation of energy supplied to the process.

Method of measurement: net CO₂ emissions from the CDU technology must be measured over the duration of the prize contest, and improvements quantified using the following equation:

$$CO2_i = \frac{CO2_{PS} - CO2_{PE}}{CO2_{PS}} \times 100 \quad [\text{eq. 1}]$$

Where,

- $CO2_i$ = improvement in net CO₂ emissions over time (%)
- $CO2_{PS}$ = net CO₂ emissions occurring within the boundary (see Glossary) at the prize start, calculated using *prize start data* from the relevant period (see Glossary), pre-innovation (in tonnes per product output)
- $CO2_{PE}$ = net CO₂ emissions occurring within the boundary at the prize end, calculated using *prize end data* from the relevant period (see Glossary), post-innovation (in tonnes per product output)

Net CO₂ emissions generated by the CDU technology at *prize start* (4 July 2016) and *prize end* (3 April 2019) shall be estimated using the following equation:

$$CO2_{E,p} = \sum_i \frac{A_{i,p} \times EF}{P_{O,p}} \quad [\text{eq. 2}]$$

Where,

- $CO2_{E,p}$ = total net CO₂ emissions over the relevant period p (in tonnes per product output)
- $A_{i,p}$ = activity data for input element i contributing towards total emissions over the relevant period p (e.g. MWh, tCO₂ supply, tCO₂ input, tCO₂ in product)
- EF = emissions factor for input element i (tCO₂/i) (see Glossary)
- $P_{O,p}$ = Product output over relevant period p (in tonnes)

Actual activity data shall be used, collected using methods consistent with those set out in Commission Regulation No. 601/2012 [on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council](#). Modelled emissions estimates or life-cycle analysis (LCA) should not be used.

Submissions must include data on all relevant input elements in the boundary as applied in *Equation 2*, and include:

- Absolute data for the various relevant input elements (e.g. energy consumption; CO₂ inputs);
- All supporting information on activity data used to compile the CO₂ emissions estimates, including energy consumption data and supporting evidence (e.g. meter readings, energy bills), and production data and supporting evidence (e.g. sales data);
- All supporting assumptions e.g. any conversion factors employed.

Estimated percentage improvement over the prize duration, covering each input and also the aggregate estimated improvement in net CO₂ emissions, shall be calculated in accordance with *Equation 1*.

The CDU-derived product must also be clearly defined (see Glossary).

Where the boundary incorporates an integrated process and/or blended product, prize participants must differentiate, to the extent possible, data on inputs specific to the CDU process and data relating to inputs for other parts of the integrated process.

2. Demonstrated effort to overcome barriers (max 15 points)

Improvements in net CO₂ emissions must be shown to have occurred as a result of efforts and innovations to overcome barriers hampering such achievements (see Glossary). For each action contributing towards the prize aim, barriers may have included:

- Technical barriers
- Financial barriers
- Commercial barriers

Supporting documentation outlining efforts made, such as R&D reports, new business arrangements, and financial analysis (e.g. cost-benefit analysis; investment analysis), may be submitted in support of claims made.

Method of measurement: description of barriers and supporting evidence of activities and innovations undertaken to overcome each applicable barrier.

3. Exploitation plans (max 10 points)

Innovations made in pursuit of the prize aim should be:

1. **Replicable** in circumstances outside that of the prize entry project
2. Capable of being rolled-out and **scaled-up** within a tangible timeframe in order to deliver significant CO₂ abatement
3. **Commercially viable** or have good prospects to become commercially available in the near future.

Plans to exploit the innovations made can provide evidence of the capacity of the technology to generate significant reductions on CO₂ emissions in Europe, and make a greater contribution to the circular economy.

Method of measurement: description of plans and supporting evidence of activities undertaken to assess the scope for further exploitation on the innovations made.

4. Environmental impacts (max 10 points)

The innovations made should cause no or minimal damage to the environment throughout their implementation, including:

- Changes in **materials consumption**, in particular increased consumption of, or changes in use of, in e.g. rare earth element for catalysts.
- Changes in **emissions to air** (including non-CO₂ greenhouse gases) or changes in **waste including hazardous waste**, resulting from process changes to utilise more CO₂

Method of measurement: documentation showing that no adverse environmental impacts arise as a result of innovations made.

6. DOCUMENTS:

The mandatory supporting documents are set out in the application form.

Contestants may be asked at a later stage for further documents (for legal entity validation, bank account validation, ethics review, declaration of honour on exclusion grounds, etc).

7. PROCEDURE:

The applications will be evaluated by independent evaluators between April and August 2019 — first individually (by each expert separately) and then as a Jury (by all experts together).

To ensure the accuracy of data provided by the contestants, the winning application or the two first applications in case of a very close score will be required to submit data and information validated by third party specialist auditors⁸. For the data requirements please see section 5.

At the evaluation phase, the expert panel will assess each submitted solution against the four award criteria and will then score each solution up to a maximum number of 50 points. The thresholds and maximum scores are indicated in the table below. The application with the highest total points above the overall threshold will be awarded the prize.

The experts will evaluate each application against the four award criteria and score them as follows:

Criterion	Threshold	Maximum points
1. Improvement in net CO ₂ emissions reduction	8	15
2. Overcoming barriers	8	15
3. Exploitation plan	6	10
4. Environmental impacts and sustainability	8	10
Total	30	50

Upon completion of their work, the jury members will sign a record of all the entries examined, containing an assessment of their quality and identifying those to whom the prize may be awarded.

On the basis of the evaluation, the Commission will decide on the award of the prize. All contestants will be informed at the latest at the end of 2019.

8. OTHER CONDITIONS:

8.1 Applicable law and competent jurisdiction

The contest is governed by the applicable Union law complemented, where necessary, by the law of Belgium. The General Court or, on appeal, the Court of Justice of the European Union, shall have sole jurisdiction to hear any dispute between the Union and any participant concerning the interpretation, application or validity of the rules of this contest, if such

⁸ The list of accredited verifiers under Commission Regulation (EU) No 600/2012 on the verification of greenhouse gas emission reports and tonne-kilometre reports and the accreditation of verifiers pursuant to Directive 2003/87/EC of the European Parliament and of the Council can be found through the national accreditation bodies following the links on the website of the [European Accreditation](#) association.

dispute cannot be settled amicably. For participants that are International organisations such as disputes with the Commission relating to the Contest must - if they cannot be settled amicably - be referred to arbitration.

The Permanent Court of Arbitration Optional Rules for Arbitration Involving International Organisations and States in force at the date of entry into force of the Contest will apply.

8.2 Payment arrangements

The prize money EUR 1.500.000 will be paid in one instalment after the award ceremony by bank transfer, provided all the requested documents have been submitted.

8.3 Publicity — Promoting the prize — Visibility of EU funding

8.3.1 Publicity by the winner(s)

The winner must promote the action and its results, by providing targeted information to multiple audiences (including the media and the public) in a strategic and effective manner.

Unless the Commission requests or agrees otherwise or unless it is impossible, any communication activity related to the action (including in electronic form, via social media, etc.) must:

- (a) display the EU emblem and
- (b) include the following text:

“This action has been awarded the Horizon Prize for CO₂ Reuse from the European Union’s Horizon 2020 research and innovation programme”.

When displayed together with another logo, the EU emblem must have appropriate prominence.

For the purposes of its obligations, the winner may use the EU emblem without first obtaining approval from the Commission.

This does not, however, give it the right to exclusive use.

Moreover, the winner may not appropriate the EU emblem or any similar trademark or logo, either by registration or by any other means.

8.3.2 Publicity by the Commission

The Commission may use, for its communication and publicising activities, information relating to the action, documents notably summaries for publication and deliverables as well as any other material, such as pictures or audio-visual material that it receives from the contestants (including in electronic form).

The Commission will publish the name of the winner, their origin, the amount of the prize and its nature and purpose — unless the winner has requested to waive this publication (because disclosure risks threatening its security and safety or harm its commercial interest).

Photos and videos taken by the Commission either in preparation of the award ceremony or during the award ceremony are the sole property of the Commission.

8.4 Dissemination and exploitation of results

The winner must comply with the obligations set out in Title III of the Rules for Participation

Regulation No 1290/2013⁹.

8.5 Processing of personal data

8.5.1 Processing of personal data by the Commission

Any personal data will be processed by the Commission under Regulation No 45/2001¹⁰ and according to the ‘notifications of the processing operations’ to the Data Protection Officer (DPO) of the Commission (publicly accessible in the DPO register).

Such data will be processed by the ‘**data controller**’ of the Commission for the purposes of the award, implementation and follow-up of the prize or protecting the financial interests of the EU or Euratom (including checks, audits and investigations; see below).

The persons whose personal data are processed have the right to access and correct their own personal data. For this purpose, they must send any queries about the processing of their personal data to the data controller, via the contact point indicated in the ‘service specific privacy statement(s) (SSPS)’ that are published on the Commission websites.

They also have the right to have recourse at any time to the European Data Protection Supervisor (EDPS). The contestants consent that the Commission publishes (in whatever form and medium) the following information:

- name
- Member State of origin (address or NUTS 2 region)
- their activities in relation to the award of the prize (via the summary for publication they provided)
- prize amount if applicable.

8.5.2. Processing of personal data by the contestants

The contestants must process personal data in compliance with applicable EU and national law on data protection (including authorisations or notification requirements).

The contestants may grant their personnel access only to data that is strictly necessary for the award, implementation or follow-up of the prize.

The contestants must inform the personnel whose personal data are collected and processed by the Commission. For this purpose, they must provide them with the service specific privacy statement(s) (SSPS) (see above), before transmitting their data to the Commission.

8.6 Ethics

The activities must be carried out in compliance with:

- (a) ethical principles (including the highest standards of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity¹¹ — and including, in particular, avoiding fabrication, falsification, plagiarism or other research

9 Regulation (EU) No 1290/2013 of the European Parliament and of the Council of 11 December 2013 laying down the rules for participation and dissemination in “Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)” (OJ L 347, 20.12.2013 p.81).

10 Regulation (EC) No 45/2001 of the European Parliament and of the Council of 18 December 2000 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 (OJ L 8, 12.01.2001, p. 1).

11 The European Code of Conduct for Research Integrity of ALLEA (All European Academies) and ESF (European Science Foundation) of March 2011. http://www.esf.org/fileadmin/Public_documents/Publications/Code_Conduct_ResearchIntegrity.pdf

misconduct) and

(b) applicable international, EU and national law.

No prize will be awarded for activities carried out outside the EU, if they are prohibited in all Member States.

The contestants must ensure that the activities have an exclusive focus on civil applications.

For more information and best practice, see the Online Manual, the sample application form for prizes and the guidance 'How to complete your ethics self-assessment'.

8.7 Conflict of interests

The contestants must take all measures to prevent any situation where the impartial and objective award of the prize is compromised for reasons involving economic interest, political or national affinity, family or emotional ties or any other shared interest (**'conflict of interests'**).

They must inform the Commission without delay of any situation constituting or likely to lead to a conflict of interests and immediately take all the necessary steps to rectify this situation.

The Commission may verify that the measures taken are appropriate and may require additional measures to be taken by a specified deadline.

8.8 Liability for damages

The Commission cannot be held liable for any damage caused to the contestants or to third parties as a consequence of the award or implementation of the prize, including for gross negligence.

The Commission cannot be held liable for any damage caused by any of the contestants, as a consequence of activities linked to the prize.

8.9 Checks, audits and investigations

The Commission, the European Anti-Fraud Office (OLAF) and the Court of Auditors may carry out checks, audits and investigations in relation to the prize.

8.10 Withdrawal of the prize — Recovery of undue amounts

The Commission may withdraw the prize and recover all payments made, if it finds out that:

- (a) false information or fraud or corruption was used to obtain the prize or
- (b) the winner was not eligible or should have been excluded.

8.11 Exclusion and financial penalties

If a contestant is in one of the exclusion situations referred to in paragraph 4.2, the Commission may also impose:

- decisions excluding the contestants from all contracts, grants and contests financed from the EU or Euratom budget for duration not exceeding the duration, if any, set by the final judgement or the final administrative decision of a Member State and either five years for the cases referred to in paragraph 4.2 (d) or three years for the cases referred to in paragraph 4.2 (c), (e) and (f).and/or

- a financial penalty between 2% and 10% of the value of the prize on a contestant in one of the cases referred to in paragraph 4.2 (c), (d), (e) and (f).

8.12 Cancellation of the contest

The Commission may cancel the contest or decide not to award a prize — without any obligation to indemnify contestants —, if:

- the objective of the contest has already been achieved
- no applications are received
- the jury does not find a winner or
- the winner is not eligible or must be excluded.

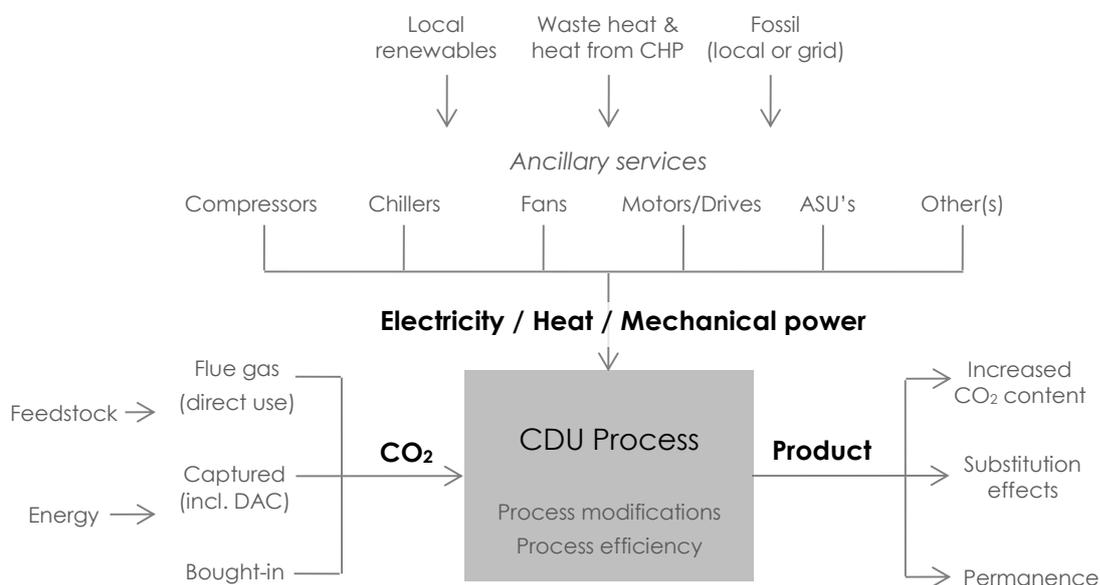
9. CONTACT:

In case of questions, please contact EC-CO2REUSE-PRIZE@EC.EUROPA.EU

Glossary

Boundary

The CO₂ accounting boundary defines the emission sources that are included in the calculation of net CO₂ emissions in *Equation 2*. Prize participants shall describe the boundaries of the CDU process applied in preparing data submissions, and as a minimum it must include the entire CDU process and take account of all of the relevant elements set out below:



For an integrated process involving other processes to produce an industrial or consumer product, the boundary may be drawn around the entire process.

The boundary should be limited to, at its widest, a single facility or installation. Where CDU products are shipped offsite for further processing, activities occurring outside of the facility should not be included in the boundary. As such, in this case, the product would be that

produced only within the facility or installation (i.e. not any product(s) subsequently produced outside the facility).

Prize start data period

Participants shall nominate 3 months of data from within *relevant period* to be used for calculating prize start emissions, as per *Equation 1*. The *relevant period* covers 6 months prior to the date of the opening of the contest and up to 6 months thereafter, that is from January to December 2016. Participants should provide as much data as possible from within this period. If the project was operational over the relevant period, a full 12 months of data should be submitted. A minimum of 3 months data is required. Participants submitting only 3 month's data must provide an explanation as to why other data has not been provided.

In exceptional circumstances, prize start data may be submitted for a period up to 12 months after the date of prize launch. Participants wishing to submit data for the period 6-12 months after prize launch must provide an explanation for the absence of data for earlier periods, with supporting evidence.

Prize end data period

Participants shall nominate 3 months of data from within the *relevant period* to be used to calculate prize end emissions, as per *Equation 1*. The *relevant period* covers the entire period immediately following the end of the *prize start data* period, that is from January 2017 to February 2019. As a minimum, data for the 12 months preceding the final month ahead of the deadline for submissions must be provided. Information about any planned or unplanned plant shutdowns or other missing data shall be documented to explain any gaps in monitoring data.

Emission factors

All prize participants must use the emission factors below to calculate net CO₂ emissions of their CDU process/technology at *prize start* and *prize end* as per *Equation 2*. These are based on their capacity to measure the innovations counting towards the prize aim.

	Element	Factor	Unit
CO ₂ supply (upstream emissions)	Bought in CO ₂	1	tCO ₂ emitted / tCO ₂ input
	Captured anthropogenic CO ₂	0.50	tCO ₂ emitted / tCO ₂ input
	Direct air captured CO ₂	0.50	tCO ₂ emitted / tCO ₂ input
	Direct flue gas CO ₂	0	tCO ₂ emitted / tCO ₂ input
CO ₂ input	CO ₂ input to CDU process	1	tCO ₂ emitted / tCO ₂ input
Electricity/heat	Grid or onsite electricity *	0.567	tCO ₂ emitted / GWh
	Local heat	0.300	tCO ₂ emitted / GWh
	Waste heat	0	tCO ₂ emitted / GWh
	Local renewable	0	tCO ₂ emitted / GWh
Product	CO ₂ content (product)	-1	tCO ₂ emitted / tCO ₂ in product
	Substitution effect	0	tCO ₂ emitted / tCO ₂ in product
	Permanence	0	tCO ₂ emitted / tCO ₂ in product

* Based on CO₂ intensity of electricity and heat production in the European Union in 2012. From European Environment Agency: http://www.eea.europa.eu/data-and-maps/daviz/co2-emission-intensity#tab-chart_1 Use of a dedicated renewable energy tariff does not qualify the use of a lower emission factor.

CO₂ supply reflects an estimate of the inherent emissions associated with capturing 1 tonne of CO₂. It is assumed that 1 tCO₂ is emitted for each tonne of bought-in CO₂ and 0.5 tCO₂ per tonne captured (either from anthropogenic sources or directly from air). As there is uncertainty regarding the relative near-term environmental benefits of DAC versus anthropogenic CO₂, equal treatment applies in estimating the net CO₂ emissions associated with CO₂ supply. Direct flue gas use is assumed to have zero inherent CO₂ as only negligible amounts of energy should be involved in supplying this gas to the process.

CO₂ input uses a factor of 1 tCO₂ emitted per tCO₂ input into the process, which assumes all process input CO₂ used is emitted to atmosphere. Where this CO₂ can be shown to be incorporated into the CDU derived product, this tCO₂ is offset (see *Product* below).

Electricity/heat applies standardised emission factors for bought-in electricity and onsite heat generated from fossil fuels. These factors must be applied by all participants, irrespective of the type of electricity tariff (including renewable tariffs). This method allows switching from grid-supply to onsite renewables can be recognised in pursuit of the prize aim.

Product applies an emission factor of -1 tCO₂ emitted per tCO₂ integrated into the product. This offsets the 1 tCO₂ applied on the CO₂ input side where utilisation efficiency of input CO₂ is 100%. Where utilisation efficiency is less than 100%, the difference between the CO₂ input and product is assumed to be emitted to atmosphere. A zero factor is applied for substitution and permanence effects, reflecting that the prize does not take account of such potential benefits given the challenge of quantifying such effects.

Barriers

Barriers may include:

- *Technical* – e.g. challenges for improving the efficiency of the process to reduce energy consumption and increase the rate of CO₂ uptake in products relative to CO₂ input; issues for modifying the process to include CO₂ utilisation and storage in the end product; issues for product design and function when increasing CO₂ content; issues associated with bringing and utilising anthropogenic CO₂ at site (availability/distance, storage, purity, costs); issues with utilising renewable energy on-site or sourcing local renewable energy (lack of site space, availability, costs etc.)
- *Financial* – e.g. costs of processes modifications or changes to operations relative to business-as-usual activities e.g. the costs of using anthropogenic CO₂ versus other CO₂ sources as currently applied; and/or,
- *Commercial* – e.g. challenges to establishing new commercial relationships with potential anthropogenic CO₂ suppliers; customers willingness to accept higher CO₂ content products