



Hub Transición Energética

CALL FOR PROPOSALS

TERMS OF REFERENCE (TOR)



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1. DEFINITIONS

- i. **Participants:** Legal entities that apply for the call and meet all the requirements established in the Terms and Conditions defined for the process.
- ii. **Call #HubTransiciónEnergética:** It consists of a set of training, support, advisory, and mentoring activities led by the Operating Entities, in which the Participant(s) may apply for the creation of innovative solutions and the validation of the existence of Business Models that address corporate and industry gaps aimed at strengthening new businesses through pilots in real environments of the organizing entities.
- iii. **Organizing Entities:** ECOPETROL and the Innovation and Technological Development Center of the Electric Sector - CIDET.
- iv. **Operating Entities:** ESTRATEK and ENDEAVOR Colombia Foundation.
- v. **Ministry of Science, Technology and Innovation (hereinafter, MINCIENCIAS):** It is the national government body in Colombia that directs the sector and the National System of Science, Technology, and Innovation (SNCTI), responsible for formulating, guiding, directing, coordinating, executing, implementing, and controlling the state policy in this matter, in accordance with Law 2237 of 2022.
- vi. **Ministry of Education (hereinafter, MINEDUCACIÓN):** It is the national entity responsible for formulating the national education policy and promoting the development of competitive and quality education that generates opportunities for progress and prosperity and contributes to closing equity gaps.
- vii. **Participation Form:** It is the form that Participants must fill out to submit their initiative and is available at the link <https://www.hubtransicionenergetica.com/>
- viii. **Agreement of Understanding:** Agreement to be concluded between the selected Participant(s) and the Organizing Entities under the call.
- ix. **Strategic sponsors or business leaders:** These are individuals belonging to CIDET, ECOPETROL, and the Econova Electric Energy network, who participate within the framework of the call as experts in the topics related to the innovation challenges defined for the #HubTransiciónEnergética call.
- x. **Innovation Committee:** Team formed by members of the Operating Entities and CIDET. This committee will facilitate the relationship with the Participants throughout the call process, the execution of pilots, and will participate in the evaluation and resource allocation processes for the experimentation phase.
- xi. **Technical Evaluation Committee:** Team formed by experts from the technical and strategic areas associated with the challenges. Its main function is to objectively analyze and assess the proposals submitted to determine their technical feasibility, adapt the established objectives, and their ability to meet the technical requirements and standards.
- xii. **Terms of Reference:** These document outlines the present terms of reference and conditions of this call for the selection of the Participant(s).

2. OBJECTIVE, TARGET AUDIENCE, AND BENEFITS

2.1 Call #HubTransiciónEnergética

This is the call through which the Operating Entities seek the participation of innovators, for the selection of up to three (3) of them capable of solving challenges in the businesses of the Organizing Entities and the Colombian electrical sector, related to technological gaps, portfolio, and the exploitation of market opportunity.

The call is designed to enable the Organizing Entities to carry out rapid experimentation processes of innovative solutions, coming from Participants aligned with the innovation challenges outlined in the initiative.

While the call may receive applications from Participants located and domiciled anywhere in the world, the official language of this process will be Spanish, so the Participant(s) must attend the activities that are part of the process in this language.

2.2 Objective of the call

The call aims to select up to three (3) Participants with the capacity to develop innovative solutions that address business challenges of the Organizing Entities and the Colombian electrical sector, both in terms of closing technological and portfolio gaps, as well as seizing market opportunities, for the integration of novel and innovative solutions.

2.3 Targeted at:

Participants with a technological and scientific foundation, possessing a global vision, where innovation is the driving force of their growth, and who have a multidisciplinary team available full-time during the four-month pilot execution period.

- i. **National and international companies and ventures:** Legal entities, duly established in their country of origin, which have as part of their purpose or business strategy the implementation of solutions required for the proposed challenges.
- ii. **National and international startups:** Recently established companies with high innovative and technological potential, whose model is scalable, and whose growth can be exponential.
- iii. **National and international scale-ups:** Companies in the process of consolidation and growth that contemplate stages for the development of their businesses, aiming for higher revenues, and aspiring to expand their presence and number of employees. In general, they are considered the next step beyond startups.
- iv. **National Research Groups:** A group of individuals who come together to conduct research on a given topic, formulate one or several problems of interest, outline a long or medium-term strategic plan to work on it, and produce knowledge outcomes on the subject matter.
- v. **National Higher Education Institutions (HEIs):** Academic entities dedicated to professional training, research, and knowledge generation in various areas of expertise. To be officially recognized and supervised, these institutions must comply with the accreditation requirements and processes established by the Ministry of Education (MINEDUCACIÓN).
- vi. **National Research Centers or Institutes for Technological Development or Innovation:** Public or private organizations dedicated to generating fundamental knowledge for the country through projects of basic and/or applied scientific research

in specific research lines. A research center may provide technical and management services to its beneficiaries, may focus on generating public goods of knowledge, and their application through technological development processes.

Hereinafter, the aforementioned organizations will be referred to as participants.

Note 1: To participate in the Call, the Participant(s) must complete the Participation Form on the dates established in the call schedule and attach the supporting documents or information requested therein as evidence.

Note 2: Participants interested in applying for the call may optionally do so in partnership, and in this case, the partnership must include at least one national organization/company. The partnership will select the organization to participate in the process, which must meet all requirements and will be responsible for executing the agreement if selected. Both national and foreign participants may take part in this option.

2.4 Potential Benefits of Participating in the Call

Selected Participants will be able to:

- i. Become allies in innovation with one of the most important energy groups in Latin America
- ii. Have the opportunity to expand their network through the Organizing Entities, Operating Entities, and the Econova Network.
- iii. Engage with business leaders, high-level mentors, and subject matter experts.
- iv. Have the opportunity to test a solution relevant to the Organizing Entities and receive support from the technical team during the pilot execution.
- v. Participate in shaping the future of the energy sector.
- vi. Have access to shared financial resources of up to 800 million COP for the financing of the pilots for the three challenges

2.5 Call format

The call will be conducted virtually through communication platforms (including Teams, Google Meet, Zoom, among others), which will be previously established by the Organizing Entity.

2.6 Withdrawal from the call

In the event that a Participant wishes to withdraw from the process, they must communicate in writing to the Operating Entity, clearly explaining the reasons for their withdrawal.

For the three (3) Participants who advance to the pilot development phase, they must comply with the conditions stipulated in the Agreement of Understanding that must be signed by the parties before the start of Phase 3 of Experimentation and Mentoring.

3. QUALIFYING REQUIREMENTS AND EVALUATION CONSIDERATIONS

For this call, Participant(s) who meet(s) the following requirements may apply.

3.1 Qualifying requirements for the companies and startups:

- Being a legally constituted company with at least 2 years prior to the start of the call. This requirement applies to both national and international participants.
- Not being registered on restrictive lists. In cases where the application is made under the partnership modality, this requirement applies to all parties.
- Providing: a) Certificate of commercial registration or incorporation/existence or its equivalent; b) Tax identification document; c) Document, power of attorney, or delegation that validates the natural person holding the legal representation of the Participant; d) Identification document of the legal representative; e) 2023 financial statements; f) Certificate of payment of parafiscal contributions for the last 6 months issued by the accountant, auditor, or legal representative.
- Having a solution (product and/or service) that fits into one of the challenges of the call, as defined in the Annex of these Terms and Conditions.
- The Participant's Team cannot be composed of employees of the Organizing Entities, nor their shareholders, subsidiaries, affiliates, nor subsidiaries, nor the Operating Entities.
- A technological maturity level between TRL 4 to TRL 9 is required according to the description of the challenges presented in the Annex of these Terms and Conditions.
- Creating a video on YouTube of up to 2 minutes explaining how their solution addresses the selected challenge and why they should be chosen.
- Completing all the required information in the Registration Form as a Company/Startup on the website <https://www.hubtransicionenergetica.com/> and attaching the requested documentation.

3.2 Evaluation considerations:

- Demonstrating annual sales preferably starting from USD 300,000 derived from their products or services.
- The transmission lines challenge requires solution proposals that are at a TRL of 7 or higher, meaning they must have demonstration and validation of the system or prototype in a real and operational environment.
- Solutions proposed for circular economy challenges may range from TRL 4 to TRL 9, with solutions at TRL 6 and above being more attractive for the process.
- Describing the consolidated channels available for testing products/services.
- Having a customer base available to validate capabilities and solutions (if necessary).
- Having ICT tools (hardware and software) available for adapting the solution.
- Demonstrating the availability of specialized machinery and equipment for pilot development. In cases where machinery and equipment are provided through a partnership with third parties, evidence of such partnership support, contract, or formal documentation establishing the relationship must be provided.
- If applicable, inform and demonstrate sponsorships that the Participant has (indicating the title of the sponsorships and whether they are authorized to use them for the benefit of third parties).

3.3 Qualifying requirements for the companies and startups' teams:

- It must be ensured that at least two (2) members of the team have full-time availability during Phase 3 to conduct experiments, implement the agreed-upon work plan, and attend all activities defined in the process.
- The CEO of the company or startup, or its equivalent must, have part-time availability throughout the pilot execution (at least 2 hours per week).
- The Team must demonstrate technical expertise in design, marketing, technological development, and business, as well as distinctive soft skills.
- The Team must have been working together for a minimum of one year and provide evidence of this.

3.4 Evaluation considerations for the companies and startups' teams:

- The Participant applying for the call must have a sufficiently robust and interdisciplinary team to develop the solutions. Ideally, the goal is to have a team of at least ten (10) individuals.
- The Participant Team must have the capacity for execution in terms of market testing, solution development, and metric achievement.

3.5 Qualifying requirements for national CIT participants:

- For research groups, it must be a group recognized by MINCIENCIAS, and the recognition must be valid at the time of application.
- For research centers, technological development, and innovation, they must have valid recognition issued by MINCIENCIAS at the time of application.
- For Higher Education Institutions (IES), they must have institutional accreditation of high quality issued by MINEDUCACIÓN in accordance with the favorable concept of the National Accreditation Council-CNA6 at the time of application.
- Providing: a) Valid recognition as a research group, research center, technological development, or innovation issued by MINCIENCIAS. For IES, a certificate of current high-quality institutional accreditation issued by MINEDUCACIÓN; b) Identification document of the legal representative; c) Document, power of attorney, or delegation validating the natural person holding the representation of the participant; d) Identification document of the principal investigator of the participant; e) Certificate of payment of parafiscal contributions for the last 6 months issued by the accountant, auditor, or legal representative.
- Having a solution (product and/or service) that fits into one of the challenges of the call, as defined in the Annex of these Terms and Conditions.
- The Participant's Team cannot be composed of employees of the Organizing Entities nor their shareholders, subsidiaries, affiliates, nor subsidiaries, nor the Operating Entities.
- A technological maturity level between TRL 4 to TRL 9 is required according to the description of the challenges presented in the Annex of these Terms and Conditions.
- Creating a video on YouTube of up to 2 minutes explaining how their solution addresses the selected challenge and why they should be chosen.

3.6 Evaluation considerations for national CIT participants:

- Describe your experience in the field by presenting a portfolio of projects undertaken in areas related to the theme of the call.
- The transmission lines challenge requires solution proposals at a TRL of 7 or higher, meaning they must have demonstration and validation of the system or prototype in a real and operational environment.
- Solutions proposed for circular economy challenges may range from TRL 4 to TRL 9, with solutions at TRL 6 and above being more attractive for the process.
- Describe the consolidated channels available for testing products/services.
- Have a base of allies available to validate capabilities and solutions (if necessary).
- Have ICT tools (hardware and software) available for adapting the solution.
- Demonstrate the availability of specialized machinery and equipment for pilot development. In cases where machinery and equipment are provided through a partnership with third parties, evidence of such partnership support, contract, or formal documentation establishing the relationship must be provided.
- If applicable, disclose and demonstrate sponsorships that the Participant has (indicating the title of the sponsorships and whether they are authorized to use them for the benefit of third parties).

- Completing all the required information in the Registration Form as CTI Actors on the website <https://www.hubtransicionenergetica.com/> and attaching the requested documentation.

3.7 Qualifying requirements for national CIT participants' teams:

- It must be ensured that at least two (2) members of the Team have full-time availability during Phase 3 to conduct experiments, implement the agreed-upon work plan, and attend all activities defined in the process.
- The Principal Investigator or equivalent must have part-time availability throughout the pilot execution (at least 2 hours per week).
- The Team must demonstrate technical expertise related to the challenge to be solved, including design, marketing, technological development, and business, as well as distinctive soft skills.
- The Team must have been working together for a minimum of one year and provide evidence of this.

3.8 Evaluation considerations for national CIT participants' teams:

- The Participant applying for the call must have a sufficiently robust and interdisciplinary team to develop the solutions. Ideally, the goal is to have a team of at least ten (10) individuals.
- The Participant Team must have the capacity for execution in terms of market testing, solution development, and metric achievement.

Note: The Organizing Entity may request from the Participant any additional documentation it deems necessary to complement, validate, and/or verify the information provided by the Participant for the purposes of this call.

4. PARTICIPANTS OBLIGATIONS

By participating in this invitation, Participants commit to:

- Participating in good faith in the open innovation call with the purpose of developing the challenge.
- Thoroughly study these Terms and Conditions, the challenge, and any additional information produced within the framework of this call. They have a duty of diligence to comply with the established conditions.
- Complying with the regulations and procedures established by the Organizing and Operating Entities during all stages of the call and the execution of the pilots.
- Attending all activities, meetings, work sessions, and events scheduled within the process, whether in person or virtual.
- Designating an authorized representative to act as the main point of contact with the Organizing and Operating Entities throughout the entire process.
- Providing all information requested by the Organizing and Operating Entities truthfully, timely, and completely.
- Maintaining the confidentiality of the information shared by the Organizing and Operating Entities, as well as any other Participant in the process.
- Collaborating actively and constructively with other Participants, the Organizing and Operating Entities, and any other stakeholders involved in the process.
- Informing the Organizing and Operating Entities of any relevant changes in their legal, financial, or operational situation that may affect their participation in both the call process and the execution of the pilots.
- Complying with the legal, regulatory, and ethical provisions applicable to their participation in the process, including, but not limited to, those related to intellectual property, data protection, and fair competition.
- Immediately communicating any conflicts of interest that may arise during their participation in the call and following the instructions provided by the Organizing and Operating Entities to resolve them.
- Adhering to the decisions and recommendations of the Organizing and Operating Entities regarding their participation in the process, including, but not limited to, those related to solution selection, pilot implementation, and result evaluation.
- Accepting that the final decisions on solution selection, pilot implementation, and any other activity related to the process will be subject to the exclusive criterion of the Organizing and Operating Entities.
- Complying with any other obligation or requirement established by the Organizing and Operating Entities within the framework of this call.

5. CALL: SCHEDULE AND PROCESS PHASES

To apply for the Call, Participants must consider the innovation challenges proposed in Annex 1 of these terms and conditions and adhere to the call's timelines, the selection process, and meet the requirements established for solution submission.

The Organizing Entities will adopt measures they deem appropriate to prevent any conduct by Participants aimed at committing fraudulent acts against this activity or violating these Terms and Conditions to the detriment of other Participants or third parties. Consequently, in the event of a violation or disregard of the Terms and Conditions of this call, the Operating Entities may exclude the Participant from engaging in such conduct from the activity. Additionally, the Participant may lose any rights to benefits they may have obtained, without the right to any claim or recognition of compensation for the Participants.

5.1 Challenges

Through this call, the Organizing Entities seek to support and develop rapid experimentation processes for innovative solutions, originating from Participants aligned with the innovation challenges described in Annex 1 of these Terms and Conditions.

5.2 Schedule and process phases

In the following table, the phases and corresponding stages of the Call are described, including the opening and closing of each selection phase, mentoring phase, and experimentation phase:

Schedule for the call (Chart 1)		
Call and registration phase		
Phase	Phase Name	Dates
1	Call and Registration of Participants	May 14th to July 5th 2024
Selection Phase Schedule		
Phase	Phase Name	Dates
1	Evaluation of First Filter/Qualifying Requirements. Selection of up to 30 Participants	July 8th to August 9th 2024
2	Evaluation of Second Filter/Solution Fit. Selection of up to 12 Participants	
3	Evaluation of Third Filter/Pitch Day	
4	Announcement of Winners	August 9th to August 12th 2024
Experimentation and Mentorship Phase Schedule		
Phase	Phase Name	Duration
1	Agreement of Understanding Signing	August 12th to December 20th 2024
2	Pilot Implementation	

Note 1: The Operating Entities, when deemed appropriate and without justification, reserve the right at any time to declare void, suspend, or terminate this call, or modify the above schedule and/or terms and conditions, without any right to claim or recognition of compensation for the Participants.

Note 2: Participants may submit proposals for different challenges, but they must submit different teams for each of them.

Such events will be notified by the Organizing Entity through the website <https://www.hubtransicionenergetica.com/>

5.3 Phases of the Call Process and Pilot Execution

The process will unfold in 3 phases, corresponding to the call and registration of companies, evaluation and preselection of Participants, mentorship, and experimentation.

5.3.1 Phase 1: Call and Registration

During this initial phase, companies will have 7 weeks to register through the call's website: <https://www.hubtransicionenergetica.com/>.

Participants submitting their solutions must accept and comply with the requirements established in this call. During this phase, Participants will share information enabling the Operating Entities to review restrictive lists or validate the information shared in the application, consultations that are authorized by the Participants.

5.3.2 Phase 2: Evaluation and Preselection

Participants who submit their participation application and meet the requirements established in this call will be evaluated by the Evaluation Committee designated by the Organizing Entity at their best discretion.

The Evaluation Committee will consist of strategic sponsors or business leaders appointed by the Organizing Entities, who, with the support of the Operating Entities, will be responsible for: evaluating the applications, defining the preselected Participants, conducting interviews, and selecting, at different stages, the Participants who will apply to the call.

Throughout the different phases and evaluation filters, Participants with the most suitable applications and projects will be selected, taking into account criteria such as: relevance of the solution to the proposed innovation challenge, innovative approach to solving the problem or need, business model, implementation timelines consistent with the experimentation phase, and project cost in the demonstration stage. Each phase will consider technical evaluation criteria consistent with the innovation challenge.

- Participant Selection Process

The selection process will consist of 3 filters: in the first (1), Participants who meet the requirements and characteristics established in sections 3.1 to 3.8, and additionally have the highest rating and suitability in these requirements, may be called to the next filter. Up to 30 participants will be selected, based on the best judgment of the Operating Entity, who meet the innovation challenge to which they have applied.

For the second (2) filter, the up to 30 selected companies may be called for evaluation interviews to get detailed information on the overall relevance of the proposed solution to the challenge, identify the Participant's capabilities to address the call and run a pilot, understand their business model, and in general, to gather all additional relevant information that allows selecting up to 12 Participants who will advance to the Pitch Day.

In the third filter, up to 12 selected Participants will pitch presenting the prototype and business case. Based on the latter, the Evaluation Committee will select up to 3 Participants

and their proposals, based on technical criteria, project relevance, alignment with the innovation challenges established in Annex 1 of these Terms and Conditions, higher likelihood of success in the pilot demonstration phase, cost-benefit for the Organizing Entities, among others. The 3 Participants with the highest scores by the Evaluation Committee will be chosen. These 3 selected Participants will participate in the mentoring and experimentation phase.

5.3.3 Phase 3: Mentoring and Experimentation

- Signing of Understanding Agreements

To participate in the third phase of the call, the selected Participants must sign the document titled "Understanding Agreement Call #HubTransiciónEnergética", which will regulate the relationship between the selected Participants and the Operating Companies. In the event that an Agreement is not signed by any selected Participant, the Organizing Entity may choose another Participant for participation in the mentoring and experimentation phase.

- Pilot Implementation

The mentoring and experimentation phase will focus on technological validation, prototype testing, and minimum viable product trials conducted by the Participants, aiming to cover the four-month period of the process. For this purpose, Participants will receive support from mentors from the Organizing Entity and external mentors from the Operating Companies, along with technical assistance in accordance with the terms outlined in this Call.

For Participants accessing this phase, capital will be allocated for the execution of pilot projects through the Innovation Committee, managed by the Organizing Entities, ensuring the optimal use and execution of resources. Pilot experiments and implementation must be approved by the Open Innovation Committee and endorsed to commence the implementation phase.

5.4 Causes for Disqualification or Exclusion

The Organizing Entities and Operating Companies may disqualify or exclude the Participant(s) in the following events:

- i. Failure to comply with any of the requirements established in this Call.
- ii. Failure to comply with the established Code of Ethics of ECOPETROL and CIDET.
- iii. Providing false and/or inaccurate data about their information or in their statements.
- iv. Using information without legal authorization or without complying with current copyright laws.
- v. Engaging in actions that violate the conditions of equity, equality, and free competition that govern this Call.
- vi. In the event that reasonable doubt arises that the participant may be involved in a real or potential conflict of interest.

6. CONFIDENTIALITY

All content, documentation, and information of any kind delivered and sent by the Participant(s), the Organizing Entities, and the Operating Companies (which may be

Recipient Party and Disclosing Party reciprocally), their representatives, and their teams within the framework of the call and the execution of the pilots will be treated confidentially by the Organizing Entity and all its team. Likewise, the delivered information will not be used or published for purposes other than those agreed upon in the Call and in the pilots.

Confidential Information shall mean any information provided in writing, visually, verbally, by analog, electronic, or digital means owned by the Disclosing Party or over which it holds any rights. Any copy thereof, including all kinds of information, notes, minutes, data, analyses, concepts, worksheets, compilations, comparisons, studies, summaries, recordings, records prepared in whole or in part with information provided by the Disclosing Party for or on behalf of the Receiving Party that contain or in any way reflect such information, shall be deemed included in Confidential Information.

The Participant Teams voluntarily and expressly agree that all information delivered and sent to participate in the Call will be used and analyzed for the purpose of being selected to participate in the process and for statistical purposes. The information received will be used applying computer security and confidentiality measures to ensure that it is not altered and to prevent unauthorized disclosure.

The Parties, understood as the Participant(s), the Organizing Entities, and the Operating Companies, undertake to keep strict confidentiality and not to make unauthorized or improper use of the Confidential Information, documented or not, which is reciprocally disclosed in the development of the terms of the Call, whether owned by them or by a third party, except for prior, express, and written authorization from its owner.

The Parties understand and agree that the obligations referred to in this Clause shall be enforceable even after the closure of the Call and until the completion of the pilots. However, the confidentiality obligation shall remain in force if the Confidential Information is classified as such by the owning Party, regardless of whether the term of validity agreed upon in this clause or any of its extensions expires. Notwithstanding the foregoing, if the Parties wish to extend the validity of this, they may do so by mutual agreement and in writing, resorting to the contractual addendum figure. The breach of this obligation by the Participant(s) shall result in immediate withdrawal as a candidate from the process and in the payment of damages caused and the enforcement of the penalty clause, as established in the Understanding Agreement - #HubTransiciónEnergética.

This obligation shall extend to the employees or subcontractors, suppliers, or allies of the Participants who become aware of confidential and reserved information. The Receiving Party shall be responsible for the use made by its subcontractors and/or employees, suppliers, or allies of the confidential information received.

Upon termination of the Understanding Agreement, the Parties shall immediately destroy and return, as appropriate, all confidential information disclosed by their counterpart to their possession, at the request of their counterpart.

Confidential Information may only be disclosed or divulged in the following events:

- i. With the prior written approval of the Disclosing Party.
- ii. If the disclosure and/or dissemination of Confidential Information is made pursuant to legal development or by order of a competent judicial or administrative authority exercising its legal functions. In this case, the Receiving Party agrees to immediately inform the Disclosing Party as soon as it becomes aware of this obligation, so that the necessary or convenient measures can be taken to protect the Confidential Information, and likewise commits to taking measures to mitigate the effects of such disclosure and will limit the disclosure only to the information actually required by the competent authority.
- iii. If the Confidential Information is or becomes available to the public or becomes public domain due to a cause other than an act or omission of the Receiving Party.
- iv. If the Confidential Information has been in the possession of the Receiving Party before receiving it from the Disclosing Party or if it has not been acquired, or from any third party who has a confidentiality commitment regarding the Disclosing Party.
- v. Information that the Parties state has ceased to be confidential.

The confidentiality obligation stipulated in this Clause shall be without prejudice to the information communicated between the Parties, for the purpose of being disclosed for commercial, administrative, technical, operational, logistical, and advertising purposes inherent to the normal fulfillment of the process.

7. TREATMENT OF PERSONAL DATA

Los Participants and their team, by participating in this Call, authorize the Organizing Entities freely and voluntarily to collect, use, transmit, transfer, store, consult, and process the personal information they have provided within the framework of the Call and the execution of the pilots, which is contained in the databases and files owned by the Organizing Entities, for the purposes described in this document.

The Participants' Teams declare freely and voluntarily that they are aware of the rights granted to them by regulations and jurisprudence as data subjects and accept the Personal Data Treatment Policy of the Organizing Entities, as well as that of the CIDET available at <https://CIDET.org.co/wp-content/uploads/2023/11/PoliticasyProteccionDatosPersonalesCIDET-Diciembre-17-2019-revSRRE.pdf> as well from ECOPETROL, at: <https://www.ECOPETROL.com.co/wps/portal/Home/es/ResponsabilidadEtiqueta/ResponsabilidadCorporativa/Declaraciontratamiento>

The Participant shall indemnify ECOPETROL and the Organizing Entities for any request or claim in this regard.

7.1 Consent for the Processing of Personal Data

Consent for the processing of personal data: In compliance with the provisions of Law 1581 of 2012 (Colombia) and other applicable regulations in each country regarding the Protection of Personal Data, you authorize CIDET and ECOPETROL to collect, store, circulate, use, process, delete, transfer, and/or transmit nationally or internationally your personal information (identification data, contact information, financial and business information, among others). This information will be processed for the following purposes: 1) Sending invitations to events and/or sending communications via SMS, call, or email, about news, innovation-related information, entrepreneurship, or sectorial information

generated by the Organizing Entities, as well as innovation programs led by CIDET and ECOPETROL; 2) Conducting market research and/or marketing activities and developing analytics and user segmentation; 3) Conducting scouting processes for solutions to the innovation challenges of the Organizing Entities; 4) Transmitting and/or transferring your personal data to third parties or allies of the Organizing Entities; 5) Conducting advertising and marketing campaigns; 6) Advancing commercial agreements, events, or institutional programs directly or in partnership with third parties; 7) Implementing loyalty programs; 8) Preparing market studies to establish consumption preferences or market surveys to verify prices on a specific product or service; 9) Georeferencing activities and statistical studies; 10) Sending information about activities carried out by the Organizing Entities or sending information considered of interest through different means; 11) Complying with legal obligations to provide information to administrative entities, as well as to competent authorities that require it; 12) Supporting the operation of programs; 13) Any other purpose that may arise in the development of contracts or commercial relationships that may be established between the Organizing Entities and the information holders. 14) Those enshrined in the CIDET and ECOPETROL Personal Data Processing Policy.

Likewise, I authorize CIDET and ECOPETROL to use my image, understanding that the photographic record, interviews conducted with me, presentations, content, and all material collected during the activities of the call and the execution of the pilots, may be reproduced in media such as: videos, publications, chronicles, success stories, websites, among others, which may contribute to the promotion and dissemination of programs developed on topics related to the purpose of this process.

I declare that this authorization is granted free of charge, so I understand that I will not receive any type of compensation, bonus, or payment of any kind. I acknowledge that there is no expectation regarding the economic effects of the disclosure that the Organizing Entities may make in the process. The information obtained for the processing of my personal data is complete, reliable, accurate, and truthful.

At the same time, I declare that I understand and acknowledge that I have been informed by CIDET and ECOPETROL of the following: a) That it is optional to answer questions about sensitive data or about minors. b) That I may revoke my consent and exercise the rights of access, rectification, cancellation, and opposition to the processing of my personal data (ARCO rights), by emailing CIDET@CIDET.org.co. c) That my personal data will be processed in accordance with CIDET's Personal Data Protection Policy available at <https://CIDET.org.co/wp-content/uploads/2023/11/PoliticasyProteccionDatosPersonalesCIDET-Diciembre-17-2019-revSRRE.pdf>. d) That my personal data will be kept in CIDET's databases for as long as necessary during the development of the call and the execution of the pilots and up to ten (10) years after the relationship is terminated.

* **Responsible for Treatment of Personal Data:** Innovation and Technological Development Center of the Electrical Sector - CIDET, with Tax ID 811.001.689-0, located at Carrera 46 # 56-11 ED. TECNOPARQUE, FLOOR 16, Antioquia, Medellín. Telephone number in Medellín (604) 4441211, email CIDET@CIDET.org.co, and website www.CIDET.org.co.

8. RESERVATION AND LIMITATIONS

The information provided by the Participant and their teams for the purpose of participating in this Call for Proposals will solely be used for evaluation and selection purposes in the

selection process. This document is limited to establishing the conditions and terms of the Call for Proposals and does not constitute, at any time, an employment or contractual relationship with the participants beyond what is expressly provided herein. Therefore, it should not be considered as a promise to initiate business or establish commercial relationships.

Selected Participants shall bear all costs, including transportation, accommodation, and expenses for their participation in the call.

The participant is aware of and agrees not to use the Call for Proposals website to upload any illegal content that violates legal terms or public order, public morality, or may cause harm, including disrespectful, defamatory, vulgar, obscene, racist, xenophobic content, among others, that may cause damage to the Organizing Entities, their teams, and/or third parties in any way. Advertising or commercial content, content that violates the intellectual property rights or copyrights of third parties, or content without acknowledging the copyright of such material, material containing viruses, or files that disrupt, destroy, or limit the operation of software, hardware, or telecommunications systems, shall not be uploaded.

The Organizing Entity reserves the right to reject any content or remove it from the Call for Proposals website at its own discretion and without prior authorization.

The Organizing Entity may disqualify or exclude any Participant who alters or affects the operation of the Call for Proposals website or the terms of the Call for Proposals at any time without prior notice.

9. INTELLECTUAL PROPERTY

9.1 Licenses, Permits, and Intellectual Property

The Participant(s) along with their Team(s) declare to have and undertake to keep current all licenses, permits, and authorizations from the corresponding authorities or third parties, which allow them to participate and maintain their participation in the Call and throughout the process, as well as to obtain promptly those that may be required or demanded. Consequently, the Participant(s) and the Team(s) of Participants shall hold harmless the Organizing Entity from any claim received from the authorities or third parties related to the licenses, permits, and authorizations that are required for their participation and permanence in the Call and in the execution of the pilots.

The Participant(s) accept and guarantee that they are legitimate holders or have the permits, licenses, or authorizations that legitimize them to authorize the Organizing Entity to publish their Participant project and the intellectual property included therein in the Call and, therefore, are not infringing the intellectual property rights of third parties, including but not limited to copyright, trademarks, slogans, emblems or trade names, designs, patents, industrial or commercial secrets, privacy, or image of a third party. The Participant(s) and their Team(s) shall hold the Organizing Entity harmless from any claim received from third parties related to the use of the intellectual property contributed to the Call and in the process of executing the pilots.

The participation and selection of Participants do not automatically imply the transfer of intellectual property rights over which they have accredited ownership. If the parties deem it appropriate and reach agreements on this matter, they shall expressly agree on them in the contractual documents.

9.2 Use of Trademarks in the Call and Pilot Execution

The Participant(s) and their Team(s) may not use the registered trademarks or trade names, logos, or designs of the call or the Organizing Entity, nor use any type of content from the Call's website without prior written authorization from the Organizing Entity. The Organizing Entity may grant written authorization to the Participant(s) and their Team(s) to place the logos of the call and the Organizing Entity in their communications and promotional media, using the graphic material defined for this purpose. The authorization will only be granted for the Participant Teams to publicize their participation in the Call and will remain valid only for the term of the Call.

The Participant(s) and their Team(s) understand and accept that the use of the trademarks and other distinctive signs of the call and the Organizing Entity does not grant any kind of license, authorization, transfer, or any other right over the distinctive signs, which may only be used for the purposes indicated by the Organizing Entity and in accordance with the instructions provided by it. The Participant(s) and their Team(s) shall refrain from modifying, altering, distorting, or in any way changing the trademarks and other distinctive signs of the call and the Organizing Entity.

By participating in the Call, Participant Teams expressly authorize the Organizing Entity to use the information provided in the Call, including the distinctive signs (trademarks, emblems, commercial slogans, names or trade names), to publish and disseminate it through any means of communication (including, without limitation, television, radio, social networks, websites) for advertising and promotional purposes related to the call, without conferring any right to remuneration or benefit to the Participant(s) and their Team(s). The Participant(s) and their Team(s) agree that their distinctive signs may appear accompanied by the distinctive signs of the call and the Organizing Entity, as well as the distinctive signs of other participants in the Call.

9.3 Unauthorized Uses

It is presumed and understood that the Participant(s) and their Team(s) agree to participate in the Call voluntarily, releasing the Organizing Entity from any responsibility regarding the information provided, and it is understood that the information provided is correct, truthful, and complete. The Participant(s) and their Team(s) assume all responsibility for the lack of truthfulness or accuracy of the information, and in this case, the Organizing Entity may deny, withdraw, or suspend the Participant Team.

10. JURISDICTION - APPLICABLE LAWS - STATEMENTS

These Terms of the Call shall be governed by the laws of the Republic of Colombia. In the event that differences arise between them, for reasons related to or arising from this Agreement, they shall seek mechanisms for direct settlement, such as direct negotiation or conciliation. For this purpose, the Parties shall have a period of thirty (30) days from the date

any party makes a request to this effect. This term may be extended by mutual agreement. In the event that the differences persist, they shall be submitted to the Ordinary Jurisdiction.

10.1 Indemnity

The Participant(s) and their Team(s) shall be solely responsible for proven and verifiable damages caused to the Organizing Entities by their acts or omissions, those of their dependents, or subcontractors in the development and execution of the pilot. The Organizing Entities shall not be liable to the Participant(s) and their Team(s) for damages or losses they may suffer due to their own acts or omissions, or for accidents that may occur during the execution of the Project, except in cases where it is verified and proven that the omission, fraud, or negligence on the part of the Organizing Entity has caused the damages and losses, in which case it shall assume responsibility for such damages. The Participant(s) and their Team(s) shall defend, indemnify, and hold harmless the Organizing Entities, their affiliated companies, and each of their respective shareholders, managers, directors, employees, representatives, agents, successors, customers, or their property, and third parties or their property, from any claim, loss, damages, liabilities, interests, judgments, sentences, penalties, costs, and expenses (including attorneys' fees and other reasonable expenses arising from the defense of the Organizing Entity).

10.2 Compliance with anti-corruption and bribery laws, prevention of money laundering and terrorism financing, and compliance provisions.

The Participants shall comply with all anti-corruption, bribery, anti-money laundering, and counter-terrorism financing regulations applicable according to the corresponding jurisdiction. The Participants shall implement measures required by the applicable regulations to prevent their operations from being used, with or without their knowledge and consent, as instruments for the commission of any illicit activity as defined in current national and international criminal and administrative laws, especially money laundering, terrorism financing, financing the proliferation of weapons of mass destruction, acts of corruption, national or international bribery, or any other crimes not listed above.

The Participant hereby states that:

- i. They comply with the regulations on Anti-Money Laundering, Terrorism Financing, and Proliferation of Weapons of Mass Destruction.
- ii. They have mechanisms for the prevention and control of money laundering, customer due diligence, detection and reporting of suspicious transactions, and control of terrorism financing.
- iii. In all operations they carry out, they monitor the origin of the resources. Likewise, before conducting commercial transactions of any nature, they will verify that the counterparty or its ultimate beneficiaries are not included in restricted entities lists or international sanctions lists.
- iv. They will provide truthful and verifiable information, and will update their institutional, commercial, and financial information at least every six (6) months or whenever requested by the Organizing Entities, providing all required documentary evidence. This duty encompasses all information regarding their legal nature. Likewise, they undertake to inform at any time about legal, economic, or financial events related to the initiative, whether it is a company, its parent company, subsidiaries, partners,

- shareholders, or directors that may generate a significant change in the assessment and/or management of the risks associated with these terms of reference.
- v. They will indemnify and hold harmless the Organizing Entity for any fine, damage, or harm suffered by it due to or when their non-compliance with Anti-Money Laundering and Terrorism Financing measures or any other crime related to the aforementioned.
 - vi. Any other act considered as such in current legislation and in national and international norms and treaties.
 - vii. Participants must inform the Organizing Entity in writing if any of their partners or shareholders, administrators (including main and substitute legal representatives, members of management bodies, or trusted personnel, as well as their relatives within the fourth degree of consanguinity or second degree of affinity or first civil), have links with any of the employees or managers with decision-making power in this contract or in the selection of Participants. Participants undertake to keep the Organizing Entity informed of any situation that may perceive or denote a possible or consummated violation of this clause. In such case, Participants agree to respect and enforce the legal provisions of all applicable jurisdictions, according to the established terms of reference and the scope of the obligations.
 - viii. During the validity of the Call and throughout the entire process, all parties must refrain from giving, receiving, granting, promising, or delivering any type of gifts, small gifts, entertainment items, hospitality, and/or anything of value related to the execution of this Agreement, including, among others, gift certificates, travel, airfare, accommodation, transportation, meals, invitations to events (including theater performances, concerts, sports events, tours, and nightclub tickets), any promotional item, and/or any other benefit or advantage, even if non-monetary.
 - ix. They are aware of, accept, and adhere to all the guidelines of CIDET's Code of Ethics, and the values that govern the relationships with Participants and the behavior they must display.

10.3 Origin of funds

The Participants declare under oath that their income comes from lawful activities, that they are not listed in national or international anti-money laundering or terrorism financing prevention lists, and therefore, they undertake to be held accountable to the Organizing Entity and third parties for any damages that may arise as a result of the falsity of this statement.

Likewise, the Participants declare that good name and reputation are key elements in the conclusion and execution of the Contract to be entered into with the Organizing Entities, for which reason they accept that it will be sufficient reason to terminate their participation in the call, without this generating any type of compensation in their favor, due to the fact that they, their legal representatives, shareholders, partners, or directors, or any administrator of the Participants are included in an investigation, report, police or judicial national or foreign list, restrictive or control list, on suspicion of being involved in money laundering, drug trafficking, human trafficking, procuring, child pornography, embezzlement, extortion, kidnapping, corruption, influence trafficking, smuggling, membership or dealings with illegal armed groups or criminal organizations of any kind, arms trafficking, terrorism, crimes against humanity or crimes against freedom, integrity, and sexual formation, etc.

The Participants undertake to comply with the requirements and obligations imposed by the current legal regulations, especially regarding the prevention of the risk of money laundering, as well as any deviation from the ethical framework.

11. ADDITIONAL STATEMENTS

The Participant declares and asserts that they have not engaged, nor have they taken part, nor do they have any evidence whatsoever that any of their owners, principal shareholders, members of the board of directors, executives, employees, or any other person working on their behalf has engaged, either directly or indirectly, in:

- i. A Prohibited Payment regarding the execution of the purpose of this call, which is defined as any offer, gift, payment, promise of payment, or authorization of payment of any sum of money or thing of value, whether by direct or indirect means, to a Public or Private Official, even if it is for the use or benefit of another person or entity to the extent that someone knows or has a reasonable basis to believe that either all or part of the money or thing of value that has been given or will be given to the other person or entity will be paid, offered, promised, given, or authorized to be paid by another person or entity, whether by direct or indirect means, to a Public or Private Official for the purpose of: (a) influencing any act or decision of the Official, (b) inducing the Official to perform or refrain from performing any act in violation of their lawful duty, (c) obtaining an improper advantage, (d) inducing the Official to use their influence with a government or administration of a private entity or any of its dependencies to affect or influence any act or decision of such government or administration of a private entity or dependency in order to help obtain or contract for any business or to direct business towards any person.
- ii. Prohibited Transaction regarding the execution of the purpose of this call, which definition includes the following:
 - a) Receiving, transferring, transporting, retaining, using, structuring, diverting, or concealing the proceeds of any illicit activity, including fraud and bribery of a Public or Private Official;
 - b) Taking part or becoming involved, financially supporting or otherwise, sponsoring, facilitating, or providing donations to any terrorist person, activity, or organization; or
 - c) Engaging in any transaction or doing business in any other way with a "designated person," meaning a person or entity listed by any governmental entity of the United States of America or by the United Nations regarding money laundering, terrorism financing, drug trafficking, or economic or arms embargoes.
- iii. They have not been, are not, and are not currently being investigated, convicted, and/or sanctioned by any national or foreign authority for having engaged or participated, in any capacity or title, in practices, acts, omissions, or crimes directly or indirectly related to public or private corruption, membership in, promotion, or financing of illegal groups, crimes against humanity, drug trafficking in Colombia or abroad, or transnational bribery.
- iv. They have not been identified by national or foreign press or by any national or foreign media, whether mass or not, as having engaged or participated, in any capacity or title, in practices, acts, omissions, or crimes directly or indirectly related to public or private corruption.;
- v. They have not been included in any national or foreign list of individuals or entities identified as having links to activities related to drug trafficking, terrorism, public or private corruption, kidnapping, money laundering, terrorism financing, or

administration of resources related to these activities, including, but not limited to: OFAC (Office of Foreign Assets Control), UN (United Nations), DFAT (Department of Foreign Affairs and Trade), INTERPOL, or any entity that modifies, adds to, or substitutes them.

- vi. They will take all reasonable measures to ensure that none of their owners, major shareholders, officers, employees, or any other person working for the company in the execution of the object of this contract (including, without limitation, its subsidiaries and affiliates, subcontractors, consultants, representatives, and intermediaries) engage in, promise, or authorize the making of a Prohibited Payment or take part in a Prohibited Transaction, whether directly or indirectly, with respect to the execution of the object of this contract.
- vii. They will immediately report to the Organizing Entity any Prohibited Payment or Prohibited Transaction of which they become aware or have reasonable grounds to believe has occurred with respect to the execution of this contract.
- viii. If the Organizing Entity has any reasonable basis to believe that a Prohibited Payment has been made, promised, or authorized, either directly or indirectly, to a Public or Private Official in relation to the object of this call, or that a Prohibited Transaction has occurred in relation to it, they will cooperate in good faith to determine whether such infringement occurred by hiring an independent third party to investigate the matter and provide a written report of their findings.
- ix. They will conduct a Due Diligence process, as circumstances warrant, on the reputation of subcontractors, consultants, attorneys, or representatives they employ to carry out the object of this contract.
- x. For the purpose of detecting any possible violation of applicable laws and regulations, Participants will periodically conduct internal or independent audits, in accordance with their usual business practices, (a) of their respective books, financial records, and accounts, and (b) of the origin of funds and assets.

Ethics and Transparency, a Commitment for All

Join us in our commitment to ethics and transparency. You are responsible for the statements you make throughout the entire call and for their truthfulness. Remember that, by applying, you declare personally and on behalf of the Participant, under oath, that all the information you share in the form, its attachments, and at any time during the call or subsequent stages is true and verifiable.

The Participant and Joint Applicants, including their members, legal representatives, partners, or shareholders, or their close relatives, must assess whether there may be any conflict of interest, disqualification, or incompatibility that may impact their participation in this open innovation call if selected and meeting all requirements.

Keep in mind that this assessment will be part of this open innovation call, and it is your duty to disclose any potential conflict of interest, disqualification, or incompatibility in a timely manner.

The Participant acknowledges and agrees that CIDET, as the Organizing Entity, reserves the right to contract with the selected Participants, through the corporate instrument designated by the Organizing Entity, where applicable.

Additionally, by applying to this Call, the Participant consents to and accepts all the terms, conditions, and requirements established in these Terms of Reference.

12. AGREEMENT OF UNDERSTANDING

The Participant must ensure that, in the development of the pilots, the Team and, in general, the personnel they use or assign rigorously observe the rules, personal protective equipment, and procedures established in the Occupational Health and Safety Management System (OH&S MS).

The Participant must ensure that, in the development of the pilot, their work team and, in general, the personnel they use or assign, comply with the regulations applicable to the Social Security System and are up to date with the payment of the respective contributions established for the different benefits. If the Participant subcontract personnel to fulfill their obligations, they must verify and ensure that they are affiliated with the Social Security System. For these purposes, proof of payment and certification issued by the statutory auditor or legal representative, as applicable according to legal requirements, must be attached to the invoice, verifying compliance with the payment of contributions to the General System of Social Security and parafiscal contributions in accordance with the applicable regulations.

The Participant and team involved in the project development declare to acknowledge and commit to knowing, accepting, and complying with the Integrated Management System Policy and the Impartiality Policy of the Organizations, and shall have the following obligations:

- a) Comply with applicable labor and immigration legislation, antidiscrimination principles, and human rights.
- b) Use the information obtained through their relationship with the Organizing Entities only for the defined purpose, as well as have information security policies and procedures that are adequate to ensure secure access to information related to the process.
- c) When subcontractors are needed for the execution of services, they shall be obliged to comply with the same obligations and commitments as the Participant(s).
- d) Not engage in commercial relationships with another company that may affect the interests of the Organizing Entities during the execution of the process.

Appendix 1: Innovation Challenges – Lines of Transmission

QUESTION

¿How could we perform remote and automated physical integrity inspection on EEE Group's aerial power transmission and distribution lines?

OBJECTIVE

Test CT+I-based solutions aimed at preventing electrical failures and the consequent loss of crude oil production by early detecting potential failure points in the aerial transmission and distribution lines of the Business Group.

Expected maturity level of the solution: TRL 7 and above

PROBLEM

The challenge of inspecting electrical transmission and distribution lines lies in the need to automate the process to identify issues related to vegetation, wildlife, weather factors, and component failures in a timely manner. The lack of real-time health status of these lines negatively impacts crude oil production, especially when electrical failures occur due to components or vegetation encroachments.

Currently, inspections are mainly carried out by personnel using visual methods or predictive techniques, which involve significant costs and dependence on favorable weather conditions. The presence of varying vegetation, areas of difficult access, and risks to personnel further complicate this process.

To address this problem, it is important to implement new inspection and analysis technologies that improve the timeliness of diagnosing the health of these lines. These technologies should allow for preventive interventions before failures occur, thus optimizing operation and minimizing risks to personnel and the environment.

BENEFITS

The notable reduction in inspection times for power transmission/distribution lines will result in increased operational efficiency and lower costs.

The use of alternative mechanisms such as unmanned vehicles will eliminate the risks associated with working at heights and electrical accidents due to contact or proximity, anticipating a decrease in deferred production thanks to early detection of potential failure points.

There will be a reduced need for human resources and vehicles, contributing to a more sustainable and efficient resource management.

The capability to conduct detailed inspections in hard-to-reach areas and detect hidden defects, assembly errors, and excessive vegetation growth highlights the potential to improve quality and safety in operations.

Moreover, there will be a decrease in biological risks associated with traversing easements during inspections, and the ease of inspection in hard-to-reach locations will be facilitated.

Additionally, the possibility of increasing the time between inspections due to the quality achieved with drones will be feasible, along with the mitigation of the impact on permits for accessing properties owned by third parties.

TARGET

Operations of the EEE Business Group that have aerial power transmission and distribution lines in their assets.

Communities near easement areas Econova Network

Electric Power Upstream Vice Presidency

VPU Low Emission Solutions Vice Presidency

VSE Orinoco Regional Vice Presidency

VRO

RESTRICTIONS

The solutions must have licensing and permits to operate drones within the operations of the Business Group, if applicable.

The solutions must integrate with digital solutions to ensure system interoperability and efficiency.

The solutions must respect the minimum safety distances established in the corresponding regulations to guarantee electrical safety.

The solutions must ensure that the cost-benefit ratio is greater than 1 after the pilot phase to guarantee the economic viability of the project.

Appendix 2: Innovation Challenges – Solar Panels

QUESTION

¿How to optimize the residual use of solar panels, solve their costly and complex disposal, and maximize the utilization of their components to create a profitable business model based on the circular economy?

OBJECTIVE

Ensure the adoption of circular economy principles for disused or potentially reusable solar panels to reduce the environmental impacts caused by them.

Expected maturity level of the solution: TRL 6 and above

PROBLEM

The diversification of the energy matrix towards renewable sources, such as photovoltaic solar energy, has been key in the transition to a more sustainable energy system. However, an important challenge arises regarding the management of waste generated by solar panels at the end of their useful life.

With an estimated lifespan of 25 to 30 years, the removal of these panels due to various structural fractures or because they no longer meet the technical requirements of the system after normal use could result in a significant accumulation of waste composed of glass, silicon, aluminum, plastic, metals, and semiconductors, among other materials.

It is estimated that by the year 2028, the first peak of solar panels out of circulation will occur, raising the question of how to properly manage this waste as WEEE (Waste Electrical and Electronic Equipment). In this context, it is crucial to develop strategies and models of circular economy that allow for the utilization of their remaining capacities or components, or ultimately, the appropriate and sustainable disposal of solar panels at the end of their useful life.

BENEFITS

Implementation of a solution to recover materials from solar panels, extending their lifespan and reducing costs in the energy transition.

Reduction of generation costs and transition technologies, making projects more viable.

Relief of pressure on scarce and finite raw materials, contributing to sustainability and resource conservation.

Decrease in the implementation costs of transition technologies by avoiding the use of highly demanded virgin materials, which would accelerate investment returns.

Contribution to the availability of raw materials by recovering materials and avoiding dependence on finite and polluting sources.

TARGET

Operations of the EEE Business Group that have batteries for energy storage in their assets.

Stakeholders in the energy transition who manufacture, use, and/or dispose of batteries.

Community of prosumers and consumers.

R&D ecosystem.

Waste management of WEEE.

Energy sector.

Community and civil society.

RESTRICTIONS

For solutions with TRL above 7, strict compliance with applicable technical standards for recycled materials is required, as well as compliance with relevant regulations such as RETIE if applicable.

For reuse solutions as well as disruptive solutions, the corresponding authorizations for handling hazardous substances are required.

Any solution must consider the necessary endorsement for the proper handling or management of WEEE (Waste Electrical and Electronic Equipment) or hazardous waste.

Appendix 3: Innovation Challenges – Batteries

QUESTION

¿How to improve the reuse of energy storage batteries, solve the costly and complex disposal of these waste, and maximize the use of their components to create a profitable business model based on the circular economy?

OBJECTIVE

Ensure the adoption of circular economy principles for batteries that are out of use or have potential for reuse, in order to reduce the environmental impacts caused by them.

Expected maturity level of the solution: TRL 6 and above

PROBLEM

The exponential growth in the adoption of electric vehicles and energy storage systems has posed a significant challenge regarding the management of batteries once they have reached the end of their life cycle.

In Colombia, where more than 50,000 electric vehicles are in circulation and a global demand of 5.3 TWh is projected by 2035, there is a growing accumulation of battery waste estimated to reach around 3,150 tons in the coming years. This situation brings about specific problems related to the disposal and reuse of batteries, including limited utilization of remaining capacity, difficulty and costs associated with waste disposal, and underutilization of the components present in the batteries.

In response to this situation, there is a need to explore circular economy business models that allow for the evaluation of different options for batteries, such as giving them a second life, utilizing their components, and/or final disposal, thus ensuring an optimal and sustainable closed-loop cycle. These models may even provide solutions to energy access issues in hard-to-reach areas of the country.

BENEFITS

- Strengthening environmental sustainability and improving corporate reputation through responsible waste management.
- Creating new sources of income and reducing disposal costs.
- Reusing energy storage batteries for a second use, which implies reducing disposal costs and environmental impact.
- Expanding access to energy in remote areas and stabilizing solar farms.
- Integrating a circular economy into the energy system, strengthening energy security and independence in isolated regions, as well as supporting the reliability of renewable energies.
- Recovering materials to extend their useful life and transitioning with reduced or regular costs.
- Changes in generation costs and energy potential, which would directly impact the viability of transition projects.
- Increased implementation costs of transition technologies due to the use of highly demanded virgin materials, prolonging investment returns.
- Adjustment in the availability of raw materials due to the finitude of sources and pollution.

TARGET

- Operations of the EEE Business Group that have energy storage batteries in their assets.
- Energy transition actors who manufacture, use, and/or dispose of solar panels.
- Community of prosumers and consumers.
- Science, Technology, and Innovation Ecosystem (CTel).
- Waste Electrical and Electronic Equipment (RAEE) managers.
- Energy sector.
- Community and civil society.

RESTRICTIONS

- For solutions with TRL above 7, strict compliance with applicable technical standards for recycled materials is required, as well as relevant regulations such as RETIE if applicable.
- For both reuse and disruptive solutions, it is required to have the corresponding authorizations for handling hazardous substances.
- Any proposed solution must include the necessary approval for the proper handling or management of Waste Electrical and Electronic Equipment (RAEE) or hazardous waste.