



INNOVATION CHALLENGE IN ELECTRICAL ENERGY STORAGE

Progress Report-II

31ST March 2021

**Customized
Energy Solutions**
Analyze · Simplify · Implement



ABSTRACT

Customized Energy Solutions India Pvt. Ltd. (CES) 2nd progress report for planning & implementation of the “Innovation Challenge in Electrical Energy Storage” pan India to support the FLCTD project to facilitate deployment & scaling up of low carbon technologies that can address the technology gaps to mitigate climate change and promote use of clean energy applications in selected sectors.



CES -IESA <> UNIDO: Plan of action

Tasks	M1	M2	M3	M4	M5	M6
1.1 Coordination support to the PMU to identify subject experts to define the innovation challenge						
1.2. Carryout out publicity of the project among educational institutes, technology R&D centers and laboratories, incubation centers, industries, utilities and MSMEs (towards garnering interest of potential innovators, investors, and other relevant stakeholders in the innovation challenge).						
1.3. Ensuring outreach and participation of the organization and entities and developing communication materials in consultation with PMU, logistics for organizing the events.						
1.4. Publicize the Innovation Challenge on various media and call for applications.						
1.5. Conduct webinars to sensitize the stakeholders based in different parts of the country (in tier-1 and tier-2 cities) about the Challenge;						
1.6. Develop criteria to screen and shortlist applications in consultation with the PMU						
1.7. Develop a Technology Measurement and Verification Process for all shortlisted technologies for the Energy Storage technology area.						
1.8. Liaison with the industry and other end-users and identify champions to participate in technology validation.						

A. CES & IESA have been carrying out the activities in constant discussion with UNIDO PMU team and the Expert Panel. As of March 2021, the status of the activities are as follows

Task	Status
1.1 Coordination support to the PMU to identify subject experts to define the innovation challenge	Completed
1.2. Carryout out publicity of the project among educational institutes, technology R&D centers and laboratories, incubation centers, industries, utilities and MSMEs	
1.3. Ensuring outreach and participation of the organization and entities and developing communication materials in consultation with PMU, logistics for organizing the events	
1.4. Publicize the Innovation Challenge on various media and call for applications.	
1.5. Conduct webinars to sensitize the stakeholders based in different parts of the country about the Challenge	
1.6. Develop criteria to screen and shortlist applications in consultation with the PMU	
1.7. Develop a Technology Measurement and Verification Process for all shortlisted technologies for the Energy Storage technology area	To be completed
1.8. Liaison with the industry and other end-users and identify champions. to participate in technology validation	To be completed

Updates on the task is shared below:

Post to our submission of the first progress report which covered Task 1.1 - 1.6, here are the updates on on-going activities.

Task 1.7: Develop a Technology Measurement and Verification Process for all shortlisted technologies for the Energy Storage technology area

CES R&D team have undertaken the screening and evaluation of 75 nos. of applicants and have shortlisted to 51 nos. depending upon the pre-defined evaluation criteria.

A standard power point presentation template was shared by UNIDO which was further edited to make it specific to Energy storage verticals. After final deliberation with experts on 15th of October 2020, the template was finalized and finally shared with the applicants based on which the expert panel will be shortlisting the applications. The presentation was shared to all the screened applicants by the UNIDO team and is expected to be submitted by 8th of April 2021.

Details on Presentation Template	Annexure I
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A more detailed verification protocol will be prepared once the applicants are shortlisted, specific to the nature of their projects.

Webinar 3:

A third webinar was scheduled on 10.2.21. The objective of the webinar was to share insights on “Guidelines for FLCTD Innovation Challenge Presentation Submission.” Mr. Rishabh Goel from UNIDO team shared an explanatory detail on how to fill the presentation template with a reference to a past challenge. Dr Satyajit Phadke from CES team shared technical insights to be considered on filling the template. The webinar witnessed 60 nos. of participants.

The agenda of the webinar is shared below:

“Guidelines for FLCTD Innovation Challenge Presentation Submission”		
Speakers	Discussion Points	Time
Rishabh Goel, National Project Associate, UNIDO	<ul style="list-style-type: none"> Overview of the FLCTD project Next steps on Screening process A display of Sample presentation 	20 mins
Dr Satyajit Phadke, Program Manager -R&D, CES	<ul style="list-style-type: none"> Explanation of Presentation Submission Technical Guidelines for completion of the application process 	20 mins
Q/A Session		20 mins

Link to recording: <https://attendee.gotowebinar.com/recording/2095440877037540111>

Activity	List	No. of participants
Webinar 3	Annexure II	60

B. Next Steps

- 2nd week of April - deadline for accepting updated detailed presentations and supporting information from shortlisted candidates
- Week of 18th April – Expert committee meeting to provide them update on shortlisted ideas and evaluation matrix.
- Time till May 15th – for evaluation of the shortlisted companies
- End of May or early June – final selection committee meeting to finalize companies selected for demonstration.

C. Annexure

Annexure I: Presentation Template for applicants

Annexure II: Webinars/Workshop participant details

D. Glossary

Sr.No	Abbreviation	Expansion Term
1.	AIIB	Asian Infrastructure Investment Bank
2.	ARAI	Automotive Research Association of India
3.	BCIC	Bangalore Chamber of Industry and Commerce
4.	BEE	Bureau of Energy Efficiency
5.	BIS	Bureau of Indian Standards
6.	BVES	German Energy Storage Association
7.	CES	Customized Energy Solutions India Private Limited
8.	CESA	California Energy Storage Alliance
9.	CII	Confederation of Indian Industry
10.	DST	Department of Science and Technology
11.	EESL	Energy Efficiency Services Limited
12.	ESI	Energy Storage India
13.	ESS	Energy Storage Solutions
14.	FLCTD	Facility for Low Carbon Technology Deployment
15.	GEF	Global Environmental Facility
16.	GESA	Global Energy Storage Alliance
17.	GIZ	German Agency for International Cooperation
18.	GOI	Government of India
19.	ICAT	International Centre for Automotive Technology
20.	IEEMA	Indian Electrical & Electronics Manufacturers' Association
21.	IESA	India Energy Storage Alliance

22.	IGEF	Indo-German Energy Forum
23.	IP	Intellectual Property
24.	ISGF	India Smart Grid Forum
25.	ISID	Inclusive and Sustainable Industrial Development
26.	M & V	Measurement & Verification
27.	MeitY	Ministry of Electronics and Information Technology, Government of India
28.	MOVE	Moving Onward Vehicle Electrification
29.	MSME	Micro, Small and Medium Enterprises
30.	NITRA	Northern India Textile Research Association
31.	NPM	National Project Manager
32.	PMU	Project Management Unit
33.	PSC	Project Steering Committee
34.	SECI	Solar Energy Corporation of India Limited
35.	SOW	Scope of Work
36.	TOR	Terms of Reference
37.	UNIDO	United Nations Industrial Development Organization
38.	WB- ESMAP	World Bank Energy Sector Management Assistance Program

ANNEXURE I



Facility for Low Carbon Technology Deployment Innovation Challenge

<NAME OF COMPANY>
<NAME OF INNOVATION>

1



Instructions

- ☐ Be precise and keep to indicated slide number limits
- ☐ Provide complete details
- ☐ Indicate all assumptions
- ☐ Information in each slide should be presented in not more than 6 bullet points
- ☐ The applicants are highly encouraged to make use of suitable graphics, line diagrams, flow charts, photographs and/or tables for explaining key concepts and system design
- ☐ Use of quantitative information to substantiate benefits of technology is suggested. Avoid use of terms such as 'high' or 'low' as much as possible.

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About the Company

MAX 2 SLIDES

3

Brief Company/Organization/Entity Profile

- ☐ Year of incorporation
- ☐ Brief description of the company/organization/entity
- ☐ Type of ownership
- ☐ Management
- ☐ Partnership with R&D institutes or industry if any
- ☐ Key milestones of product development from idea to current status

4

About the Innovation

MAX 8 SLIDES

5

Technology Details

- ❑ Brief information about the innovation (2 slides, include photographs and schematics)
- ❑ Certifications/Research articles/Patents/ IPR

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Innovation Benefits

Clearly outline the following (with brief calculations)

Energy savings per annum

Conventional processes may be consuming large amounts of energy (kWh or Joules) for the application and new inventions may lead to reduction of energy consumption. This could be in the form of reduced electricity usage, reduced fuel usage or both. This lower operating cost for the user and lower environmental impact of the application.

GHG savings per annum

If the invention reduces or eliminates the fuel usage via electrification of a process or application, Greenhouse gas (GHG) emissions are expected. This may also happen via replacement of conventional fuel with a clean fuel such as hydrogen or a relatively hydrog fuel.

Cost savings

Cost savings can occur as a result of energy savings, capital cost reduction, improved longevity of system, operational cost peak load reduction. Please explain as applicable.

Peak Load reduction

Certain electrical loads require very high power over a short duration of time of the day. As a result of this, the electrical supply needs to be rated for this maximum power value even though it may be used for a short period only. In other cases, expensive upgrade of the electrical supply system may be avoided if the peak load can be reduced or managed effectively by the use of energy storage technologies.

Other environmental benefits

Reduction of emission of SOx or NOx or other environmental benefits

Clearly share the assumptions for the above

Innovation Details

Provide clear explanation of the innovation and technical aspects of your innovation

Discuss your innovation from the perspective of process, technology, efficiency, cost, practicality.

Compare with other existing technologies that are used for the same purpose clearly indicate differences

Status of Innovation

- ☐ Prototype drawings and photographs can be attached as PDF, but should not exceed 8 MB
- ☐ If any installations have been completed, please indicate provide a detailed reference of the installation including:
 - ☐ Location and plant name
 - ☐ Installation details (technical and financial)

Operational data can be used to quantify the energy savings, cost savings, peak load reduction or GHG reduction. The length of operational data considered should be sufficiently long to eliminate start-up effects.
 - ☐ Resolution of any non-engineering issues such as permitting/licensing/safety compliance
 - ☐ Name, email id and phone number of contact person (at installation site)
 - ☐ Photographs of the installation

Please note that innovation benefits may span across one or more categories mentioned below. If so, please quantify each separately.

Innovation Benefits

- ☐ Clearly outline the following (with brief calculations)
 - ☐ Energy savings per annum

Conventional processes may be consuming large amounts of energy (kWh or Joules) for the application and new inventions may lead to reduction of energy consumption. This could be in the form of reduced electricity usage, reduced fuel usage or both. This lower operating cost for the user and lower environmental impact of the application.
 - ☐ GHG savings per annum

If the invention reduces or eliminates the fuel usage via electrification of a process or application, Greenhouse gas (CO₂) emissions are expected. This may also happen via replacement of conventional fuel with a clean fuel such as hydrogen or a relatively hydrog fuel.
 - ☐ Cost savings

Cost savings can occur as a result of energy savings, capital cost reduction, improved longevity of system, operational cost peak load reduction. Please explain as applicable.
 - ☐ Peak Load reduction

Certain electrical loads require very high power over a short duration of time of the day. As a result of this, the electrical supply needs to be rated for this maximum power value even though it may be used for a short period only. In other cases, expensive upgrade of the electrical supply system may be avoided if the peak load can be reduced or managed effectively by the use of energy storage technologies.
 - ☐ Other environmental benefits

Reduction of emission of SO_x or NO_x or other environmental benefits
- ☐ Clearly share the assumptions for the above

Scaling up of Innovation

MAX 5 SLIDES

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Business Plan

- ☐ Please provide information about your business plan (if available)
- ☐ Please include a SWOT analysis (if available)?
- ☐ How do you plan to access markets/ new customers?
- ☐ What will be your funding requirements?

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FLCTD Support

- ☐ If selected under the FLCTD program, what support do you require product development or support for commercialization?
- ☐ What other support do you expect from FLCTD?

Viability & Market Potential

MAX 6 SLIDES

Cost of Technology

- ☐ Total project cost/ economics end to end (include O&M)
- ☐ Please also indicate any anticipated additions/ changes to the existing scheme for installation (and its relevant cost)- for example, any additional retrofit that may be required at the clients location/plant/facility to accommodate the innovation
- ☐ Have you done any calculations to estimate the cost of the system when manufactured at a large scale? Expected cost reduction from current prototype.

Technical/ Onsite Viability

- ☐ Collaboration with existing technology suppliers
- ☐ Impacts on existing technology/ O&M, guarantees, etc.
- ☐ Are there conditions that may affect the operation? (e.g., weather, water, ambient conditions)
- ☐ Operation and Maintenance requirements (if available)
- ☐ How much time will it take for the equipment to be designed and commissioned?

Financials

- ☐ Investment Cost
- ☐ Payback
- ☐ ROI/ IRR

Market for the Innovation

- ☐ Replication Potential of the Product
 - ☐ Assuming no limit on your organization's capacity, how many installations are possible in Indian industry?
- ☐ Major Sectors to be targeted
- ☐ Cross Sectoral Potential
- ☐ Who are your competitors?
- ☐ Please be specific – numbers, percentages, names, etc.

About the Team

MAX 1 SLIDE

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Team Composition and Expertise

- Core strengths and experience of key team members
- Contributions of team members towards ideation and implementation of innovation
- Key external advisors and their contributions

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Details of Measurement & Verification (M&V) Protocol

MAX 3 SLIDES

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Critical Parameters of the Technology

Criteria	Expected Response	Remarks
Which are the critical parameter's resulting in improvement Ex: Operating temperature range of the product /system, mileage, power consumption, fuel saving	List down the parameters and the measurement data of the baseline condition.	Please incorporate instrumentation, online data availability baseline data availability • Needed before installation of the system and • As part of implementation plan
Is the anticipated benefit(s) quantitative or Qualitative	Quantitative / Qualitative	Please list out both types of benefits • Quantitative Benefits : • Qualitative Benefits :
Is the benefits achieved varies with production level / season / change in process conditions etc	List down the critical parameters that can influence the performance of the system and expected benefits .	Please incorporate the level of control you have on the variation? Sensitivity analysis What will happen if the water depth varies? / Product changes? / Pilot location influence saving? Etc..
Do you have performance data of the present (baseline condition) system	Yes / No	Please incorporate the data with details of measurement estimation in implementation plan.

Saving Benefits

Criteria	Expected Response	Remarks
Whether electrical energy saving expected by implementing the technology?	Yes / No	Please incorporate energy meter as part of the system as part of implementation plan.
Whether thermal energy saving expected by implementing the technology?	Yes / No	Please incorporate fuel consumption measuring system as part of implementation plan.
Is there direct CO ₂ benefits other than thermal and electrical energy saving?	Yes / No	Please also indicate any other material or resource saving apart from CO ₂ savings

Annexure II

Webinar on Guidelines for FLCTD Innovation Challenge Presentation Submission

Attendee Report:

Last Name	First Name	Email Address	Country
Anehosur	Veeresh	veeresh@nunam.com	India
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Brahmanathkar	Sourbh	sourbh@igovidyouth.com	India
Das	Sandipan	sandipan.das@usolar.in	India
Gawade	Ashish	agawade@jeevtronics.com	India
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9970115174	GoVidyouth Mobility Pvt Ltd
7003913785	U-Solar Clean Energy Solutions
+919850819688	Jeevtronics Pvt Ltd
09440939201	Nanospan
09599490997	UNIDO
09600067714	Aerostrovilos Energy
09113970352	Clean Electric Private Limited
06366236970	U-solar Clean Energy Solutions
9869767803	Log 9 Materials
6375093445	Cancrie
8978333007	SINNOVANCE Industrial Solutions Pvt Ltd
7093905101	Terracarb Private limited
+918888440836	SALT ENERGY STORAGE PVT LTD
8054377670	IIT Delhi
09435025587	CES
8884380431	Cellprop Private Limited
9177355600	Pluss Advanced Technologies Pvt Ltd
07838908459	CES
7898530478	V Flow Tech Pte. Ltd
08004443974	Offgrid Energy Labs
90680732	Vflow Tech
8568913008	V Flow Tech Pte Ltd
9972512512	Finiot
8891756765	Grinntech Motors and Services
9870998632	Log 9 Materials Scientific Private Ltd
9820048263	Virya Batteries P. Ltd.
9845962434	Indian Institute of Science
6393759534	CES
09971767202	Finiot
+91 7550126088	SAND BIRD
9080064400	IGNIT TECHNICAL SOLUTIONS
7738346746	IIT Madras
07972760258	Futronics design Pvt Ltd

09080222078	Inventus BioEnergy Pvt Ltd
9742141685	IIT Madras Research Park
9871132122	UNIDO
09840057460	InventusBioEnergy Private Limited
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O4oo45079	Nanospan
9717397213	Indian Institute of Technology Delhi
9372333274	IAEE (Institute of Agriculture Energy and Environment)
9629424170	DHANVANTRI BIOMEDICAL
+918249994335	NIT Silchar
9052438456	UNIDO
9840357400	DANFOSS
8050314551	Pluss Advanced Technologies Ltd.
9892049302	CUSTOMIZED ENERGY SOLUTIONS
908190877	DARWYN
9113970352	Clean Electric Private Limited
9769369624	Amperehour Energy
9947876952	M/s Cellprop Private Limited
9314567890	IIT-M
08287695157	Cancrie
8754465234	Grinntech Motors & Services Pvt Ltd
9110733291	Mojo Green Pvt Ltd
9010822191	Indian Institute of Chemical Technology
07972760258	IIT Kharagpur

Job Title

Business Lead
CEO
Research Scholar
Head - Business Development
COO
Sales and Marketing Associate
Director/ CEO
CTO
Project Associate
CEO
PM
Marketing and Sales Associate
Executive Assistant - CEO Office
Co-founder, CTO
DIRECTOR
CEO
Executive Engineer
Research Scholar
Asst Manager
COO
Scientist
Sr. Consultant
Design Engineer
Co-founder. CEO
Business Development
VP
CTO
VP - Product Development
Senior Scientist
CEO
Professor
Manaer R&D
Founder

Chief Production Officer
CEO
Student
Co-founder

Industry

Energy, Chemical, Utilities
Energy, Chemical, Utilities
Education
Other
Energy, Chemical, Utilities
Energy, Chemical, Utilities
Medical, Pharma, Biotech
Energy, Chemical, Utilities
Other
High Tech - Hardware
Transportation & Distribution
Energy, Chemical, Utilities
Energy, Chemical, Utilities
Energy, Chemical, Utilities
Energy, Chemical, Utilities
Manufacturing
Energy, Chemical, Utilities
Other
Energy, Chemical, Utilities
Manufacturing
Manufacturing
Consulting
Energy, Chemical, Utilities
Energy, Chemical, Utilities
Energy, Chemical, Utilities
Energy, Chemical, Utilities
Financial Services - Other
Energy, Chemical, Utilities
Energy, Chemical, Utilities
Other
Education
Energy, Chemical, Utilities
Other

Manufacturing
Energy, Chemical, Utilities
Education
Other

CEO	Energy, Chemical, Utilities
Program Manager	Other
Admin and Finance Assistant	Other
Chief Technology Officer & Head of Operations	Other
CMD	Manufacturing
VP	Energy, Chemical, Utilities
Professor	Energy, Chemical, Utilities
Director	Energy, Chemical, Utilities
CEO	Medical, Pharma, Biotech
Assistant Professor	Education
Technical Expert	Consulting
Director Business Development	Manufacturing
Principal Scientist, New Product Initiatives	Energy, Chemical, Utilities
Director	Consulting
CEO	High Tech - Hardware
PM	Transportation & Distribution
CEO	Energy, Chemical, Utilities
Chief Technology Officer	Manufacturing
Student	Aerospace & Defense
Co-founder CEO	Energy, Chemical, Utilities
Strategy - Lead	Manufacturing
Director	Energy, Chemical, Utilities
Principal Scientist	Government - Federal
Research Scholar	Energy, Chemical, Utilities