Executive Summary of Social Impact of Ladies Hostel, IISc

L&T Technology Services (LTTS) partially funded the construction of a 166-room hostel complex for women students in STEM (Science, Technology, Engineering and Mathematics) at the Indian Institute of Science (IISc). This was a significant collaborative effort to address the need for more accommodation facilities for women pursuing higher education in these fields. This partnership reflects a commitment to promote the following.

- To provide a safe environment to the women research scholars
- To enable them have 24x7 access to university resources like Labs and libraries
- To ensure the women research scholars from lower economic groups have an affordable living option and
- To promote gender diversity and inclusivity in the STEM disciplines.

LTTS's contribution to this project demonstrates their commitment to Corporate Social Responsibility and their understanding of the importance of women participation in STEM education".

About IISC and the Ladies Hostel supported by LTTS

The IISc is a premier institute that has been committed to promoting greater participation of women in the fields of science and engineering. Over the years, women students have been found to contribute to a quarter of the student numbers at IISc and has shown a consistent upward trajectory in recent years. In response to this trend, the institute intended to establish a modern women's hostel with state-of-the-art facilities to adequately support the growing number of women students. LTTS funded the cost of constructing Hostel Complex C.

Hostel Complex C for Women encompasses four floors with a total built-up area of 4,973 square meters and 1,727 square meters provides a comfortable and functional living hostel space for the women students. There are 166 rooms distributed across the different floors. All the rooms have been occupied by students. The breakdown of rooms is as follows:

Floor	Rooms
Ground floor	36
First Floor	36
Second floor	40
Third floor	27
Fourth floor	27
TOTAL ROOMS	**166**

Each floor has a common room, for students to socialize, study, or simply unwind. There are 3 restroom complexes on each floor, totalling to 12 toilet complexes throughout hostel complex C. The construction of the C Block women's hostel followed sustainable and environmentally safe practices like top soil conservation, erosion sedimentation control, using Aerocon blocks, plastering work using gypsum, eco drain pipes for sewers, water heating system using heat pumps and solar panels, single low-e window glasses, low VOC paints and sealants, rainwater harvesting structures with recharge pits and harvesting tank, greywater treatment for flush and landscaping, solar power, heat reflective tiles, segregated

water and energy meters. Incorporating these features into the construction of the C Block women's hostel not only demonstrated a commitment to sustainable building practices but also provided a comfortable, efficient, and environmentally friendly living space for the women students. The careful selection of materials, technologies, and construction practices showcases a holistic approach to reducing the hostel's environmental impact while ensuring a high quality of life for its occupants.

The project was evaluated using the REESS framework. REESS framework measures the performance of programme on five parameters – Relevance, Effectiveness, Efficiency, Social Impact and Sustainability.

Relevance

Lack of safe and affordable spaces for female students is a deterrent for many of them to enrol in colleges and pursue higher education and careers in technology and related fields. Providing a safe, supportive, and affordable environment for female students promotes academic success among them and to their overall development and well-being.

Effectiveness

The women's hostels within the Indian Institute of Science (IISc) campus primarily contributes to ensuring a safe and secure space for the female students. It has also facilitated in providing 24X7 access to the University facilities like laboratories and libraries which are key to STEM education. The hostel has also been instrumental in providing an affordable space to support female students from all economic backgrounds. It has further fostered a conducive environment to encourage and boost the growing participation of women in Science and Technology related fields.

Efficiency

The low and affordable fees that the women pay for the hostel facilities is very less compared to rental charges for living in Bengaluru city. It ensures that women research scholars from lower economic groups have an affordable and safe living option. Staying in the hostel helps them to save time on travel and enables them to spend more time in the laboratories within the campus any time of the day or night thereby promoting efficiency in the academic journey of women students at IISc.

Social impact

The LTTS-IISC hostel accommodation for women in STEM fields has a profound impact on the educational and personal development of female students by providing a safe, supportive, and empowering environment conducive to their academic growth and success. It fosters and encourages women's participation, in STEM disciplines. By nurturing talent and fostering a sense of community, the hostels play a crucial role in advancing women's representation and contributions to the world of STEM.

Sustainability

The ladies' hostel is a permanent structure that will continue to provide housing facilities for women research scholars in the years to come and encourage greater participation of women in scientific fields. Sustainable and environmentally conscious practices have been integrated while constructing the women's hostel. Energy-efficiency measures, utilization of solar

panels, creation of well-ventilated rooms, and building around trees have also been implemented to ensure sustainability of the infrastructure created.

REESS Ratings

Relevance Indicators	RATING	Average
Access to Education as per UN SDG	9	9
Need for safe and secure living spaces for female students	9	
Gender Equality	9	
Aligning with GOI's education Objectives	9	
Aligned with LTTS CSR agenda	9	
Reaching women from various parts of India	9	
Catering to a diverse range of women	9	
Effectiveness Indicators		
Safety and Security	9	8.8
Access to Education	10	
Creating a supportive community	8	
Role Models and Mentorship	8	
Networking and Collaboration	9	
Adequacy of Rooms	9	
Quality Facilities Available	9	
Access for disabled students	9	
Facilities for Sick Patients	9	
Support for Guests	8	
Efficiency Indicators		
Time Saved on Travel	9	9
More Time Spent in Laboratories within the Campus	9	
Low Fees and Rental Charges Compared to Living in the City	9	
Savings on Travel Expenses	9	
Time Management and Focus	9	
Social impact Indicators		
Providing safe and secure living space for female students	10	10
Encouraging Women Participation in STEM	10	
Boosting Confidence and Leadership	10	
Breaking Stereotypes and Gender Bias	10	
Empowering Future women Role Models	10	
Improved access for disabled students	10	
Sustainability Indicators		
Availability of a Permanent structure	10	9.7
Encourages sustained enrollment of female students	10	
Green Ratings & Energy-Efficiency Measures	10	
Ventilation measures	9	
Preserving Green Cover	10	
Proximity to Facilities	9	
Enhanced Campus Connectivity	10	

Conclusion

These ratings indicates that the construction of the women's hostel complex C within the IISC campus holds immense relevance in providing a safe and affordable environment for the female students. It enables them to have a 24X7 access to the labs and libraries at IISc and aid them in their research work. The hostel provides a safe environment for women and supports their participation in STEM, and fosters diversity. By investing in such infrastructure, LTTS along with IISc has collectively worked toward creating a more safe, secure inclusive and equitable society where women can thrive and contribute significantly to the STEM fields.

Executive Summary – Scholarship program for Data Science Program at IIT Madras

In a collaborative effort, LTTS partnered with IIT Madras to establish a merit-based scholarship initiative, targeting economically underprivileged yet deserving individuals enrolled in the Foundation Course of the Online BS Data Science Program at the institution. The execution of this program involved a total financial outlay of INR 2.208 Crores. This assessment comprehensively outlines the overall influence of the scholarship initiative, which was extended to 690 scholars during the Financial Year 2020-21. The primary objective of this study is to evaluate the extent to which the provided support has contributed to the achievement of LTTS's objectives. The study's focal point is to equip LTTS with a comprehensive understanding of the scholarship program's pertinence, effectiveness, sustainability, and social repercussions, thereby facilitating informed recommendations for its sustained implementation. The impact assessment for this project was conducted between July-August 2023.

Of the 690 students who received the scholarship, 65 were females.

	Male	Female	Total
Completed	611	61	672
In progress	14	4	18
TOTAL	625	65	690

- 18% of students are still pursuing the Foundation level course.
- 74% of the total, have chosen to pursue the Diploma level after completing the Foundation course. This highlights the practical orientation of the program, as a majority of students are seeking specialized and hands-on training in data science skills. It also reflects the industry's growing demand for professionals who possess practical expertise in areas such as data analysis, machine learning, and statistical modelling.
- 7% of the students (n=50) are pursuing the degree in data science. This proves that these students are committed to a comprehensive academic exploration of the subject, potentially with the aim of becoming experts or pursuing research in this field.
- Among the students who have received this scholarship, 672 students have fully utilized the scholarship amount of Rs 32,000 and the rest are those who are still pursuing the course.
- 112 students responded to an online survey. All of them were extremely happy to pursue the course with a certificate from IIT Madras.
- 67% of those surveyed found the scholarship easy to avail.
- 84% of the respondents felt that the scholarship was offered at the right time for them to pursue a course of their choice.
- Most of the respondents were students and aspired to pursue a career in Data Science

Evaluation of Program Objectives

The objectives were evaluated using the REESS framework which measures the performance of programme on five parameters – Relevance, Effectiveness, Efficiency, Social Impact and Sustainability

Relevance:
Data science courses are significant in today's world due to the growing reliance on data-driven decision-making in various industries and domains. The LTTS scholarship program for data science students aims to make this education accessible in India, especially to the people from lower income backgrounds. It aligns with LTTS's mission, UN SDG for Quality Education, and the government's push for equitable educational opportunities. The program's recognition by IIT Madras adds value to the students by facilitating them to build a career in data related roles.

Effectiveness:
The scholarship program offered plays a crucial role in delivering quality education by providing deserving students with access to prestigious institutions and valuable resources. This program not only levels the playing field for talented students regardless of their financial background, but also enhances their technical skills through networking experiences. The application process is widely perceived as accessible and user-friendly, further ensuring that a significant number of students can easily benefit from this opportunity.

Efficiency:
The scholarship program offered by LTTS has proven to be highly efficient in various aspects. The initiative's focus on affordability has made quality education accessible, particularly in the field of Data Science, reducing financial barriers for deserving students. This not only aids in skill development but also reduces the need for burdensome loans. The scholarship process's efficiency has been appreciated by the majority of respondents, further highlighting the program's success in ensuring timely and valuable support for aspiring students.

Social Impact:
The scholarship program has made a significant social impact by benefiting those from less privileged backgrounds, who might have otherwise been forced to leave their studies. The need-based support has levelled the playing field, promoting fairness and equality in education. Moreover, the program has boosted self-confidence, pride, and morale among students by recognizing their achievements and alleviating financial stress. Additionally, the scholarship has improved employment prospects by providing academic support and practical interactions.

Sustainability:
The Scholarship Program's sustainability is rooted in its strategic planning, adaptability to evolving educational needs, robust funding network, industry collaborations, and eco-friendly online education approach. Through continuous monitoring and support, the program enables the growth of financially disadvantaged students, while its diverse funding sources and industry partnerships ensure long-term viability. Overall, the program stands as a model of sustainable education, poised to make a lasting impact on students and the ecosystem.

REESS Ratings

	RELEVANCE	RATING	Average
1	Need for professionals in the Data Science field	8	8.6
	Conduciveness of Program Location	8	
	Lack of availability of similar service providers	6	
	Beneficiary Selection	8	
	Caters to underserved, underprovided sections of society	9	
	Aligns to aspirations and skills of students	9	
	Availability of similar academies	8	
	Alignment with LTTS's vision and mission	10	
	Alignment to UN SDG	10	
	Alignment with Govt Programs	10	
2	**EFFECTIVENESS**		
	Identification process of scholars	8	8.8
	Course content specific to needs of the industry	9	
	Building careers in data related roles	9	
	Placements in Data Science related fields	9	
	Support delivery of Quality Education	9	
	Ease of Availing Scholarships	9	
	Ease of Application Process	7	
	Pride in being associated with IIT brand name	10	
3	**EFFICIENCY**		
	Ratio of Support provided to overall requirement	9	9.4
	Adherence to program targets	10	
	Affordability of education	9	
	Helps reduce debt	8	
	Timeliness of the Scholarship	10	
	Waiting time for availing Scholarships	10	
	Scholarship tranche payment benefit	10	
4	**SOCIAL IMPACT**		
	Equitable access to education	9	9.3
	Better prospects for careers in emerging field of Data Science	9	
	Improved academic knowledge and interests of students	9	
	Increased self-confidence, pride, and boosts morale	9	
	Fostering diverse learning opportunity	9	
	Creating a pool of professionals in the field of Data Science	10	
	Fulfilling the aspiration to be an IIT alumni	10	
5	**SUSTAINABILITY**		
	Sustainable platform to attract quality students	9	8.8
	Financial Sustainability after giving the scholarship	9	
	Organization capacity to continue support	10	
	Adapting to evolving needs of students & academic eco-system	9	
	Sustained interest among parents and students	9	
	Creating school/college programs/networks to ensure continuity	7	

Conclusion

A rating of 8.5+ in all the REESS aspects proves that this scholarship is a very relevant and an impactful initiative that helps in grooming many individuals in the field of Data Science. LTTS' scholarship program has emerged as a transformative platform for students in the field of Data Science, offering them a career path in this emerging career field. By granting access to quality education in Data Science, the program equips students with the skills and knowledge necessary to thrive in a rapidly evolving technological landscape. It has enabled many students from the lower economic strata to upgrade their career and academic prospects and be certified from the prestigious IIT Madras. It not only supports underprivileged students but also contributes to social equity, innovation, and the nation's education objectives. The scholarship's impact extends to improving career prospects, fostering diverse learning opportunities, and increasing students' interest in academics.

Executive Summary - Social Impact assessment of The Green Office Project – Chemical Engineering Department, IIT Madras

The world increasingly recognises renewable energy as a multiplier solution that addresses climate challenges, fosters socioeconomic growth and enhances energy security amid a global energy crisis. At the COP 27, India has committed to achieving a net-zero carbon emissions by 2070. Over the years, India has been making significant strides in the adoption of renewable energy and has set targets to reduce the carbon intensity of the nation's economy. However, challenges such as infrastructure development and grid integration remain, which the Indian government and private sector are actively working to address. Amongst the challenges to be addressed is the efficiency of storage systems as solar energy is not always produced at the time energy is needed most. So, storage can increase system efficiency and resilience, and it can improve power quality by matching supply and demand.

The IITs which are at the forefront of innovation in the country have been addressing important problems associated with energy conversion and storage devices including, solar fuels, batteries, supercapacitors, fuels cells, and electrolysers. Towards this, LTTS - which is driven by its mission to build a more robust and equitable society - has funded the department to address the issue of energy conversion including multiple storage systems. The funding was to the tune of INR 120 lakhs plus overheads, which included : 5 kW solar panels, 15 to 16 kWh lithium batteries, ~ 1 kW water electrolyser, in-house development of metal-air batteries and carbon dioxide electrolysers, power conditioning units, retrofitting cost of office at IIT Madras, manpower associated with the work, hydrogen storage tanks and compressors and other necessary components to integrate the solar panels, energy storage systems and the electrical appliances at 'green office. The proposed objectives of the project were:

1. Demonstrate grid-independent 'green office' at IIT Madras which will employ solar panels, lithium-ion batteries, water electrolysers, zinc-air batteries and carbon dioxide recycling stations.
2. Enable the large-scale demonstration of indigenously developed metal-air battery technology and carbon dioxide electrolysers.

The project was inaugurated on May 11th 2022 by Mr. Amit Chadha (CEO & MD, L&T Technology services) in presence of Prof. Kamakoti (Director, IIT Madras). After a year of implementation of the project, LTTS approached The Social Audit Network-India to conduct an impact assessment of the project.

About the Green Corridor

All the corridors of the Chemical Engineering department as well as the front entrance are solar operated with an installed capacity of 11(+1.4) kW. So far 9100 kWh has been generated since the start of the project. Every corridor is powered by a different battery chemistry so that robust testing is possible. The project has used a combination of energy storage systems,

namely Lithium iron phosphate (prismatic), Lithium iron phosphate (cylindrical), Lead-acid battery, Hydrogen fuel cell, Water electrolyzer and Zinc-air battery.

An open-source platform further customised for this specific situation is being used to collect data. Real time data is collected that provides information on batteries, time taken to charge/ discharge, availability of power, efficiency of each system and others. Data analysis of the project is made available for all to avoid reinventing. The building is used as a modular unit for others as a testing facility. These players just plug in and do the testing as against having to develop a similar building and infrastructure to do so. Since robust data is also captured, it makes for a good testing ground.

Relevance

The project addresses the need for solutions to reduce dependence on fossil fuel and aligns with the larger goal of the organisation to innovate technology, with Global commitments like the SDG and aligning with our national priorities. It further addresses the problems related to storage technologies for renewables and hence takes a step towards in solving some very relevant energy issues in the country. One of the main focus areas of the IITs is R&D, that helps innovate and bring about path breaking solutions to real problems that exist in the country and globally. The current project does exactly that. The innovations on storage battery technology can bring about real changes that help India reach the target of zero emissions.

Effectiveness

The effectiveness of the project is demonstrated by way of it being grid independent, improving supply through multiple storage systems. This allows for taking advantage of each technology's specific benefits. If one system fails, the others can compensate, ensuring more reliability in power supply. Combining Short term, medium term and long-term storage options optimises energy management. They also can handle variable renewable energy generation effectively, ensuring steady power supply during periods of low generation. Diversified storage system can also handle manufacturing shortages more effectively. With the renewable energy landscape evolving rapidly, adapting to emerging advancements is easier with multiple storage systems. This project has also led to building the confidence in renewable energy among Governments, Corporate and other stakeholders and has become a source of inspiration for other projects.

Efficiency

The cost savings on electricity is about Rs. 1 lakh for the year and the total energy saving is 9.l MWh of electricity. Due to developing the technology- zinc air and carbon dioxide electrolyzer- inhouse, the storage system as well is very cheap, effective and has very little negative environmental impact. The long term return on investment cannot be projected

accurately now, but cost saving on energy storage is expected to be one-half compared to the present benchmark. These indicators suggest that the project is also very efficient in both, actual and environmental cost.

Social Impact

The long term social change and impact that this project can have is by far the biggest reason why this project should be further expanded. The project has contributed to the increased knowledge and skills for the research team and the startup. The energy security due to the reliability and stability of power and therefore the reduction in cost is a huge impact, as power can reach marginalised communities as well. Resilience during disasters, job creation in production, installation and maintenance are other long term indicators of social impact. Finally, the potential to reduce the impact of climate change and the negative impact on health due to burning of fossil fuels are the reasons that globally renewables are being advocated.

Sustainability

The project is sustainable because of its futuristic vision- renewables are the need and here to stay. Reducing the costs of energy in the long run , achieving complete grid independence also points that this is sustainable in the long run.

REESS Ratings

Relevance Indicators	**Rating**	Average
Need for solutions to reduce dependence on fossil fuel	10	10
Aligns with the larger goal of the organisation to innovate technology	10	
Aligns with Global commitments	10	
Aligns with Government of India's push to Make in India	10	
Addresses the problems related to storage technologies for renewables		
Effectiveness Indicators		
Grid independence	9	9.6
Effectiveness of multiple storage systems	9	
Confidence of Governments, Corporate and other stakeholders in the project	10	
Source of inspiration for other projects	10	
Converting negative to a positive solution	10	

Efficiency Indicators		
Cost efficiency on electricity usage	10	9
Cost saving due to storage technology innovation	8	

Energy efficiency and reduction in emissions	10	
Efficiency of inhouse technologies	8	
Return on investment	9	
Social impact Indicators		
Knowledge gain	10	10
Beneficiaries	10	
Behavioural change	10	
Energy security	10	
Resilience during disasters	10	
Job creation	10	
Potential to reduce climate change impact	10	
Impact on health	10	
Sustainability Indicators		
Futuristic technologies	10	9.25
Reducing the costs of energy	10	
Becoming completely grid independent	8	
Self sustaining outside the campus	9	

Conclusion

An overall rating of 9+ for all the REESS parameters indicates that this project has been a very relevant and impactful project.

The green office project has achieved its objectives of grid independence and indigenous development of zinc air and carbon dioxide electrolysers and has demonstrated that this has a huge impact in the future on renewable energy. The patents received for the project is another feather in its cap. The indigenously developed storage systems have very little negative impact on the environment, can be made to be cost- effective in scale and adds pride to India.

Executive Summary – Social Impact Assessment of the Studio Classroom at IIT Madras

The establishment of the Studio Classroom at IIT Madras under the National Program on Technology Enhanced Learning (NPTEL) by LTTS was a significant stride in the domain of higher technical education. NPTEL is renowned as one of the world's biggest higher technical education platforms, and the inclusion of the state-of-the-art Virtual Studio and Studio classrooms in IIT adds a new dimension to its offerings. Through the courses developed in the studio, IIT aims to provide valuable upskilling and cross-skilling opportunities to thousands of Indians, thereby enhancing their eligibility for diverse job prospects.

The study focuses on evaluating the overall impact of the program, which was made available through the NPTEL portal in the form of courses recorded in these studios. The online studio was designed and constructed during FY 2020-21 and launched in March 2021. The social impact study of the studio was held during July-August 2023.

About the Studio

The Virtual Studio Classroom, located in Room 301-E, was inaugurated on 26th March 2021, and it has been thoughtfully designed to accommodate up to 100 people comfortably. With 28-30 three-seater desks and benches, the facility offers ample seating space for learners. Moreover, the provision of a designated area to store bags ensures a clutter-free environment, fostering an optimal learning atmosphere. The presence of audio-visual support and a Green Screen for slide presentations allows for dynamic and engaging teaching methods.

Recording Room: Adjacent to Room 301, a separate Recording Room with a Control Room houses professional-grade equipment. This includes a 4K camera, which represents a significant improvement over the older variant's 1080P camera. The enhanced resolution contributes to a clearer and more immersive learning experience for students accessing recorded content. The presence of a monitor in the Control Room provides real-time feedback to instructors during recording sessions, ensuring the quality and effectiveness of their delivery.

Green Matte Studio: The Green Matte Room, is another innovative addition to the setup. With a fully green background, instructors can utilize any virtual background during recordings. This feature has proven particularly valuable during the pandemic when COVID-safe production necessitated remote teaching setups. The absence of student seating in this recording space emphasizes its primary focus on facilitating high-quality recordings and producing engaging educational content.

Overall Reach

During the period 2021-23, the studio played a pivotal role in facilitating 300 hours of recording sessions in the CRC virtual studio and 36 hours in the Green Matte room. The studio successfully recorded a total of 10 and the green matte room recorded 12 video sessions, during the two years. This collection of video content served as a repository of educational resources that both professors and students could access. The range of subjects covered by these recordings reflected the diverse academic offerings of the institution, making it an invaluable asset for education. The studio classroom sessions also saw significant engagement. The virtual studio hosted 831 students offline, 229 online participants and the

Green Matte room reached out to 49,600 students who were enrolled in various online programs. These interactive sessions provided students with the opportunity to engage directly with professors, fostering a dynamic learning environment that encouraged active learning and participation. The studio catered to a diverse range of courses offered by the institution, like Computer Architecture, Secure Processor Microarchitecture, Research for Marketing Decisions, Design of Mechanical Transmission Systems, Analog IC Design, "Indian Democracy: A Synergy of Constitution, Parliament, Judiciary, and Civil Society, Korean, Deep Learning, Construction Economics and Finance, Advanced Quantum etc.

This project was evaluated using the REESS framework on five parameters – Relevance, Effectiveness, Efficiency, Social Impact and Sustainability.

Relevance

The establishment of the Studio Classroom and virtual studio at IIT Madras is highly relevant in the context of modern education and societal needs. It directly contributes to SDG 3 by promoting quality education and lifelong learning opportunities, aligns with the GOI's objectives to enhance education accessibility, and reflects LTTS's commitment to corporate social responsibility and community impact. Through the NPTEL platform and the Studio Classroom, individuals from all backgrounds can access educational resources, upskill, and contribute to India's progress and development.

Effectiveness

The adept use of technology by the online studios with the state-of-the-art infrastructure has enabled IIT Madras to offer industry-specific courses to a wide spectrum of students with its prestigious branding. It has also improved the scalability of the courses offered through online resources and content created. These studios were a boon for students during the COVID times and all the virtual courses were handled seamlessly by the faculty. These factors provided a high-quality educational experience for the students and allowed IIT to expand access to education and empower learners with relevant knowledge and skills.

Efficiency

The streamlined teaching process within the Studio Classroom and Virtual Studio allows professors to focus on refining their teaching methods and engaging with students proactively in a virtual mode. Moreover, the cost-effectiveness of the studio model makes education more accessible and affordable. Additionally, self-paced learning through NPTEL ensures a personalized and effective learning experience for all students enrolled. Students benefit from the recognition of IIT's certificates, thereby enhancing their career prospects.

Sustainability

The online studio is an innovative and forward-thinking approach to education delivery and content preservation. By recording and preserving educational content, the studio contributes to a more sustainable education system by reducing resource consumption and overcoming geographical barriers. Furthermore, the adaptability and resilience of its online platform make it an asset during times of crisis, ensuring that education remains accessible and uninterrupted.

Social impact

The LTTS-IIT Studio Classroom program not only enhances the reputation and credibility of educational content but also fosters inclusivity, empowers individuals from diverse backgrounds, and contributes to the growth and development of skilled workforce. Many courses were offered that were attended by students who always aspired to study at IITs but were not eligible to join. The initiative serves as an exemplar of how technology and innovation can be harnessed to create positive change in education, leading to inclusive education and creating a skilled society.

REESS Ratings

RELEVANCE	**RATING**	Average
Program reaching people from all backgrounds	10	9.6
Contribution to UN SDG	10	
Aligning with GOI's education Objectives	10	
Aligned with LTTS CSR agenda	10	
Excellence in Education	9	
Addresses student needs through Industry-Specific Courses	9	
Ability to access IIT degree without writing JEE	9	
EFFECTIVENESS		
Scalability of Educational Offerings	9	9.5
State-of-the-Art Setup	10	
Brand Value	10	
Timely Completion of Studio Construction	10	
Dual Functionality as Classroom and Recording Space	10	
Better Quality of Videos	9	
More Seating Capacity	9	
Transforming Educational content delivery	9	
EFFICIENCY		
Streamlining Teaching Process	8	9
Cost-Effectiveness	10	
Recognized Certification	9	
Self-Paced Learning	9	
Ease of operations by support staff	9	
SOCIAL IMPACT		
Increased pride and placing in society	9	9
Promoting Inclusivity and Accessibility	9	
Empowerment through Low-Cost Education	9	
Impact on the Workforce and Economy	9	
Overcoming Geographical Barriers and Promoting Accessibility	9	
SUSTAINABILITY		
I nnovative Approach to Content Delivery and Storage	8	9.5
Long-term benefits	10	
Reduction in Resource Consumption	10	
Environmental Impact and Carbon Footprint	9	

Adaptability and Resilience During Crises	10	
Capacity of done to continue the program	10	

Conclusion

Based on the indicators defined above, the average REESS score for the program is **9.21**. This indicates a high level of compliance. The need for studios within IIT Madras to increase access and scale to online courses was of paramount importance in the digital age of education and LTTS, through its contribution has helped further this. These studios play a pivotal role in creating and delivering high-quality online course content, enabling prestigious institutions like IITs to extend their educational offerings to a broader audience. Through LTTS's support, IIT Madras has been able to reach learners worldwide, transcend geographical boundaries and make education more accessible to students from diverse backgrounds. The project helped meet a crucial need as it ensured the production of clear, engaging, and visually appealing content and recordings, elevating the overall learning experience and making online courses more effective in imparting knowledge to students. These combined aspects contribute to making the Studio Classroom a valuable and successful education platform.

Executive Summary – Natural Resource Management Project implemented by AKRSP(I) – The Dangs

The Dangs district borders Maharashtra's Dhule and Nashik districts to the east and south, and Gujarat's Tapi and Navsari districts to the north and west respectively. It is recognised as one of Gujarat's smallest and most underdeveloped tribal districts, with around 96% of its population belonging to tribal communities. The primary livelihood for most of the community revolves around agriculture and livestock, providing them with subsistence means of living. The Dangs receives an average of 1,600 mm rainfall during the monsoon season. Despite this ample rainfall, water scarcity remains a common issue in almost every village during the summer months. The Dangs district is home to several rivers, including the Purna, Gira, Ambika, and the Swargavahini. These water bodies, with their origins in the Western Ghats, traverse the region, seemingly offering an abundant supply of water.

While the rivers indeed flow through the region, their water is often challenging to harness. The absence of adequate irrigation infrastructure poses a significant hurdle for farmers in utilising river water for agricultural needs. Traditional methods of irrigation are often inefficient, leading to substantial water wastage and limiting the area that can be brought under cultivation. Also, the hilly terrain of the Western Ghats makes it challenging to construct large-scale irrigation projects and reservoirs, which could help in water storage and distribution Access to water access is crucial for the agrarian economy and irrigation.

In response to this water scarcity and rainfed farming, LTTS has implemented a project along with AKSRP(I) named “Natural Resource Management Project”. The project has covered marginalised villages of Dangs District with the objective to enhance the resilience of agriculture-based livelihood practices. The LTTS-AKRSP (I) initiative has been implemented in remote villages within the Dangs District's Ahwa, Waghai, and Subir blocks. These villages host marginal and smallholder farmers, primarily reliant on rainfed agriculture and labor for livelihoods. With water assured, the project also emphasises on crop diversification. By promoting varied crops and innovative techniques, profitability and productivity are enhanced, securing farmers' economic well-being, equipped to thrive in the changing agricultural landscape and improve their overall livelihoods. The project was carried out between December 2021 and March 2022, for which the impact assessment was conducted during July-August 2023. Focused group discussion was held with the beneficiaries in the presence of the local community mobiliser and AKRSP (I) staff.

About the Integrated Village Development Project

The LTTS-AKRSP (I) project has been implemented in the most remote villages of three blocks in the Dangs District: Ahwa, Waghai, and Subir. A significant portion of the community residing in these project villages consists of marginal and smallholder farmers, who primarily rely on rain fed agriculture and agricultural labour as their main sources of livelihood.

1.1 Water Resource management

To offer a sustainable solution for irrigation to benefit the local communities, the project encompasses several key activities, including the implementation of solar-based mini lift irrigation schemes, the construction of Farm Ponds, and the establishment of drip irrigation systems. These activities, when combined, contribute to expanding the area of cultivable irrigated lands, thereby boosting agricultural productivity, and enhancing the livelihoods of the community.

1.1.1 Solar-based mini lift irrigation units

Solar-based mini lift irrigation units are compact, decentralised systems designed to lift water from a water source (such as a well, pond, or river) and distribute it to agricultural fields at higher elevations. These units employ solar photovoltaic (PV) panels to harness sunlight and convert it into electricity, which drives the water pump to lift water to the desired location. After introducing the Solar irrigation system, 43 farmers who were using diesel engines and electric motors have replaced their previous engines. The initial investment for solar mini lift irrigation units varies from 7.5 lakhs to 10 lakh rupees. AKRSP (I) has provided 10 such units in villages in the project areas benefiting 157 farmers.

"Most of us engaged as agricultural labourers. It is only after LTTS-AKRSP (I) programme we have started cultivating millets and growing vegetables. Although there is a river, we did not have the facility to draw water to our field with the solar lift irrigation we have 70% of our village land available for cultivation now." – ***Satish Bhai Gaekwad, Bandhpada Village***

1.1.2 Farm Ponds

13 farm ponds have been provided benefiting 40 farmers. LTTS-AKRSP (I) also introduced fish farming in the programme areas. LTTS-AKRSP (I) has provided inputs – excavation, lining, plastic sheet, etc.

1.2 Farm Based activities.

Farming is the backbone of rural communities, and farm-based activities play a crucial role in sustaining livelihoods and contributing to economic growth. The following farm-based activities launched by LTTS and AKRSP (I) in The Dangs have contributed to agricultural development and rural prosperity.

1.2.1 Horticulture

51 farmers have been provided support with 50 mango saplings each, primarily of the Kesar variety. These mango plants are expected to mature within 3 to 4 years, and from the 4th year onwards, they are projected to yield approximately 20 to 30 Kg of mangoes per plant. As a result, each farmer can expect to earn a minimum seasonal income ranging from Rs.50,000 to 55,000 every year. It was observed that 90% of the plants survived, while 10% experienced mortality. To address this issue, inter-cropping was carried out in the orchards to ensure the proper establishment of the mango plants and to maximise their overall success rate.

1.2.2 Drip Irrigation

A total of 25 farmers have embraced water-efficient irrigation practices, specifically Drip/Rain pipe Irrigation. This method enabled farmers to utilise water in an efficient manner, optimising its distribution and minimising wastage. By implementing this approach, farmers saved water resources and ensured its availability for additional crops, contributing to improved agricultural productivity and sustainable water management**.**

The adoption of Drip Irrigation reflects the farmers' commitment to modern and environmentally conscious farming practices, which ultimately benefited both the agricultural sector and the broader community.

1.2.3 Vegetable cultivation

Vegetables are high-value crops, and their cultivation can lead to improved economic prospects for farmers. A total of 86 farmers have been supported with various materials for mandap construction, including GI wire of 10-gauge and 15-gauge from TATA Ayush, as well as Plastic wire. Additionally, they have received bio inputs and materials for pest management and micronutrient supplementation. The farmers have undergone comprehensive training in vegetable cultivation, with a focus on efficient water usage, natural farming practices, value addition, and the development of a value chain. These training sessions equip the farmers with the necessary knowledge and skills to enhance their agricultural practices, improve crop yields, and add value to their produce through processing and value chain development.

1.2.4 Soil Conservation activities

Soil conservation activities aim to prevent soil erosion and degradation, preserving the fertility and productivity of agricultural land. Techniques like contour farming, terracing, mulching, and cover cropping are commonly employed to protect the soil from erosion caused by rainfall and winds. Soil conservation practices are essential for sustainable farming and long-term agricultural viability. The primary goal of the Soil and Water Conservation (SWC) programme in the region is to encourage farmers to adopt effective soil and water conservation practices. This initiative aimed to ensure the long-term sustainability of cultivable land, safeguarding it for future generations.

1.2.5 Land levelling

Land levelling is the process of smoothing out uneven terrain to create a uniform surface. This activity enhances water distribution during irrigation, reduces waterlogging in low-lying areas, and allows for efficient water usage. Land levelling improves crop yields and facilitates the adoption of modern farming practices. A total of 351 farmers have reaped the benefits of land levelling, transforming 53 Acre of previously uncultivated and uneven land. As a result, these farmers can now engage in cultivation and generate a minimum additional income ranging from Rs. 15,000 to Rs. 18,000 per season.

The REESS framework

REESS framework measures the performance of project on five parameters – **Relevance, Effectiveness, Efficiency, Social Impact and Sustainability**. The REESS criteria answers the following questions and is defined as follows

Relevance

The program area experiences heavy rainfall from June to August, characterised by slopes that challenge soil and water conservation. Steep terrain leads to erosion and runoff issues. Summer months (April and May) and post-monsoon face severe water scarcity due to a lack of conservation practices, hindering irrigation. Farmers struggle to divert river water due to hilly terrain, using distant diesel engines for irrigation, causing pollution.

Soil erosion has led to poor fertility in rainfed tribal agriculture, lacking alternative income. Villages lack funds for drip irrigation investment and maintenance. Despite fertile land, horticulture was new pre-LTTS-AKRSP (I), impacting nutrition due to limited income and forest reliance. Youth suffer from poor nutrition.

LTTS and AKRSP (I) introduced solar lift irrigation, reducing water travel and costs. Farmers learned efficient water use, adopting drip irrigation and farm ponds for rain storage. Solar lift irrigation expanded cultivable land and crop variety, replacing diesel-reliant sugarcane. LTTS-AKRSP (I) provided seeds, stumps, wires, and saplings, elevating nutrition, and offering livelihood alternatives, preventing migration, and enhancing village sustainability.

Effectiveness

Solar mini lift irrigation transformed tribal areas with abundant solar energy, providing sustainable water for irrigation. Crop yields and tribal farmers' livelihoods soared. Community groups managed maintenance and operations, ensuring solar unit functionality. Drip irrigation thrived in scarce water regions, elevating yields, and income. Farm ponds stored rainwater, combating scarcity, and boosting crops. Horticulture diversified crops, raised income, and fortified food security.Vegetable cultivation enriched tribal areas, generating income, nutrition, and efficient land use. Capacity building and women's involvement ensured system upkeep. Ladies finger cultivation empowered women financially. LTTS-AKRSP (I) interventions showcased effective planning, evident in remarkable outcomes. Optimising land levelling and water conservation was prioritised. These strides marked positive steps towards sustainable agriculture and resource management.

"We did not have electricity lines in our village, hence did not have motor pumps for irrigation. During the kharif season we cultivated Bengal gram, Paddy, ragi and Toor dahl; and green gram, beans and other vegetables during the rabi season. I used to spend around ₹5000 every month to buy vegetables and groceries. Now with our own kitchen garden, we can sustain our household expenses. My savings has also increased from 500 rupees a month to 1000." - **Nattu Bhai, Bordhad Village**

Efficiency

The efficiency of solar mini lift irrigation, farm ponds, horticulture, drip irrigation, and vegetable cultivation in tribal areas has a significant impact on the success and sustainability of these practices. Solar mini lift irrigation was highly efficient in tribal areas, especially because there was ample solar energy availability. It reduced dependence on conventional energy sources, leading to cost savings and environmental benefits. Drip irrigation had high water use efficiency, making it well-suited for tribal areas with limited water resources. It led to significant water savings and increased crop yields. Vegetable cultivation was efficient in tribal areas as it offered the opportunity for small-scale farmers to utilise their land effectively and generate higher income.

Sustainability

Solar mini lift irrigation revolutionised water resource management by replacing energy-intensive methods, curbing emissions, and optimising water use. This bolstered agriculture, raised crop output, and uplifted tribal farmers' lives sustainably. Farm ponds conserved rainwater, crucial for tribal regions facing scarcity, fostering biodiversity and ecosystem services. Drip irrigation's efficiency conserved water, limited

runoff, and aided nutrient precision. Sustainable horticulture, like organic farming and mulching, enriched soil, ensuring lasting productivity. Horticultural practices diversified tribal farming, boosting resilience against pests, diseases, and climate changes. Vegetables improved food security, offering nutritious options and income, securing economic sustainability for tribal communities.

Social Impact

The successful implementation of solar drip irrigation and farm ponds in The Dangs has transformed water scarcity issues for local farmers. This enhanced access to water boosted agricultural productivity, improving livelihoods significantly. This also led to increased food security, diverse crop yields, and elevated incomes. These practices curbed rural-to-urban migration, empowered women, and catalysed rural economic development. The positive environmental impact included water conservation and knowledge transfer.

By introducing solar lift irrigation, farm ponds, drip irrigation, and horticulture, the program has revolutionised tribal agriculture. Sustainable technologies have bolstered productivity, water management, and resource efficiency. Beyond tangible gains like higher yields and efficient water use, capacity building has empowered tribal farmers with modern sustainable techniques. This has triggered positive socio-economic shifts, fostering self-reliance and social inclusion. The initiative's focus on tribal communities has curbed inequalities, ensuring underserved farmers access sustainable practices.

I am certain that our village will be declared as a model tribal village in the next 5 years and am sure we can sustain the work that AKRSP (I) initiated. None of use urea or any other chemical fertiliser as The Dangs is declared as an organic district. – **Satish, Bandhpada village**

We have stopped going to neighbouring villages to engage in agricultural labour. We can save 20 to 30,000 every year now from sale of ladies finger." ***Amina Ben***

REESS Ratings

Relevance Indicators	**RATING**	Average
Small and marginal farmers depended on rainfed agriculture and migrating for labor to cities for 8 months	10	10
Tribal families living in Poverty	10	
Non-Availability of other service providers doing similar programs	10	
Lack of Awareness on alternate farming practices	10	
Eagerness of farmers to learn new methods of farming	10	
Slopy farmlands where cultivation is not feasible	10	
Effectiveness Indicators		
Community Participation	10	9.2
Livelihood Improvement	9	
Empowerment of Women and Marginalised Groups	8	
Environmental Awareness and Education	8	

Relevance Indicators	RATING	Average
Stakeholder Satisfaction	10	
Carbon Sequestration	10	
Efficiency Indicators		
Cost-effectiveness	10	9.8
Timeliness	10	
Resource Allocation	10	
Administration	10	
Monitoring and Evaluation Process	10	
Participation of local communities	9	
Social Impact Indicators		
Poverty and debt Reduction for the tribals	10	8.8
Enhanced Income Generation fro the tribals	8	
Prevention of migration	9	
Gender Equality	9	
Enhanced knowledge levels among tribals	9	
Better Health and Nutrition among tribals	8	
Empowered tribal communities	9	
Sustainability Indicators		
Soil Health and Erosion Control	9	9
Sustained income for tribals	9	
Community Ownership	9	

Conclusion

A REESS rating of 8.5+ has proved that this project is transformative for communities, fostering sustainable agricultural practices, and empowering farmers in The Dangs. These sustainable practices also strengthened climate resilience, ensuring a prosperous and harmonious future for the tribals. The LTTS-AKRSP (I) initiative in The Dangs stands as a beacon of how modern agriculture can resolve challenges and foster prosperity.