Technology Roadmap
Committee Meeting
Water

1st Meeting Report
April 18, 2024

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List of Abbreviations

AJK	Azad Jammu & Kashmir
CTCN	Climate Technology Centre and Network
DD	Deputy Director
DGA	Director General Agriculture
EPA	Environmental Protection Agency
FBC	Fluidized Bed Combustion
GB	Gilgit-Baltistan
GGC	Green Growth Consultants
GGGI	Global Green Growth Institute
KPK	Khyber Pakhtunkhwa
LG&RD	Local Government and Rural Development
MoCC&EC	Ministry of Climate Change and Environmental Coordination
MRF	Material Recovery Facility
MSW	Municipal Solid Waste
NDC	Nationally Determined Contributions
PET	Polyethylene Terephthalate
P&D	Planning and Development
RDF	Refuse-Derived Fuel
SEED	Sustainable Energy and Economic Development
WASA	Water and Sanitation Agency
MNCs	Multinational Corporations
CDA	Capital Development Authority
PCRET	Pakistan Council of Renewable Energy Technology
PCSIR	Pakistan Council of Scientific & Industrial Research

1. Introduction

A technology roadmap for NDC implementation is a strategic planning tool that provides a structured approach to identify, prioritize, and sequence the deployment of technologies to address climate change challenges and promote sustainable development. Pakistan's *Nationally Determined Contributions 2021* prioritizes technology-based interventions as a means towards climate action and calls for technology transfer and interventions for key sectors in Pakistan, including water and waste. Pakistan is dedicated to leveraging technology to enhance its climate action by integrating technology into its NDCs, it aims to create an enabling environment that promotes efficiency, inclusive access and adequate management of its water and waste sectors. To achieve this, the Ministry of Climate Change and Environmental Coordination (MoCC&EC), through the Climate Technology Centre and Network CTCN's technical assistance, has initiated the development of Pakistan's Technology Roadmap for the waste and water sectors for NDC implementation.

The project is designed to initiate a collaborative process of designing a comprehensive waste and water sector Technology Roadmap aligned with Pakistan's development and climate targets. As such, three committees have been formulated to enable data/information sharing, and feedback support for developing a roadmap. These committees include an overarching Roadmap Committee and a technical committee for the waste and water sectors. The key purpose of the Technical Committees is to ensure alignment with ongoing regulations, plans, and policies, alignment with the needs of multiple stakeholders at national and subnational levels and ensure that the roadmap outlines pathways that are feasible and realistic to accelerate the climate and sustainable development agendas.

2. Objectives of the Meeting

At the outset of the Technical Committee's proceedings, the primary focus lies on two pivotal objectives. First and foremost, the committee aims to confirm the validity of the shortlisted technologies for consideration. This involves a thorough examination of each technology on the list to ensure its suitability and relevance to the waste and water sectors.

Secondly, the committee aims to establish clear and precise criteria for prioritizing technologies within these sectors. This involves refining and fine-tuning the existing parameters to create a robust framework that will guide future decision-making processes.

Throughout the meeting, participants will engage in detailed discussions, leveraging their technical expertise and insights to scrutinize the proposed technologies and criteria. Each aspect will be carefully examined, with a keen emphasis on clarity and practicality. By the meeting's conclusion, the committee aims to achieve consensus on both the validation of the technology list and the refined scoring criteria for prioritization.

3. Methodology

The meeting was held online on the 18th of April, 2024, through a pre-shared Zoom link and was attended by 20 participants of the technical roadmap committee, excluding the GGGI, GGC, and MoCC&EC teams. The technical committee was formulated by GGC with technical assistance from the MoCC&EC, a list of participants was formulated which can be find attached in the (**ANNEX-I)**. Following the shortlisting of technologies in the water and waste technical committee meetings held on 20th March 2024. The First technical committee meeting was held to gather feedback on the shortlisted technologies and the scoring criteria developed for the water and waste sectors.

This meeting and feedback collection was conducted using three platforms: Zoom, Mentimeter, and Google Forms. During the engagement, moderators encouraged the stakeholders to share their valuable opinions, maintaining the flow of information to meet the meeting objectives. Mentimeter software was utilized to hold an interactive discussion session with participants to identify shortcomings or improvements in the shortlisted technologies and scoring criteria. This session was also recorded on Zoom. Following this, a Google Form was shared with the participants to record their input. This meeting and recorded responses successfully facilitated the identification of feedback from the stakeholders.

4. Scoring Criteria Questions Feedback

4.2. Water Sector

Overall, the stakeholders affirmed their confidence on the scoring criteria and stated that it is well devised. However, additional feedback provided by the stakeholders is analyzed below::

1 – Legal, Regulatory, and Financial Landscape

Stakeholders put forward that Pakistan is diverse in terms of topography, therefore the policy landscape needs to amended accordingly based on different areas such as mountains, deserts and plains. The feedback received through Google Forms indicated that the matrix was relatively simple and required a more comprehensive analysis of potential options, including a deeper examination of the regulatory and legal framework. Further, a stakeholder added that the **M&E framework does not exist in Pakistan** for any of the technologies listed. While some responses considered the existing laws and regulations seems quite supportive to these technologies. Yet, the **capacity building** of Provincial Departments is deemed necessary to implement these technologies in the country. Also, **AJK** should be considered in all sorts of legal frameworks.

On the question of scoring criteria, one respondent highlights the significant potential for private sector involvement in the technology, indicating favorable conditions for private investment. However, Monitoring and Evaluation (M&E) framework does not exist in Pakistan. One of the respondents

highlighted that the legal framework is not yet fully ready, indicating the need for extensive work to bridge the gap between policymaking and regulation.

Voting on Technologies in terms of legal, regulatory and financial readiness:

The comparative bar chart below (Figure 1) indicates the proportion of votes received for each technology on a rating scale of 1-5.

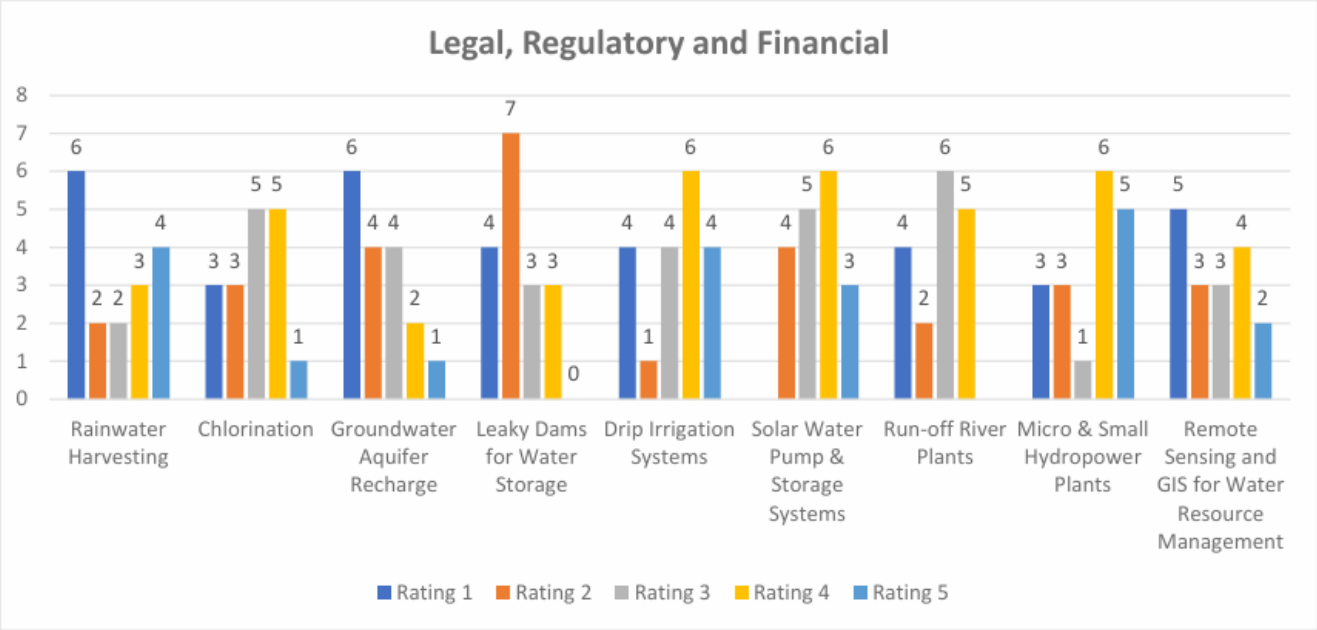

Figure 1: Proportion of votes received

Average Score Received by each Technology

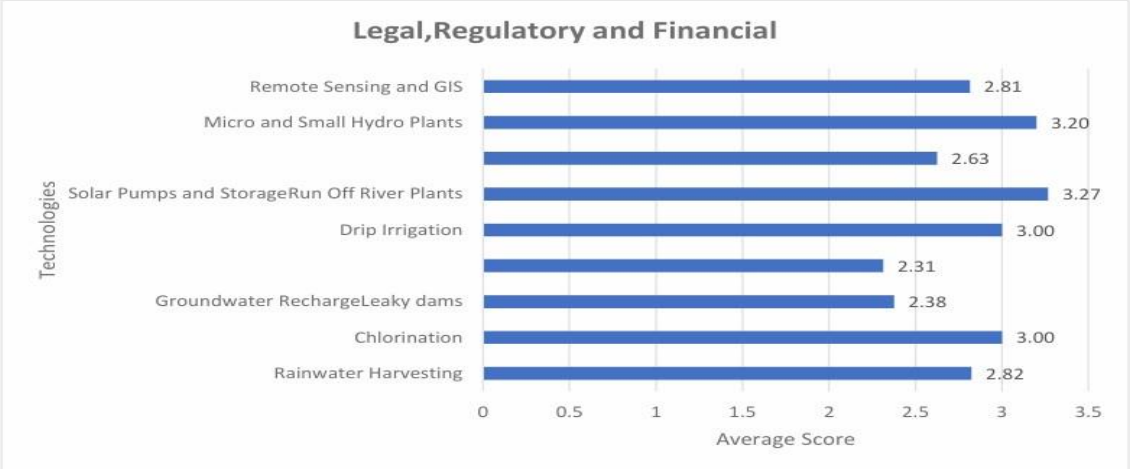

Figure 2: Average scores

Technologies like **solar water pump & storage systems and micro & small hydropower plants** received higher average scores of **3.27 and 3.20**, respectively. These scores suggest a more optimistic outlook for implementation, possibly due to perceived benefits and support, despite potential regulatory and financial considerations.

2 – Economic and Technical Feasibility:

A stakeholder stated that there is no option for full readiness or partial readiness, and both options can be selected. Another stakeholder added that their organization has installed more than 540 Micro Hydropower Plants in GB, AJK, and KPK with installation capacities ranging from 20-100kW. Finances from the private sector were involved in this process but a major chunk of funding came from the public sector. Further, the stakeholder also added that their organization is developing pumped hydropower storage systems based on renewable energy wind and solar, for which the demo-projects were completed in 2023. At inquiring about the sources of investment for these technologies, the stakeholder responded that the funding is mainly from the public sector but private sector is also involved. The main focus of their organization is raising awareness, which can lead to private-sector investment in these projects.

Through feedback on Google Forms, it was established that the case of technologies can be linked with Climate Financing and the technical feasibility of the above-mentioned options which varies from case to case. Further responses from stakeholder's recorded through google forms Indicate that before implementing these technologies, feasibility studies for each technology may be conducted to ascertain the viability and economic factor. Wastewater treatment and management as part of the economic and technical feasibility analysis should also be considered.

The majority of stakeholders stated a positive response on the technical and economical feasibility of the technologies. One response suggested that the technologies listed above can efficiently minimize the use of energy and other resources. It will also promote efficiency in the management and delivery of the water and waste sector and these technologies are not that expensive as well. Affordability is linked with the international support in term of climate justice and climate financing. Most of the technologies are available in Pakistan and are believed to be useful. For expansion of these technologies, capacity building and skill training are required.

Voting on Technologies in terms of economical and technical feasibility:

The comparative bar chart below (Figure 3) indicates the proportion of votes received for each technology on a rating scale of 1-5.

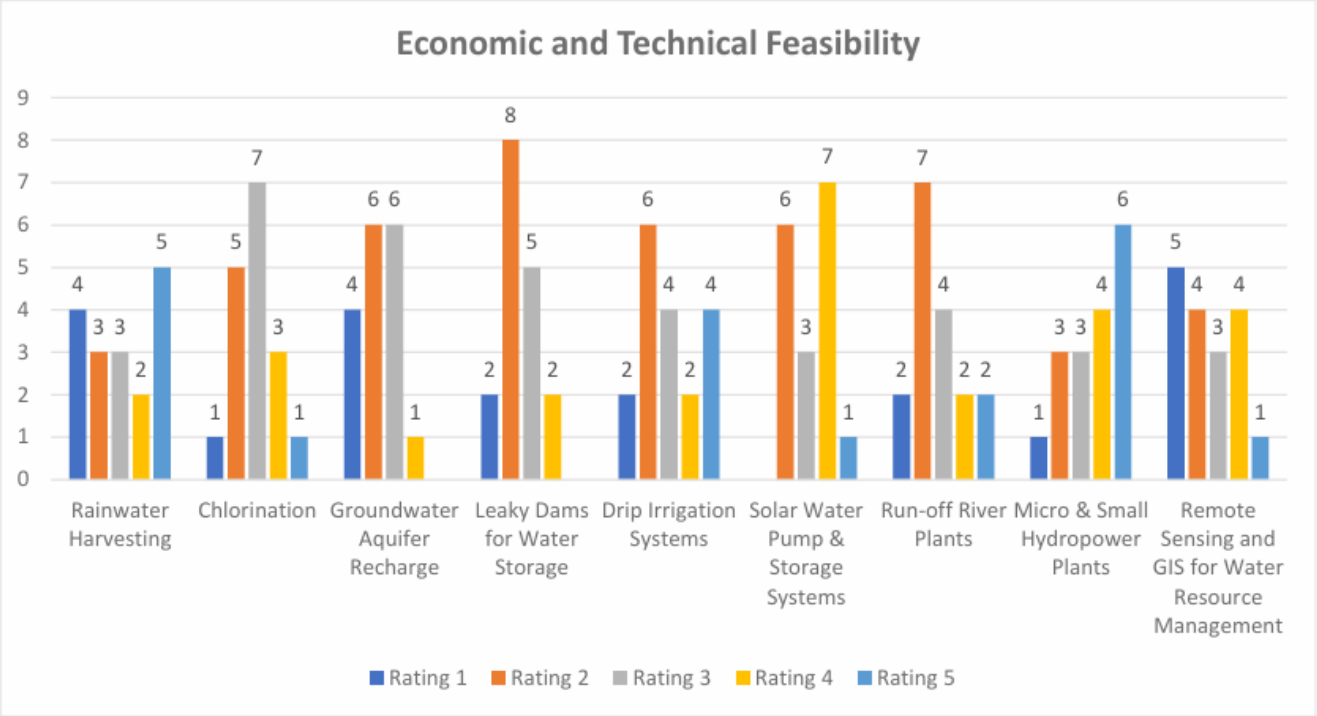

Figure 3: Proportion of votes received

Average Score Received by each Technology

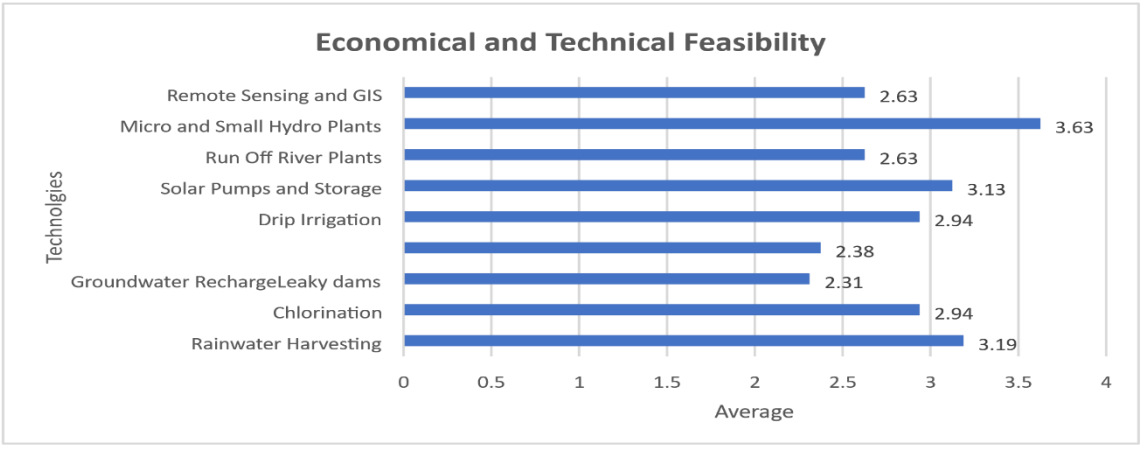

Figure 4: Average scores

Overall, the ratings indicate varying levels of perceived economic and technical feasibility for implementing these technologies in Pakistan, with some technologies like **micro & small hydropower plants and rainwater harvesting** viewed more favorably (**3.62 and 3.18**) respectively compared to others such as groundwater aquifer recharge and chlorination. Addressing technical challenges and

ensuring economic viability will be crucial for the successful implementation of these technologies in Pakistan's water management initiatives.

3 – Inclusive Development and Social Impacts:

A Stakeholder added further that the water table is being depleted day by day and the domestic subsector needs to be focused on more as it is an important aspect. Stakeholder feedback on shortlisted water technologies highlights the importance of **rainwater harvesting, groundwater management, and solar-powered solutions.** Concerns about water table depletion and pollution underscore the need for careful management and pollution control measures. Agriculture shows the highest readiness for inclusive development, while hydropower projects demonstrate significant investments and potential for private sector involvement. A document was also shared by a stakeholder titled "**Future Drought Risk and Adaptive Capacity in Balochistan including the role of 100 dams and CPEC in Balochistan**" that will assist in the hydropower sub-sector technologies assessment. These insights provide valuable guidance for further steps in the development of the NDC technology roadmap for the water sector.

Further responses recorded through google forms suggested mainstreaming climate change into the development process at national and provincial levels is crucial, particularly in vulnerable regions like **AJ&K**. Specific ranking of projects based on their inclusive development and climate impacts highlights the need for localized strategies tailored to address unique challenges.Each technology has varying impacts on climate change and the country's development, necessitating consideration of these factors before implementation. Awareness dissemination at the grassroots level is essential, especially in vulnerable regions like **AJ&K**. Further, a stakeholder suggested incorporating wastewater management into the water sector discussion.

The majority of stakeholders agreed on the inclusive development these technologies bring. One of the stakeholders responded that these technologies will contribute improvement of the quality of life of the people of Pakistan and will contribute to inclusive development through supporting vulnerable sectors of the communities. These technologies will contribute to emission reduction and in building resilience and adaptive capacity of the communities in Pakistan

Voting on Technologies in terms of inclusive development and Climate Impacts:

The comparative bar chart below (Figure 5) indicates the proportion of votes received for each technology on a rating scale of 1-5.

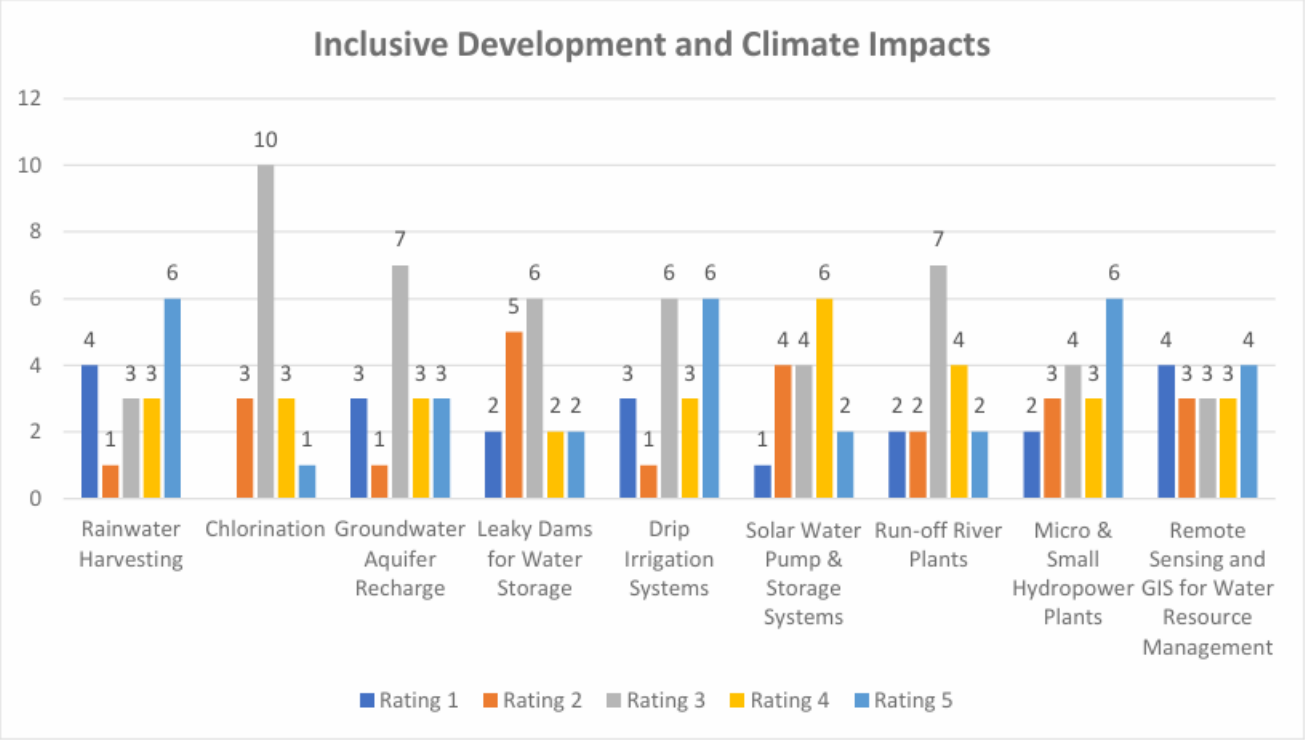

Figure 5: Proportion of votes received

Average Score Received by each Technology

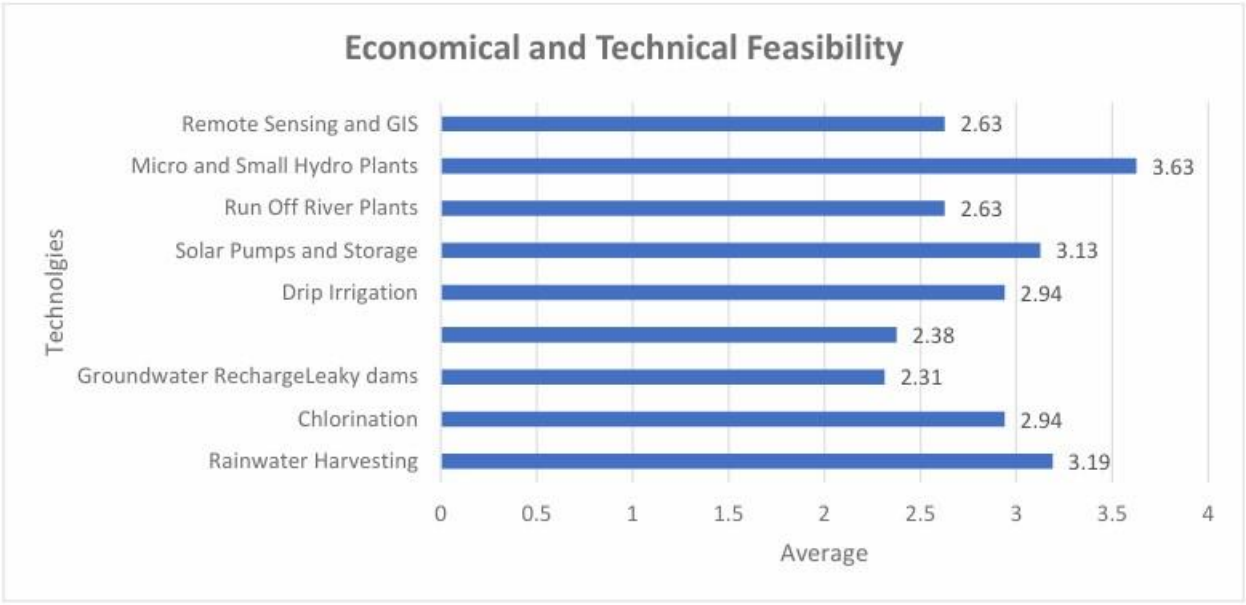

Figure 6: Average scores

Overall, the ratings suggest varying levels of perceived impact on inclusive development and climate for implementing these technologies in Pakistan, with technologies **like rainwater harvesting, drip irrigation systems and MHPs** (Average score of 3.37, 3.325 and 3.32 respectively) viewed more favourably compared to others such as leaky dams and remote sensing/GIS. Addressing these concerns will be essential for maximizing the positive impacts of these technologies on inclusive development and climate resilience in Pakistan.

5. Discussion and Outcomes

The following discussion and outcomes were generated during and after the First technical roadmap committee meeting through Zoom with the technical committee members, GGC, and GGGI team.

5.1. Additional Feedback

5.1.1. Water Sector

- A stakeholder stressed the importance of directing attention towards rainwater harvesting methods to address water scarcity issues effectively, who was informed that it is already shortlisted and will be focused upon.
- Multiple stakeholders added that groundwater is a serious issue in the domestic as well as agriculture sector, which is why groundwater aquifers should be emphasized more. Concerns were raised regarding the challenges associated with replenishing groundwater aquifers, noting the high energy demand and complexity involved in the process.
- A proposal was made to utilize the potential of Balochistan's reservoirs by implementing solar pump and storage systems, aiming to optimize water management strategies in the region, which was noted for prospects.
- It was advised to focus on enhancing water conservation practices before transitioning to solar-powered pumping and storage solutions, recognizing water conservation as a critical priority.
- Recommendations were put forward to incorporate rainwater harvesting techniques into the domestic sector and adopt water-efficient irrigation methods, such as drip irrigation, in agriculture to promote sustainable water usage, but it was informed that it has been already shortlisted for further assessments.
- Observations were shared regarding the adverse effects of extensive construction activities on the groundwater table in Quetta, highlighting the need for careful management of urban development projects.

- Concerns were expressed regarding the pollution of groundwater in KP due to industrial wastewater discharge, underscoring the importance of addressing pollution sources to safeguard water quality for various purposes.
- A stakeholder noted in the Google Forms response that clean drinking water is the desire of every person, so we have to realize the importance of clean technology for a better future.

6. Way Forward

A physical Technical Roadmap Committee meeting will be scheduled to convene within the coming month or so, to refine the selection of technologies. At this meeting, the team will present a comprehensive assessment of the shortlisted technologies, which will serve as a crucial foundation for identifying the most pertinent options. The evaluation will include extensive analysis based on predefined scoring criteria, allowing for the ranking of technologies according to their suitability and potential impact. This systematic approach ensures that the prioritized technologies align closely with the overarching goals and requirements, guiding the roadmap toward effective and impactful technology adoption. An investment forum will also be developed that will focus on the potential investment opportunities for the bankable projects, and to mobilize finance and green investment for Pakistan.

7. Conclusion

The First Technology Roadmap Committee Meeting has led to the contribution of vital feedback from the Committee which is crucial to finalize the shortlisted technologies for the Waste and Water Sectors.

The first technical committee meeting successfully achieved its objectives of validating the shortlisted technologies and refining the scoring criteria for prioritizing them within Pakistan's water sector NDC implementation strategy.

Prioritized Technologies

Based on the voting results and discussions, here are the top three prioritized technologies for the water sector:

1. **Micro & Small Hydropower Plants:** Receiving high average scores across all criteria (legal, economic, and social), these plants offer promising potential for clean energy generation and private sector involvement.

2. **Rainwater Harvesting:** Stakeholders emphasized its importance for addressing water scarcity, particularly in the domestic sector. Its economic feasibility and social benefits were also highlighted.

3. **Drip Irrigation Systems:** Seen as a crucial technology for promoting water conservation and efficiency in agriculture, a key sector in Pakistan's development.

These prioritized technologies offer a balanced approach, considering technical feasibility, economic viability, and positive social and climate impacts. The committee will take these considerations into account as they move forward in developing the NDC technology roadmap.

ANNEX-I Participants Lists

Name	Institution/Designation	Sector	Gender	Province/ Region
1. Dr. Sardar Rafique	DD, Environmental Protection Agency	Gov	Male	AJK
2. Khawaja Imran	PSID	Gov	Male	Punjab
3. Ahmad Rajwana	Deputy Secretary, Ministry of Finance	Gov	Male	Federal
4. Ahmed Ali	Head (TL-SPDO) Ministry of Poverty Alleviation and Social Security	Gov	Male	Federal
5. Azeem Sajjad	Joint Director, Ministry of Information Technology and Telecommunication	Gov	Male	Federal
6. Waqas Abdullah	Planning Officer, Agriculture	Gov	Male	AJK
7. Asim Javed	Director, Punjab Food Authority	Gov	Male	Punjab
8. Farah Ather	DD, Punjab Food Authority	Gov	Female	Punjab
9. Amir Habib	Assistant Director, Science and Technology	Gov	Male	KPK
10. Dr. Taza Gul	Director, Science and Technology	Gov	Male	KPK

11. Niazullah	Independent Technology Expert	Private	Male	-
12. Engr. Ali	GM EDB, Engineering Development Board, Ministry of Industries and Production	Gov	Male	Federal
13. Omar Shahid	Assistant Director, KPEZDMC	Gov	Male	KPK
14. Dr. Tahir Mehmood	Technical Person, Pakistan Council of Renewable Energy Technology	Gov	Male	Federal
15. Babar	JD Policy, MoITT	Gov	Male	Federal
16. Ibrar Hussain	Deputy Director (IT), IT Department	Gov	Male	GB
17. Engr. Khan	AD, IT Department	Gov	Male	GB
18. Azeem Sajjad	Joint Director, MoIT and Telecommunication	Gov	Male	Federal
19. Imran Ali Shah	Evaluation Specialist, Ministry of Poverty Alleviation and Social Safety	Gov	Male	Federal

20. Uzair Naqvi	Environmental Geologist, Power Development Organization	Gov	Male	AJK