Technology Roadmap
Committee Meeting
Waste

1st Meeting Report
April 18, 2024

Contents

List of Abbreviations

AJK	Azad Jammu & Kashmir
CDA	Capital Development Authority
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
MNCs	Multinational Corporations
MoCC&EC	Ministry of Climate Change and Environmental Coordination
MRF	Material Recovery Facility
MSW	Municipal Solid Waste
NDC	Nationally Determined Contributions
PCRET	Pakistan Council of Renewable Energy Technology
PCSIR	Pakistan Council of Scientific & Industrial Research
PET	Polyethylene Terephthalate
P&D	Planning and Development
RDF	Refuse-Derived Fuel
SEED	Sustainable Energy and Economic Development
WASA	Water and Sanitation Agency

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 committed to the incorporation of technology in its climate agenda and shaping an enabling environment for the effective incorporation of technology in its NDC implementation to ensure 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 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. 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 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. 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. Waste 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 suggested that the animal waste sub-sector should also be included in the shortlisted sub-sectors. Another stakeholder added that the regulatory framework does exist in Pakistan for recycling plastic waste, and MNCs and other industries follow these guidelines. The stakeholder was corrected that the regulatory framework is not very strong and only a few organizations recycle their plastic waste, and many others do not. On the other hand, the stakeholders from Punjab suggested that the regulatory framework regarding plastic recycling in Punjab is satisfactory. Further, a stakeholder added that Legal frameworks exist, and financial feasibilities are also available in Pakistan for most of these technologies, but a proper regulatory framework is still needed. A stakeholder from Balochistan added that there exists no regulatory framework in the province and the government does not finance such initiatives. The environmental protection agency government of Gilgit-Baltistan is working on the regulatory frameworks.

Feedback suggested that in general, the legal environment is almost ready for these technologies with the existing guidelines and modifications can be made accordingly on the basis of guidelines and regulations. The financial structures are available but needed capacity development and strong linkages and coordination with the donors.

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

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

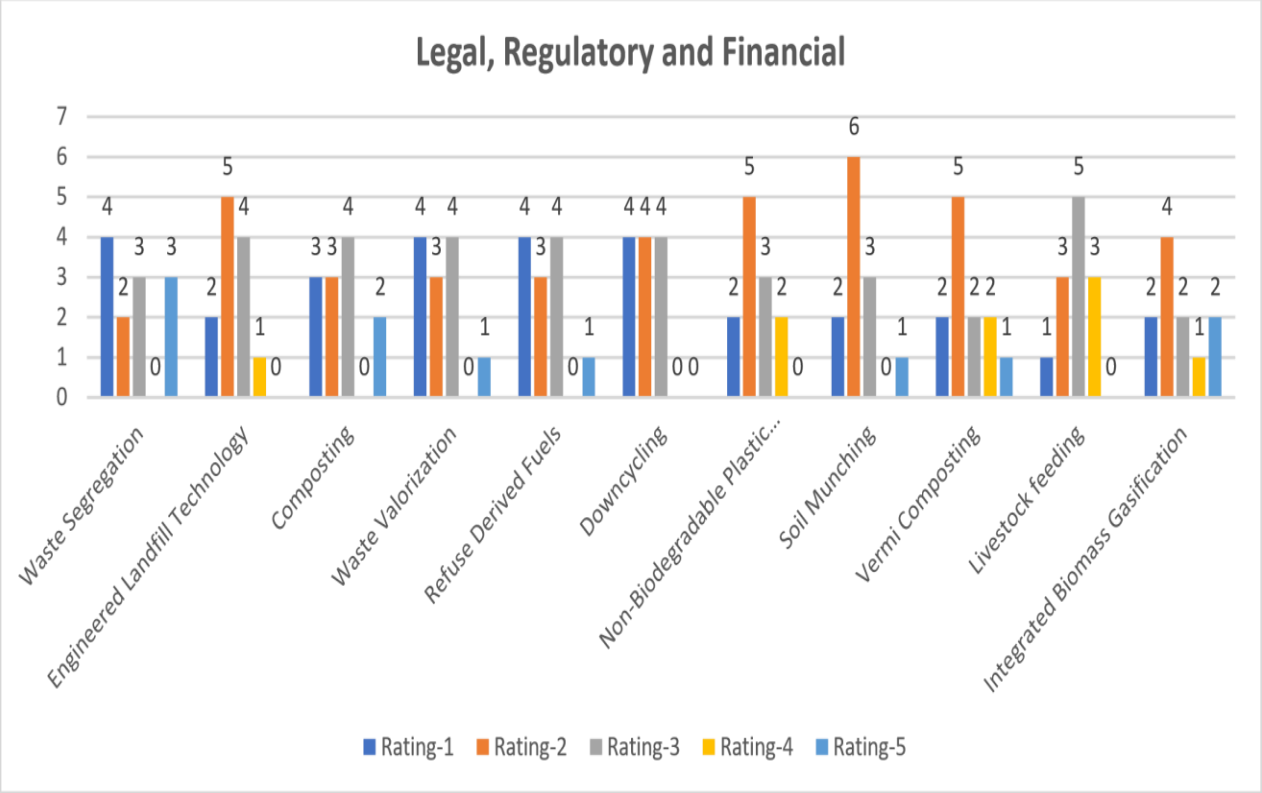
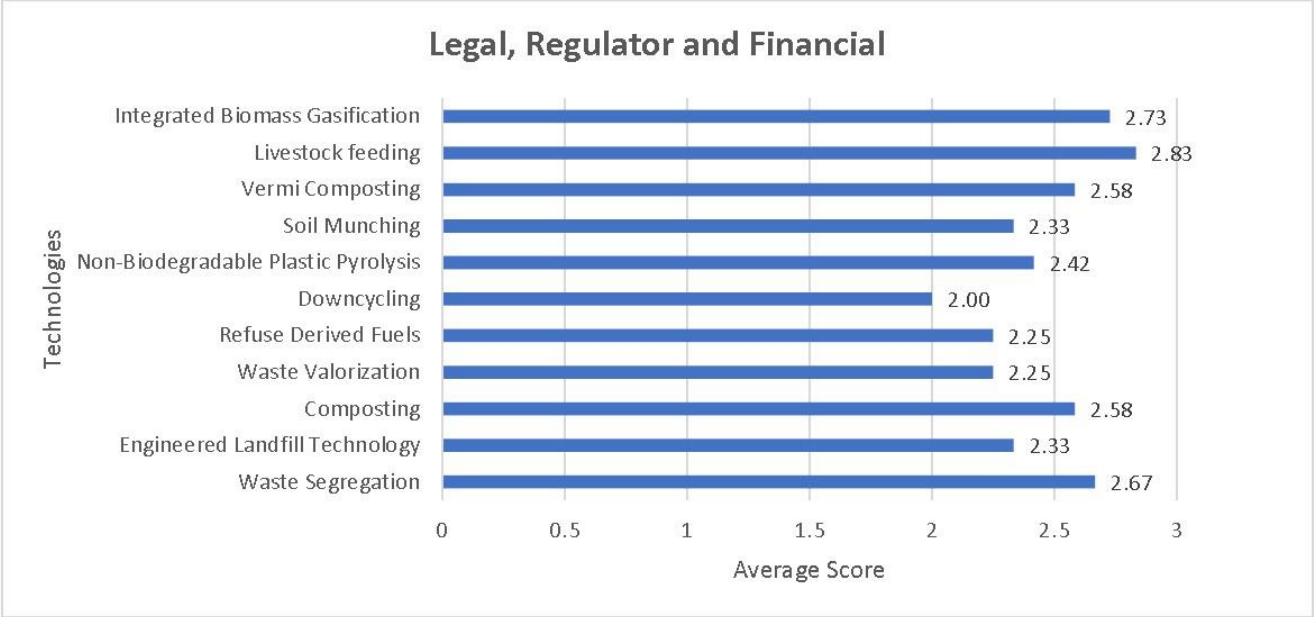


Figure 1: Proportion of votes received

Average Score Received by each Technology



From a response it was evident that these technologies will minimize the use of energy and other resources by promoting efficiency in the management and delivery of the water and waste sectors. These technologies are not that expensive but financial resources are another challenge in Pakistan as well. Manufacturing and use of these technologies within Pakistan is an issue but can be managed by skill enhancement and capacity-building trainings if the adequate resources are arranged.

A stakeholder mentioned their organization **"IGNITE"** and their project of Plastic Road in Islamabad with the assistance of the Capital Development Authority (CDA) and Coca-Cola, highlighting the technical feasibility of such projects. Another stakeholder added that economic and technical feasibilities exist in Pakistan for most of the technologies. Legal and regulatory framework is in place but financial recourses are limited, which is a hurdle. Regarding applicability a stakeholder suggested that these technologies can be applied according to nature of waste and economic position of residence.

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

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

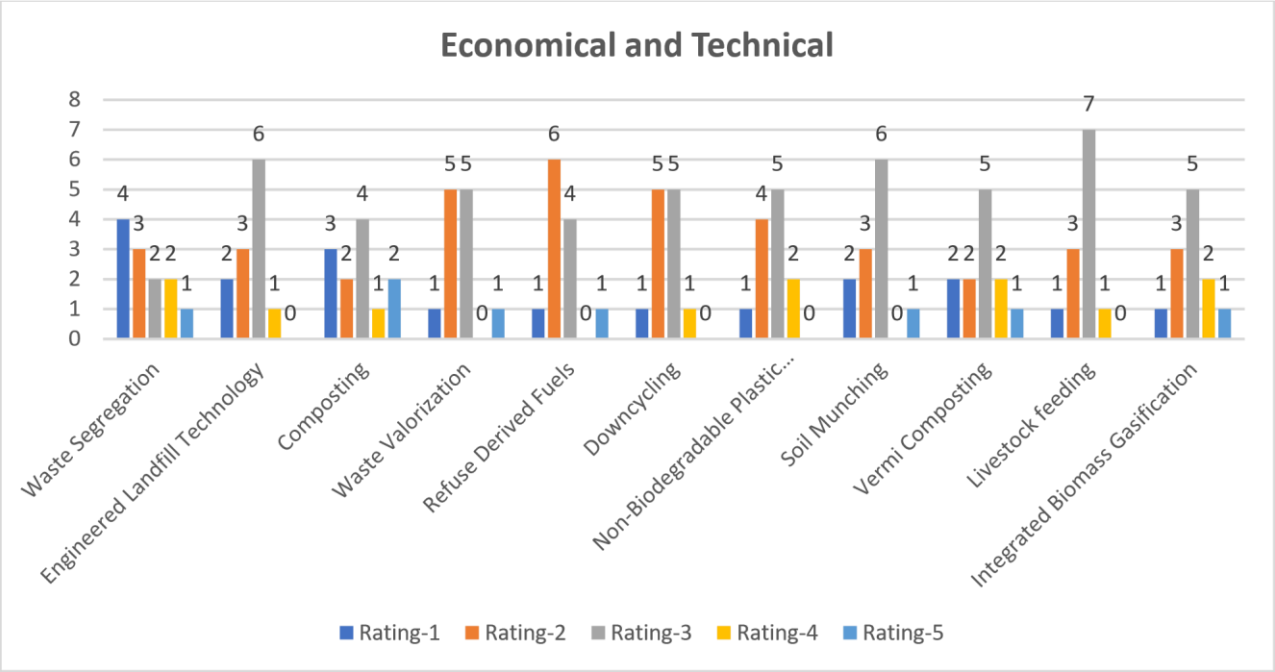


Figure 3: Proportion of votes received

Average Score Received by each Technology

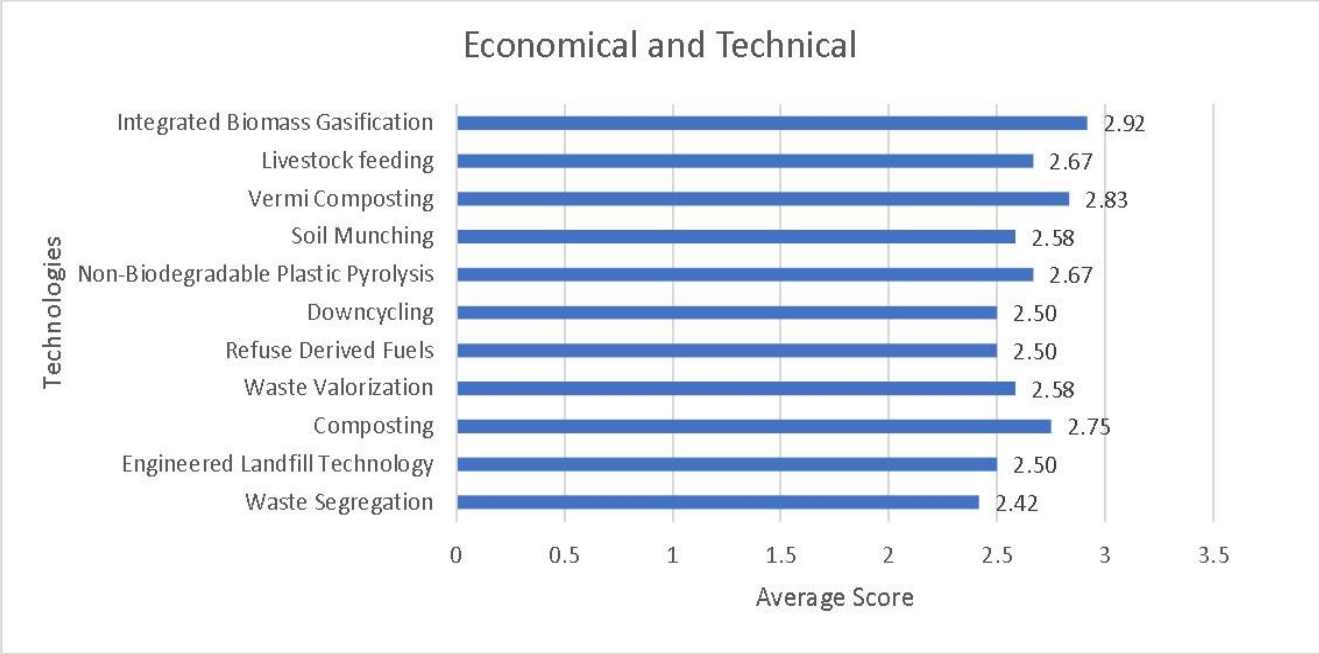


Figure 4: Average scores

Integrated Biomass Gasification (2.92) and Vermi Composting (2.83) are the top two technologies with the highest average ratings for economic and technical feasibility perspective. These technologies are perceived to be more feasible to implement in Pakistan in terms of both

economic and technical aspects. On the other hand, technologies like Waste Segregation (2.42) and Engineered Landfill Technology (2.50) have lower average ratings, indicating that stakeholders may perceive these technologies to have more challenges in terms of economic and technical feasibility. Overall, Integrated Biomass Gasification, Vermi Composting, and Composting appear to be prioritized options for waste management solutions in Pakistan based on stakeholders' perceptions of feasibility.

3 – Inclusive Development and Social Impacts

Stakeholders emphasized the need for refined waste management solutions. While one suggested an incineration facility, another highlighted the potential of biogas from animal manure. Municipal solid waste (MSW) emerged as the most prepared sub-sector across legal, regulatory, and financial aspects, while plastic waste faced challenges. Despite some readiness in economic and technical feasibility, plastic and agriculture waste lagged behind MSW. In terms of inclusive development and social impacts, MSW garnered the highest support, while plastic waste faced limitations. Stakeholders also debated the strength of regulatory frameworks, with varying perspectives across different regions.

A stakeholder added that Inclusion of the climate change checklists in the project development and approval process is important to ensure inclusive development & climate impacts which can be achieved by implementation of the newly developed climate guidebook at federal and provincial levels. Not only this but the ozone depletion and climatic temperature will be reduced through use of these technologies. Moreover, social mobilization and awareness campaigns play an important role for inclusive development and extensive efforts are required in this domain.

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.

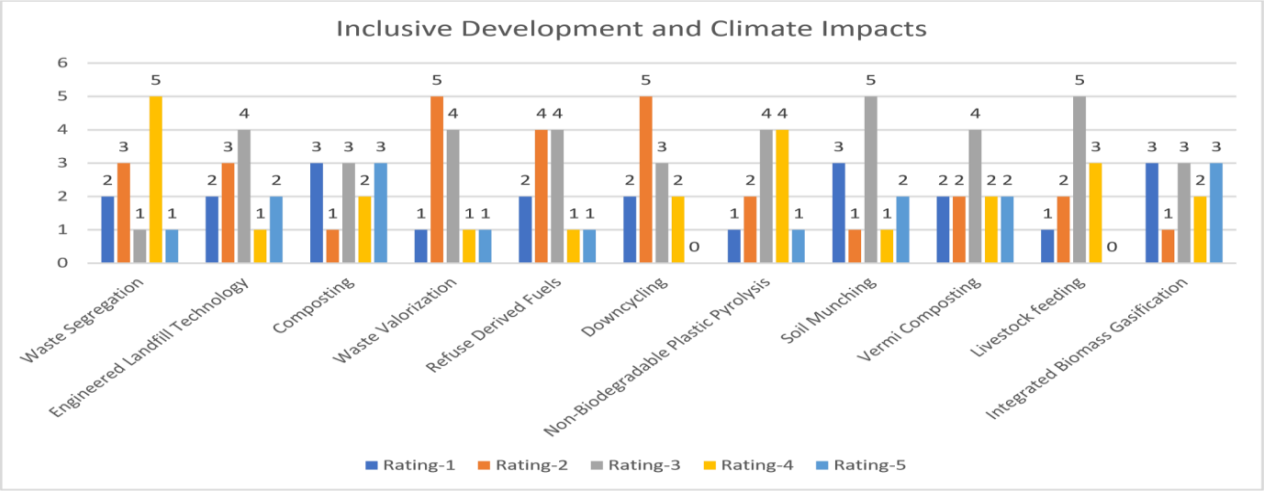


Figure 5: Proportion of votes received

Average Score Received by each Technology

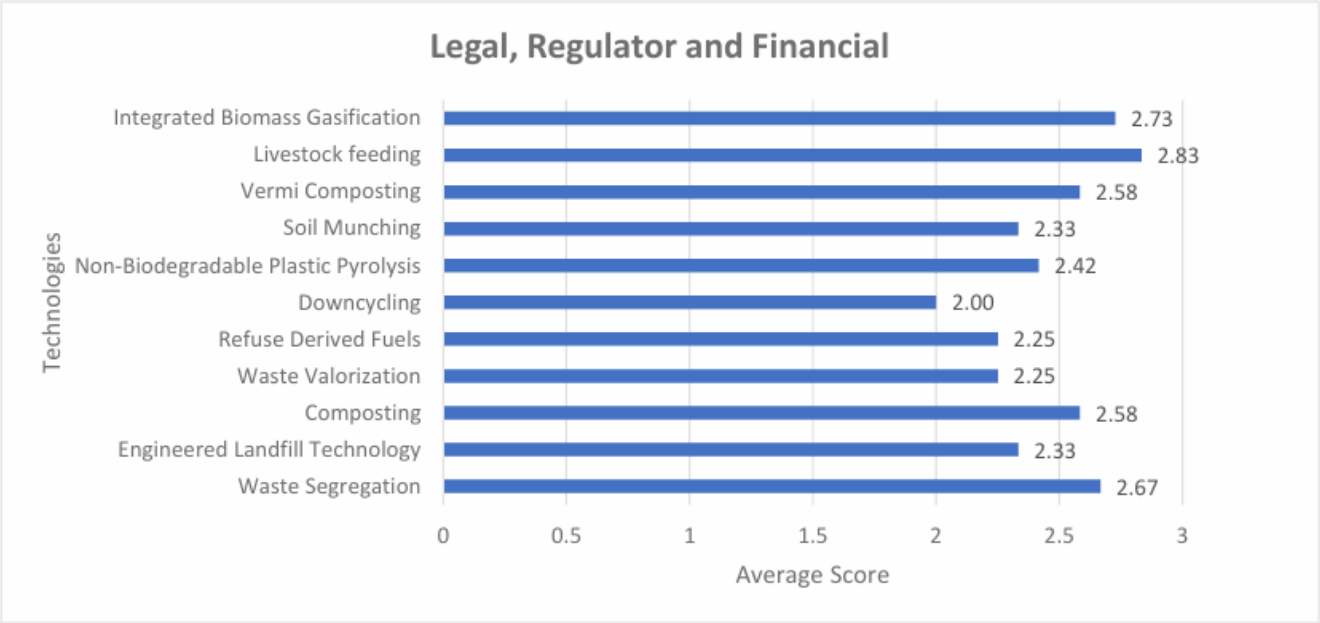


Figure 2: Average score of each technology

From the analysis, technologies like **Composting (3.08) and Non-Biodegradable Plastic Pyrolysis (3.1)** have higher average ratings for anticipated inclusive development and climate impact. These technologies are perceived to have a more positive influence on both inclusive development and climate impact in Pakistan. On the other hand, technologies like Downcycling (2.42) and Waste Valorization (2.67) have lower average ratings, indicating that stakeholders may perceive these technologies to have less potential for inclusive development and climate impact.

Overall, Composting, Non-Biodegradable Plastic Pyrolysis, and Integrated Biomass Gasification are viewed as prioritized options for their potential positive impacts on inclusive development and climate in Pakistan.

5. Additional Feedback

Following discussions and outcomes were generated during and after.

5.1. Shortlisted Technologies

5.1.2. Waste Sector

- One stakeholder highlighted the urgent need for an incineration facility in Pakistan but was corrected with information that 60% of the country's waste is organic. It was explained that for efficient incineration, waste should have a low calorific value, and incineration is primarily used for hospital waste to eliminate bacteria and viruses.

- Another stakeholder pointed out the significant potential for biogas formation from animal manure, given Pakistan's large population of over 1.1 million animals. They emphasized that biogas technology could facilitate energy generation from this waste source while minimizing greenhouse gas emissions. The stakeholder provided valuable insights but in response, it was advised that the shortlisting has been done by the stakeholders and the bio-methanation has not been shortlisted.
- A stakeholder noted in the Google forms that there is substantive scope for the waste sector and the policy framework is already available, which makes the adoption of these technologies easy.

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.

Across different aspects of feasibility and impact, certain technologies emerged as prioritized options for waste management solutions in Pakistan. Based on stakeholders' perceptions:

Legal, Regulatory, and Financial Feasibility: Livestock Feeding and Integrated Biomass Gasification received the highest average ratings, indicating perceived favorability in terms of legal, regulatory, and financial feasibility. Waste Segregation, Livestock Feeding, and Integrated Biomass Gasification were highlighted as prioritized options.

Economic and Technical Feasibility: Integrated Biomass Gasification and Vermi Composting emerged as the top two technologies with the highest average ratings for economic and technical feasibility. Integrated Biomass Gasification, Vermi Composting, and Composting were identified as prioritized options.

Inclusive Development and Social Impacts: Composting and Non-Biodegradable Plastic Pyrolysis received higher average ratings for anticipated inclusive development and climate impact. Composting, Non-Biodegradable Plastic Pyrolysis, and Integrated Biomass Gasification were recognized as prioritized options.

These prioritized technologies offer promising pathways for addressing climate change challenges, promoting sustainable development, and ensuring inclusive access to waste management solutions in Pakistan. 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 list

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 Telecommunications	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	Priv	Male	-
12. Engr. Ali	GM EDB, Engineering Development Board,	Gov	Male	Federal
	Ministry of Industries and Production			
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),	Gov	Male	GB
17. Engr. Khan	IT Department	Gov	Male	GB
18. Azeem Sajjad	AD, IT Department	Gov	Male	Federal
19. Imran Ali Shah	Joint Director, MoIT and Telecommunications	Gov	Male	Federal
20. Uzair Naqvi	Evaluation Specialist, Ministry of Poverty Alleviation and Social Safety	Gov	Male	AJK