



Scope of Work for Feasibility Studies for a Community Water and Energy Resource Center (CWERC)

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Prepared for:

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Executive Summary

The development of a Community Water and Energy Resource Center (CWERC) by the City of Laredo, in collaboration with the Rio Grande International Study Center (RGISC), is a forward-thinking initiative aimed at redefining wastewater management, food waste management, and renewable energy generation. Feasibility studies on the siting and economics of constructing a CWERC in Laredo, Texas, is bolstered by the assistance of the North American Development Bank's Technical Assistance Program (TAP), which is designed to aid in the development of environmental infrastructure projects through financial and institutional support.

The goal of a CWERC is to provide the municipality with a new and sustainable source of reclaimed water thereby reducing current pressures on the Rio Grande, a distressed river system that serves as the City's only source of drinking water. Moreover, it enhances the City's wastewater treatment capacity, and can generate renewable energy for the grid by treating wastewater and solid food waste. These different components create revenue-generating features within the CWERC to make this project self-sustaining over time.

The CWERC directly aligns with strategic objectives identified in the City of Laredo's 50-year Integrated Water Master Plan (IWMP), and represents a more comprehensive approach to treating waste as an innovative solution to restoring natural systems in the face of climate change. Over the next 6-9 months, the City of Laredo and RGISC will work closely to undertake two feasibility studies on the siting and economics of building a CWERC in Laredo. We will work to identify the best qualified consultants who have experience in this emerging field, and are able to address the changing landscape of traditional wastewater and solid food waste management.

Section 1. Introduction & Background

Laredo stands at a critical juncture, faced with aging infrastructure, a fast-growing population, increasing water scarcity, rising temperatures, decreasing rainfall, and an urgent need for sustainable energy solutions. The CWERC is a visionary approach to these challenges and aims to transform waste into wealth, specifically through the recycling of wastewater and organic waste into valuable resources such as clean energy, reclaimed water, and bio-nutrients.

The CWERC represents a decentralized, small-scale wastewater treatment facility - roughly 2-3 MGD - that transcends traditional utility models by integrating waste-to-energy technologies. The City's current wastewater treatment framework, characterized by increasingly centralized systems, faces limitations in scalability, flexibility, and sustainability. Moreover, Laredo's reliance on the Rio Grande for its water supply underscores the urgency of adopting integrated water resource management practices to ensure long-term water security, whilst allowing the City to keep control of its local water resources, rather than relinquishing control of those resources to private third-party entities.

A CWERC embodies a comprehensive approach to waste and energy management, functioning primarily as:

- A sophisticated wastewater treatment plant
- A biogas production facility, utilizing biogas to generate electricity and thermal energy for both onsite use and sale to the grid
- A facility producing high-caliber reclaimed water suitable for potable water supply

- A processor of both food waste and wastewater sludge into organic soil amendments

All of the systems assembled in a CWERC are common. The technologies assembled include:

- Anaerobic digesters, used nationally for over 140 years
- Membrane bioreactors, introduced nationally in 1965
- Heat pumps, operational since 1945

CWERCs are *not* designed as research facilities; rather, they are operational installations focused on practical applications in waste and energy management. Their primary roles involve the processing of wastewater and organic waste into reusable resources and energy. A CWERC will offer a swift, accessible route to enhance wastewater management and energy generation, bypassing the hefty financial investments and long-term commitments associated with larger infrastructure endeavors.

A successful CWERC can set a precedent for urban sustainability and showcase how border cities can harness innovative technologies to address complex environmental challenges while fostering economic growth and community resilience. Through prioritizing scalable and adaptable solutions, the CWERC not only meets - but also expedites the City's sustainability goals, facilitating immediate and attainable infrastructure improvements.

Section 2. Strategic Alternatives: Comparing CWERC Project with Traditional Infrastructure Investments (Secondary Source Acquisition)

The comparison below of capital-intensive infrastructure projects outlined in Section 6.6.1 of the City's IWMP shows that the CWERC is a promising financial and sustainable alternative to help the City address long-term wastewater treatment and energy generation needs in the face of climate change and future water scarcity challenges.

1. **Imported Groundwater Supplies:** The City's IWMP identifies the exploration of imported groundwater as a critical alternative water source. While potentially effective, the development, conveyance, and treatment of imported groundwater from outside counties will require significant capital investment, significant rate increases, and demand substantial operational funding.
2. **Desalination Projects:** Another alternative explored in the IWMP is desalination. Desalination projects are known for their high energy requirements, extreme ecological and environmental impacts, and substantial capital and operational costs. They involve complex infrastructure, including intake and discharge facilities, pretreatment processes, desalination units (such as reverse osmosis), and energy recovery systems. These projects also face regulatory challenges that can add to the cost and timeline for implementation.

Section 3. Alignment with the City of Laredo's 50-Year Integrated Watermaster Plan (IWMP)

This section outlines the direct correlations between the CWERC's aims as well as the priorities, challenges, and strategies outlined in the IWMP:

1. **Aging Infrastructure and System Reliability (5.23.1.3 Availability):**
The City's Watermaster Plan discusses the critical condition of Laredo's aging water

infrastructure and the urgent need for system reliability enhancements to meet Emergency Supply Goals. It highlights the city's dependency on outdated systems that are ill-equipped to meet future demands or withstand environmental stresses. The CWERC directly addresses these concerns by introducing advanced wastewater treatment and renewable energy generation technologies to extend the lifespan of City infrastructure and water availability in the Rio Grande.

Excerpt from IWMP:

"In addition to cost and the related conveyance distance, the alternative supplies should be compared based on the availability of the firm water supply...an alternative supply be expected to adequately meet the Emergency Supply Goals..."

2. Water Reuse Strategy and Infrastructure Development (5.8.2 Water Reuse)

The City's proactive stance on water conservation and secondary supply is evident through its plans for water reuse, highlighted in the Texas Water Development Board's 2021 Rio Grande Region M Regional Water Plan. The Region M Planning Group reported that the municipal water demand for the City of Laredo is expected to increase by 63% in 2070. However, by 2040, the City of Laredo is expected to exhaust the available supply of municipal water from the Rio Grande that is allocated to the city per year. This is primarily due to a projected population increase for the City of Laredo from 301,124 people in 2020, to over 440,247 people by 2040, which represents a 46.2% increase in less than 20 years.

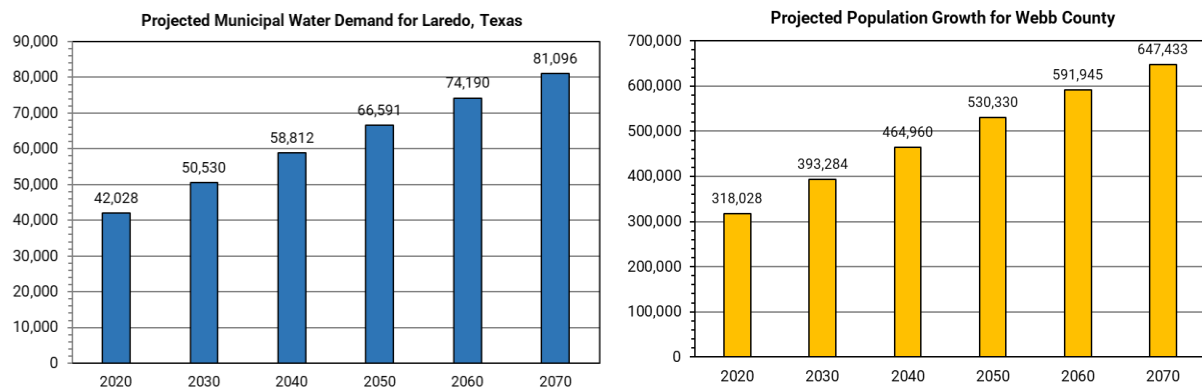


Figure 1. Projected Population Growth and Municipal Water Demand for Webb County

3. Regulatory Framework and Reuse Opportunities (Section 5.9.2 Reuse Water from WWTP):

The IWMP outlines a methodical approach to identifying and connecting potential reuse customers, ensuring the city's infrastructure evolves in lockstep with environmental stewardship and economic efficiency type projects, such as the CWERC. The detailed discussion on Texas reuse water regulations under TCEQ's oversight presents a clear regulatory framework that the CWERC can navigate for implementing water reuse strategies. Specifically, the delineation between Type I and Type II reclaimed water uses provides a basis for planning water reuse projects that cater to different needs and levels of public exposure.

4. Existing and Proposed Reuse Infrastructure (Section 5.11 Potential Reuse Customers and Reuse Water Demand):

The IWMP's overview of Laredo's current reuse infrastructure and future projects highlights specific opportunities for enhancing water reuse capabilities. The identification of potential reuse customers and the demand for reclaimed water offers direct parallels to the CWERC's goals of identifying and implementing sustainable water solutions.

5. Cost Estimates and Financial Planning (Section 5.21 Cost Estimates and LCCA):

This IWMP offers detailed financial analyses of proposed water reuse projects, including cost-benefit analyses, life-cycle cost assessments, and funding strategies. For a CWERC, highlighting the economic feasibility and expected long-term benefits can demonstrate the City's commitment to economically viable and environmentally sustainable water management solutions in line with the IWMP.

Section 4. Scope of Work and Detailed Use of TAP Funds

TAP funds will be used to execute a series of preliminary studies, assessments, and planning activities crucial for the CWERC's conceptualization and possible construction in Laredo. Each component below is designed to ensure a thorough and rigorous evaluation of the CWERC's siting and economic feasibility, laying the groundwork for an informed decision on the project's future development.

Total Budget Overview				
Project Expenses		Description	Allocated Funds	Matching Funds
1.	Engineering Feasibility and Site Analysis	Funds will be used to perform essential engineering assessments and site analysis to ensure optimal location selection for efficiency and minimal environmental impact	\$40,000	RGISC Monetary: \$7,500 (Cash) + Harvard GSD: \$10,000 (In-Kind)
2.	Economic Feasibility and Funding Impact	Funds will be used to assess the economic feasibility of the CWERC, including cost analysis and funding source identification to ensure financial viability	\$40,000	Laredo Utilities: \$9,000 (Cash + In-Kind) + Harvard GSD: \$10,000 (In-Kind)
3.	Water Use and Environmental Impact Studies	Funds will be used for in-depth studies on reclaimed water use and its environmental impact, supporting sustainability	\$40,000	Harvard GSD: \$5,000 (In-Kind) + RGISC Staff: \$30,000 (In-Kind)

		and ecosystem health		
4.	Project Design and Consulting Services	Funds will be used to hire professional firms for detailed project design and consulting, essential for technical refinement and project implementation readiness	\$60,000	Zimmerman Consulting: \$10,000 (In-Kind)
Total Budget			\$180,000	\$81,500

The sizing of a CWERC is determined by the volume of wastewater it is intended to treat, and in the case of a Laredo facility, this will be influenced by the available wastewater from existing sewer interceptors. The facility is projected to treat between 1 and 3 million gallons daily. There is a significant cost differential between treating 1 million gallons and 3 million gallons, largely due to the expense of the membrane bioreactor, the most costly component of the facility. Precise treatment volumes, as well as detailed cost and operational specifications, will be ascertained through feasibility studies. These studies are crucial as they provide the necessary data to finalize the size and scope of the installation, and offer a comprehensive analysis of the costs and potential income the facility will generate. This process is integral to the funding's objectives.

Section 5. Roles and Responsibilities

This section outlines the anticipated roles and expectations of key stakeholders involved in the feasibility studies for the CWERC project

1. Project Management Team (PMT):

- **Expectations:** The PMT will oversee the entire feasibility study process, ensuring project milestones are met on schedule and within budget. They are responsible for coordinating between different stakeholders, recruiting and selecting qualified consultants in this emerging field, budget tracking, and ensuring the quality and integrity of the feasibility studies
 1. **City of Laredo Role:** Project planning, issuing RFQs, contracting with consultants, engaging consultants with relevant staff from Utilities and other city departments; and monitoring progress. Facilitate communication among stakeholders, resolve conflicts, and make decisions to keep the project on track
 2. **RGISC Role:** Collaborating entity with the City of Laredo on consultant selection; tracking project timelines and milestones; assisting with the coordination of all stakeholders, including NADBank staff. Engage community members with greater awareness about a CWERC, its operations and potential benefits to the City
 3. **Harvard GSD/Zimmerman Consulting Role:** Prepare a preliminary feasibility for siting and potential locations, and work with City and RGISC staff to develop other parts of the feasibility studies as needed

2. **Engineering and Design Specialists:**

- **Expectations:** Specialists in engineering and design are expected to contribute their technical expertise to the preliminary design of the CWERC. They will evaluate the integration of renewable energy technologies, water treatment processes, solid waste treatment processes, and the potential scalability of the CWERC model
- **Roles:** Develop preliminary engineering designs, assess technological options, and ensure the proposed solutions are technically feasible and aligned with Laredo's infrastructure

3. **Environmental and Economic Consultants:**

- **Expectations:** Consultants will be expected to conduct thorough assessments of the CWERC's environmental impact and economic viability. This includes analyzing the project's potential to contribute to climate change mitigation, its ROI to the City of Laredo, and exploring funding opportunities and financing options
- **Roles:** Perform detailed environmental impact assessments and economic feasibility studies. Deliver reports that highlight potential benefits and challenges, and offer recommendations for enhancing the project's environmental and economic outcomes

4. **Community Stakeholders and Local Residents:**

- **Expectations:** Residents are expected to share insights and voice their needs regarding the project, while engaging in discussions about fair benefits distribution and ensuring the project aligns with local priorities
- **Roles:** Over the course of the 9-month project timeline, RGISC will facilitate engagement with impacted community residents through two informal meetings

Section 6. Project Timeline

This project timeline outlines the key milestones and tasks to conduct siting and economic feasibility studies for a CWERC, in a nine-month period to meet NADBank timeframe expectations, from May 2024 to January 2025.

9-Month Project Timeline: May 2024 - January 2025

Initial Phase (May - July 2024):

- Project Launch
- Stakeholder Coordination: Establish communication and coordination protocols with the City of Laredo and NADBank
- Consultant Engagement: Issue RFQ, select, and contract consultants for the project
- Project Planning: Develop selection criteria/decision matrix for site and technology options
- Preliminary Data Collection and Analysis: Begin mapping analysis and data collection, continue data collection, conduct outreach with potential constituents, and analyze supporting infrastructure inputs

Interim Phase (August - October 2024):

- Site Selection and Analysis (**Milestone #1**): Finalize site selection, conduct risk and benchmarking analysis, start market analysis, and begin engineering analysis

- Engineering and Financial Planning: Continue with the engineering analysis, develop outputs and metrics, identify project owner/operator, complete engineering analysis (**Milestone #2**), finalize revenues and financing plan, and start economic development planning
- Start the initial preliminary design phase

Final Phase (November 2024 - January 2025):

- Design Refinement and Reporting: Detailed review and refinement of the engineering plan, continue with the detailed design phase, and begin development of the final project report
- Community Engagement and Finalization (**Milestone #3**): Complete the 25% project design and final project report, conduct public consultation and feedback sessions
- Project Conclusion: Selection of recommended plan and presentation of recommended plan to City Council for approval