Energy Efficiency as a Method to Improve Water Management Practices at the Local Level




XVI World Water Congress
Cancun, Quintana Roo

May 2016

Introduction

Border Environment Cooperation Commission

North American Development Bank

U.S. – México Binational Organization

Mission:

To preserve, protect and enhance human health and the environment of the US - Mexico border region...

Project Certification and Finance

Project Types:

- Water/Wastewater
- Solid Waste Management
- Air Quality
- Clean & Efficient Energy
- Other Emerging Sectors

Background

Water Utilities in Mexico

- **Physical Efficiency: 50 – 65%**
  (% of water actually delivered to consumer)

- **Commercial Efficiency: 60 – 80%**
  (% of invoiced water actually paid)

- **Overall Efficiency: 35% - 50%**

Not Collected

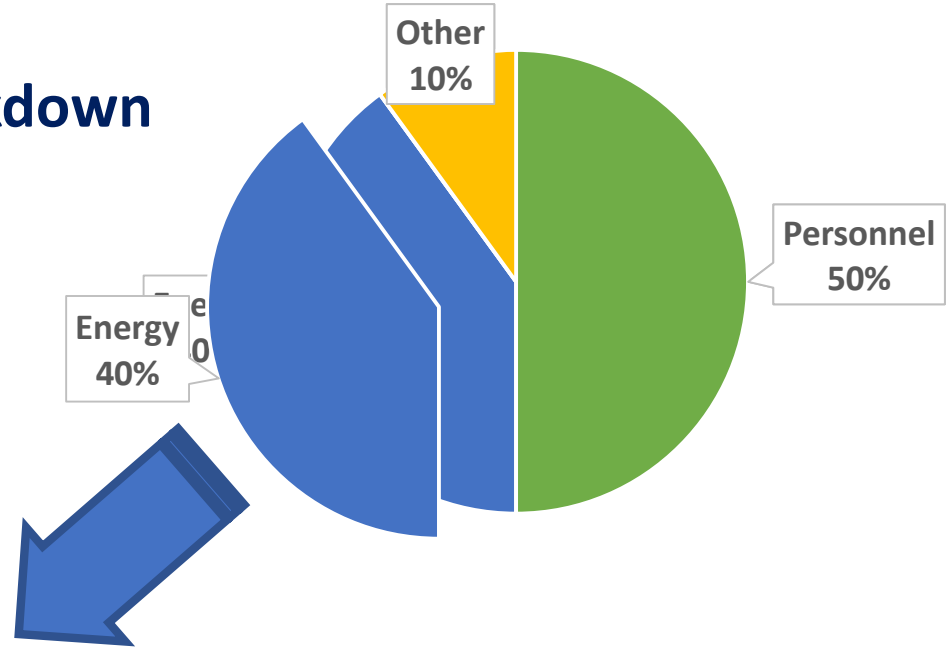
Collected

FINANCIAL HARDSHIP

Background

Water Utilities in Mexico

- **Typical Expense Breakdown**

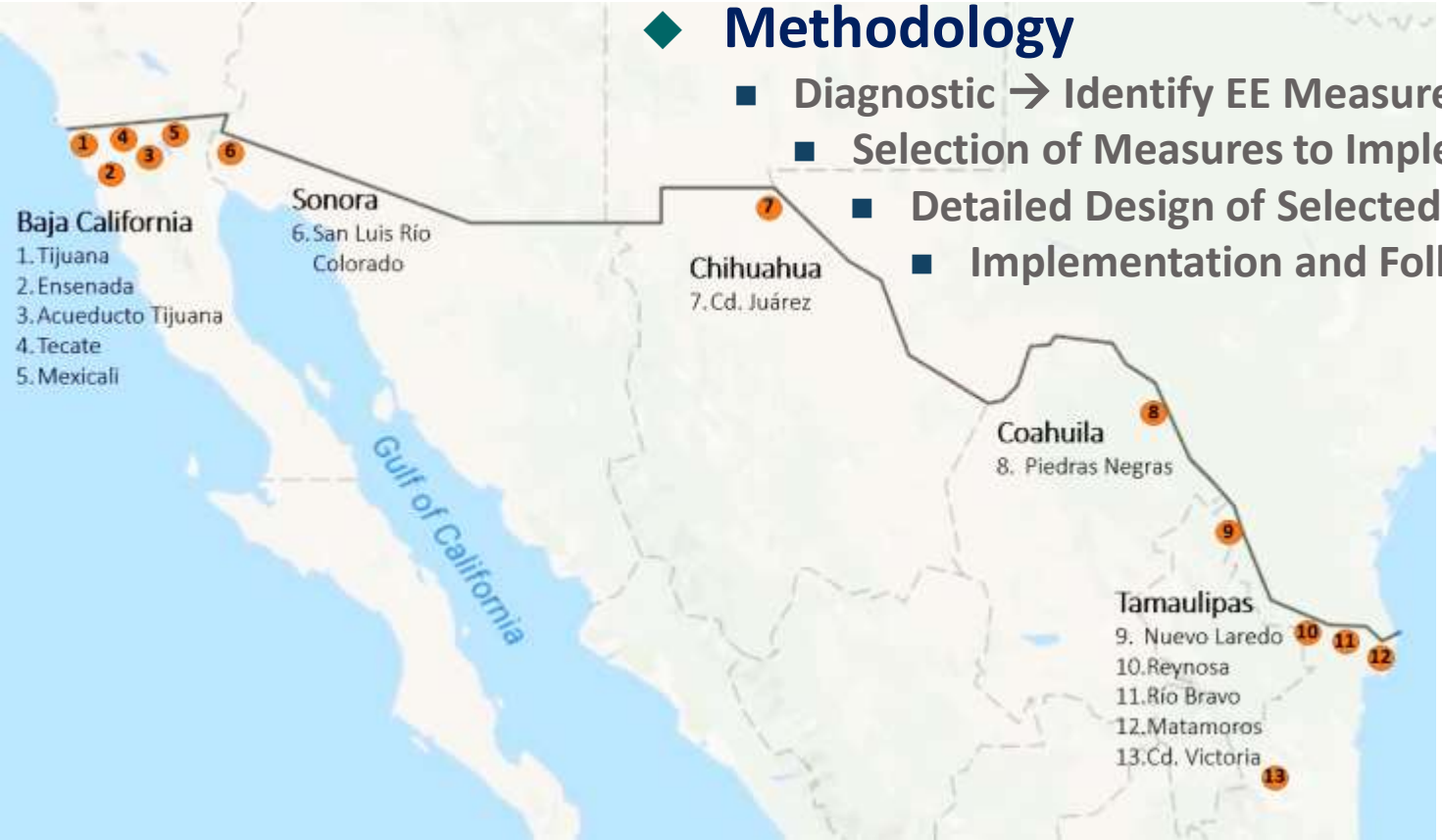


- **Energy Audit Program**
  - Lower Water Utility Energy Consumption → Reduction of GHG Emissions
  - Reduce Overall Water Utility Expenses → Free up Funds for Infrastructure
  - Good Operations/Maintenance Practices → Institutional Strengthening

Energy Audit Program

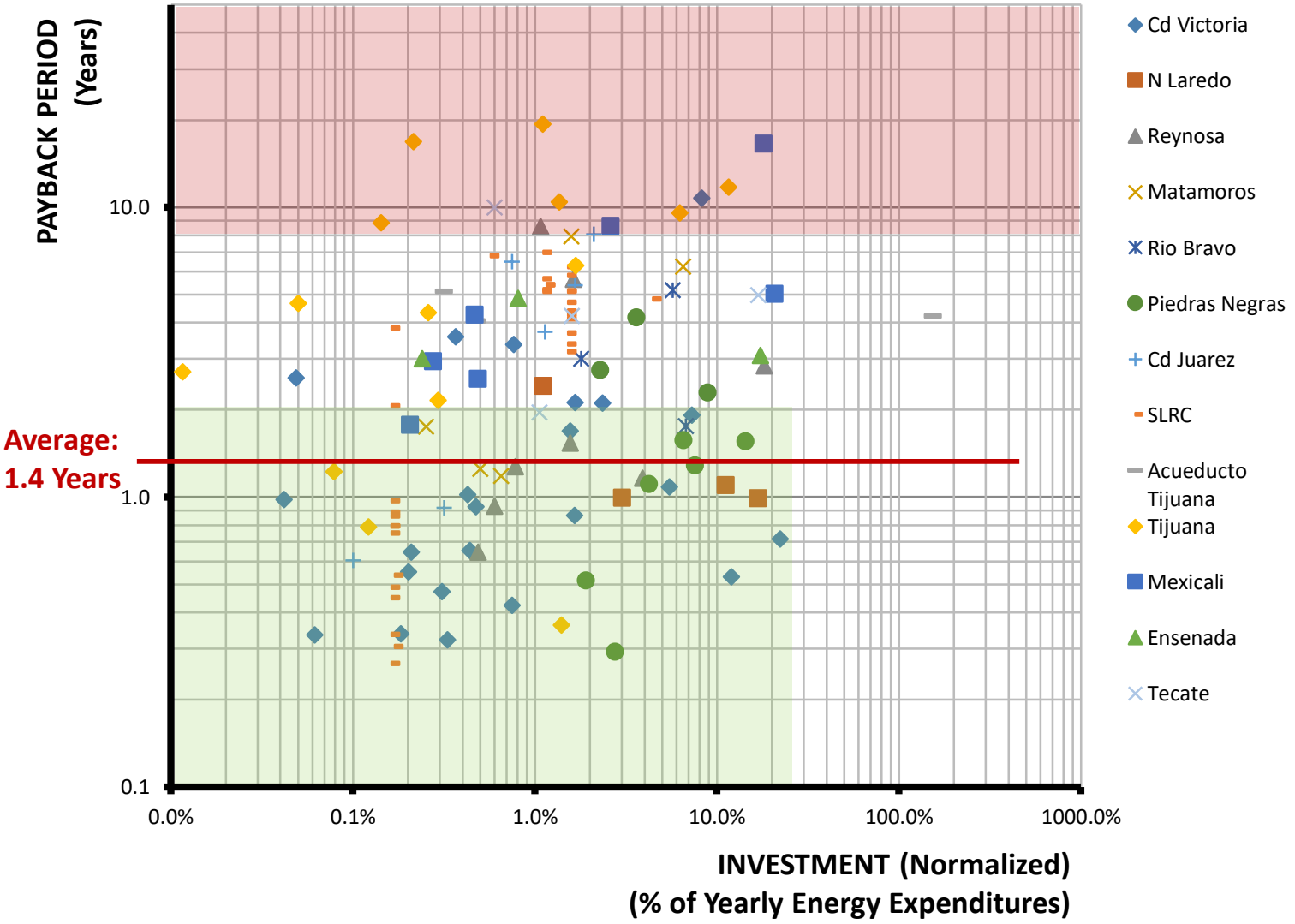
General Description

- **Energy Audit Program**
  - 2012 to Present
  - 13 Energy Audits in Mexico
  - 139 Potential EE Measures
  - Payback Period: 1 month – 10+ years
- **Methodology**
  - Diagnostic → Identify EE Measures
    - Selection of Measures to Implement
      - Detailed Design of Selected Measures
        - Implementation and Follow-up



Energy Audits

Resutls



Energy Audits

Findings – Types of Measures

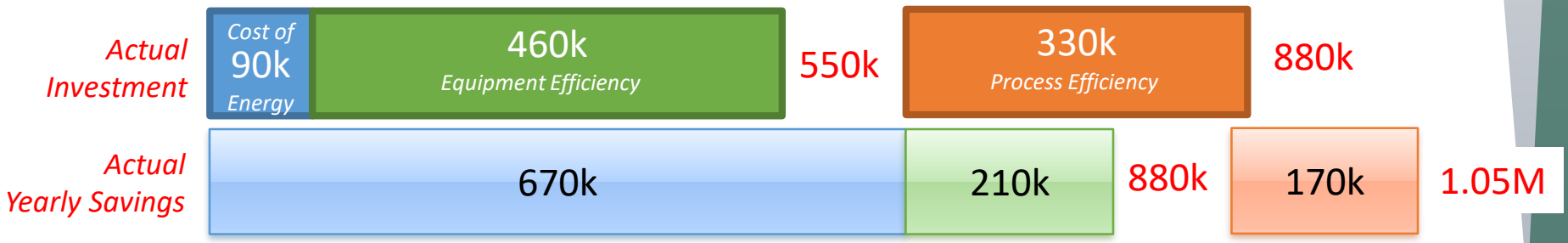
- **Cost of Energy**
  - Electric Utility Tariffs
  - Power Factor Penalties
  - Peak Time Usage and Demand Management
  - Payback: < 1 Year
- **Equipment Efficiency**
  - Appropriate Pump/Equipment Selection
  - Equipment Electromechanical Efficiency
  - Overall Adequacy Installation
  - Payback: 1 – 4 Years
- **Process Efficiency**
  - Variable Speed Drives
  - Redesign of Infrastructure (pipe sizing, storage tanks)
  - Payback: 3 – 8 Years

Energy Audits

Piedras Negras Case Study

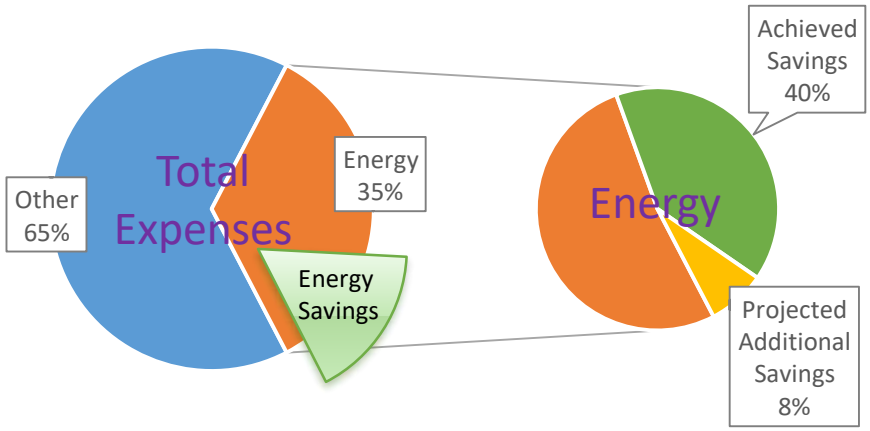
Energy Audit (Diagnostic)

Implementation of Energy Efficiency Measures



Energy Savings Results

- Energy Savings Achieved: 40%
- Energy Savings Projected: 48%



Energy Audits

Lessons Learned

- Similarity of Energy Efficiency Measures Identified
- Similar Problems/Issues for Implementing Measures
- Importance of Follow-up for Implementation of Measures
- Substantial Cost/Effort of Energy Audit and Follow-up

Learning Energy Efficiency Network

Background and Origins

- **LEEN – Germany 2002**
  - 30 Pilot Networks – 366 Companies – Energy reduction 2x as fast
  - Goal to establish 500 LEENs by 2020

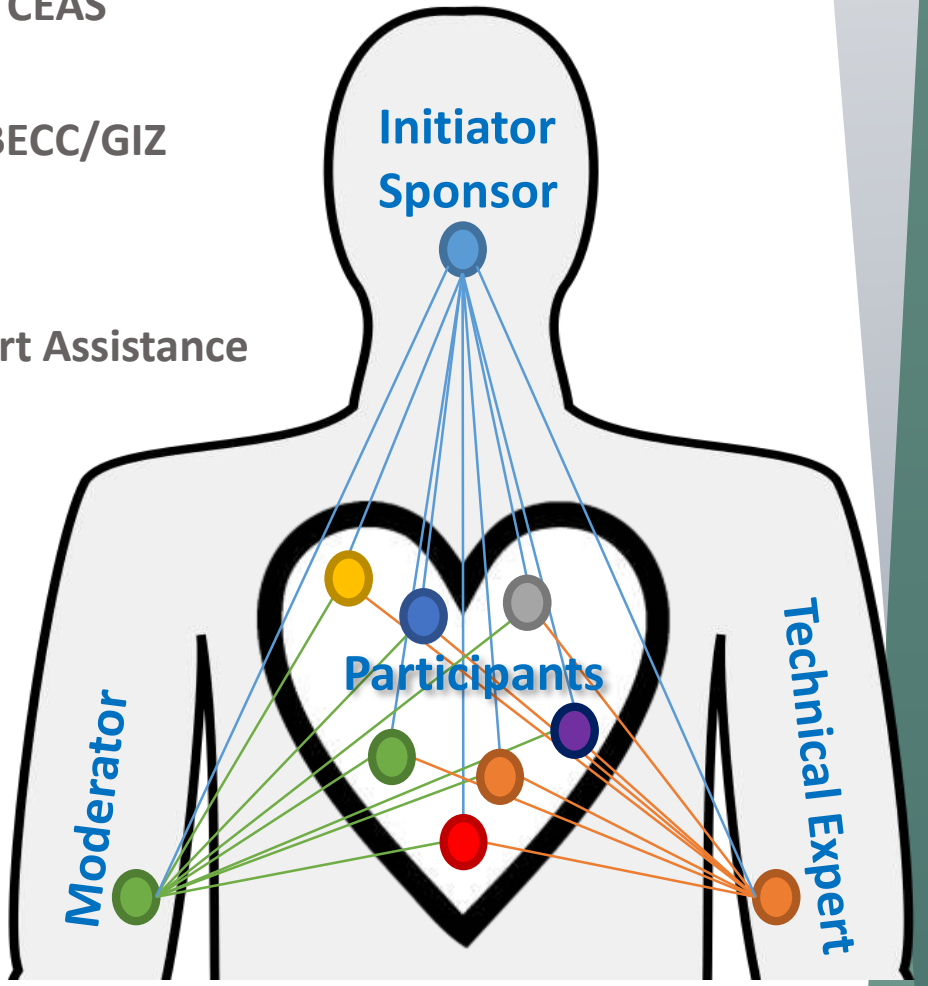
- **GIZ in Mexico (German Cooperation for Sustainable Development)**
  - 2014 – Seminar on Techniques for Moderation of Learning Energy Efficiency Networks
  - LEEN traditionally used in private industry settings
  - Desire to apply LEEN concept to public water utilities

- **GIZ-BECC: Promote a LEEN for Public Water Utilities in Coahuila**

Learning Energy Efficiency Network

Key Elements

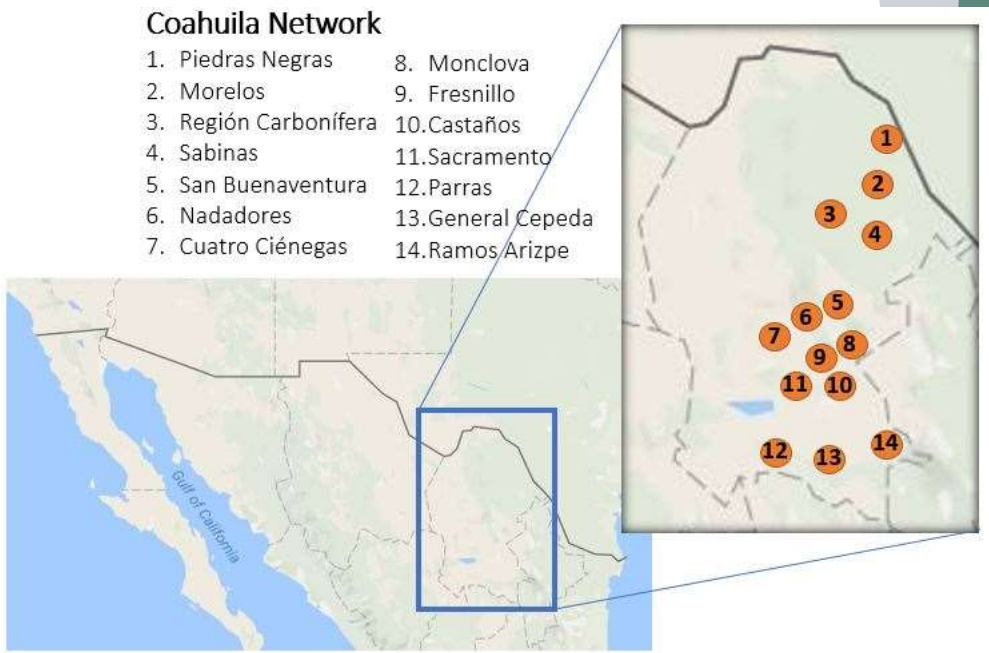
- **Initiator**
  - Head of Sector/Industry Leader – CEAS
- **Sponsor**
  - Financial/Technical Assistance – BECC/GIZ
- **Moderator**
  - Facilitate Communications
  - Logistics for Workshops and Expert Assistance
- **Technical Expert**
  - Initial Diagnostics
  - Follow-up and Technical Advise
  - Technical Training
- **Participants**
  - Active participation
  - Exchange of experiences and knowledge
  - Commitment to goals



Learning Energy Efficiency Network

Coahuila Pilot Network

- State-wide Invitation – Information Workshop
- 14 participants signed 1-Year LEEN Agreement
  - Cities: 6,000 – 230,000 pop.
- Initial Workshop / Signing
- Facilities Diagnostic
- Follow-up Workshops
  - Selection of EE Measures
  - Goal Setting
  - Follow-up/Technical Assistance
  - Technical Training
- Effort Extended for a 2nd Year
  - 12 Cities



Learning Energy Efficiency Network

Coahuila LEEN Efforts

- **Energy Diagnostic for 60 Electro-mechanical Facilities**
  - Combined Annual Energy Cost – 41.7 Million Pesos
- **116 Potential Energy Efficiency Measures Identified**
  - Required Investment – 19.9 Million Pesos
  - Potential Savings – 12.8 Million Pesos/year
  - Payback Periods – 0.1 to 24 Years
- **24 Projects Selected for 1st Year Implementation**
  - Required Investment – 1.2 Million Pesos
  - Potential Savings – 2.3 Million Pesos/year
  - Average Payback Period – 0.5 Years
- **44 Projects Selected for Subsequent Implementation**
  - Required Investment – 11.6 Million Pesos
  - Potential Savings – 7.3 Million Pesos/year
  - Average Payback Period – 1.6 Years

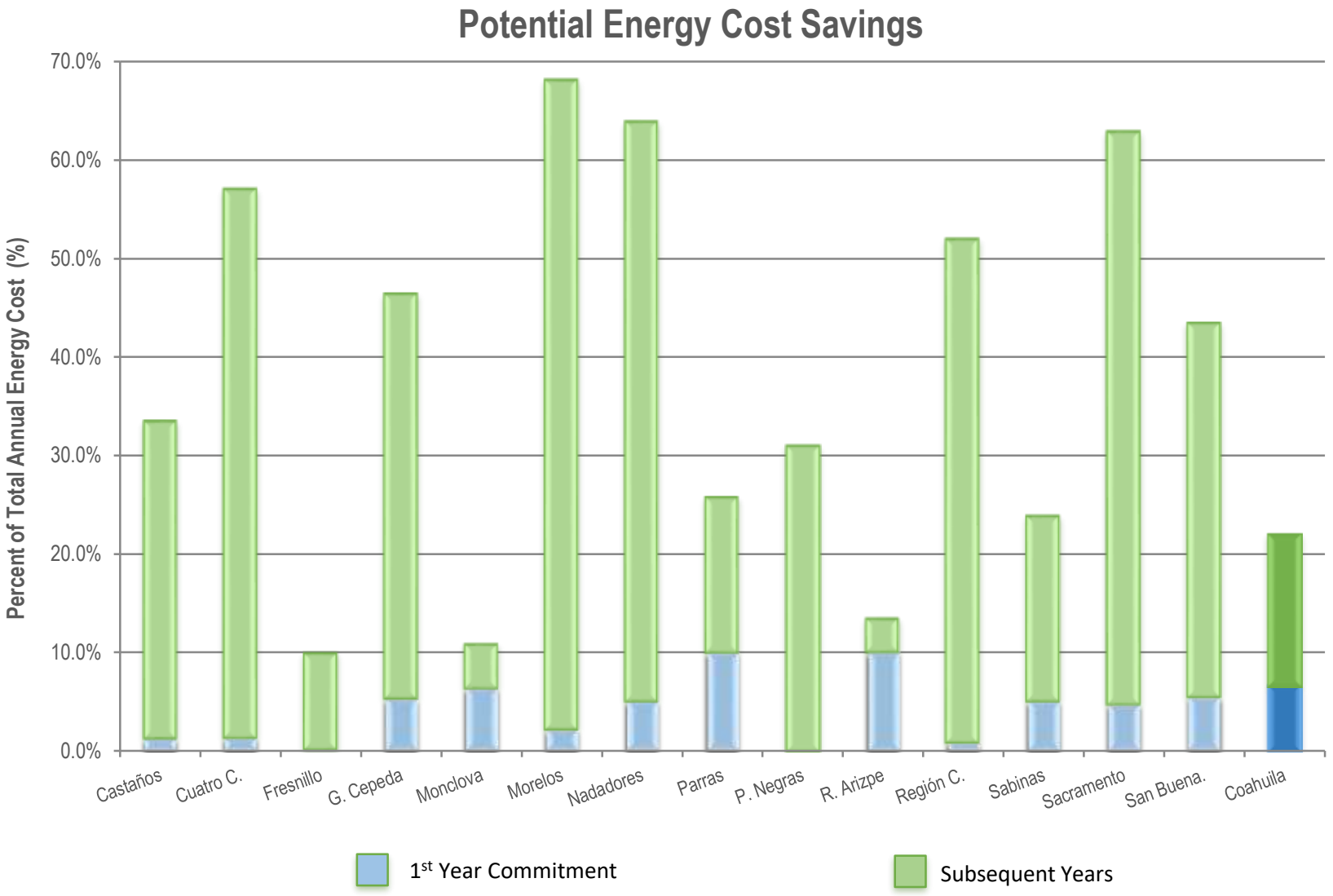
Learning Energy Efficiency Network

Coahuila LEEN Results

	Projected Annual Savings			Required Investment		
City	1st Year	Subsequent	Total	1st Year	Subsequent	Total
Castaños	26,543	656,218	682,760	15,988	745,762	761,750
C.Ciénegas	10,991	452,040	463,031	9,062	51,700	60,762
Fresnillo	10,023	542,624	552,647	11,484	1,383,821	1,395,305
G. Cepeda	17,686	136,514	154,200	25,206	229,350	254,556
Monclova	952,025	661,739	1,613,764	521,338	304,361	825,699
Morelos	14,818	445,112	459,930	8,124	616,134	624,258
Nadadores	28,060	329,044	357,104	25,050	717,209	742,259
Parras	254,622	400,572	655,194	422,993	101,470	524,463
P. Negras	0	649,532	649,532	0	3,392,866	3,392,866
R.Arizpe	797,301	273,024	1,070,325	0	508,684	508,684
R. Carbonifera	35,739	2,072,963	2,108,702	28,436	2,197,188	1,208,256
Sabinas	31,147	115,625	146,771	9,335	279,973	289,308
Sacramento	19,310	237,726	257,036	17,876	428,321	446,197
S. Buenavent.	53,627	374,061	427,688	21,014	621,155	642,169
TOTAL:	2,251,891	7,346,793	9,598,685	1,115,906	11,577,994	12,693,900

Learning Energy Efficiency Network

Coahuila LEEN Results



Learning Energy Efficiency Network

Lessons Learned

- Substantial Cost Efficiency of Initial Group Diagnostic/Audit
- Substantial Cost Efficiency of Follow-up on Implementation of EE Measures
- Significant Advantage of Sharing Knowledge/Experiences among Piers
- Pier Pressure Aids Urgency of Implementation of EE Measures
- Development of Relationships among Piers beyond Energy Efficiency Measures
- Follow-up Workshops Provide a Stage for Training Sessions that contribute to Overall Institutional Capacity Building

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Thank You

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