Results Measurement System
Aggregate Report

As of December 31, 2022

Contents

I. Summary of Results

As of December 31, 2022, the North American Development Bank (NADBank) has helped finance 267 environmental infrastructure projects that have been implemented and are operational. A total of 161 of these operational projects have undergone a closeout process to verify their actual performance versus the intended performance at certification. This report documents the aggregate results of those 161 projects. Additional projects are operational but have not yet been closed out, thus the actual impact of the Bank's projects is greater than the results verified and presented in this report.

IMPACT OF 161 PROJECTS WITH CLOSEOUT REPORTS

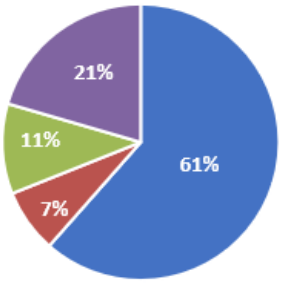
13	water treatment systems with a combined capacity of 86 mgd and 251 miles of water lines serving 1.2 million people
40	wastewater treatment systems with a combined capacity of 314 mgd and 1,233 miles of sewer lines serving 10.5 million people
2	water conservation projects for irrigation districts, saving of 33 million gallons of water per day
3	stormwater projects with 21.5 miles of collectors and 386 acre-feet of reservoir capacity, safeguarding the homes of 1.1 million people
7	sanitary landfills and 105 vehicles and equipment , handling 2,173 metric tons/day of waste, benefiting 2.9 million people
15	air quality improvement projects providing 10.1 million square meters of paved streets and preventing 13,460 metric tons per year of airborne particles (PM_{10})
2	public transportation projects providing 343 low-emission vehicles, serving 3.5 million people and displacing 2,554 metric tons of CO_2e per year
33	clean energy facilities with a combined generation capacity of 2,825 MW producing 8,321 GWh of electricity to benefit 4.1 million people and displacing the emission of 4 million metric tons of CO_2e per year

CO_2e = Carbon dioxide equivalent; GWh = gigawatt-hour; mgd = million gallons a day; MW = megawatt

Approximately 16.2 million people are benefitting from these projects in the U.S.-Mexico border region.

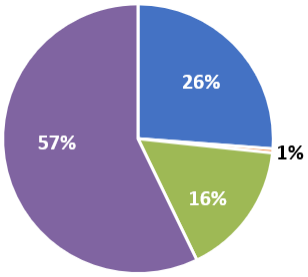
IMPACT OF 161 PROJECTS WITH CLOSEOUT REPORTS

Number of Projects



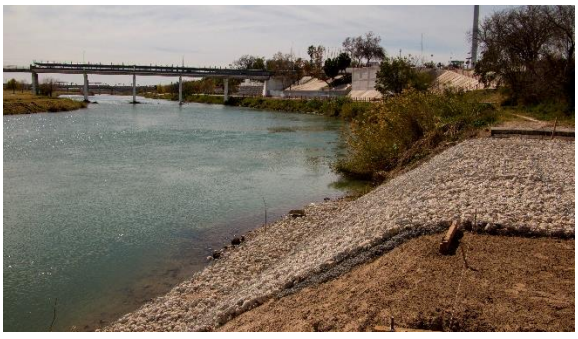
161 projects

Total NADBank Funding



US$2,592 million

Water	Waste Management	Air Quality	Sustainable Energy
▪ Drinking water ▪ Wastewater ▪ Stormwater ▪ Water conservation	▪ Solid waste disposal ▪ Solid waste collection	▪ Concrete paving ▪ Asphalt paving ▪ Public transportation ▪ Basic urban infrastructure	▪ Wind energy ▪ Solar energy ▪ Biogas



II. Introduction

For the North American Development Bank (NADBank), it is important to know that the projects it finances are not only completed as approved, but also that they perform as intended to improve the environment and related health conditions for border residents. To that end, a Results Measurement System (RMS) was developed that includes a closeout process (COP) for all projects certified and implemented since 2006.[1] NADBank prepares and submits closeout reports for individual projects to its Board of Directors, as well as provides periodic reports of aggregate closeout results. This third aggregate closeout report provides the cumulative results for the different infrastructure sectors based on several indicators for the projects that have undergone a closeout process through December 2022.

III. Results Measurement System

The purpose of the RMS is to provide an objective assessment of project outputs and outcomes, as a means of determining whether implemented projects are generating the results anticipated at certification, as well as to measure those results. It also serves to provide important feedback on lessons learned and best practices to be applied to future projects.

The RMS reflects the experience and best practices of other multilateral development banks, with an emphasis on simplicity and cost-effectiveness. The logic-based results chain is designed as a continuous system where the inputs produce outputs that generate outcomes based primarily on access to the infrastructure (Box 1). By providing access, positive impacts should be achieved based on the intended use of the infrastructure.

Box 1: Results Chain Components

- ✓ ***Inputs*** – The resources used and actions taken to generate outputs, which are established in the project proposal and tracked as part of the day-to-day activities of project implementation (through funding disbursement and monitoring processes).
- ✓ ***Outputs*** – The tangible goods and services produced by the project, which are measured to determine whether the project deliverables were achieved as certified, in terms of their physical characteristics (i.e., size, capacity, technology), schedule, costs and funding structure.
- ✓ ***Outcomes*** – The results likely to be achieved from the project outputs, which are measured as access to or performance of the infrastructure.

A result matrix that defines the project objectives, baseline and target values, and the indicators for measuring results, is developed for every project and included in the project proposal submitted to the Board of Directors for approval.[2] Figure 1 illustrates the relationship between the project cycle and the results chain, with the RMS integrated on a parallel track to review and document the achievement of the anticipated results. Figure 2 illustrates the possible components for the results matrix of a wastewater project.

[1] In accordance with Board Resolution 2006-38.
[2] A result matrix began being applied to every project in 2008.

Figure 1
RELATIONSHIP OF THE RESULTS CHAIN TO THE PROJECT CYCLE

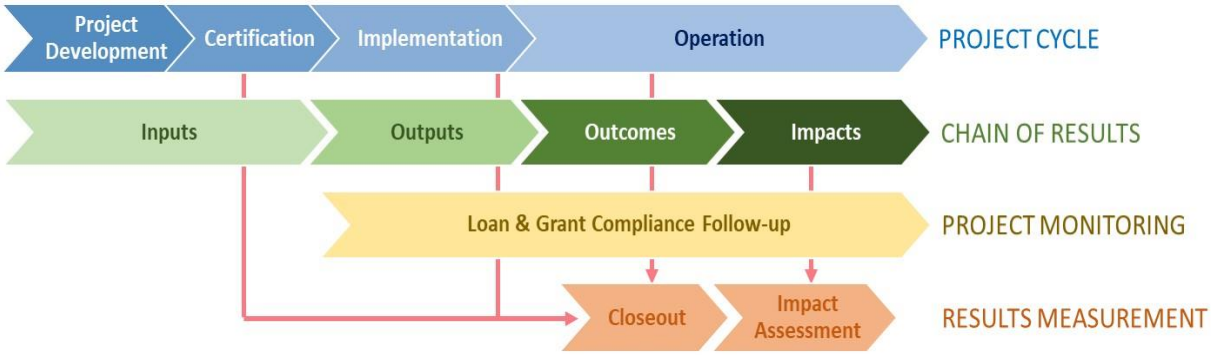
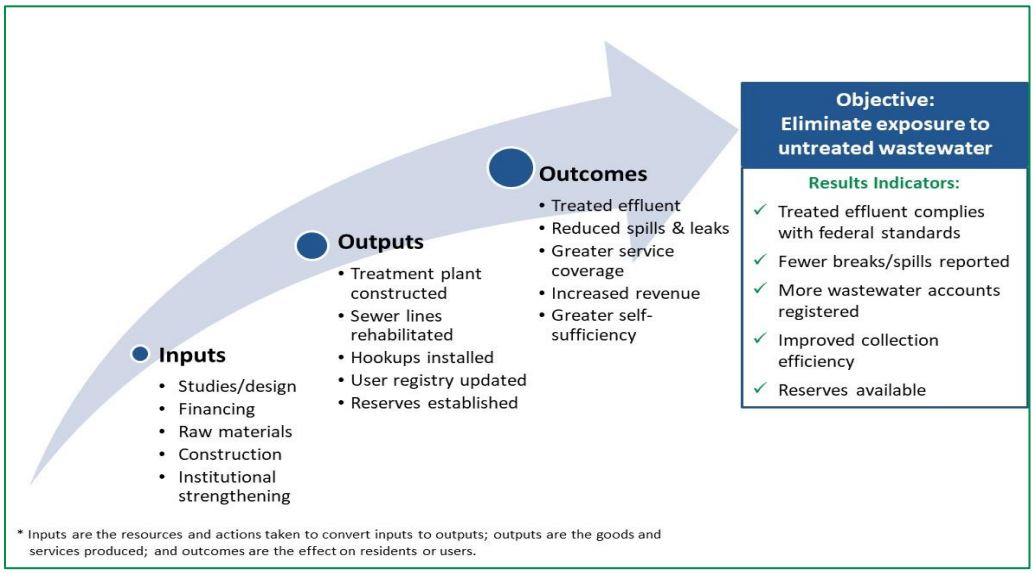


Figure 2
SAMPLE RESULTS CHAIN FOR A WASTEWATER PROJECT



To standardize the performance assessment of each project, a menu of output and outcome indicators has been developed for each sector under the NADBank mandate. Each indicator was selected considering its appropriateness for representing the change in status of the most important environmental or human health conditions addressed by the project prior to (baseline) and following project implementation; as well as for its simplicity, representativeness, feasibility and verifiability. Appendix A contains the list of output and outcome indicators used in the closeout reports and cumulatively reported in this aggregate report.

The RMS consists of two components: a closeout process conducted after the project has been in operation for at least a year and an impact assessment for selected projects. The closeout report verifies whether the project was constructed as approved and has been operating as intended, while the impact assessment is performed to ascertain the actual impact of the project on specific environmental and human health indicators in the long-term.

Project Closeout Process

The closeout process for environmental projects serves to assess and document the achievement of the fundamental objectives of a project with respect to the investments made and the infrastructure built, or equipment and services provided. It is an effective tool for measuring results, as it provides the opportunity to confirm the extent to which physical targets (outputs) were met and the intended results (outcomes) have been achieved. It is also a source of valuable feedback for improving practices (success factors and lessons learned) through on-site observations and direct dialogue with project sponsors and operation personnel.

The closeout process is usually conducted one year after initiation of project operations. Project data is collected from construction records, field visits and interviews with key stakeholders. Actual project results are then compared against those projected in the results matrix at certification to determine the level of achievement of the anticipated outputs and outcomes (Box 2). The results of this evaluation are documented in a closeout report.

Box 2: Closeout Process Evaluation Objectives

Evaluate actual construction/operation conditions vs projected conditions at certification

- ✓ Were all construction components (outputs) completed?
- ✓ Is the infrastructure operating as anticipated?
  - Technical – capacity, efficiency, quality, operator training
  - Financial – revenue, reserves, management
- ✓ Were the uses and sources of funds modified?
- ✓ Was the anticipated access to service (outcome) achieved?

Determine causes for deviations (lessons learned)

- ✓ Identify what may have influenced the deviation
  - Insufficient funding / fluctuating costs
  - Design or operation issues
  - Unanticipated conditions – climate, land, customer factors
- ✓ Create a feedback loop to determine if the success factors and lessons learned can be applied to future projects.

In accordance with NADBank Board instructions, a closeout process is completed for all certified projects funded by NADBank since 2006. The resulting closeout reports are submitted to the Board as they are completed. Additionally, per the requirements of the U.S. Environmental Protection Agency (EPA), a closeout process must be conducted for all projects funded through the Border Environment Infrastructure Fund (BEIF) since program inception. A full report prepared in accordance with EPA guidelines is provided for BEIF projects funded since 2006; however, in the case of older BEIF projects, only a fact sheet is produced.

An electronic tracking tool was developed to document the universe of projects eligible for closeout and their status. The tracking tool is a database that includes the performance of

each project with respect to its applicable output and outcome indicators. Its main purpose is to facilitate the aggregation of results by indicator and sector.

Impact Assessment

An impact assessment is the next logical step in the measurement of results by shedding light on whether the implemented project is indeed achieving its fundamental objective—having an impact beyond its physical outputs and outcomes—by providing environmental and health benefits to the intended population. Impact assessments are part of NADBank's standard operating procedures and are conducted for projects where the assessment is deemed valuable and feasible. Due to limited resources, projects are selected carefully for development of an impact assessment.

IV. Aggregate Results

Closeout Reports by Funding Program

As of December 31, 2022, a total of 267 projects funded by NADBank have been implemented and were operational. To date, a closeout report has been completed for 161 of the 224 implemented projects that were eligible to undergo the closeout process because they have been in operation for at least a year.[3] Consequently, a pipeline of 63 projects was pending closeout at year-end. A breakdown of the projects by funding program is provided in Table 1.

Table 1
STATUS OF CLOSEOUT PROCESS BY FUNDING PROGRAM

Funding Source*	Period	Projects Ready for Closeout	Closeout Reports Completed
BEIF	1997-2005**	38	10
	2006-2022	45	42
Loan-BEIF	1997-2005*	13	8
	2006-2022	26	17
Loan	2006-2022	70	62
Loan-SWEP	2006-2022	2	2
SWEP	2006-2022	7	6
CAP	2006-2022	21	12
Loan- CAP	2006-2022	1	1
WCIF	2006-2022	1	1
Total:		**224**	**161**

* BEIF – Border Environmental Infrastructure Fund; CAP – Community Assistance Program; SWEP – Solid Waste Environmental Program; WCIF – Water Conservation Investment Fund
**For projects certified before 2006 shorter factsheets may be developed in lieu of a full closeout report, depending on the availability of information and the approval of EPA.

[3] A closeout report is considered complete once it is approved by the Chief Environmental Officer (CEVO) and delivered to the Board (in the case of NADBank-funded projects) or to EPA (in the case of BEIF-funded projects).

The total cost of the 161 projects that completed the closeout process was US$7.91 billion, approximately 1.5% less than the amount estimated at certification (US$8.03 billion). NADBank provided loans and grants totaling US$2.60 billion to help finance those projects, as shown in the following table.

Table 2
PROJECT FUNDING COMPARISON – CERTIFICATION vs. ACTUAL
(US$ Millions)

NADBank Funding for the 161 Closed-out Projects*	Estimated at Certification	Actual at Closeout
Loans	2,555.89	2,199.17
CAP grants	5.45	4.72
Other NADBank grants	6.57	4.75
BEIF grants	410.10	383.24
Total	**2,978.02**	**2,591.81**

* BEIF – Border Environmental Infrastructure Fund; CAP – Community Assistance Program; Other grants were provided through the Solid Waste Environmental Program (SWEP) and Water Conservation Investment Fund (WCIF)

Closeout Reports by Project Type

During 2021 and 2022, a total of 40 projects went through the closeout process, increasing the total aggregate number of closed-out projects by 32% compared to the closeout reports completed as of December 2020. Table 3 shows the breakdown of completed closeout reports by sector. As of December 2022, 63 projects were in the closeout pipeline—most of the older projects in the water sector were funded under the BEIF program.

Table 3
EVOLUTION OF COMPLETED CLOSEOUT REPORTS

Sector	Total Reports Completed		Closeout Pipeline
	By December 2020	By December 2022	
Water and wastewater	71*	94	52
Stormwater management	3	3	1
Water conservation	1	2	0
Solid waste	8	12	4
Air quality improvement	10	15	1
Public transportation	2	2	1
Sustainable energy	26	33	4
Total:	**121**	**161**	**63**

* Three wastewater projects that were included in previous versions of the Aggregate Closeout Report were removed. These projects were certified and implemented but not financed by NADBank. Generally, only projects financed by the Bank undergo a closeout process and should be reported.

The most significant change from the previous aggregate report is in the water and wastewater sector, which increased from 71 to 94 closeout reports.

Aggregate Results by Project Type

This aggregate report compiles the results for all 161 BEIF and NADBank-funded projects—97 in Mexico and 64 in the United States—which had completed the closeout process as of December 31, 2022. Key aggregate indicators for those projects are presented below.

Drinking Water – 30 Projects
(15 water + 15 water/wastewater)

ACTUAL OUTPUTS		ACTUAL OUTCOMES		% Outcome Achieved
13	water treatment systems with a combined capacity of **86.33** mgd	**1.2**	million people benefitted.	
251	miles of new distribution lines	**76.4**	mgd of water treated and distributed.	→ **103%**
9.9	million gallons of water storage capacity constructed	**19,578**	residential hookups installed	→ **94%**

mgd = million gallons a day

Wastewater – 79 Projects
(64 wastewater + 15water/wastewater)

ACTUAL OUTPUTS		ACTUAL OUTCOMES		% Outcome Achieved
40	wastewater treatment systems with a combined capacity of **314** mgd	**10.5**	million people benefitted	
1,233	miles of collection lines and **104** lift stations	**304**	mgd of wastewater treated	→ **97%**
4,515	decommissioned septic tanks	**420,043**	residential sewer connections	→ **94%**

mgd = million gallons a day

Stormwater Management – 3 Projects

ACTUAL OUTPUTS	ACTUAL OUTCOMES	% Outcome Achieved
21.5 miles of stormwater collectors	**1.1** million people benefitted	
386 acre-feet of reservoir capacity	**122,493** households benefitting from stormwater infrastructure	→ **100%**
175 cubic feet/second of pumping capacity		

Water Conservation – 2 Project

ACTUAL OUTPUTS	ACTUAL OUTCOMES	% Outcome Achieved
264 miles of improved water conveyance canals	**24,362** people benefitted	
	50.46 cubic feet per second of water saved	→ **100%**

Solid Waste – 12 Projects

ACTUAL OUTPUTS	ACTUAL OUTCOMES	% Outcome Achieved
7 sanitary landfills with a combined capacity of **1.06 million** cubic meters	**2.9** million people benefitted	
3 new transfer stations	**2,173** metric tons/day of solid waste properly managed	→ **120%**
6 illegal/substandard dump sites closed	**24.7** acres of dumpsites closed	→ **100%**
105 collection and landfill operation vehicles		

Air Quality Improvement – 15 Projects

(11 roadway improvement + 3 basic urban infrastructure* + 1 border crossing)

ACTUAL OUTPUTS		ACTUAL OUTCOMES		% Outcome Achieved**
10.1	million square meters of street and road surface paved	**4.4**	million people benefited.	
		13,460	metric tons/day of suspended particulate matter (PM_{10}) prevented.	→ **61%**
		12,364	residential water hookups installed.	→ **78%**
		13,296	residential sewer connections installed	→ **66%**

* Basic urban infrastructure projects consist of a mix of works from various sectors, including as street paving, water and sewer connections & lines, storm drainage and public lighting

** As explained in Section V. Conclusions, this outcome is primarily due to a reduction in project scope and not a lack of performance.

Public Transportation – 2 Projects

ACTUAL OUTPUTS		ACTUAL OUTCOMES		% Outcome Achieved
343	vehicles with low-emission technology	**3.5**	million people benefitted.	
		2,554	$mTCO_2eq$/year of greenhouse gas emissions displaced.	→ **381%***
		168	metric tons/year of NOx and HC emissions displaced	→ **160%***

$mTCO_2eq$ = metric tons of carbon dioxide equivalent; NOx = Nitrogen oxides; HC = Hydrocarbons

* The mix of diesel vs. natural gas (NG) buses changed significantly from project certification to implementation. More NG buses, which are cleaner, were actually financed than anticipated.

Sustainable Energy – 33 Projects

ACTUAL OUTPUTS		ACTUAL OUTCOMES		% Outcome Achieved
2,825	megawatts (MW) of new generation capacity from renewable sources	4.1	million people benefitted	
16	solar photovoltaic parks	8,321	gigawatt-hours (GWh)/ year of power generation	→ 86%
14	wind farms	4.06	million mTCO2eq/year of greenhouse gas emissions displaced	→ 90%
2	biogas plant	8,348	metric tons/year of other harmful emissions displaced	→ 85%

mTCO2eq = metric tons of carbon dioxide equivalent

V. Conclusions

The cumulative results for most indicators from NADBank's core sectors demonstrate achievement of at least 90%, and in some cases over 100%, of the targets at project certification. This rate of success indicates that an adequate planning and certification process was conducted, and that construction oversight and the required follow-up were performed correctly to ensure good project outputs.

In the case of air quality improvement projects, the Bank documented relatively low cumulative achievements in comparison to anticipated outcomes. The low percentages can be explained by a couple of projects where the original certified project scope was significantly reduced during project implementation. Consequently, the outputs and outcomes achieved were also significantly reduced with respect to those originally anticipated. Notwithstanding the smaller dimension of the projects, the infrastructure built has performed adequately. Since those projects were relatively large, their indicators weigh heavily in the cumulative figures.

The performance documented by the closeout reports for projects in the sustainable energy sector is somewhat lower than that of other types of projects. Four major factors explain why these indicators are below expectations.

1. *Probabilistic nature of wind/solar resources*. Wind and solar energy projects rely on the actual availability of these resources to produce electricity. Project development and design are based on historical data. Some degree of variability in the yearly production of energy is expected. The closeout reports are based only on the first year of operation, which may or may not be representative of an average year throughout the life of the project. The Bank should consider updating closeout reports using more than one year of performance data to evaluate these types of projects, as we periodically revisit projects that showed lower than expected results during closeout.

2. *Development of the results matrix during the early stages of project certification*. NADBank processes call for the results matrix to be included in the certification proposal sent to the Board of Directors. Sustainable energy projects are typically certified with the information that is available from the Sponsor at that time. A more in-depth technical due-diligence review performed by the independent engineer, which refines the project and the expected results, is typically done after certification. Changes in the expected project performance provided by the independent engineer are then used during financial closing, but the results matrix is not updated. The actual project results evaluated during project closeout are compared to the original results matrix, without any adjustments to the expected performance of the project based on the information provided by the independent engineer. In these cases, projects may be performing as expected based on the final design but may not be aligned with the expectations set in the original results matrix at certification. The Bank should consider updating the data included in the results matrix for projects after certification or during the closeout process when necessary.

3. *Use of emission factors that change over time*. As new power plants are connected to the grid, the state energy matrix and emission factors change, typically becoming cleaner over time. From the time of certification to the closeout of a project these emission factors could change significantly. Changes in the composition of the energy matrix over time result in inconsistent emission calculations between the certification document and the closeout report. For consistency, the more recent closeout reports use the original emission factors established in the results matrix during the certification process.

4. *Technical issues*. In projects of the magnitude of the wind farms and solar parks financed by the Bank, it is not uncommon for some technical issues to occur during the first year of operation, such as the failure of some solar panels, their components or their tracking systems; problems with blades on wind turbines; and similar issues that are typically resolved during the first several months of operation. During these first few months of operation, performance of the facility is not at its peak, and yet it is the first year of operation that is used during closeout to evaluate performance.

As the backlog of closeout reports for older projects is eliminated, the Bank is currently implementing a taskforce to propose enhancements to its Results Measurement System. This action will allow NADBank to ascertain the performance of the projects over longer periods of time and draw better lessons for future projects.