Evaluation of EXIM's Environmentally Beneficial Goods and Services Mandate

OIG-EV-24-02
August 27, 2024

Office of Inspector General
Export-Import Bank of the United States

MEMORANDUM

To: Ufo Eric Atuanya
Acting Senior Vice President of Global Business Development and Senior Advisor for Africa

MICHAEL RYAN Digitally signed by MICHAEL RYAN Date: 2024.08.27 08:33:35 -04'00'

From: Michael T. Ryan
Assistant Inspector General for Special Reviews and Communications

Subject: Evaluation of EXIM's Environmentally Beneficial Goods and Services Mandate (OIG-EV-24-02)

Date: August 27, 2024

This final report presents the results of our evaluation of EXIM's Environmentally Beneficial Goods and Services Mandate. The objectives were to 1) summarize and report on EXIM's performance on the environmental effects of exported goods and services supported through its programs, using agency-provided data; and 2) assess EXIM's performance, to include identifying any challenges or obstacles, in achieving its goal of five percent of the "applicable amount" being made available each fiscal year for financing renewable energy. The evaluation covers the period from Fiscal Year (FY) 2021 through FY 2023.

EXIM Implements Environmental Charter Positions Separately

This evaluation is not a comprehensive assessment of EXIM's environmental practices and performance, in part, because EXIM implements its Environmentally Beneficial Goods and Services Mandate separate and distinct from EXIM's other environmental Charter provisions.[1] EXIM informed OIG that, from both an internal policy and legal perspective, the agency interprets the Charter's requirement to promote exports of environmentally beneficial goods and services, via EXIM's Environmental Exports Program (EEP), as separate and distinct from its requirement to analyze the environmental effects of certain transactions.[2] For the purposes of this report, OIG takes no position on EXIM's interpretation of these Charter provisions. OIG plans to initiate additional oversight on EXIM's consideration of the environmental effects of certain transactions, to include the interactions of applicable Charter provisions.

[1] EXIM's Charter contains several provisions that define EXIM's responsibilities as it relates to the environment. Such provisions are contained in Section 11 of EXIM's Charter, entitled Environmental Policy and Procedures.
[2] EXIM provided OIG an email clarifying the agency's internal policy, as well as its legal interpretation (via its Office of General Counsel), of EXIM's Charter, Section 11.

Additional Context Necessary to Clarify Evaluation Scope

This memorandum provides additional context regarding the first evaluation objective to clarify the scope of our evaluation and respond to EXIM's technical comments to a draft of this report.

Section 11 of EXIM's Charter, entitled Environmental Policy and Procedures, contains two subsections that impact EXIM programs: 11(a) – Environmental Effects Consideration and 11(b) – Use of Bank Programs to Encourage Certain Exports; both provisions were added to the Charter in 1992.[1] Congress subsequently amended the Charter in 1994, to further identify the scope of allowable exports under subsection 11(b).[2] In 2006, the Charter was amended to require public disclosure of environmental assessments and supplemental environmental reports required under subsection 11(a).[3] Finally, the transaction amount threshold for conducting environmental assessments was modified in 2015.[4] Section 11 also contains a provision, 11(c), which requires annual reporting to the Congress on EXIM's environmental policy and procedures. As described below, our evaluation did not assess EXIM's performance and procedures in considering the environmental effects of goods and services related to EXIM's direct loan and guarantee programs, as set forth in Section 11(a) of the Charter.

Mandate to Promote Exports of Environmentally Beneficial Goods and Services

Section 11(b) requires EXIM "to encourage the export of goods and services that have beneficial effects on the environment or that mitigate potential adverse environmental effects"—such as exports of products and services used for the monitoring, abatement, control, or prevention of pollution. According to EXIM officials, EXIM implements Section 11(b) through its EEP. EEP allows for financial incentives that encourage the export of goods and services where end use is known, or reasonably assumed, to benefit the environment. Goods and services categorized as "environmentally beneficial" include renewable energy, energy efficiency, waste treatment, recycling, and pollution reduction. EXIM officials stated that EEP focuses on increasing EXIM's support for goods and services categorized as "environmentally beneficial". While EEP is not intended to assess the potential beneficial and adverse environmental effects caused by specific project activities, such effects would be separately addressed or reviewed through due diligence procedures required under Section 11(a) of the Charter. Our evaluation's first objective focused on EEP's performance related to environmental effects (specifically CO_2 emissions), the creation of U.S. jobs, and the impact of the transactions on economic growth.

Requirement to Consider Environmental Effects

As previously noted, Section 11(a) of the Charter requires EXIM to establish procedures that account for potential beneficial and adverse environmental effects for transactions under

[1] See Pub. L. 102-429.

[2] See Pub. L. 103-428.

[3] See Pub. L. 109-438.

[4] See Pub. L. 114-94.

EXIM's direct lending and guarantee programs. This section also authorizes the Board of Directors (Board) to withhold financing from a project for environmental reasons or to approve financing—after considering the project's potential environmental effects.

According to EXIM officials, EXIM implements Section 11(a) through its Environmental & Social Due Diligence Procedures and Guidelines (ESPG).[5] These officials added that ESPG is a due diligence process that considers the potential environmentally beneficial, as well as adverse, effects of goods and services exports. ESPG can apply to any transaction with more than $10 million in financial exposure to EXIM, including EEP transactions (e.g., a hydroelectric dam or solar energy project). EXIM officials stated that ESPG incorporates detailed and robust due diligence of proposed projects against EXIM's internationally benchmarked environmental and social procedures and guidelines. As required, EXIM staff provide an environmental memorandum to the Board with the results of this due diligence assessment.

In alignment with Section 11(a), EXIM officials informed OIG that the Board can review each potential transaction and the associated environmental memorandum to assess an applicant's alignment with the ESPG. In instances where EXIM determines that an applicant may not be able to successfully align with the ESPG, the applicant may decide to withdraw their application before it goes to the Board for review. EXIM officials also stated that any business entity can request financing from EXIM, in accordance with Section 2(k) of the Charter, entitled Prohibition on Discrimination Based on Industry. However, according to EXIM officials, not all requested transactions make it to Board approval, and EXIM reviews all transactions for compliance with several different criteria, including environmentally beneficial or adverse effects. Specifically, EXIM officials stated that EXIM may not discriminate based solely on industry or sector; however, the Board may review transactions on a case-by-case basis to determine if EXIM should withhold financing based on a project's alignment with the ESPG, as outlined in Section 11(a) of the Charter.

This evaluation did not review EXIM's implementation of Section 11(a) or its ESPG. As previously stated, OIG plans to initiate oversight work of EXIM's implementation of Section 11(a) of the Charter during the coming fiscal year.

This report contains two recommendations. We consider management's proposed actions to be responsive. The recommendations will be closed upon completion and verification of the proposed actions.

We appreciate the cooperation and courtesies provided to this office throughout this review. If you have questions, please contact me at 202-565-3963 or at michael.ryan@exim.gov.

[5] EXIM, *Environmental and Social Due Diligence Procedures and Guidelines*, June 27, 2013, revised December 12, 2013.

Office of Inspector General
Export-Import Bank of the United States

OIG-EV-24-02

What OIG Evaluated

Acting on behalf of the Office of Inspector General (OIG), KPMG conducted the evaluation of Export-Import Bank of the United States' (EXIM's) Environmentally Beneficial Goods and Services Mandate. The objectives of this engagement were to 1) summarize and report on EXIM's performance on the environmental effects[1] of exported goods and services supported through its programs, using agency-provided data; and 2) assess EXIM's performance, to include identifying any challenges or obstacles, in achieving its goal of five percent of the "applicable amount" being made available each fiscal year for financing renewable energy.

What OIG Recommends

We issued two recommendations to address the challenges in achieving EXIM's goal for the export of environmentally beneficial goods and services and strengthening the internal controls related to Environmental Exports Program (EEP) process. In its comments on the draft report, EXIM concurred with both recommendations. EXIM's response to each recommendation, and OIG's reply, can be found in the Recommendations section of this report. EXIM's formal response is reprinted in its entirety in Appendix D.

EXECUTIVE SUMMARY

Evaluation of EXIM's Environmentally Beneficial Goods and Services Mandate

August 2024

What OIG Found

EXIM's EEP transactions make up a small percentage of EXIM's overall portfolio—about 2.7 percent of all EXIM transactions during fiscal year (FY) 2021 through FY 2023, the period reviewed. For this period, EXIM authorized 146 EEP transactions, totaling approximately $1.3 billion. This evaluation found that, although EXIM made available $6.75 billion for renewable energy export authorizations in each fiscal year in accordance with its Environmentally Beneficial Goods and Services (EBGS) charter mandate, it was not able to authorize that amount in transactions.

The evaluation also considered expected environmental and economic impact of EXIM's EEP transactions only (not the impact of all EXIM transactions) using a dynamic global-economy model. The model estimated a net reduction in carbon dioxide (CO_2) emissions due to EEP transactions from FY 2021 through FY 2023. The model predicted a cumulative reduction in CO_2 of around 2.13 million tons globally from FY 2021 through FY 2023, a result indicative of a positive impact on the environment from EEP transactions. In addition, based on an emission intensity measure (e.g., different emission levels in different countries) EEP transactions were estimated to have effectively avoided about 600,000 tons of CO_2. Furthermore, these EEP transactions were predicted to have a measurable impact on the U.S. economy with the model estimating EEP transactions attributed to annual Gross Domestic Product (GDP) growth of $1.1 billion in 2021, $1.4 billion in 2022, and $3.5 billion in 2023. Simultaneously, the model predicted that EEP transactions generated approximately 50,000 direct and indirect jobs in the U.S. during these years.

Collectively, this evaluation estimated that EXIM's small EEP portfolio could result in positive contributions to the U.S. economy while benefiting the environment at-large. We also found that opportunities exist to improve outreach efforts to expand EXIM's EEP authorizations.

[1] As discussed in Appendix A, the environmental effects measured in this evaluation were CO_2 emissions and emission intensity.

CONTENTS

OBJECTIVE

On behalf of the Office of Inspector General (OIG), KPMG conducted this evaluation to:

1) Summarize and report on Export-Import Bank of the United States' (EXIM's) performance on the environmental effects of exported goods and services supported through its programs, using agency-provided data; and
2) Assess EXIM's performance, to include identifying any challenges or obstacles, in achieving its goal of five percent of the "applicable amount" being made available each fiscal year for financing renewable energy.

This evaluation focused specifically on transactions made through EXIM's Environmental Exports Program (EEP) and did not focus on EXIM's entire portfolio of transactions. See Appendix A for details on the scope, environmental effects and methodology of this evaluation.

BACKGROUND

EXIM was established in 1934 through an Executive Order and was made an independent agency through congressional charter in 1945. EXIM serves as the official export credit agency of the United States. EXIM's mission is to support U.S. exports by providing export financing in cases where the private sector is unable or unwilling to provide financing or where such support is necessary to level the playing field due to financing provided by foreign governments to their exporters that are in competition for export sales with U.S. exporters. EXIM's charter requires reasonable assurance of repayment for the transactions EXIM authorizes, and close monitoring of credit and other risks in its portfolio. In pursuit of its mission of supporting U.S. exports, EXIM offers four financial programs: direct loans,[1] loan guarantees,[2] working capital guarantees,[3] and export credit insurance.[4]

[1] EXIM offers fixed-rate loans directly to foreign buyers of U.S. goods and services. EXIM can extend to a company's foreign customer a fixed-rate loan generally covering up to 85 percent of the U.S. contract value. The fixed-interest rates for these loans are determined through the Arrangement on Guidelines for Officially Supported Export Credits negotiated among members of the Organization for Economic Co-operation and Development.

[2] EXIM loan guarantees cover the repayment risks on the foreign buyer's debts when purchasing U.S. exports. EXIM guarantees to a commercial lender that, in the event of a payment default by the borrower, it will pay to the lender the outstanding principal and interest on the loan. For medium- and long-term transactions, EXIM generally provides a 100 percent guarantee on a loan worth 85 percent of contract value, with a 15 percent down payment from the buyer.

[3] Under the working capital guarantee program, EXIM provides repayment guarantees to lenders on secured, short-term working capital loans made to qualified exporters. The working capital guarantee may be approved for a single loan or a revolving line of credit. EXIM generally provides a 90 percent loan-backing guarantee.

[4] EXIM's export credit insurance program supports U.S. exporters by insuring them against the risk of foreign buyer or other foreign debtor default for political or commercial reasons. This risk protection permits exporters to extend

The transactions authorized under these four programs are categorized as either long-, medium-, or short-term. Long-term transactions require extensive credit assessments, feasibility assessments, and environmental and social due diligence reviews performed by underwriters with subject-matter expertise before being considered for approval. The evaluations assess key transactional risks such as the borrower's industry, competitive position, operating performance, liquidity position, leverage, ability to service debt obligations, and other factors. Medium- and short-term transactions are largely approved under individual delegated authority granted by the Board of Directors to EXIM staff and commercial banks pursuant to prescribed credit standards and information requirements. In fiscal year (FY) 2023, EXIM approved $8.8 billion in total authorizations; of which $4.9 billion were long-term, $267.9 million were medium-term, and $3.6 billion were short term. EXIM's obligations carry the full faith and credit of the U.S. Government.

EXIM's Portfolio Is Concentrated in Carbon-Intensive Sectors

EXIM's portfolio remains–and has historically been–concentrated in carbon-intensive sectors that rely on the use of fossil fuels. In FY 2023, 56.4 percent ($19.34 billion) of EXIM's sectoral exposure was in the aircraft and oil and gas sectors. A further 8.2 percent ($2.8 billion) of exposure was related to power projects, many of which utilize fossil fuels as the primary source of power generation.[5] EXIM's exposure to carbon intensive sectors modestly declined over the past decade. In FY 2013, 59.7 percent ($68.1 billion) of EXIM's exposure was in the aircraft and oil and gas sectors and 6.5 percent ($7.4 billion) was related to power projects.[6] EXIM continues to fund transactions involving use of fossil fuels. For example, the agency approved a $500 million authorization in March 2024, to support oil and gas field development in the Kingdom of Bahrain.[7]

EXIM's support of transactions is guided by the agency's charter, as well as its *Environmental and Social Due Diligence Procedures and Guidelines*.[8] In general, EXIM's charter directs the agency to provide equal opportunities to all U.S. business. In addition, the charter specifically prohibits the agency from discriminating against any industry, sector, or business related to projects concerning the exploration, development, production, or export of energy sources and the generation or transmission of electrical power, or combined heat and power, regardless of the energy source involved. However, within the charter, exceptions do exist where EXIM is

credit to their international customers where it would otherwise not be possible. Insurance policies may apply to shipments to one or multiple buyers, insure comprehensive credit risks (including both commercial and political) or only political risks, offer either short-term or medium-term coverage, and are primarily U.S.-dollar transactions.

[5] See Export-Import Bank of the United States, *CREATING LOCALLY, EXPORTING GLOBALLY: Helping American Businesses Win the Future* (2023).

[6] See Export-Import Bank of the United States, *Annual Report* (2013).

[7] See Export-Import Bank of the United States, *Export-Import Bank of the U.S. Approves Energy Sector Transaction* (March 14, 2024).

[8] Export-Import Bank of the United States, *Environmental and Social Due Diligence Procedures and Guidelines* (June 27, 2013, revised December 12, 2013). These guidelines are established pursuant to EXIM Charter Section 11(a).

required to have procedures to "take into account the potential beneficial and adverse environmental effects" of projects being supported through its programs, and the Board may withhold financing from a project for environmental reasons.[9] Although EXIM has adopted procedures and guidelines on environmental due diligence, as required by the charter, the agency has not revised them in more than a decade. Furthermore, OIG notes that EXIM's European counterparts have increasingly adopted policies that generally limit their ability to fund transactions in the oil and gas sector in recent years.[10]

EXIM's Mandate for Environmentally Beneficial Goods and Services

Global Market for Environmental Goods and Services

The World Trade Organization (WTO) reported that trade in environmental goods and services (EGS) has seen a swift expansion by 243 percent during 2000 to 2020.[11] This trade represented 4.4 percent of global trade in 2020. From the equity market perspective, it is estimated that green revenues for listed companies are expected to exceed $5 trillion by 2025, nearly doubling since the conclusion of the Paris Agreement in 2015.[12] With respect to the U.S. market, it is estimated that EGS accounted for $725 billion in purchaser values in 2019, which translates to about 1.9 percent total U.S. gross output in that year.[13] WTO has suggested that a wide variety of EGS and trade policies that enhance access to these technologies in vulnerable countries can aid in climate change mitigation and adaptation.

EXIM's Environmental Goods and Services Mandate

Despite the industry nondiscrimination language, described above, EXIM's charter includes a congressional mandate for the encouragement of promoting exports that positively impact the environment or reduce potential negative environmental effects, referred to as the Environmentally Beneficial Goods and Services (EBGS) mandate. The charter also specifies that at least five percent of the "applicable amount" should be available each FY for financing exports of renewable energy, energy efficiency, and energy storage technology. EXIM's charter

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[9] Export-Import Bank of the United States, *Charter of the Export-Import Bank of the United States* (January 19, 2021).

[10] United Kingdom (UK) (2022) "Statement on International Public Support for the Clean Energy Transition." Retrieved from: webarchive.nationalarchives.gov.uk

[11] World Trade Organization (WTO) (2022) "Leveraging Trade in Environmental Goods and Services to Tackle Climate Change." *Policy Brief*, WTO, Geneva. Retrieved from: policy_brief_environmental_goods_e.pdf (wto.org)

[12] Dai, L.; L. Clements, E. Bourne, and J. Kooroshy (2023). "Investing in the Green Economy 2023 – Entering the Next Phase of Growth." Sustainable Growth. Retrieved from: Investing in the green economy 2023 - entering the next phase of growth (lseg.com)

[13] Fixler, D.; J.L. Hass, T. Highfill, K. Wentland, and S. Wentland (2024). "*Chapter 6: Accounting for Environmental Activity: Measuring Public Environmental Expenditures and the Environmental Goods and Services Sector in the U.S.*" Draft Prepared for the National Bureau of Economic Research (NBER) Conference on Research in Income and Wealth (CRIW) Volume on Measuring and Accounting for Environmental Public Goods: A National Accounts Perspective. Retrieved from: c14825.pdf (nber.org)

defines the applicable amount as a maximum of $135 billion in authorizations for each FY; therefore, EXIM is to make available $6.75 billion per FY for those exports.

EXIM created the Environmental Exports Program (EEP) to achieve the EBGS mandate. The EEP primarily focuses on the following traditional line of EXIM financial products to meet the mandate: long term loans and guarantees; medium-term insurance and guarantees; and short-term environmental export insurance programs.[14,15]

The working capital guarantee program provides small- and medium-sized businesses with access to funds and gives lenders confidence to extend loans to these companies for pre-export funding needs.

In order for exports to be considered EEP transactions they must provide either of the following:

1. Environmentally beneficial products or services for foreign environmental or renewable energy projects or facilities; or
2. The export of products and services specifically used or dedicated to aid in the prevention, abatement, control, or mitigation of air, water, and ground contamination or pollution, or which provide protection in the handling of toxic substances and wastes, subject to EXIM's determination.

EXIM's Engineering and Environment Division is responsible for determining eligibility of individual transactions based on its expertise related to the uses and purposes of the products in the transaction. For long-term projects, the EEP eligibility determination is made as part of the overall engineering due diligence review. An assigned engineer is responsible for providing a written eligibility determination in the Engineering Board memorandum. In the case of medium- and short-term transactions, determinations are handled by special coverage review tasks and documented within the EXIM Online or EXIM Loan Management System (ELMS). EXIM reviews its EEP transaction records at least twice a year to screen for incorrectly categorized transactions and corrects its records - if needed. A final check is done at the end of the FY before publishing the final EEP authorizations for the FY in EXIM's annual financial report.

EXIM's Global Business Development (GBD) office is responsible for EEP's outreach efforts, as well as EXIM's other export programs. Its four staff personnel are responsible for hosting webinars, seminars, and international business development missions for its primary targets of

[14] Long-term and medium-term loans guarantees include automatic local cost coverage equal to 40 to 50 percent, depending on the market, of the U.S. contract price; capitalization of interest during construction; and maximum allowable repayment terms permissible under the Organization for Economic Cooperation and Development guidelines and EXIM's Country Limitation Schedule.

[15] Short-term environmental export insurance program provides U.S. small business exporters with the ability to offer credit terms to foreign buyers for up to 180 days. It includes 95 percent commercial coverage and 95 percent political coverage with no deductible; advanced deposit of $500; and provisions for assignment of insured receivables.

American chambers of commerce, international trade organizations, and other international trading partners. Each GBD office employee is responsible for hosting approximately 50 to 70 of these events per year. One-on-one meetings are established once prospective exporters have inquired of EXIM and request additional information on any of its program.

EXIM CO_2 Emission Reporting

EXIM publicly reports information on the environmental impact and job creation associated with some of its transactions.[16] In its annual reporting and on its website, EXIM tracks and reports CO_2 emissions for certain greenhouse-gas emitting projects with an expected CO_2 production over 25,000 tons per year. EXIM reported two transactions that met this threshold, collectively estimated to generate a total of 2.99 million tons annually.[17] This amount of CO_2 equates to about 0.06 percent of U.S. emissions.[18] The specific information used by EXIM to calculate the actual expected environmental and economic impacts of its programs was not part of the scope of this evaluation. In addition, the agency's reporting did not document the environmental impact or job creation of all the EEP transactions.

Model Measurement of Environmental Impact of Exported Goods and Services

The scope of this evaluation was to calculate the environmental benefits of EXIM's EEP transactions, which are a subset of the total transactions authorized by EXIM. This evaluation did not assess the environmental benefits of EXIM's other transactions outside of EEP, which accounted for the majority (97.3 percent) of transactions between FY 2021 and FY 2023.[19] For evaluating the environmental, as well as economic, impacts of EXIM's EEP transactions, we used a dynamic multi-sector and multi-regional computable general equilibrium (CGE) model (also known as an economy-wide model). Specifically, we adapted a customized version of the Global Trade Analysis Project (GTAP) database and the model.[20]

GTAP is a global network of researchers and policy makers conducting quantitative analysis of international policy issues. This project allows users to customize a testing model using relevant

[16] EXIM's annual reports include the estimated yearly levels of CO_2 emissions associated with approved projects that met a certain threshold, and EXIM reports aggregate and transaction-level estimates for U.S. job creation from its transactions. EXIM also provides access to the environmental social impact assessment for all category A projects it considers and makes available category B environmental information that has been requested by stakeholders. The environmental social impact assessments specifically describe the complete range of potential adverse environmental effects associated with the projects.

[17] EXIM (2023) "Creating Locally, Exporting Globally: Helping American Business Win the Future 2023." EXIM Annual Report. Retrieved from: https://img.exim.gov/s3fs-public/reports/annual/2023/EXIM_AnnualReport'23_27032023_Final.pdf

[18] As reported by the U.S. Energy Information Administration, the U.S. energy-related CO_2 emissions were 4,807 million tonnes in 2023. Retrieved from: https://www.eia.gov/environment/emissions/carbon/.

[19] KPMG did not assess the EEP transactions against other compliance requirements within the EXIM charter, as those requirements were out of scope for the evaluation.

[20] Description of GTAP database and models are provided in Appendix A.

databases. We set up our model using the GTAP database. Once we established the model, we implemented various scenarios that could help provide insights into possible environmental and economic effects of EEP transactions, including looking at CO_2 emissions, emissions intensity, economic comparisons, and job creation. Of note, the evaluation looked at authorizations as a proxy for shipment value of exported goods and services to estimate potential impacts. The model provides projected, or estimated, results instead of actual results achieved through EEP transactions. For more information on the model and results, see Appendix A and Appendix B, respectively.

FINDINGS

Finding 1: Improvements Needed in Expanding the Adoption of EXIM's EEP from U.S. Exporters.

The evaluation found that although in accordance with the EXIM charter, $6.75 billion had been made available by EXIM for renewable energy export authorizations for each fiscal year in the scope period, EXIM was not able to authorize that amount in transactions. Furthermore, EXIM's total transactions for EEP represented a small percentage, about 2.7 percent, of EXIM's overall transactions. Specifically, from FY 2021 to FY 2023, EXIM authorized 146 EEP transactions, totaling approximately $1.3 billion and representing almost 6.5 percent of all EXIM authorizations for this period. Table 1 breaks out the type and number of EEP transactions and all EXIM transactions authorized from FY 2021 to FY 2023.

Table 1: EEP Authorizations and Number of Transactions during FY 2021 – FY 2023

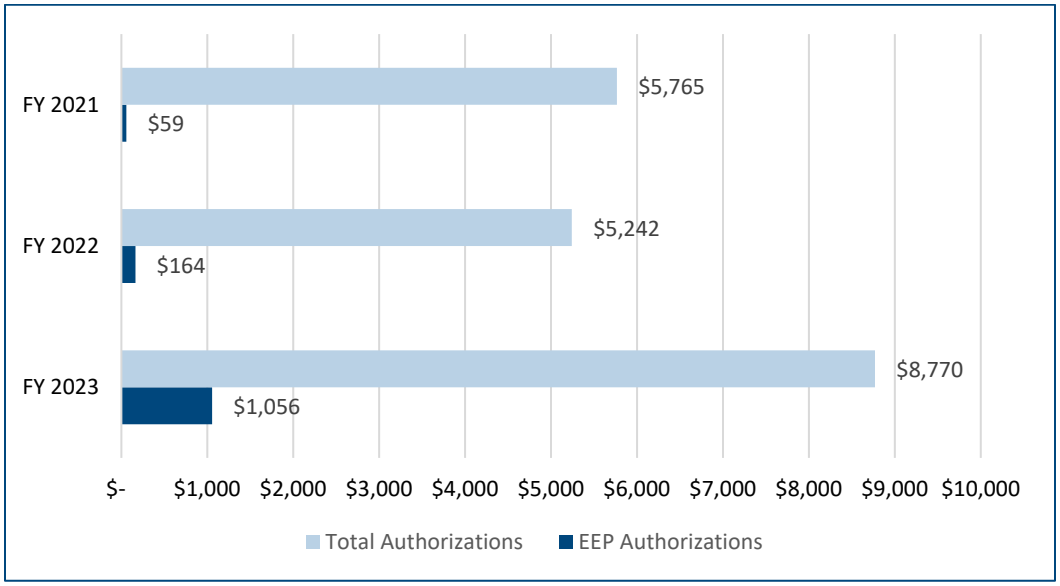
	EEP		Total EXIM Portfolio	
	Authorizations, in Millions	Number of Transactions	Authorizations, in Millions	Number of Transactions
Direct Loan	**$964.73**	**2**	**$1,546.50**	**6**
2021	$0.00	0	$69.80	1
2022	$0.00	0	$0.00	0
2023	$964.73	2	$1,476.70	5
Export Credit Insurance	**$114.58**	**108**	**$7,101.30**	**4,776**
2021	$42.77	67	$2,273.20	1,868
2022	$39.20	24	$2,342.40	1,589
2023	$32.61	17	$2,485.70	1,319
Loan Guarantee	**$106.42**	**13**	**$7,580.40**	**266**
2021	$15.73	3	$2,219.60	81
2022	$82.75	5	$1,740.90	84
2023	$7.94	5	$3,619.90	101
Working Capital Guarantee	**$92.65**	**23**	**$3,549.00**	**361**
2021	$0.00	0	$1,202.70	124
2022	$42.11	12	$1,158.70	126

	EEP		Total EXIM Portfolio	
	Authorizations, in Millions	Number of Transactions	Authorizations, in Millions	Number of Transactions
2023	$50.54	11	$1,187.60	111
Grand Total	**$1,278.38**	**146**	**$19,777.20**	**5,409**

Source: EXIM EEP transactions data and EXIM annual financial report.

Of note, for FY 2021 and FY 2022, EEP authorizations represented 1.0 and 3.1 percent of total EXIM authorizations, respectively, with a significant increase to 12.0 percent in FY 2023 due to two large direct loan program transactions—see Figure 1.

Figure 1: Total Authorizations and EEP Authorizations by FY, in millions



Source: EXIM EEP transactions data and EXIM annual financial report.

While we recognize that EXIM's charter notes that its activities are meant to supplement private lenders and not compete with private lenders, EXIM still has latitude to promote its programs.[21] According to EXIM's charter, it "shall encourage the use of its programs to support the export of goods and services that have beneficial effects on the environment or mitigate potential adverse environmental effects." [22] A primary way to encourage the use of its programs is through outreach. Interviews with EXIM management identified the following challenges and obstacles to conducting outreach activities to encourage the use of EEP programming:

1. EXIM's website states that it provides financing when private-sector lenders are unable or unwilling to do so. Accordingly, EXIM's ability to identify and authorize transactions that could qualify under the EEP are resultingly limited by the agency's statutory role.

[21] Charter of the Export-Import Bank of the United States (Updated January 19, 2021), Section 2(b)(1)(B).

[22] Charter of the Export-Import Bank of the United States (Updated January 19, 2021), Section 11(b)(1).

2. According to EXIM officials, potential EXIM EEP transactions are typically identified through their outreach efforts. EXIM's Global Business Development office is responsible for outreach efforts for long-term and medium-term transactions that can have more significant impact to reaching its goal. EXIM's Global Business Development office was only recently established in FY 2022 and has not filled all open positions. As a result, potential outreach efforts are limited to the four existing staff.

Without increased outreach efforts by EXIM to encourage and expand U.S. exporters' adoption of the EEP program, EXIM will continue to experience challenges in achieving total authorizations that match or exceed the $6.75 billion in funds made available to support environmentally beneficial goods and services.

Recommendations

Recommendation 1: EXIM's Office of Policy Analysis and International Relations should conduct a study with existing EEP exporters, to identify the key factors resulting in the decision to utilize EXIM for financing the EEP export. These key factors should then be assessed for potential inclusion into future outreach efforts with potential U.S. exporters to expand EEP transaction opportunities.

Recommendation 2: EXIM's Chief Banking Officer should establish periodic internal reporting of specific EEP outreach efforts by their office such that those efforts can be assessed for effectiveness in identifying and securing EEP authorizations. The reporting should include the type of outreach held, the attendees, and any follow up meetings resulting from the outreach.

Finding 2: Positive Environmental and Economic Impacts are Expected to Result from EXIM's EEP Transactions

The evaluation found that EXIM's EEP transactions represent a small percentage of EXIM's overall portfolio. This evaluation only looked at EEP transactions, and not EXIM's entire portfolio of transactions. Of note, the results from the model are projected or estimated results from the EEP transactions and are not actual results.[23] These projected results help provide insights into the effects of EEP transactions on the environment, the U.S. economy, and U.S. job creation. Specifically, the model used for this evaluation found the following for EXIM's EEP transactions:

- EXIM's EEP transactions from FY 2021 through FY 2023 were expected to reduce CO_2 emissions, an indicator of a positive impact on the environment.
- The model expected that the CO_2 emissions from U.S. produced exports would be, collectively, lower than if the products were made in the importing country, by comparing the emission intensity of different countries.
- The model estimated EXIM's EEP transactions have a positive effect on the U.S. economy. For example, the model projected that EEP transactions added $3.5 billion to the U.S. GDP in CY 2023.
- The model estimated that EXIM's EEP transactions contributed to job creation in the U.S. and expected that EEP transactions cumulatively contributed to creating more than 50,000 direct and indirect U.S. jobs from CY 2021 through CY 2023.

EEP Transactions Estimated to Reduce CO_2 Emissions

During the period reviewed, the overall EEP transactions facilitated by EXIM demonstrated an expected positive impact on the environment.[24] One of the key metrics to assess environmental impact is the reduction in carbon dioxide (CO_2) emissions. CO_2 is a major greenhouse gas that contributes to global warming and climate change.[25] Therefore, a reduction in CO_2 emissions is considered a positive environmental outcome. However, our estimate only reflects the environmental benefit of EEP transactions and does not consider the impact of EXIM's overall portfolio. As previously noted, EXIM reported two transactions in FY 2023 that resulted in approximately 2.99 million metric tons per year in CO_2 emissions, outstripping the estimated benefits presented below.

To assess the environmental benefits of EEP transactions, the model predicted anticipated CO_2 benefits using those transactions. As displayed in Figure 2, the EEP transactions contributed to a cumulative estimated increase in CO_2 emissions in the U.S. during calendar years (CY) 2021 and 2022, but there was a considerable estimated decrease in emissions of 382,000 tons of CO_2 in

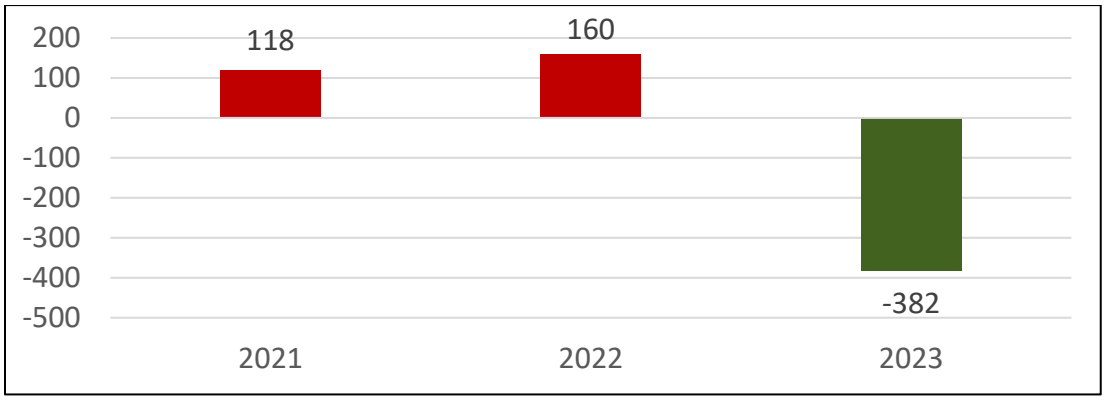
[23] For more information about the testing model used and associated assumptions, see Appendix A.

[24] See scenario 6 – combined EEP transactions, in Table A1 in Appendix A.

[25] Environmental Protection Agency (2024). "Overview of Greenhouse Gases" Retrieved from: https://www.epa.gov/ghgemissions/overview-greenhouse-gases

CY 2023.[26] The initial expected increase in CO_2 emissions in CY 2021 and CY 2022 is mainly attributable to an increase in emissions associated with the production and transportation of exportable goods that involve the use of fossil fuels. The predicted net reduction by CY 2023 is mainly attributable to EXIM's working capital transactions for the anticipated solar power generation in the U.S.

Figure 2: Estimated Impact of All EXIM EEP transactions on CO_2 Emissions in the U.S. (in thousand tons)



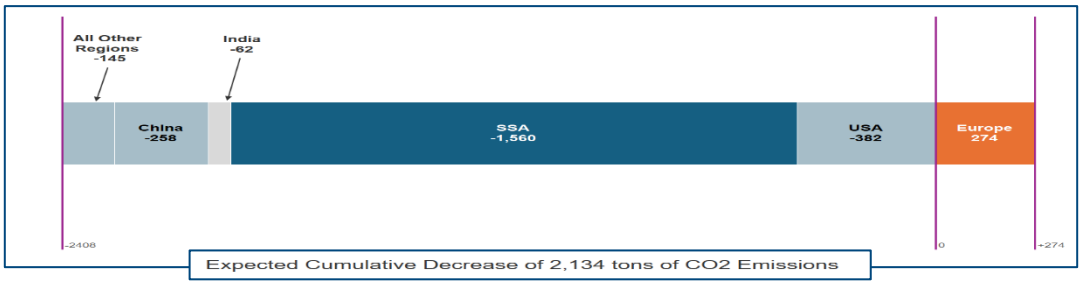
Source: Model simulations

When considering emission changes driven by EXIM's EEP transactions worldwide, the evidence of environmental benefit in the model became more pronounced. As presented in Figure 3, the model predicted a reduction in CO_2 by 2.13 million tons globally, with most of this predicted reduction attributed to a CO_2 reduction in the Sub-Saharan Africa (SSA) region (1.56 mt of CO_2). Once operational, EXIM's direct loan authorized for a future solar energy project in Angola is expected to be the single largest EEP transaction to contribute to the estimated reduction in the carbon footprint in aggregate. [27]

[26] Since the economic model data pertains to calendar year, the model predicted evaluation results refers to the corresponding calendar year (e.g., CY 2021, CY 2022, CY 2023). The evaluation results reported throughout this report pertain to calendar year.

[27] Note that the direct loan provided to Angola was authorized in FY 2023, but the solar farm has not yet been built. The model predicted emissions is an expected result based on when the solar farm is operational, and the power generated is used.

Figure 3: Estimated Impact of All EXIM EEP on Cumulative Change in Global CO_2 Emissions in CY 2023 (in thousand tons)



Source: Model simulations

EXIM's EEP impact extends beyond individual transactions, creating a positive ripple effect on a global scale. For example, while a solar panel manufactured in the U.S. increases the emissions in the U.S., it reduces the CO_2 emissions in the country it will be used for power generation, resulting in an overall decrease in emissions.[28]

EEP Emissions for U.S. Produced Exports Expected to be Lower Than Locally Produced Goods and Services

We utilized the emission intensity estimated by sector and region from the GTAP database and assessed the overall expected environmental impact attributable to EXIM's EEP transactions.[29]

In calculating the expected environmental effects of EXIM's EEP transactions, we conducted an analysis of emissions for goods and services made in the U.S. compared to those same goods and services being made in the importing country. This analysis showed that the total emissions for those goods and services being made in the U.S. would be 427,000 tons compared to 1,000,000 tons for those same goods and services being made in the importing country. As a result, U.S. production and exports through EXIM's EEP initiatives is expected to prevent more than 607,000 tons of CO_2 from being emitted, see Figure 5. This overall expected decrease can be attributed mainly to EXIM's EEP transactions under the export credit insurance and the loan guarantee programs. These results offer insights into understanding the interplay between trade, production, and emissions, which is crucial for sustainable development of an economy.

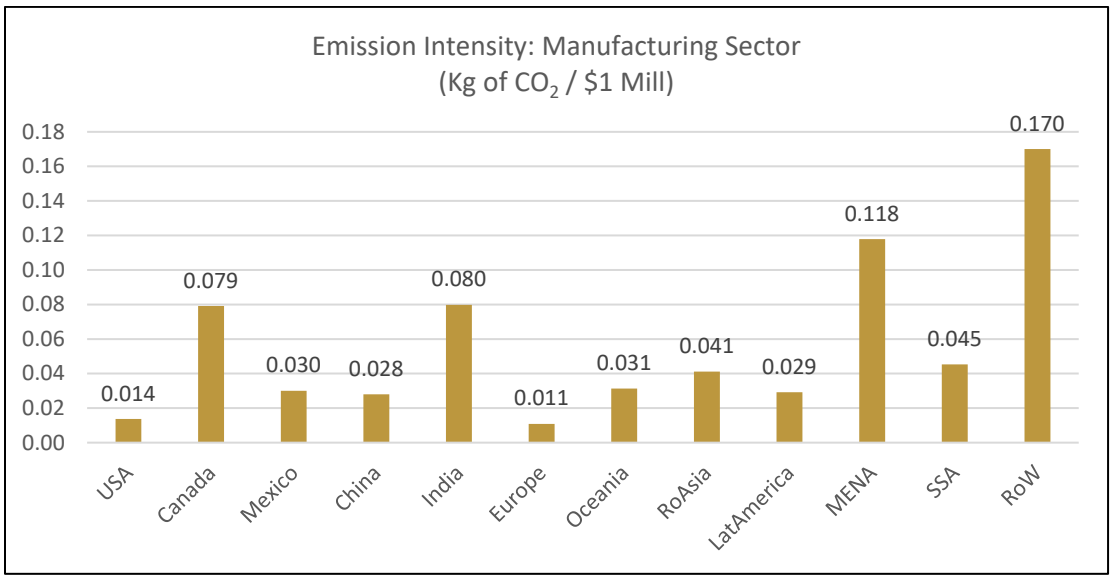
In addition, our analysis found that the emission intensity varies substantially across regions, with higher intensity in energy exporting regions as well as in developing regions relative to developed regions that have more efficient technologies and environmental regulations in place. For instance, emission intensity of the manufacturing sector across different regions as

[28] It is important note that the estimated CO_2 impact of all the EXIM's EEP transactions is on annual basis for this evaluation scope period. However, a project such as solar power system can have a life of 25-30 years. Estimating life-cycle assessment-based emissions from the production of the manufactured product through the disposal of the manufactured product is beyond the scope of this evaluation.

[29] For description of emission intensity see Appendix A.

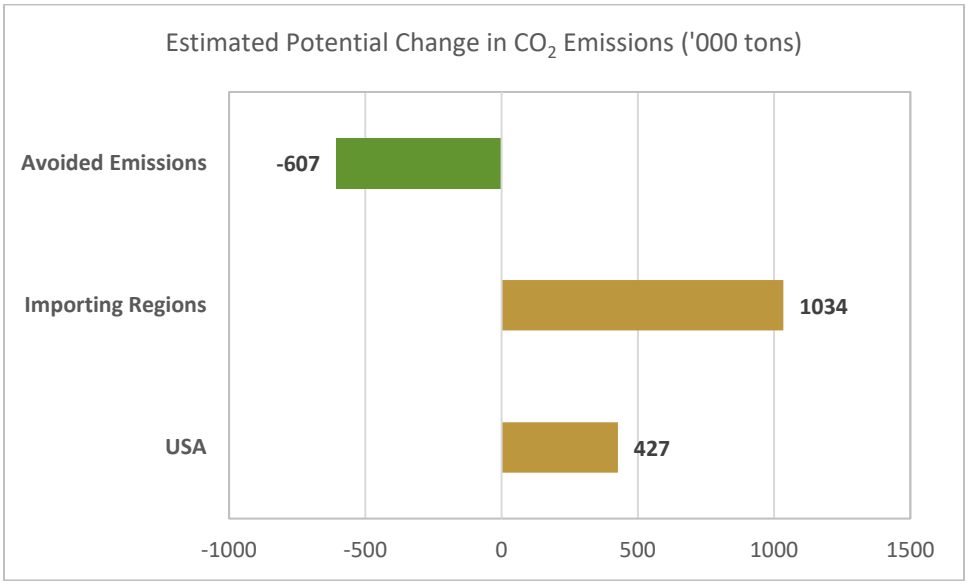
presented in Figure 4, shows that the emission intensity is lowest in Europe, followed by the U.S. The intensity is much higher in the Middle East and North Africa (MENA), and the Rest of the World (RoW) regions. We found similar variance in the emission intensity across different regions for other selected sectors (manufacturing, machinery, paper products, electric equipment, and transportation equipment)—see Table B11 in Appendix B for more information. Although not as low as Europe, the U.S. maintains a relatively efficient emission profile across most sectors.

Figure 4. Estimated Emission Intensity of Manufacturing Sector across Regions



Source: Emission Intensity calculated based on GTAP data.
Note: See Table B11 in Appendix B for more information about the emission intensity for the manufacturing sector as well as other industry sectors.

Figure 5. Estimated Cumulative Change in US CO_2 Emissions and Potential Avoided Emissions, in 2023



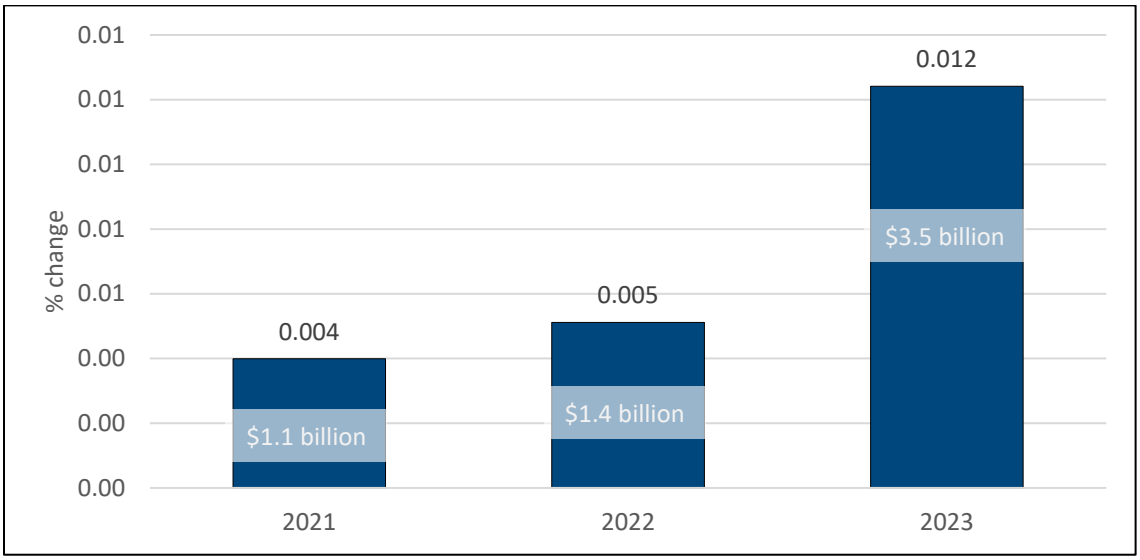
Source: Model simulations and Emission Intensity based calculations.

EEP Transactions Estimated to Positively Impact U.S. GDP

The model estimated EXIM's EEP transactions have positive repercussions on the U.S. economy. In the combined scenario accounting for all EEP transactions, the United States experienced annual increases in GDP by $1.1 billion, $1.4 billion, and $3.5 billion, in CY 2021, CY 2022, and CY 2023, respectively.[30] See Figure 6, below, for more information about the estimated total change to GDP from CY 2021 through CY 2023. The higher contribution to economic growth in CY 2023 is attributable to large working capital transactions such as manufacturing and exporting wastewater treatment equipment that occurred during the year.

[30] The model-predicted results in monetary terms that are reported in billions or millions in 2023 dollars. This is represented as $2023 billion or $2023 million in the tables.

Figure 6. Estimated Impact of All EXIM EEP transactions on U.S. GDP, by CY



Source: Model simulations

The GTAP model predicted that EXIM's EEP also contributed positively to the GDP expansion in other regions.[31] The model estimated that countries or regions with direct loans benefitted more than those countries or regions with the other three financial programs. EXIM's direct loans were estimated to be instrumental in stimulating economic growth in other regions. These direct loans facilitate expansion in critical sectors, such as renewable energy, thereby fostering economic progress in these regions.

In contrast to the argument that imports impeded a country's domestic production, this evaluation estimates that the regions importing goods and services under EXIM's EEP transactions did not experience any significant decline in their GDP, according to the model. This can be attributed to the nature of the imported goods, which were primarily intermediate inputs (e.g., the raw materials or parts provided to an entity in the importing country who used the parts to make and sell different finished products). The import of these "intermediate inputs" stimulated the economic activity in the importing regions. By providing the necessary resources for production, EXIM financed imports, from EEP transactions, enabled businesses to increase their output, thereby boosting the overall activity (and offsetting potentially negative impacts of increase in imports on their economies).

EEP Transactions Estimated to Contribute to Job Creation

Our model estimated that EXIM's EEP transactions contribute to job creation in the United States. Conceptually, when U.S. firms export their goods or services, they typically expand

[31] EXIM's financing through the EEP transactions was estimated to increase the GDP of other countries. For example, European GDP by $1.63 billion and $1.72 billion in CY 2022 and CY 2023, respectively, due to EEP transactions for the Netherlands and Romania. The results on GDP impact for all the model regions are provide in Table C5.1: in Appendix C.

production to meet foreign demand. This requires additional labor. As firms increase production for exports, they hire more workers. This positive relationship between output and employment is known as scale effect.[32] The hiring of additional workers to meet production needs leads to job creation. In addition, meeting the efficient resource allocation criterion, the model assumes the export receipts are invested back into the local economy on relatively productive sectors. This creates a ripple effect of job creation in other industries in the U.S.

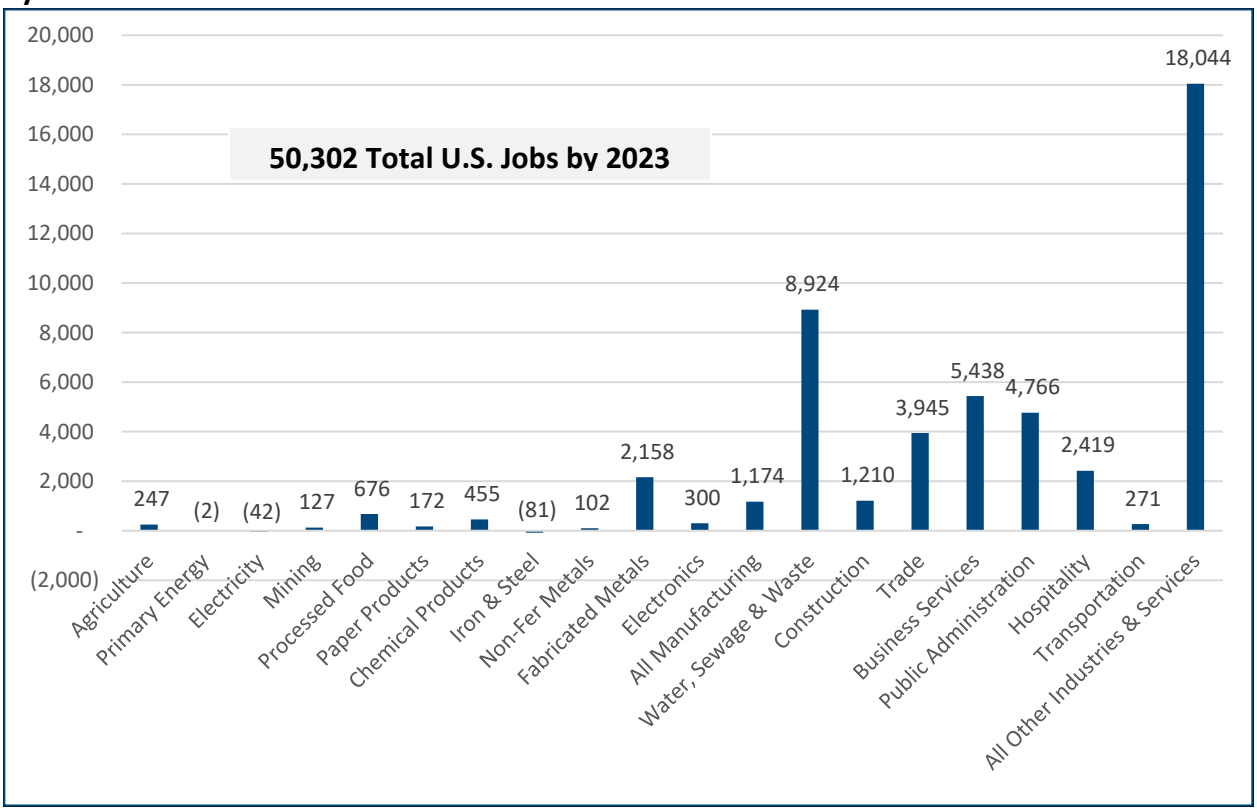
Based on the GTAP model outputs, EXIM's EEP transactions were predicted to contributed to creating approximately 11,000; 10,000; and 29,000 U.S. jobs in CYs 2021, 2022, and 2023, respectively. Therefore, EXIM's EEP is expected to have cumulatively contributed to creating more than 50,000 direct and indirect U.S. jobs from CY 2021 through CY 2023. These figures include all direct and indirect jobs created along the supply chain of the U.S. economy. Direct jobs are those in sectors involved in exporting goods or services and they are directly tied to the export activity itself. Indirect jobs are those in sectors along the exporter's supply chain (e.g., transportation and distribution, support services). In addition, higher household incomes resulting from the hiring of additional workers can boost local spending, leading to the indirect creation of additional jobs in consumer-oriented services sectors.

The detailed industry-level employment distribution, shown in Figure 7, illustrates that EXIM's EEP transactions are estimated to impact at least 12 industry and service sectors. Among the prominent sectors, the water, sewer, and waste sector had an estimated increase of 8,924 new jobs, the fabricated metals sector gained an estimated 2,158 new jobs, and all manufacturing sectors gained an estimated 1,174 new jobs. The other services sector gained the highest estimated number of jobs (18,000), along with 5,438 estimated jobs created in the businesses services sector, and 4,799 jobs in public administration. The trend of larger gains in services sector jobs may be attributable to factors such as the prominence of service sectors in the U.S. economy, supply chain dynamics, and the induced effects of consumer spending.

For more information about the testing model used and associated assumptions, see Appendix A, the EXIM EEP transactions data summarized in Appendix B, and additional analyses by each EEP transaction type is provided in Appendix C.

[32] One of the common simplified assumptions in the CGE models is zero-profit condition which ensures that firms neither make excessive profits nor incur losses, leading to efficient resource allocation. If firms are making zero profits, they are covering their costs, which includes the cost of labor. Therefore, firms will only hire workers if the value of their output exceeds the cost of worker wages (i.e., cost of labor). This can lead to job creation if the demand for goods and services increases, as firms will need to hire more workers to increase production.

Figure 7. Estimated Impact of all EXIM EEP Transactions on Distribution of U.S. Employment by Sectors in CY 2023



Source: Model simulations

RECOMMENDATIONS

OIG provided a draft of this report to EXIM management for their review and comment on the finding and recommendations. OIG issued the following recommendations to EXIM. The agency's complete response can be found in Appendix D.

Recommendation 1: EXIM's Office of Policy Analysis and International Relations should consider conducting a study with existing EEP exporters, to identify the key factors resulting in the decision to utilize EXIM for financing the EEP export. These key factors should then be assessed for potential inclusion into future outreach efforts with potential U.S. exporters to expand EEP transaction opportunities.

Management Response: In its August 23, 2024, response, EXIM concurred with this recommendation and stated that the Office of Global Business Development would have responsibility for addressing the recommendation instead of the Office of Policy Analysis and International Relations.

OIG Reply: OIG considers this recommendation resolved. The recommendation can be closed when OIG receives and accepts documentation that the Office of Global Business Development considered conducting a study with existing EEP exporters, to identify the key factors resulting in the decision to utilize EXIM for financing the EEP export.

Recommendation 2: EXIM's Chief Banking Officer should consider establishing periodic internal reporting of specific EEP outreach efforts by their office such that those efforts can be assessed for effectiveness in identifying and securing EEP authorizations. The reporting should include the type of outreach held, the attendees and any follow up meetings resulting from the outreach.

Management Response: In its August 23, 2024, response, EXIM concurred with this recommendation and stated that the Office of Global Business Development would have responsibility for addressing the recommendation instead of the Chief Banking Officer.

OIG Reply: OIG considers this recommendation resolved. The recommendation can be closed when OIG receives and accepts documentation that the Office of Global Business Development considered establishing periodic internal reporting of specific EEP outreach efforts by its office such that those efforts can be assessed for effectiveness in identifying and securing EEP authorizations.

APPENDIX A: OBJECTIVES, SCOPE, AND METHODOLOGY

This evaluation was conducted from September 25, 2023, to May 1, 2024 (the project duration), in accordance with the *Quality Standards for Inspection and Evaluation*, as issued in 2020 by the Council of the Inspectors General on Integrity and Efficiency. Those standards require that we plan and perform the evaluation to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on the evaluation objective. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions.

This report did not constitute an audit of financial statements or an attestation engagement as defined under Generally Accepted Government Auditing Standards or AICPA professional standards. We caution that projecting the results of our evaluation to future periods is subject to the risks of changes in conditions.

Objectives and Scope

On behalf of the Office of Inspector General (OIG), KPMG conducted this evaluation to:

1) Summarize and report on the Export-Import Bank of the United States' (EXIM's or agency) performance on the environmental effects of exported goods and services supported through its programs, using agency-provided data; and

2) Assess EXIM's performance, to include identifying any challenges or obstacles, in achieving its goal of five percent of the "applicable amount" being made available each FY for financing renewable energy.

The purpose of the economy-wide model used in this evaluation is to develop estimates of the aggregate environmental effects of exported goods and services supported through EXIM's programs (i.e., EEP), using EXIM-provided data. The scope of the evaluation was EXIM's financial products and procedures related to U.S. environmental companies and U.S. exported environmental goods and services. Specifically, this calculation entails an evaluation of the environmental effects of EXIM's EEP financial products and procedures from October 1, 2020 (FY 2021) through September 30, 2023 (FY 2023).

Methodology

We conducted portions of this engagement remotely and relied on audio- and video-conferencing tools to hold in-person interviews with EXIM personnel. KPMG also reviewed pertinent records provided by EXIM. KPMG used professional judgment and analyzed physical, documentary, and testimonial evidence to develop its findings, conclusions, and actionable recommendations. A summary of the procedures we performed is as follows:

- Reviewed the EEP policies and procedures document;
- Inquired about the prior audit history of the EEP, including internal/external audit reports and other relevant audit history, and validated the results of KPMG's inquiry;

- Reviewed applicable rules, regulations, and other guidance, as necessary;
- Assessed the EXIM's policies and procedures to develop and/or modify existing audit procedures;
- Reviewed EXIM EEP data files and annual reports as well as other records and documentation provided by EXIM;
- Selected samples of EEP transactions for testing eligibility and reviewed supporting documentation provided by EXIM; and
- Documented results of testing procedures.

We discussed the substance of this report and its findings and recommendations with offices, individuals, and organizations affected by the evaluation.

Economy-wide Model, Methodology and Assumptions

To evaluate the impact of exported goods and services, we adapted a dynamic multi-sector and multi-regional computable general equilibrium (CGE) also known as economy-wide modeling framework. The dynamic CGE model adapted for this evaluation is a customized version of the publicly available Global Trade Analysis Project (GTAP) suite of models and database. The economy-wide model includes firms, households, and government, and allows for interactions among different markets and sectors, providing a comprehensive framework for analyzing how changes in one part of an economy affects the other parts through various linkages including international trade. The extended version of these economy-wide models that allow for interaction of energy and environmental sectors have been valuable tools for evaluating impact of energy policies, environmental regulations, and climate change policies (e.g., Nijkamp et al., 2005[41]; Madden, 2020[42]).

This evaluation was conducted based on the CGE modelling framework, a comprehensive framework used in economics for analyzing the complex interactions in an economy and to evaluate the effects of change in economic policies or events in other regions. The overall methodology includes three steps: database configuration, model calibration, and scenario design and implementation. Each of these steps is explained in detail in the following section.

GTAP Database

The GTAP database is a widely used resource by the CGE modelers, which provides a comprehensive, multi-country, multi-sector data that encapsulates sectoral input-output and international trade connections. It incorporates policies impacting production, consumption, and trade. This unique, globally balanced database compiles data from various international sources such as UN Comtrade for merchandise trade, the World Bank for macroeconomic data,

[41] Nijkamp, P., Wang, S., & Kremers, H. (2005). Modeling the Impacts of International Climate Change Policies in a CGE Context: The Use of the GTAP-E Model. *Economic Modelling, 22*, 955-974.

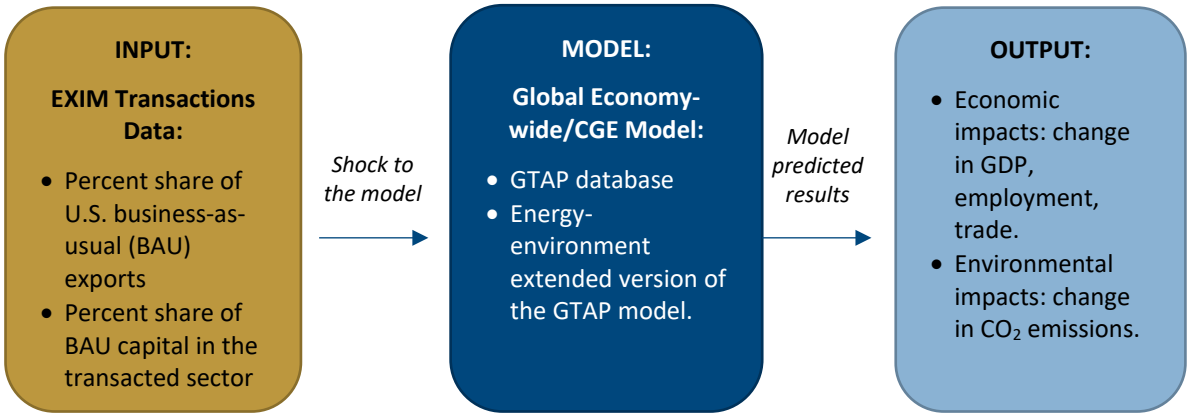
[42] Madden JR. (2020). Evidence-Based Analysis of Issues in Environment, Energy, and Disaster Risks with CGE Models: An Introduction to Part I. *Environmental Economics and Computable General Equilibrium Analysis*, 41:3–12. doi: 10.1007/978-981-15-3970-1_1.

International Trade Commission for tariff data, and the International Monetary Fund for services trade. It also includes data from numerous national and international agencies that publish input-output (I-O) tables for component countries. The dataset includes producer and consumer behavioral elasticity parameters, some of which are estimated econometrically, while others are calibrated to align entity behavior with economic theories.

The GTAP database is fully documented, publicly available, regularly updated, and peer-reviewed by the GTAP consortium members which includes international agencies such as the World Bank, World Trade Organization, and government agencies such as U.S. Environmental Protection Agency, U.S. International Trade Commission, and U.S. Department of Agriculture.

A high-level schematic flow of evaluation approach is presented in Figure A1. The evaluation is modeled in three steps: database configuration, model development, and scenario design and implementation. In summary, we configured the GTAP database into 12 regions and 42 sectors with specific power-generating technologies reflecting the sectors and regions of EXIM's EEP transactions. This database was used in the extended version of the GTAP model, which was calibrated for detailed energy-environmental interactions for this analysis. EXIM's EEP transactions, as outlined in Appendix B, were assessed through a counterfactual scenario compared to a baseline scenario. The baseline scenario represents what would likely occur under normal circumstances that do not include EXIM's EEP exports, while the counterfactual scenarios consider the impact of EXIM's EEP transactions. The differences between the baseline and counterfactual scenarios in our analysis represents the predicted changes in the economy and CO_2 emissions that were attributable to EXIM's EEP transactions, thereby determining the impact of these transactions.

Figure A1: Schematic Flow of EXIM's EEP Evaluation Model



Source: KPMG's approach to EXIM's EEP evaluation.

Database configuration

We used the latest (2017) available GTAP database (Aguiar et al. 2023[43]), the core data of global CGE models. This database consists of 75 sectors and 160 regions, five different labor categories based on skills by industry, by region. An extended version of the GTAP database called GTAP-Power Database (Chepeliev, 2020[44]) provides electricity-detailed disaggregation into transmission & distribution, nuclear, coal, gas, oil, hydroelectric, wind, solar, and other power generating technologies. This comprehensive database offers valuable information on energy use and emission intensities across sectors and regions, which is essential to evaluate the impact of EXIM's EEP transactions.

Under ideal circumstances, simulations would run on the fully disaggregated data with 160 regions and 75 sectors, this is not computationally practical due to the resource-intensive processes needed for such large simulations. To manage resource constraints, we performed the commonly accepted practice of developing a custom aggregation specific to the fact pattern. Considering EXIM EEP transactions across sectors and export regions, we customized the aggregation to include 12 global regions (Table B9 in Appendix B) and 42 sectors (Table B10 in Appendix B). In addition to the GTAP data, we used employment data from the International Labor Organization (ILO), which provides employment by sector across all countries. These data, which include number of employees by sector, is incorporated into the aggregated GTAP database.

Economy-wide model

An economy-wide model is the model that makes predictions about the economy. Typically, an economy-wide model uses an accounting framework that separates the overall economy of a country or region into a smaller number of sectors or agents, each of which interacts with other sectors or agents to simulate the activity of a market for goods and services or factors of production (Hertel et al., 1997[45]).

Computable general equilibrium ("CGE") model

A type of economy-wide model, a CGE model is a mathematical representation of an economy that preserves theoretical economic relationships between supply and demand across many markets. Demand for a good depends upon prices of other goods and income. Income depends upon wages, profits, and rents, which depend upon supply, technology, and production. Finally, production depends upon demand, leading to a circular model of the economy. The model

[43] Aguiar, A., Chepeliev, M., Corong, E. & van der Mensbrugghe, D. (2023). The GTAP Data Base: Version 11. *Journal of Global Economic Analysis* 7(2). Retrieved from https://doi.org/10.21642/JGEA.070201AF

[44] Chepeliev, M. (2020). "GTAP-Power 10 Data Base: A Technical Note. GTAP Research Memorandum No. 31, Center for Global Trade Analysis, Purdue University, West Lafayette, IN. Retrieved from: https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=5938

[45] Hertel, T.W. (1997 Ed.) *Global Trade Analysis: Modeling and Applications*. Cambridge University Press, New York, NY.

solves for prices at which production equals demand in every market. The CGE models are widely used for trade and trade policy analysis, as it creates a consistent framework for analyzing exports and imports across all other countries (Burfisher, 2021[46]).

Use of a CGE model for Analysis of Environmental Effects

CGE modeling frameworks are used widely in environmental policy and natural resource allocation analyses. Because CGE models can capture the effects of changes in production and consumption of goods and services across multiple markets, this class of model is often employed in the evaluation of economic benefits, costs, and economic impacts across multiple sectors while remaining consistent with assumed levels of government spending and taxes. The models also impose constraints on the possible activities of households and firms, and therefore must produce a set of outcomes that are intended to mimic real-world constraints. These elements together enable the model to produce an internally consistent output that allows researchers to consider the possible costs and benefits of policies. CGE models are based on the input-output models but assign a more important role to prices and recognize resource constraints and behavioral responses. By simulating different economic scenarios over time, policymakers can anticipate future opportunities and challenges to promote sustainable economic growth.

The CGE model also permits a set of environmental overlays, such as factors that relate measures of greenhouse gas emissions including carbon dioxide with underlying economic activity. Energy consumption is a fundamental input in nearly all economic activities. The CGE model maintains this relationship by accounting for energy use across different sectors. The model assigns amount of CO_2 emissions based on the underlying output by industry. In other words, it considers the emission intensity of various economic sectors. CGE models have been popular models across government agencies to evaluate effects of trade, energy, and environmental policies. For example, Bergman et al. (2005)[47], Wing (2009)[48], and Marten et al. (2018[49]), have well documented the application of CGE models to assess impact of environmental regulations, climate policies, abatement technologies, and regulatory designs. These studies collectively contribute to our understanding of how CGE models can be applied to assess the economic and environmental impacts of policies, providing valuable insights for policymakers and researchers.

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[46] Burfisher M.E. (2021) Introduction to Computable General Equilibrium Models. 3rd ed. Cambridge University Press

[47]Bergman, L. (2005). Chapter 24 CGE Modeling of Environmental Policy and Resource Management, Editor(s): K-G. Mäler, & J.R. Vincent, Handbook of Environmental Economics, Elsevier, 3:1273-1306.

[48] Wing, I. S. (2009). Computable General Equilibrium Models for the Analysis of Energy and Climate Policies. International handbook on the economics of energy, 332-366.

[49] Marten, A.L. and Garbaccio, R. (2018). An Applied General Equilibrium Model for the Analysis of Environmental Policy: SAGE v1.0 Technical Documentation. Working Paper 2018-05. National Center for Environmental Economics (NCEE), U.S. Environmental Protection Agency, Retrieved from: https://www.epa.gov/sites/default/files/2018-10/documents/2018-05.pdf

The CGE Model Calibration

The CGE model adapted in this evaluation is called GTAP-EP-RD (Corong, 2020),[50] based on how it has evolved from a standard comparative static GTAP model (Hertel, 1997 Ed.; Corong et al., 2017),[51] an extension of energy and environment (GTAP-E: Burniaux and Truong, 2002),[52] an extension of power-generation technologies (GTAP-E-Power: Peters, 2016),[53] and a recursive-dynamic model (GTAP-RD: Aguiar et al., 2019)[54] enabling it to capture and analyze changes over time. The model is calibrated to the configured database of 42 sectors and 12 regions, providing granular energy-environmental interactions and allows for short-term to long-term analysis where the agents based their decisions on adaptive expectations (what will happen in the future depends on what happened in the past). We assume that labor and capital is perfectly mobile across industries.

This extensive configuration enables the model to deliver detailed insights into energy-environmental interactions, a crucial aspect of contemporary global trade analysis. The GTAP-Energy and Power Recursive Dynamic model supports both short, medium, and long-term analysis, making it a versatile tool for various studies. The recursive dynamic model operates based on the principle of adaptive expectations, meaning that it uses past events to inform future decisions. This approach allows for more informed and accurate predictions and analyses. The energy and environmentally extended dynamic GTAP model make it a valuable tool for rigorous policy analyses related to energy and the environment.

Some of the key features of the model are highlighted below:

- All sectors of the economy are accounted for.
- All global regions are modeled, with the level of aggregation chosen by the user.
- The model assumes perfect competition in all markets with price adjustments to ensure that all markets clear simultaneously.
- A regional household collects all the factor income in its region and spends it over two expenditure types: private household (consumer) and savings, over a Cobb-Douglas

[50] Corong, E. (2020). "The GTAP-Energy and Power Recursive Dynamic (GTAP-EP-RD) model code". Center for Global Trade Analysis (GTAP), Purdue University.

[51] Corong, E.L., T.W. Hertel, R. McDougall, M.E. Tsigas, & van der Mensbrugghe, D. (2017). "The Standard GTAP Model, Version 7." The Standard GTAP Model, Version 7. *Journal of Global Economic Analysis*, *2*(1), 1–119. Retrieved from: https://doi.org/10.21642/JGEA.020101AF

[52] Burniaux, J. and Truong, T. (2002). "GTAP-E: An Energy-Environmental Version of GTAP Model." GTAP Technical Paper No. 16, Center for Global Trade Analysis, Purdue University, West Lafayette, IN. Retrieved from: https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=923

[53] Peters, J.C. (2016), "The GTAP-E-Power: An Electricity-detailed Economy-wide Model." *Journal of Global Economic Analysis,* 1(2):156-187.

[54] Aguiar, A., E. Corong, & D. van der Mensbrugghe (2019). "The GTAP Recursive Dynamic (GTAP-RD) Model: Version 1.0." Retrieved from: https://www.gtap.agecon.purdue.edu/resources/download/9871.pdf

utility function. There are ten different types of private households representing income and race, not just one representative household.

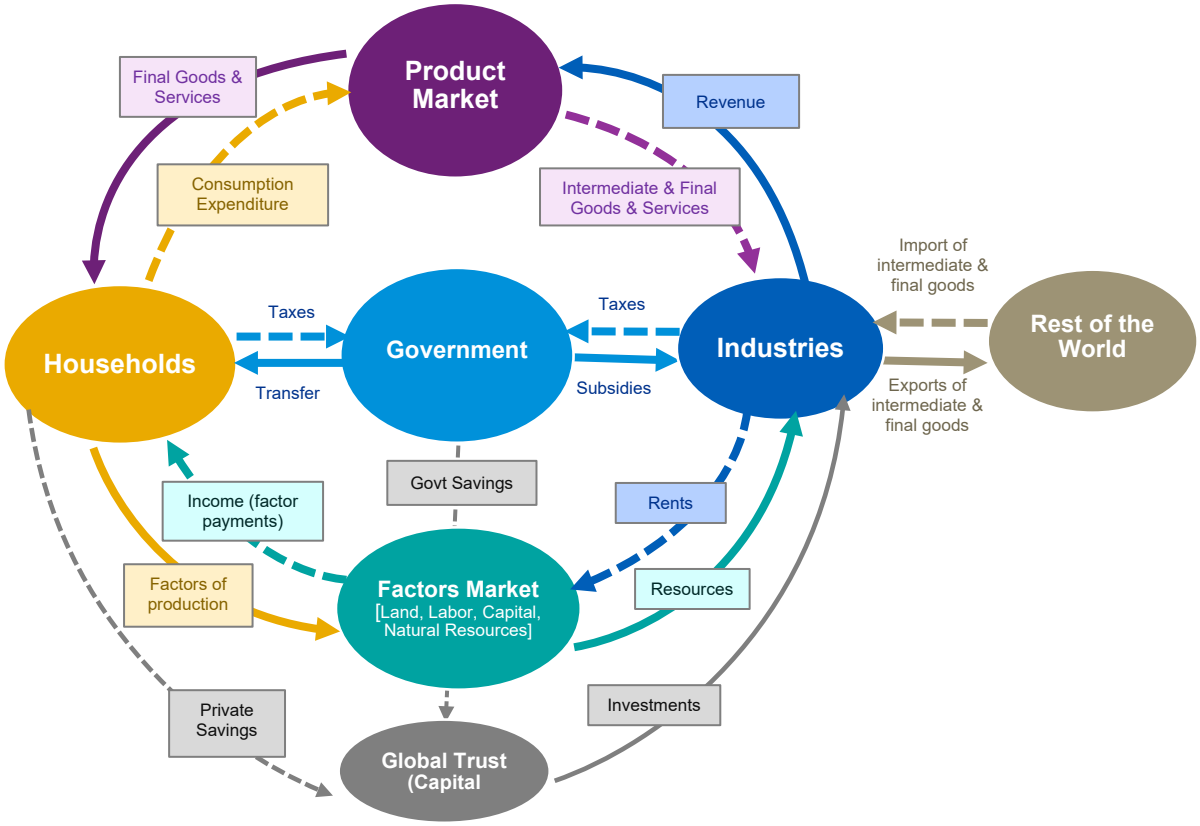
- Government receives all the taxes and spends on subsidies and expenditure on goods and services, while saving (or dissaving) some of its income.
- A representative firm maximizes profits in nested constant elasticity of substitution (CES) functions in a perfectly competitive market for each industry/sector in each region and pays income to the regional household for utilizing the endowment commodities (i.e., land, labor, capital, and natural resources).
- Bilateral trade as well as transport margins are computed across all commodities and regions.
- In an open economy, firms also export the tradable commodities and import the intermediate inputs from the rest of the world.
- The model follows the Armington assumptions[55](Armington, 1964)[56] to account for product heterogeneity for outputs produced in different regions. This means there is imperfect substitution between domestic and imported goods.
- All money must be spent, all spending must be earned, and subsidies must be covered by taxes or borrowing.
- Market clearing is assumed – this means, total value of output is equal to a total value of domestic consumption and exports.
- Firms, private households, and the government have different demands for imports.
- Imports must equal exports, by commodity and trade route.
- Global saving is equal to global investment.
- Employment is computed by sector, and by region.
- The energy-environmental extension explicitly models energy substitution, allowing for better understanding of the interactions between energy, economy, and the environment.
- The power sector extension accounts for various electricity generation technologies, allowing for a more nuanced understanding of the sector.

In Figure A2, we illustrate the circular flow of income and expenditure in the GTAP CGE model, which captures the complex interactions between different sectors and agents in the economy.

[55] The Armington Assumption, named after economist Paul Armington, is an economic theory used in models of international trade, which is based on the premise that products traded international are differentiated by their country of origin.

[56]Armington, Paul S. (1969). "A Theory of Demand for Products Distinguished by Place of Production". Staff Papers - International Monetary Fund. 16 (1): 159. doi:10.2307/3866403.

Figure A2: Circular Flow of Income and Expenditure in the GTAP CGE Model



Source: Adapted from Hertel et al. (2010)[57] and Brockmeier (2001)[58].

Producer Firms: Firms use inputs from the factor markets (land, labor, capital, natural resources) and intermediate goods to produce goods and services. These outputs are sold in domestic and international markets. The revenue generated is used to pay for the inputs and the remaining is distributed as profits.

Households: Households supply labor and capital to the factor markets and receive wages, rents, and profits in return. They use this income to purchase goods and services from the domestic and international markets.

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[57] Hertel, T. W., Tyner, W., & Birur, D. (2010). The global impacts of biofuel mandates. *The Energy Journal*, 31(1), 75–100. doi:10.5547/ISSN0195-6574-EJ-Vol31-No1-4

[58] Brockmeier, M. (2001). "A Graphical Exposition of the GTAP Model," *GTAP Technical Paper No. 8*, Center for Global Trade Analysis, Purdue University, West Lafayette, IN, USA. Retrieved from: at: https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=311

Government: The government collects taxes from households and firms and uses this revenue to provide public goods and services. It also redistributes income to households through transfers and social benefits.

Factor Markets: Land, labor, capital, and natural resources are traded in factor markets. Households supply these factors to firms in exchange for wages, rents, and profits.

International Markets: Countries trade goods and services with each other. Exports generate revenue, while imports require expenditure. The balance of trade (exports minus imports) contributes to a country's income.

Energy and Environmental Extension: The energy and environmental extension of the CGE model incorporates energy volumes and carbon emissions. The carbon emissions are directly computed based on the combustion of fossil fuels with specific carbon emissions factors which represent the amount of CO_2 emitted per unit of energy produced when the fuel is burned. The CO_2 emissions from each sector in an economy are calculated based on the volume of fossil fuels used by the sector and the corresponding emission factor. The sum of these sectoral emissions gives the total CO_2 emissions for the economy.

Scenario Design and Implementation

The economic and environmental implications of EXIM's EEP transactions (Tables B1 through B8, in Appendix B) are evaluated by comparing them to a baseline scenario. This baseline, also known as the business-as-usual (BAU) scenario, serves as a standard for comparison. It represents what would likely occur from 2017 to 2035 under normal circumstances, as predicted by macroeconomic forecasts (for more detailed information, please refer to Table A1). It is important to note that the BAU scenario does not consider any EXIM transactions. The impact of these transactions is evaluated by comparing the baseline with counterfactual scenarios. The counterfactual scenarios are alternative scenarios that consider the impact of EXIM's EEP transactions. As displayed in Table A1, the scenarios 2 through 6 represent the counterfactual scenarios. By comparing these counterfactual scenarios to the baseline, we assess the difference in economic and environmental outcomes.

Table A1: Description of Baseline and Scenarios.

No.	Scenario:	Description	Details
1.	**Baseline or BAU**	• The "baseline" analysis is a standard forecast of a **business-as-usual** (BAU) growth path for the US and other global regions for the period 2018-2035. • This BAU scenario does not assume any transactions of EXIM.	• Macro forecasts rely upon for Population, Labor force, & GDP were based on Shared Socioeconomic Pathway (SSP-2) "Middle of the Road" – intermediate challenges pathway (Oliver et al., 2017[59]; Samir and Lutz, 2017[60]). • Energy price forecasts on coal, oil, natural gas, and electricity are sourced from the International Energy Agency (IEA).
2.	**Scenario:** **Export Credit Insurance (ECI)**	• The ECI simulation represents EXIM transactions under ECI program from 2021 through 2023.	• The ECI lending by product categories & countries are mapped to GTAP sectors and regions. • Scenario shocks are calculated as incremental exports based on ECI exports to the baseline US exports. • The ECI export equivalent amount of increase in output (production) in the US.
3.	**Scenario:** **Direct Loan Program (DLP)**	• The DLP simulation represents EXIM transactions under DLP program in 2023.	• The DLP transactions in 2023 were mapped to the corresponding two regions and sectors. • The DLP amount equivalent increase in capital in the funded sectors were shocked in the corresponding regions.
4.	**Scenario:** **Working Capital Guarantee (WCG)**	• The WCG simulation represents EXIM transactions under WCGP program 2022 & 2023.	• The WCG transaction amount is calculated as capital investment in the corresponding sector in the US.

[59] Oliver F., et al. (2017). "The marker quantification of the Shared Socioeconomic Pathway 2: A middle-of-the-road scenario for the 21st century." *Global Environmental Change*, 42: 251-267, DOI:10.1016/j.gloenvcha.2016.06.004

[60] Samir, K.C. and W. Lutz. 2017. "The human core of the shared socioeconomic pathways: Population scenarios by age, sex and level of education for all countries to 2100." Global Environmental Change 42: 181-192.

No.	Scenario:	Description	Details
5.	**Scenario:** **Loan Guarantee Program (LGP)**	• The LGP simulation represents EXIM transactions under LGP program in 2021, 2022, 2023.	• The shipment volume data from LGP transactions is used to calculate the incremental US exports relative to baseline. • The LGP export equivalent increase in output in the US.
6.	**Scenario:** **Combined EEP transactions**[61]	• Combines all the four instruments listed above.	• The shipment data from ECI & LGP instruments are combined. • The working capital and direct loan lending are combined by region.

Emission Intensity:

More than 82 percent of EXIM's EEP transaction data involved goods and services made in the U.S. and exported to other region or countries. The country in which a good or service is produced has a direct impact on CO_2 emissions since countries have different emissions rates. As such, a product made in the United States may result in a lower emission rate than if a product was made somewhere else with a higher CO_2 emission rate. This difference is referred to as emission intensity. Emission intensity is an important metric for understanding the environmental impact of various sectors and regions, as different industries exhibit varying levels of emission intensity depending on their reliance on fossil fuels and energy-intensive production processes. In 2024, the Congressional Budget Office (CBO) reported that variations in sectoral emissions intensity can either increase or decrease the overall emissions; depending on the energy mix and technology, the emission intensity can significantly vary across the sectors and countries.[62]

Limitations of CGE modeling

In order to operate, CGE models typically require large databases consisting of detailed historical tables that capture spending and purchasing relationships between producers and consumers in a region. In addition, CGE models offer only a generalization of reality and may not capture important factors that govern the actual behavior of consumers and producers.

Despite these limitations, we believe the CGE model is suitable for the scope of this evaluation, which seeks to estimate the aggregate environmental effects of the environmentally beneficial goods and services supported by EXIM's activities.

[61] Scenario 6 marked to indicate that it represents a combination of all four instruments: ECI, DLP, WCGP, and LGP.

[62] Congressional Budget Office (2024). "*Emissions of Greenhouse Gases in the Manufacturing Sector*." Congressional Budget Office, Non-partisan Analysis for the U.S. Congress. Retrieved from: www.cbo.gov/publication/59695

Software Used

This evaluation was conducted using GEMPACK software for data base and model development (Horridge, et al., 2018)[63] and the simulations were conducted using RunDynam, a Windows interface specially developed by Horridge (2012)[64], for carrying out forecasts and policy deviations with recursive dynamic models.

Findings and Conclusion

We completed the objectives for the evaluation and identified two findings and two recommendations, as presented in the Findings section of the report, that have been reported to EXIM management.

[63] Horridge J.M., Jerie M., Mustakinov D. & Schiffmann F. (2018), *GEMPACK manual*, GEMPACK Software, ISBN 978-1-921654-34-3. Retrieved from: GEMPACK User Manual (copsmodels.com)

[64] Horridge, J.M. (2012). RunDynam Software. Available from Centre of Policy Studies (CoPS), Victoria University, Melbourne, Australia.

APPENDIX B: DATA TABLES

The EXIM's transactions under EEP are summarized in the tables below. These tables are summarized by mapping the transactions to respective industry sector and the country to the corresponding geographic region, used in the model.

Table B1: Summary of EXIM's EEP Authorization Value by FY

Instrument	Authorization, USD in Millions	Percent of Authorization Amount	Number of Transactions
Direct Loan	**$964.73**	**76.33%**	**2**
2023	$964.73	76.33%	2
Export Credit Insurance	**$114.58**	**9.07%**	**107**
2021	$42.77	3.38%	67
2022	$39.20	3.10%	24
2023	$32.61	2.58%	17
Loan Guarantee	**$106.42**	**8.42%**	**13**
2021	$15.73	1.24%	3
2022	$82.75	6.55%	5
2023	$7.94	0.63%	5
Working Capital Guarantee	**$92.65**	**7.33%**	**23**
2022	$42.11	3.33%	12
2023	$50.54	4.00%	11
Grand Total	**$1,278.38**	**100.00%**	**146**

Source: EXIM EEP Transactions

Table B2: Summary of EXIM's EEP Shipment Value by FY

Instrument	Shipment Value, USD in Millions	Percent of Shipment Amount	Number of Transactions
Direct Loan	**$439.21**	**45.66%**	**2**
2023	$439.21	45.66%	2
Export Credit Insurance	**$211.36**	**21.98%**	**107**
2021	$63.83	6.64%	53
2022	$85.81	8.92%	32
2023	$61.72	6.42%	22
Working Capital Guarantee	**$206.07**	**21.42%**	**23**
2022	$37.61	3.91%	12
2023	$168.46	17.51%	11
Loan Guarantee	**$105.18**	**10.94%**	**13**
2021	$4.25	0.44%	1
2022	$71.23	7.41%	7
2023	$29.70	3.09%	5
Grand Total	**$961.82**	**100.00%**	**145**

Source: EXIM EEP Transactions

Table B3: Export Credit Insurance: Summary of Shipment Amount by Sector and Region, USD in millions by FY

Sector and Region	2021	2022	2023	Total	Percentage of Total
Manufacturing	**$44.63**	**$50.83**	**$33.46**	**$128.93**	**61.00%**
Asia	$24.77	$19.98	$10.79	$55.54	**26.28%**
Europe	$7.68	$14.30	$7.61	$29.60	**14.00%**
Latin America/Caribbean	$3.55	$6.24	$5.79	$15.58	**7.37%**
North America	$3.23	$5.25	$4.08	$12.56	**5.94%**
Middle East and North Africa	$1.19	$3.13	$1.43	$5.76	**2.72%**
Other	$1.65	$0.73	$2.28	$4.65	**2.20%**
Oceania	$2.13	$0.74	$1.06	$3.94	**1.86%**
Sub-Saharan Africa	$0.42	$0.46	$0.42	$1.30	**0.62%**
Mining, Quarrying, and Oil and Gas Extraction	**$8.83**	**$14.84**	**$9.97**	**$33.63**	**15.91%**
North America	$3.63	$6.96	$3.91	$14.51	**6.86%**
Europe	$2.89	$3.90	$2.26	$9.05	**4.28%**
Asia	$1.60	$2.33	$1.84	$5.77	**2.73%**
Latin America/Caribbean	$0.56	$0.95	$1.19	$2.70	**1.28%**
Middle East and North Africa	$0.09	$0.54	$0.75	$1.38	**0.65%**
Oceania	$0.05	$0.16	$0.02	$0.22	**0.10%**
Other	$0.00	$0.00	$0.00	$0.00	**0.00%**
Wholesale Trade	**$4.16**	**$10.95**	**$11.98**	**$27.09**	**12.82%**
Asia	$2.12	$3.86	$4.91	$10.89	**5.15%**
Latin America/Caribbean	$1.62	$2.92	$2.97	$7.51	**3.55%**
Europe	$0.26	$2.97	$3.97	$7.21	**3.41%**
Other	$0.08	$0.78	$0.00	$0.85	**0.40%**
North America	$0.07	$0.30	$0.08	$0.45	**0.21%**
Middle East and North Africa	$0.02	$0.10	$0.01	$0.12	**0.06%**
Oceania		$0.03	$0.03	$0.06	**0.03%**
Agriculture, Forestry, Fishing and Hunting	**$1.51**	**$5.42**	**$5.58**	**$12.52**	**5.92%**
Oceania	$1.02	$4.19	$4.52	$9.73	**4.60%**
North America	$0.49	$1.21	$1.05	$2.75	**1.30%**
Latin America/Caribbean		$0.02	$0.01	$0.03	**0.01%**
Europe	$0.00	$0.00	$0.00	$0.01	**0.00%**
Professional, Scientific, and Technical Services	**$2.58**	**$2.00**		**$4.58**	**2.16%**

Sector and Region	2021	2022	2023	Total	Percentage of Total
Other	$2.58	$2.00		$4.58	**2.16%**
Utilities	**$1.85**	**$1.77**	**$0.01**	**$3.62**	**1.71%**
Latin America/Caribbean	$1.19	$1.61		$2.79	**1.32%**
Other	$0.60			$0.60	**0.28%**
North America	$0.04	$0.06		$0.10	**0.05%**
Europe	$0.02	$0.05		$0.07	**0.03%**
Asia		$0.04	$0.01	$0.05	**0.02%**
Oceania	$0.00	$0.00		$0.00	**0.00%**
Middle East and North Africa		$0.00		$0.00	**0.00%**
Services			**$0.73**	**$0.73**	**0.34%**
Latin America/Caribbean			$0.73	$0.73	**0.34%**
Administrative and Support and Waste Management and Remediation Services	**$0.15**	**$0.00**	**$0.00**	**$0.15**	**0.07%**
Asia	$0.12			$0.12	**0.06%**
Europe	$0.02			$0.02	**0.01%**
North America	$0.01			$0.01	**0.01%**
Other	$0.00	$0.00	$0.00	$0.00	**0.00%**
Information	**$0.13**			**$0.13**	**0.06%**
Oceania	$0.13			$0.13	**0.06%**
Grand Total	**$63.83**	**$85.81**	**$61.72**	**$211.36**	**100.00%**

Source: EXIM EEP Transactions

Table B4: Direct Loan Program: Summary of Shipment Amount by Sector and Region, USD in millions

Instrument	FY 2023	Percentage of Total
Power Projects	**$380.39**	86.61%
Sub-Saharan Africa	**$380.39**	86.61%
Angola	$380.39	86.61%
Services	**$58.82**	13.39%
Europe	**$58.82**	13.39%
Romania	$58.82	13.39%
Grand Total	**$439.21**	**100.00%**

Source: EXIM EEP Transactions

Table B5: Working Capital Guarantee: Summary of Shipment Amount by Sector and Region, USD in millions by FY

Instrument	2022	2023	Percentage of Total
United States	**$37.61**	**$168.46**	**100.00%**
Manufacturing	$26.41	$149.54	85.38%
Services		$4.52	2.19%
Utilities	$4.05		1.97%
Wholesale Trade	$7.16	$14.40	10.46%
Grand Total	**$37.61**	**$168.46**	**100.00%**

Source: EXIM EEP Transactions

Table B6: Loan Guarantee Program: Summary of Shipment Amount by Sector and Region, USD in millions by FY

Instrument	2021	2022	2023	Percentage of Total
Manufacturing		**$12.04**	**$23.38**	**33.68%**
Europe			**$0.82**	**0.78%**
Netherlands			$0.82	0.78%
Latin America/Caribbean			**$22.56**	**21.45%**
Honduras			$3.92	3.73%
Mexico			$18.64	17.72%
North America		**$8.63**		**8.20%**
Canada		$8.63		8.20%
Sub-Saharan Africa		**$3.41**		**3.25%**
Senegal		$3.41		3.25%
Professional, Scientific, and Technical Services		**$14.14**	**$5.80**	**18.96%**
Latin America/Caribbean		**$14.14**	**$5.80**	**18.96%**
Brazil		$14.14	$5.80	18.96%
Wholesale Trade	**$0.23**	**$7.94**	**$0.52**	**8.26%**
Latin America/Caribbean		**$2.29**	**$0.52**	**2.67%**
Argentina		$1.99		1.89%
Mexico		$0.30	$0.52	0.78%
Sub-Saharan Africa	**$0.23**	**$5.65**		**5.59%**
Nigeria		$5.65		5.37%
Senegal	$0.23			0.22%
Construction	**$4.02**			**3.82%**
Sub-Saharan Africa	**$4.02**			**3.82%**
Cameroon	$4.02			3.82%
Not Identified		**$37.10**		**35.28%**
Latin America/Caribbean		**$37.10**		**35.28%**
Honduras		$37.10		35.28%
Grand Total	**$4.25**	**$71.23**	**$29.70**	**100.00%**

Source: EXIM EEP Transactions

Table B7: Number of Transactions by Program and Sector by FY

Sector and Region	2021	2022	2023	Total
Direct Loan			**2**	**2**
Power Projects			1	1
Services			1	1
Export Credit Insurance	**53**	**32**	**22**	**107**
Administrative and Support and Waste Management and Remediation Services	1			1
Agriculture, Forestry, Fishing and Hunting			1	1
Information	1			1
Manufacturing	36	18	16	71
Mining, Quarrying, and Oil and Gas Extraction	1	1		2
Professional, Scientific, and Technical Services	4			4
Services			1	1
Utilities	2	1	1	4
Wholesale Trade	8	12	3	23
Working Capital Guarantee		**12**	**11**	**23**
Manufacturing		5	10	15
Services			1	1
Utilities		1		1
Wholesale Trade		6		6
Loan Guarantee	**1**	**7**	**5**	**13**
Construction	1			1
Manufacturing		2	5	7
Not Identified		1		1
Professional, Scientific, and Technical Services		1		1
Wholesale Trade		3		3
Grand Total	**54**	**51**	**40**	**145**

Source: EXIM EEP Transactions

Table B8: Shipment Value by Program and Sector, USD in millions by FY

Sector and Region	2021	2022	2023	Total
Direct Loan			**$439.21**	**$439.21**
Power Projects			$380.39	$380.39
Services			$58.82	$58.82
Export Credit Insurance	**$63.83**	**$85.81**	**$61.72**	**$211.36**
Administrative and Support and Waste Management and Remediation Services	$0.15	$0.00	$0.00	$0.15
Agriculture, Forestry, Fishing and Hunting	$1.51	$5.42	$5.58	$12.51
Information	$0.13			$0.13
Manufacturing	$44.63	$50.83	$33.46	$128.92
Mining, Quarrying, and Oil and Gas Extraction	$8.83	$14.84	$9.97	$33.64
Professional, Scientific, and Technical Services	$2.58	$2.00		$4.58
Services			$0.73	$0.73
Utilities	$1.85	$1.77	$0.01	$3.63
Wholesale Trade	$4.16	$10.95	$11.98	$27.09
Working Capital Guarantee		**$37.61**	**$168.46**	**$206.07**
Manufacturing		$26.41	$149.54	$175.95
Services			$4.52	$4.52
Utilities		$4.05		$4.05
Wholesale Trade		$7.16	$14.40	$21.56
Loan Guarantee	**$4.25**	**$71.23**	**$29.70**	**$105.18**
Construction	$4.02			$4.02
Manufacturing		$12.04	$23.38	$35.42
Not Identified		$37.10		$37.10
Professional, Scientific, and Technical Services		$14.14	$5.80	$19.94
Wholesale Trade	$0.23	$7.94	$0.52	$8.69
Grand Total	**$68.08**	**$194.65**	**$699.09**	**$961.82**

Source: EXIM EEP Transactions

Table B9: Aggregation of Regions in the Model

No.	Region	Description
1	**USA**	United States of America.
2	**Canada**	Canada.
3	**Mexico**	Mexico.
4	**China**	China; China, Hong Kong SAR.
5	**India**	India.
6	**Europe**	Austria; Belgium; Bulgaria; Croatia; Cyprus; Czechia; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Lithuania; Luxembourg; Malta; Netherlands; Poland; Portugal; Romania; Slovakia; Slovenia; Spain; Sweden; United Kingdom of Great Britain; Switzerland; Norway; Rest of EFTA; Albania; Serbia; Belarus; Russian Federation; Ukraine; Rest of Eastern Europe; Rest of Europe.
7	**Oceania**	Australia; New Zealand; Rest of Oceania.
8	**Rest of Asia (RoAsia)**	Japan; Republic of Korea; Mongolia; Taiwan Province of China; Rest of East Asia; Brunei Darussalam; Cambodia; Indonesia; Lao People's Democratic Republic; Malaysia; Philippines; Singapore; Thailand; Viet Nam; Rest of Southeast Asia; Afghanistan; Bangladesh; Nepal; Pakistan; Sri Lanka; Rest of South Asia.
9	**Latin America (LatAmerica)**	Argentina; Bolivia; Brazil; Chile; Colombia; Ecuador; Paraguay; Peru; Uruguay; Venezuela (Bolivarian Republic; Rest of South America; Costa Rica; Guatemala; Honduras; Nicaragua; Panama; El Salvador; Rest of Central America; Dominican Republic; Haiti; Jamaica; Puerto Rico; Trinidad and Tobago; Caribbean.
10	**Middle East & North Africa (MENA)**	Bahrain; Iran (Islamic Republic of); Iraq; Israel; Jordan; Kuwait; Lebanon; Oman; Palestine; Qatar; Saudi Arabia; Syrian Arab Republic; Türkiye; United Arab Emirates; Rest of Western Asia; Algeria; Egypt; Morocco; Tunisia; Rest of North Africa.
11	**Sub-Saharan Africa (SSA)**	Benin; Burkina Faso; Cameroon; Cote d'Ivoire; Ghana; Guinea; Mali; Niger; Nigeria; Senegal; Togo; Rest of Western Africa; Central African Republic; Chad; Congo; Democratic Republic of the Con; Equatorial Guinea; Gabon; South-Central Africa; Comoros; Ethiopia; Kenya; Madagascar; Malawi; Mauritius; Mozambique; Rwanda; Sudan; United Republic of Tanzania; Uganda; Zambia; Zimbabwe; Rest of Eastern Africa; Botswana; Eswatini; Namibia; South Africa; Rest of Southern African Countries.
12	**Rest of World (RoW)**	Rest of North America; Kazakhstan; Kyrgyzstan; Tajikistan; Uzbekistan; Rest of Former Soviet Union; Armenia; Azerbaijan; Georgia; Rest of the World.

Source: Global Trade Analysis Project (GTAP) database

Table B10: Aggregation of Sectors in the Model

No.	Sector Name	Description
1	**AgriFF**	Agriculture-Forestry-Fishing (Paddy rice; Wheat; Cereal grains; Vegetables, fruit, nuts; Oil seeds; Sugar cane, sugar beet; Plant-based fibers; Crops; Bovine cattle, sheep and goats; Animal products; Raw milk; Wool, silk-worm cocoons; Forestry; Fishing).
2	**Coal**	Coal.
3	**Oil**	Oil.
4	**Gas**	Gas; Gas manufacture, distribution.
5	**Mining**	Minerals; Mineral products.
6	**Proc_Food**	Processed Food (Bovine meat products; Meat products; Vegetable oils and fats; Dairy products; Processed rice; Sugar; Food products; Beverages and tobacco products).
7	**OthManufg**	Other manufacturing (Textiles; Wearing apparel; Leather products; Wood products; Manufactures).
8	**PaperPrdts**	Paper products, publishing.
9	**Oil_pcts**	Petroleum, coal products.
10	**ChemPdts**	Chemical products; Basic pharmaceutical products; Rubber and plastic products.
11	**Iron_Steel**	Ferrous metals.
12	**NonFerMetals**	Metals.
13	**FabrMetals**	Metal products.
14	**Electronics**	Computer, electronic and optic.
15	**ElectriEquip**	Electrical equipment.
16	**Machinery**	Machinery and equipment.
17	**MotVeh**	Motor vehicles and parts.
18	**TransEqp**	Transport equipment.
19	**TnD**	Electricity transmission and d.
20	**NuclearPw**	Nuclear power.
21	**CoalPw**	Coal power baseload.
22	**GasPw**	Gas power baseload; Gas power peak load.
23	**WindPw**	Wind power.
24	**HydroPw**	Hydro power base load; Hydro power peak load.
25	**OilPw**	Oil power baseload; Oil power peak load.
26	**OtherPw**	Other power baseload.
27	**SolarPw**	Solar power.
28	**Wat_Sew_Wste**	Water supply; sewerage, waste management & remediation activities
29	**Construction**	Construction.
30	**Trade**	Trade.
31	**Hospitality**	Accommodation, Food and service.
32	**RoadTrans**	Transport.
33	**WaterTrans**	Water transport.
34	**AirTrans**	Air transport.
35	**Warehousng**	Warehousing and support activities.
36	**Information**	Communication.
37	**Finance**	Financial services.
38	**Insurance**	Insurance.
39	**RealEstate**	Real estate activities.
40	**BusiServcs**	Business services.
41	**OthServcs**	Recreational and other service; Education; Human health and social work a; Dwellings.
42	**PubAdmin**	Public Administration and defense.

Source: Global Trade Analysis Project (GTAP) database

Table B11: Emission Intensity of Selected Sectors across Regions

(Units: Kg of CO_2 / $1 Million Output)

	Manufacturing	Machinery	Electric Equipment	Paper Products	Transportation Equipment
USA	0.01372	0.01480	0.02391	0.11535	0.01262
Canada	0.07915	0.01978	0.01576	0.16097	0.01080
Mexico	0.03004	0.01350	0.02189	0.13972	0.00960
China	0.02798	0.02544	0.00619	0.09110	0.03123
India	0.07978	0.05535	0.00837	0.23186	0.00654
Europe	0.01088	0.00982	0.01009	0.05611	0.01186
Oceania	0.03133	0.00784	0.00821	0.07669	0.00212
Rest of Asia	0.04114	0.00823	0.01150	0.12675	0.01267
Latin America	0.02920	0.01239	0.01620	0.08938	0.00685
MENA	0.11785	0.14854	0.12791	0.34726	0.07339
SSA	0.04535	0.02993	0.11340	0.08370	0.01271
RoW	0.17004	0.24712	0.31850	0.52797	0.10883

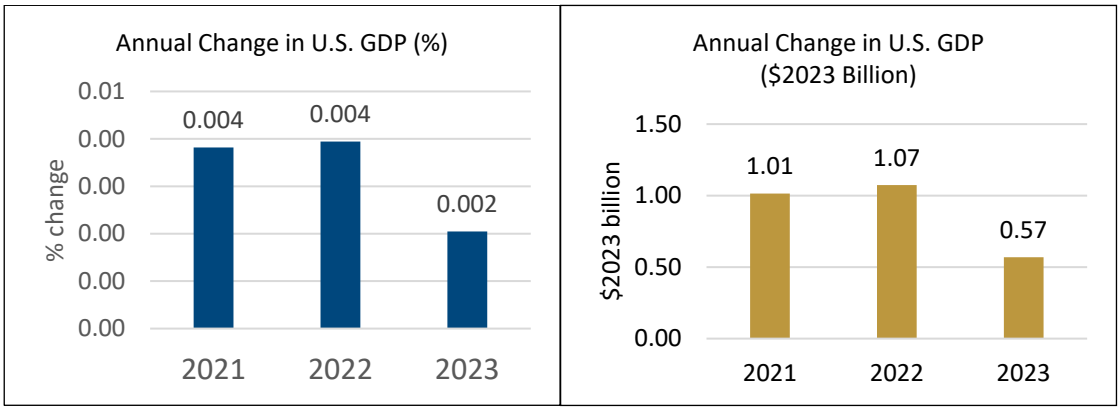
Source: Emission Intensity calculated based on GTAP data.

APPENDIX C: ADDITIONAL PROGRAM LEVEL ANALYSES

This appendix provides the data and analyses at the financial program level that support the overall findings of this report. [65] Please find below more information from KPMG's analyses of the export credit insurance, loan guarantee, working capital guarantee, and direct loan programs.

1. Export Credit Insurance (ECI) Scenario Analysis

Figures C1.1: Impact of ECI Program on U.S. GDP

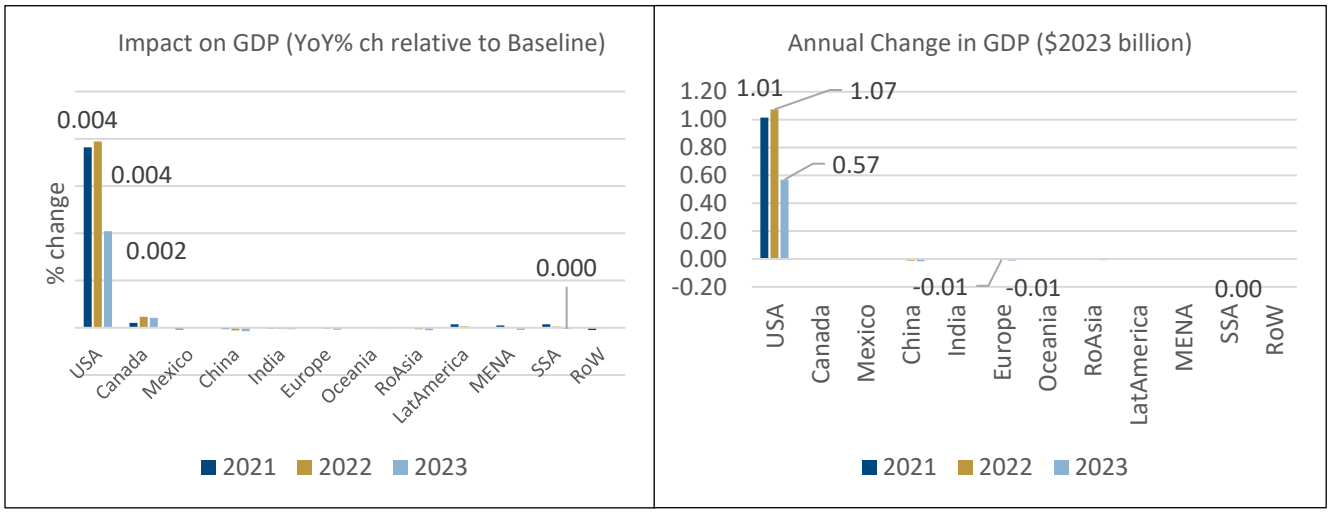


Source: Model simulations

- EXIM's ECI transactions under EEP program alone found to contribute annual increases of 0.002 to 0.004 percent in GDP during 2021-2023.
- In value terms, the ECI program led to increases of more than a billion dollars in GDP during 2021 and 2022, but this dropped to $0.57 billion 2023 due to decrease in transactions in that year.

[65] The model-predicted results in monetary terms that are reported in billions or millions in 2023 dollars. This is represented as $2023 billion or $2023 million in the tables.

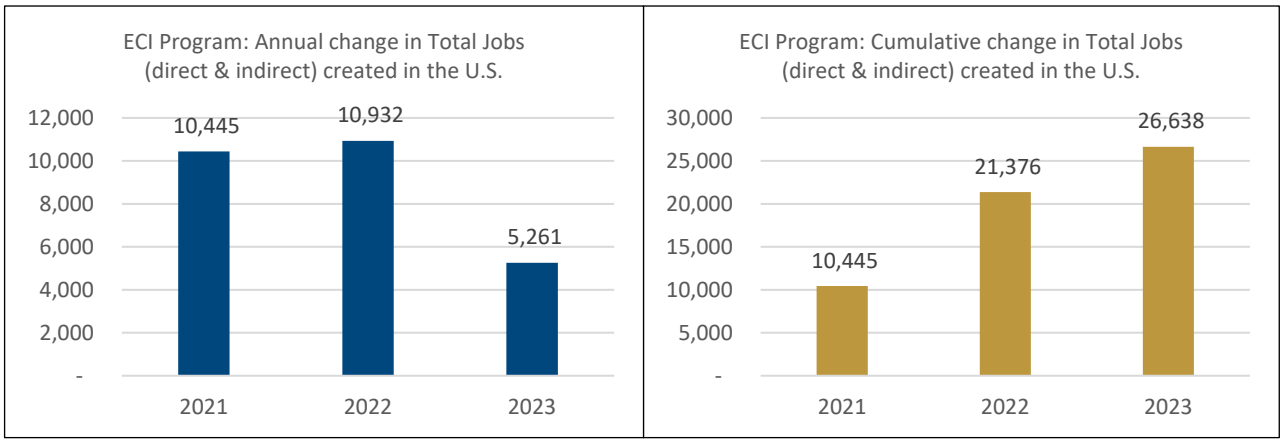
Figures C1.2: Impact of ECI Program on GDP across Regions



Source: Model simulations

- The ECI program contributed to increases in GDP mainly in the U.S. The other regions did not show any notable effect on their GDP due to US exports under ECI program.

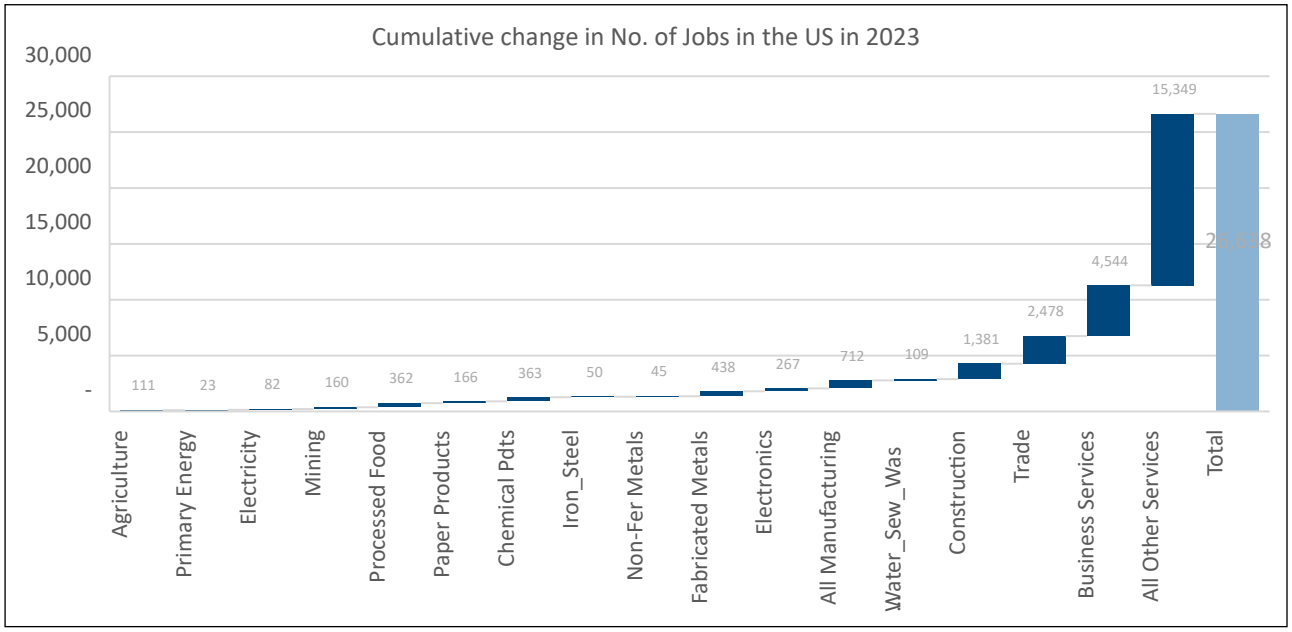
Figures C1.3: Impact of ECI Program on Employment Annual change in Total Jobs



Source: Model simulations

- ECI program showed annual increases (year-on-year (YoY) change) of close to 5,000 and 11,000 in employment during 2021 and 2023.
- Cumulatively ECI resulted in more than 26,000 direct and indirect jobs in the U.S. by 2023.

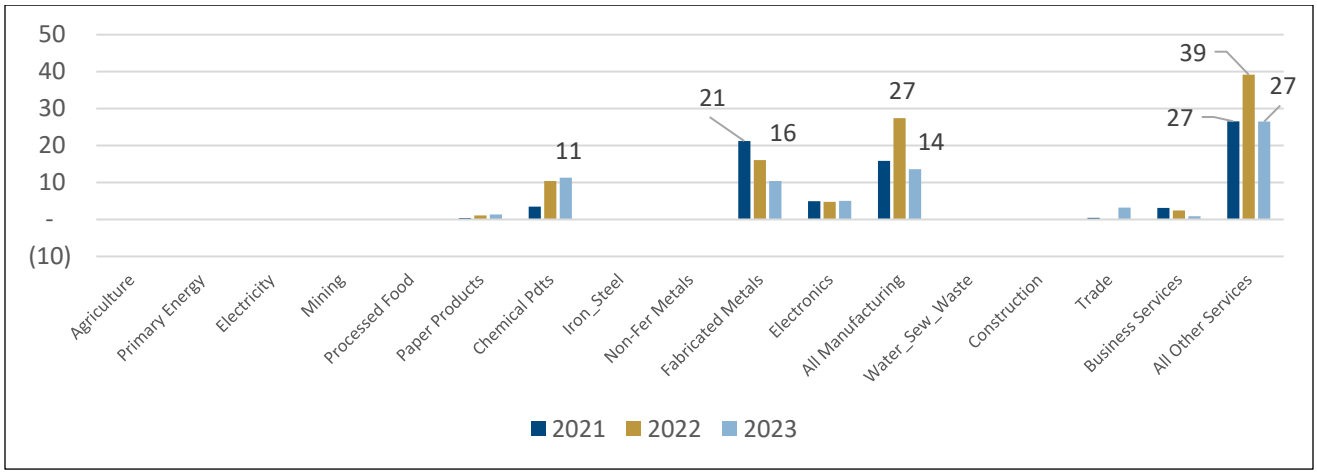
Figure C1.4: Impact of ECI Program on Employment (Cumulative Change in Total No. Jobs in 2023)



Source: Model simulations

- Out of more than 26,000 cumulative job increases due to ECI transactions, all other services sector dominated the jobs gain, followed by Business Services, Trade, and Construction sectors. These jobs included both direct and indirect jobs created along the supply chain.

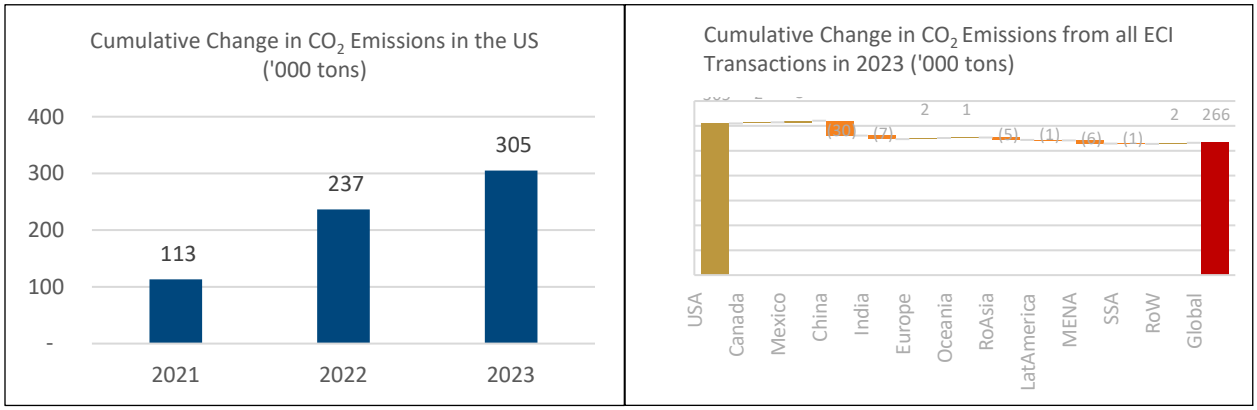
Figure C1.5: Impact of ECI on U.S. Exports: Annual Change in $2023 million



Source: Model simulations

- The impact of ECI on increases in U.S. exports reflects on the sectors that are directly benefited by the EXIM's ECI transactions.
- The highest increase in U.S. exports due to ECI transactions were reported in 2022 ($90 million).

Figures C1.6: Impact of Overall ECI Transactions on CO_2 Emissions

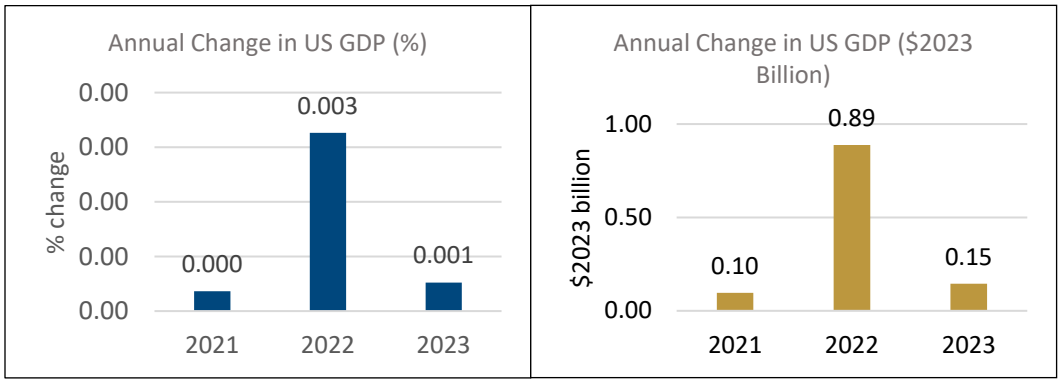


Source: Model simulations

- EXIM's ECI transactions alone resulted in a net increase in CO_2 emissions in the U.S. The cumulative increase in emissions was 305,000 tons by 2023. This is mainly attributable to the direct emissions resulting from manufacturing of the exported goods in the U.S.

2. Loan Guarantee Program (LGP) Scenario Analysis

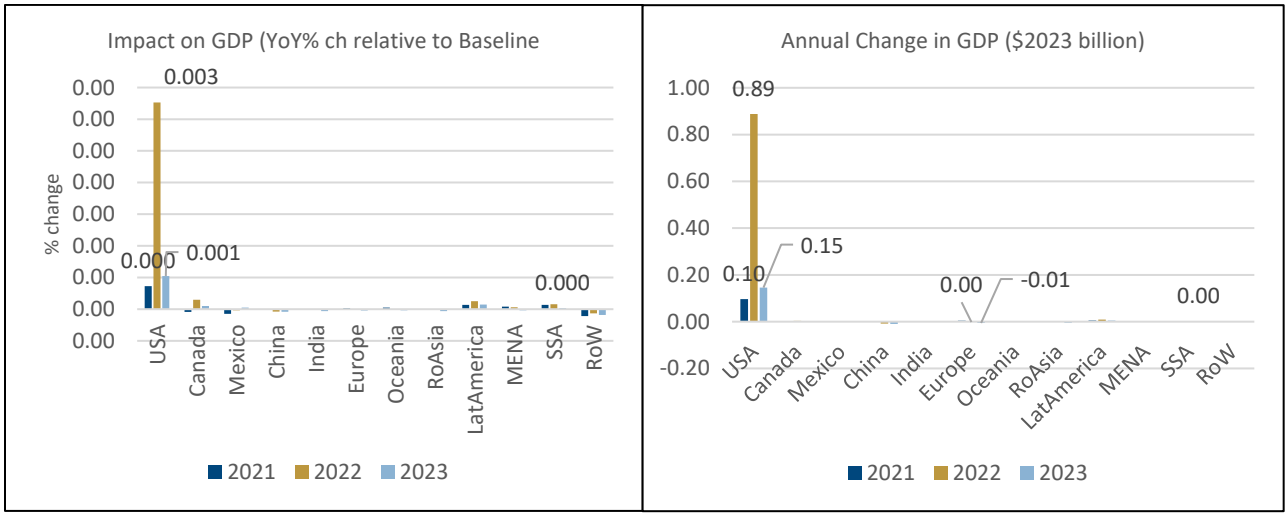
Figures C2.1: Impact of LGP on US GDP by CY



Source: Model simulations

- EEP transactions under LGP led to annual increases of GDP by 0.003 percent in 2022.
- LGP led to annual increases of $0.10 billion, $0.89 billion, 0.15 billion in GDP during CY 2021, 2022, and 2023, respectively.

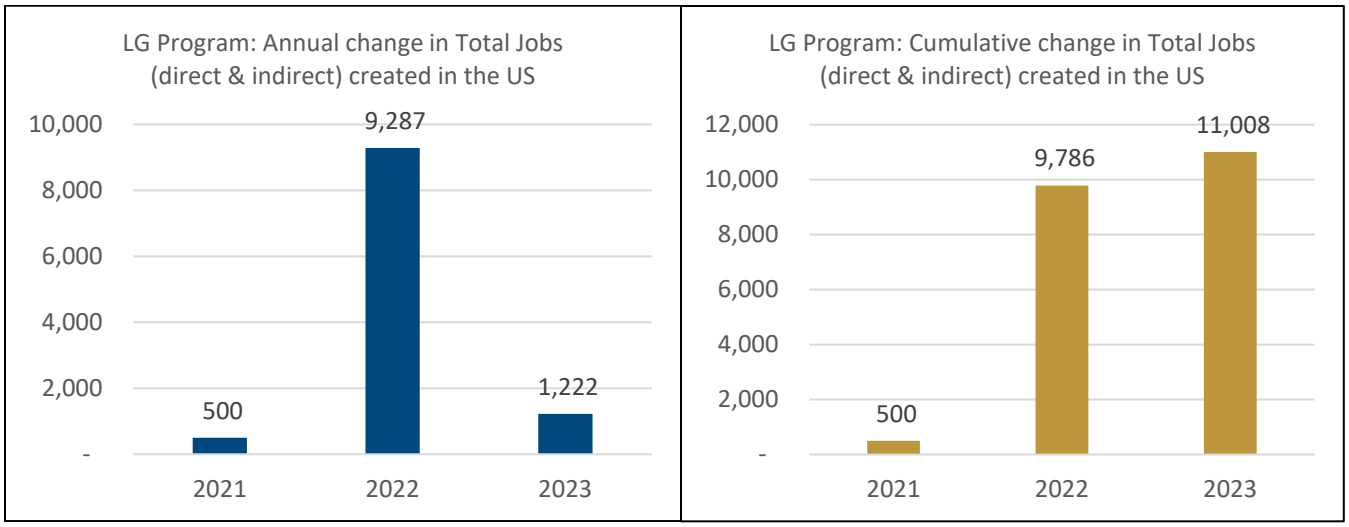
Figures C2.2: Impact of LGP on GDP across regions by CY



Source: Model simulations

- EXIM's LGP transactions related U.S. exports showed no considerable impact on GDP in other regions.

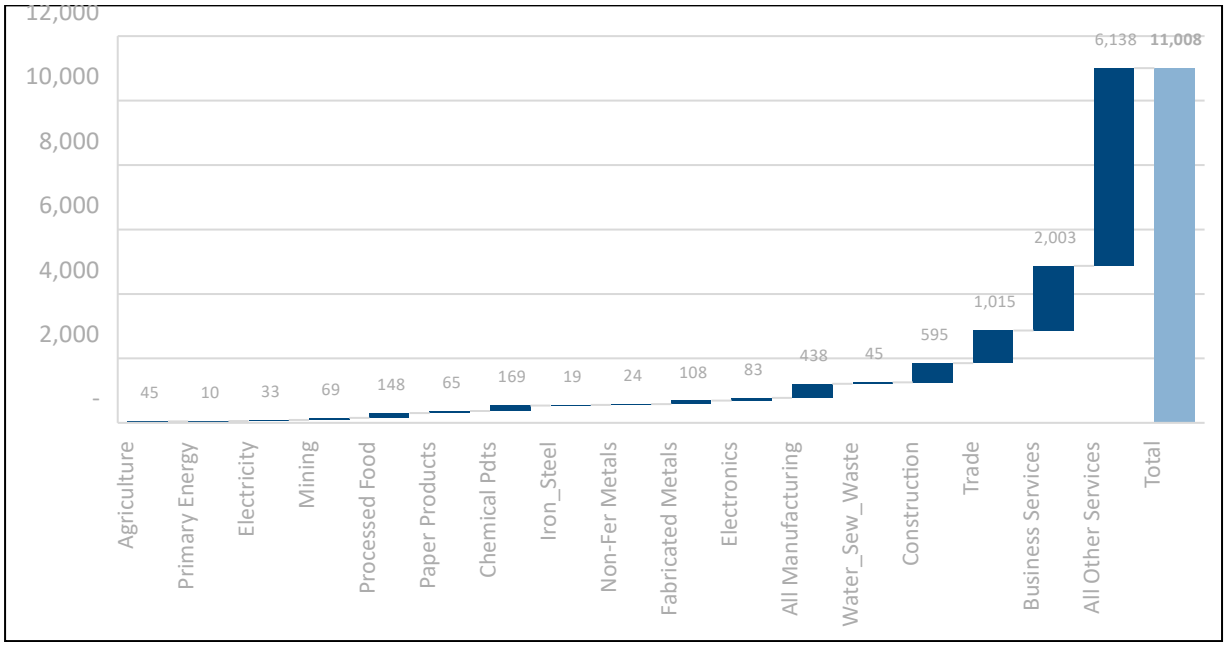
Figures C2.3: Impact of LGP on Employment



Source: Model simulations

- LGP transactions led to an annual increase of 500 new jobs in 2021, but the new jobs increased significantly to 9,287 in 2022, and 1,222 new jobs in 2023.
- Cumulatively LGP led to 11,000 direct and indirect jobs in the U.S. by 2023.

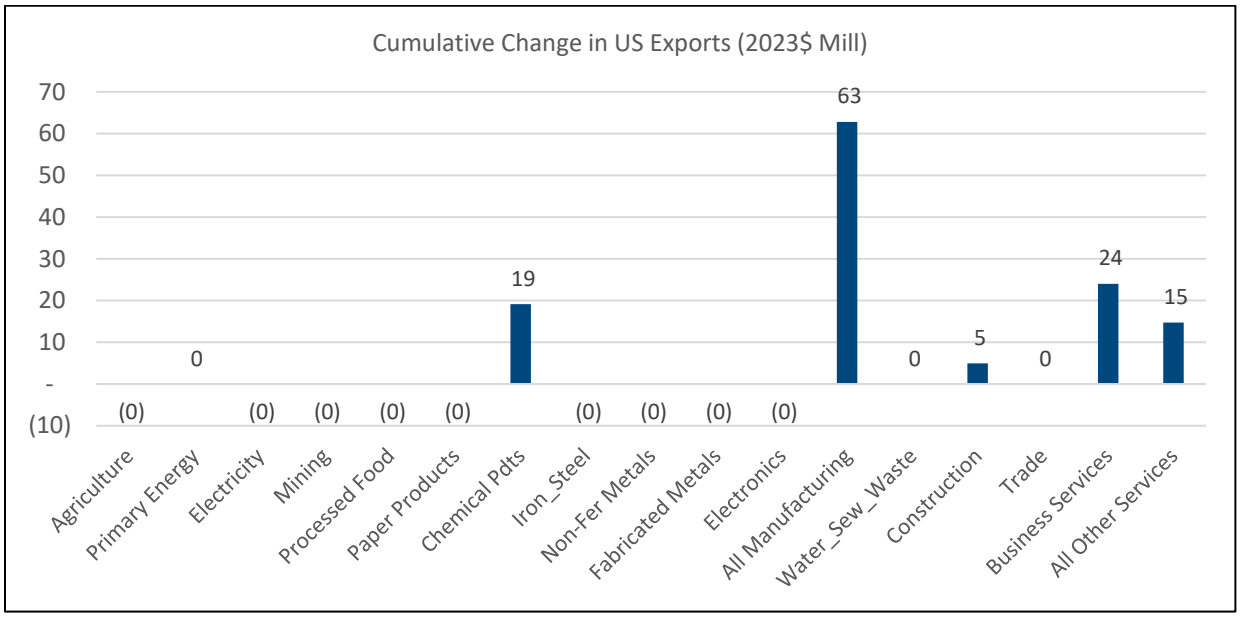
Figure C2.4: Impact of LGP on Employment (Cumulative Change in Total no. of Jobs) in the U.S. in 2023.



Source: Model simulations

- Out of more than 11,000 cumulative direct and indirect job increases in the U.S. due to LGP transactions by 2023, the All Other Services sector dominated the jobs gain, followed by Business Services, Trade, and Construction sectors.

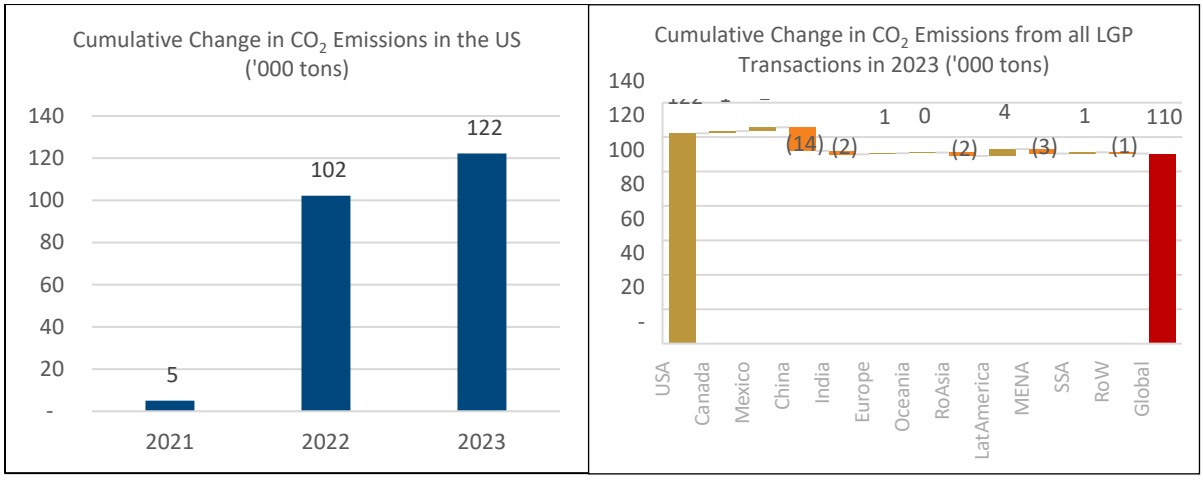
Figure C2.5: Impact of LGP on U.S. Exports



Source: Model simulations

- LGP transactions showed that Manufacturing, Business Services, Paper Products, Construction, and All Other Services sectors were the key drivers of the largest impacts on US Exports.

Figures C2.6: Impact of LGP Transactions on CO_2 Emissions

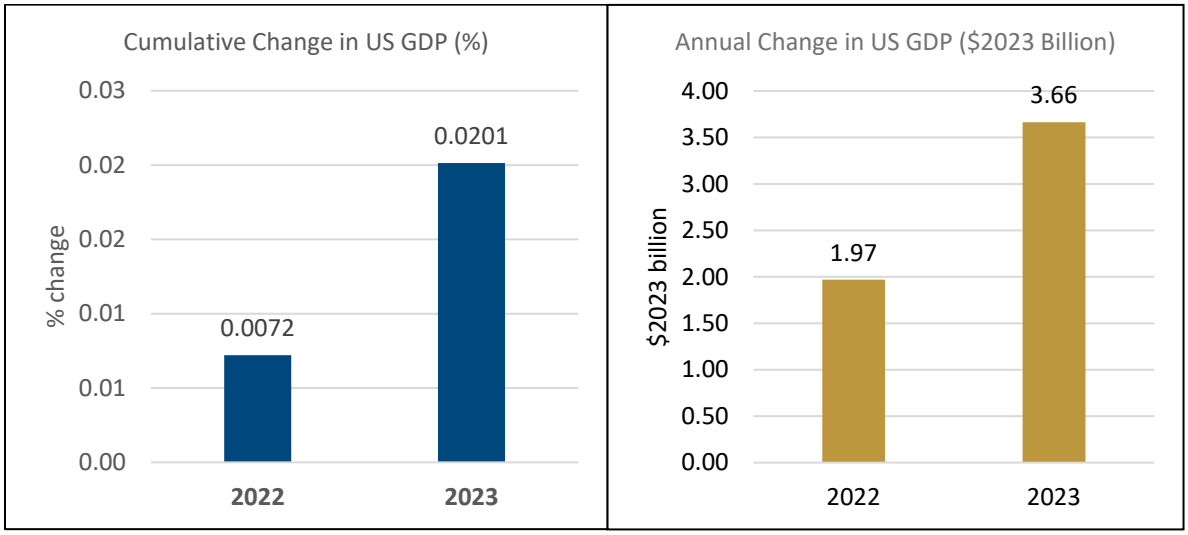


Source: Model simulations

- EEP transactions involving LGP were associated with a net increase in CO_2 emissions in the U.S. by 122,000 tons by 2023.

3. Working Capital Guarantee (WCG) Scenario Analysis

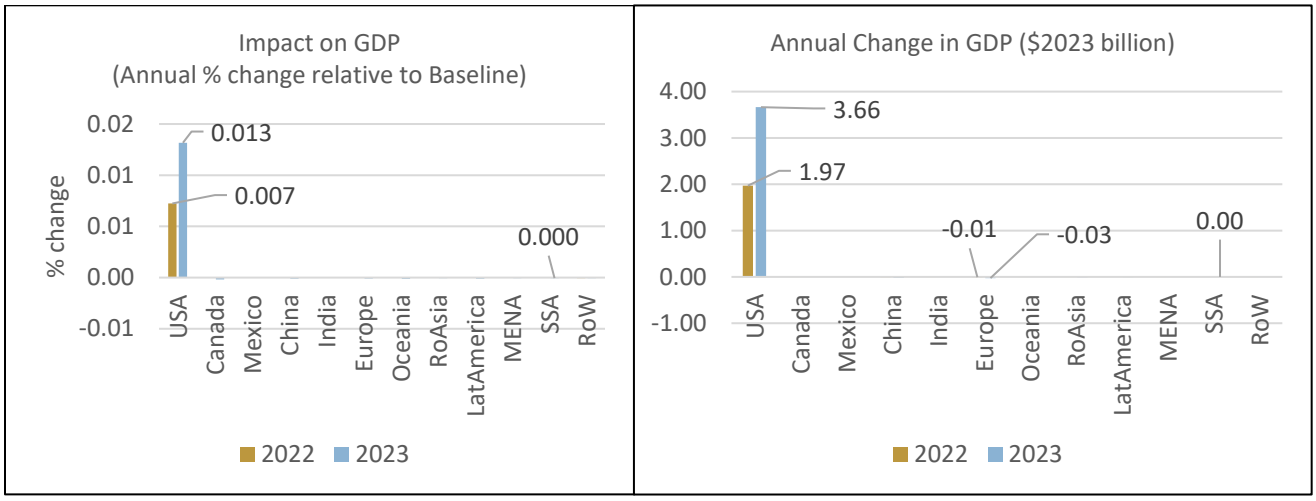
Figures C3.1: Impact of WCG Program on U.S. GDP (Cumulative Change in CY U.S. GDP (%))



Source: Model simulations

- EEP exports under the WCG program were tied to annual increases of 0.007 and 0.020 percent in GDP in 2022 and 2023, respectively.
- In value terms, this amounted to annual increases of $1.97 billion and $3.66 billion in GDP in those two years.

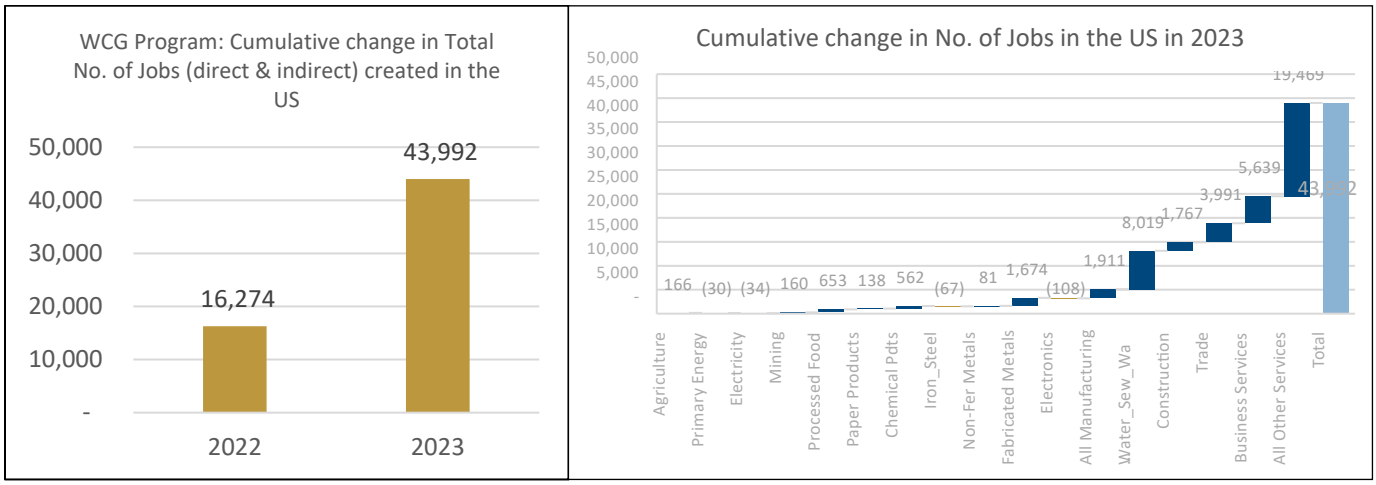
Figures C3.2: Impact of WCG Program on Regional GDP (Annual change relative to Baseline)



Source: Model simulations

- WCG program led to an increase of GDP only in the U.S. and it did not have any considerable impact on other regions.

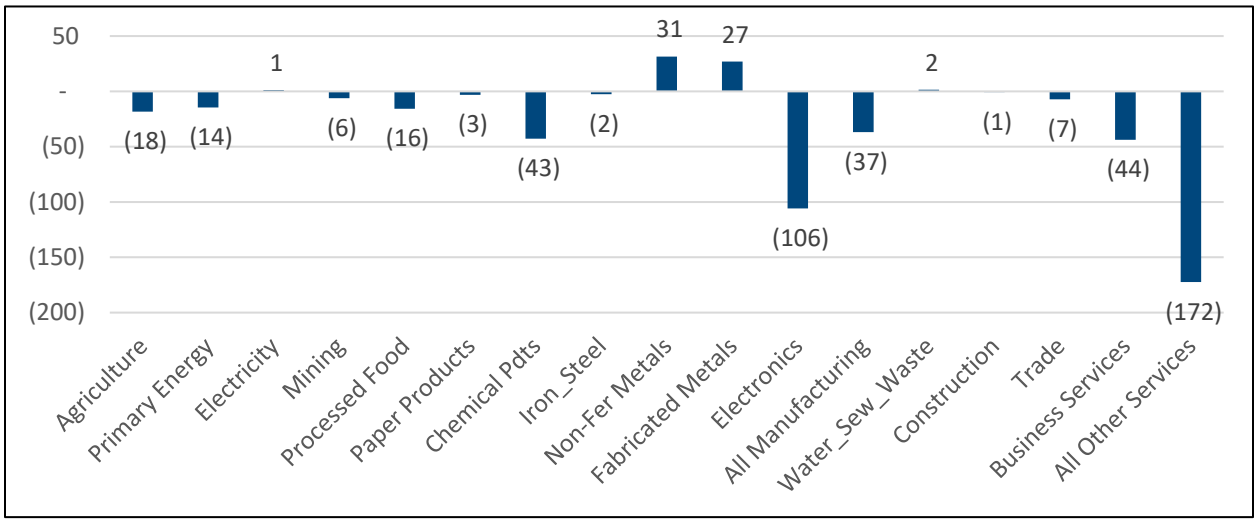
Figures C3.3: Impact of WCG Program on Employment in the U.S.



Source: Model simulations

- WCG program contribution towards to new jobs creation was considerable, with nearly 44,000 new jobs by 2023.
- Aside from miscellaneous services, sectors such as Water Sewage, Business Services, Trade, Construction, and Fabricated Metals experienced the highest increase in employment based on impacts of WCG transactions.

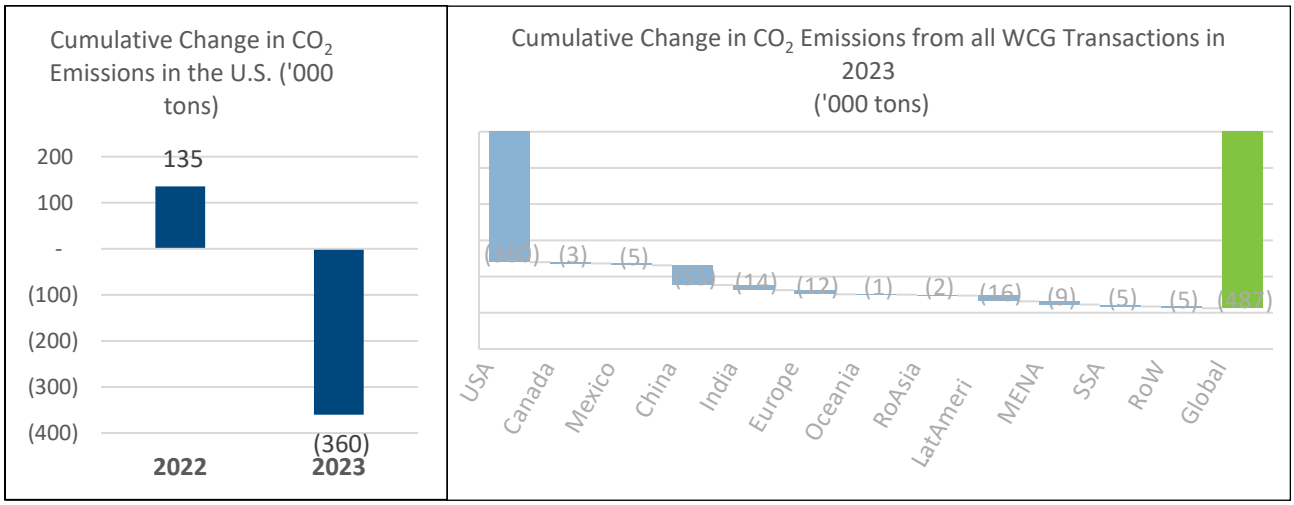
Figure C3.5: Impact of WCG Program on U.S. Exports (Cumulative Change, $2023 Million)



Source: Model simulations

- EEP exports under the WCG program did not show an aggregate increase in US exports but there were some indications exports increased in certain sectors, offset by decreases in others.

Figures C3.6: Impact of WCG Program Transactions on CO_2 Emissions

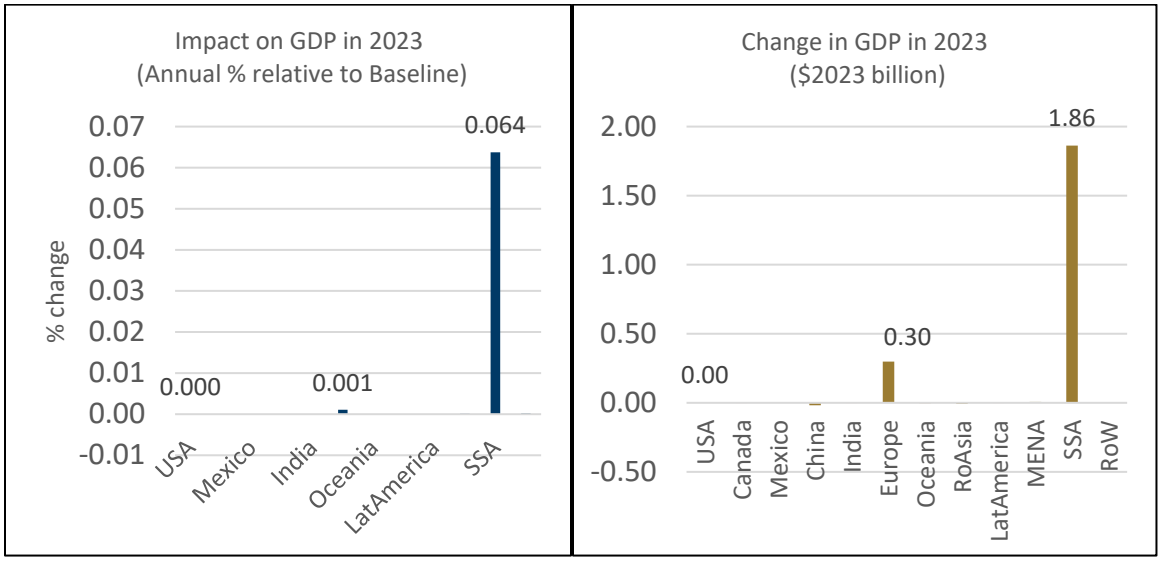


Source: Model simulations

- EEP exports under the WCG program showed increase in U.S. emissions in 2022, but the emissions significantly dropped in 2023, which is mainly attributable to solar energy transactions.

4. Direct Loan Program (DLP) Scenario Analysis

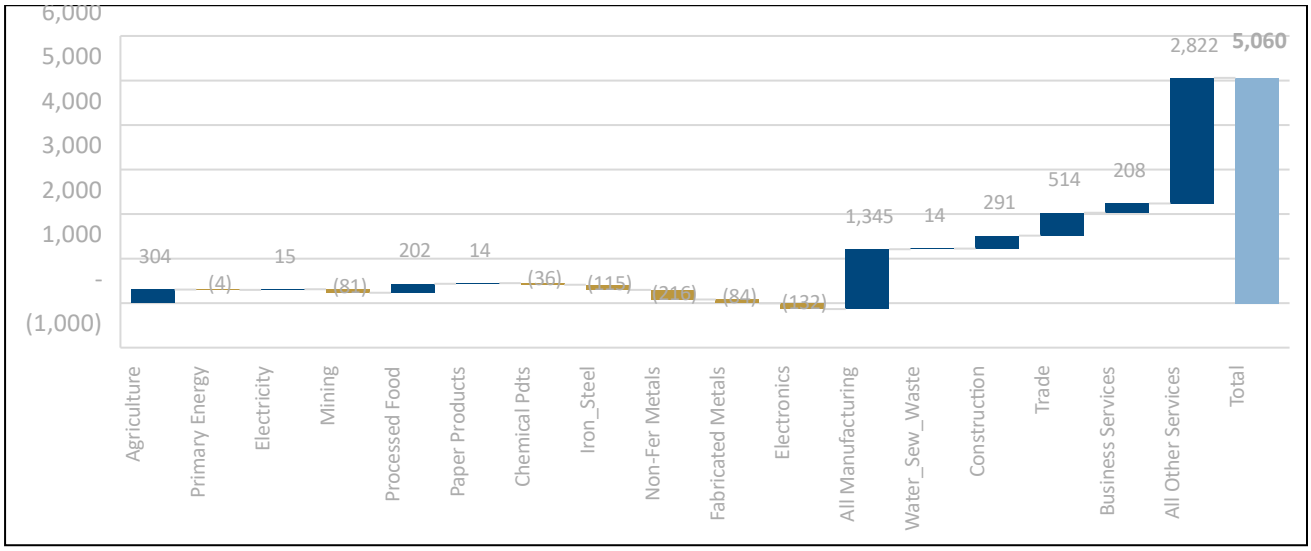
Figures C4.1: Impact of DLP on US GDP



Source: Model simulations

- A transaction involving exports to Angola is responsible for most impacts related to EEP transactions for the DLP.

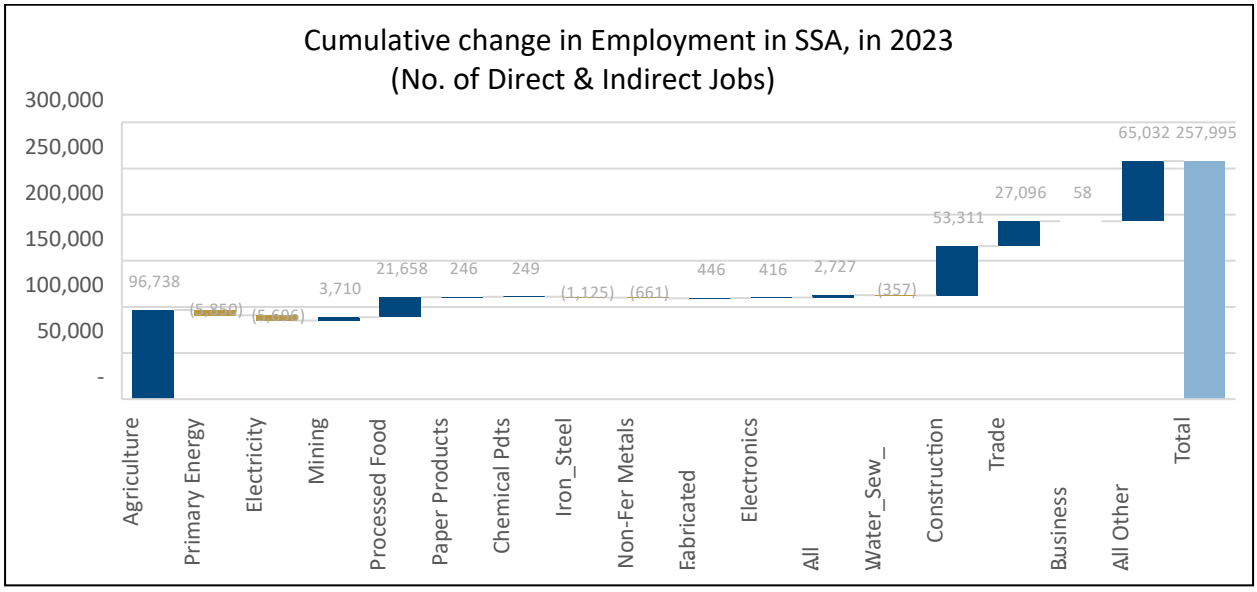
Figure C4.2: Impact of DLP on Employment in Europe region (Cumulative change in total direct & indirect jobs in Europe, in 2023)



Source: Model simulations

- Aside from All Other Services, sectors such as All Manufacturing, Trade, Agriculture, Construction, and Business Services experienced the highest increase in employment based on impacts of EEP transactions that involve DLP.

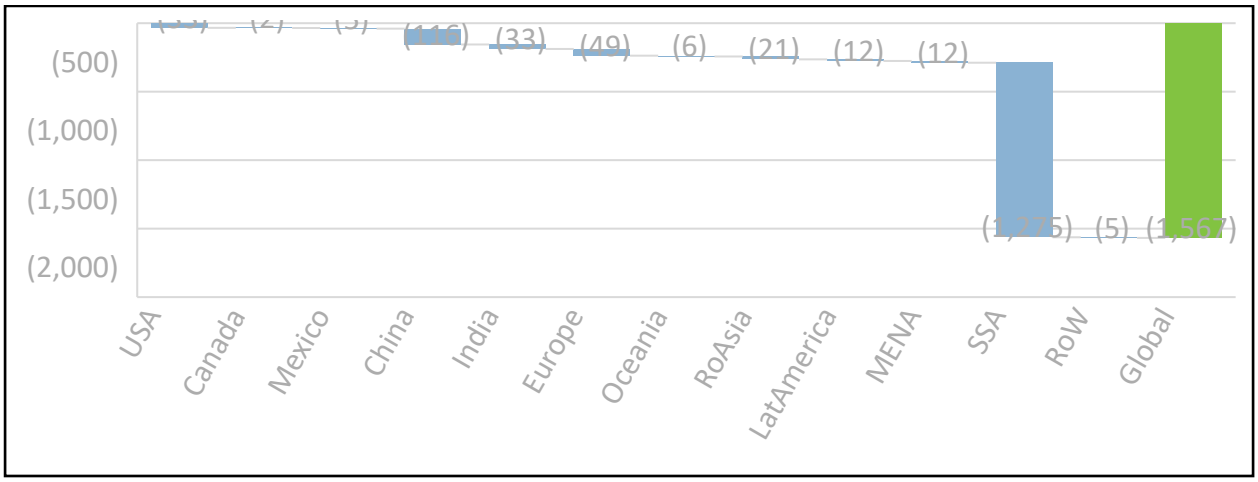
Figure C4.3: Impact of DLP on Employment in Sub-Saharan Africa (SSA) region (Cumulative change in total direct & indirect jobs in 2023).



Source: Model simulations

- The DLP resulted in substantial job creation in Sub-Saharan Africa (SSA) with approximately 258,000 new direct and indirect jobs. This is mainly attributable to nexus of energy sector with other sectors of the economy. This illustrates how an increase in access to clean energy can substantially boost the economy.

Figure C4.4: Impact of DLP Transactions on CO_2 Emissions (Cumulative Change in 2023, '000 tons)



Source: Model simulations

- DLP transactions led to substantial decrease in CO_2 Emissions in SSA, by 1.3 million tons in 2023. When accounted for reduction in European emissions too, global emissions in total dropped by 1.6 million tons.

5. Combined Scenario – Additional Results

Table C5.1: Estimated Impact of All EXIM EEP Transactions on GDP (Annual change in billions, 2023 dollars)

Region	CY 2021	CY 2022	CY 2023
USA	**1.061**	**1.392**	**3.455**
Canada	0.002	0.005	0.002
Mexico	-0.001	0.001	0.002
China	-0.006	-0.041	-0.088
India	-0.001	-0.003	-0.008
Europe	**0.001**	**1.630**	**1.723**
Oceania	0.000	-0.002	-0.008
Rest of Asia	-0.001	-0.011	-0.034
Latin America	0.005	0.003	-0.011
MENA	0.003	0.001	-0.004
SSA	**0.002**	**0.020**	**1.579**
Rest of World	0.000	0.001	0.002

Source: Model simulations

APPENDIX D: MANAGEMENT RESPONSE

EXIM
EXPORT-IMPORT BANK
OF THE UNITED STATES

Helping American Businesses Win the Future

DATE: August 23, 2024

TO: Mr. Michael T. Ryan, Assistant Inspector General for Special Reviews and Communications

THROUGH: Ravi Singh, Acting Senior Vice President & Chief Financial Officer

RAVI SINGH Digitally signed by RAVI SINGH Date: 2024.08.23 13:42:08 -04'00'

FROM: Ufo Eric-Atuanya, Acting Senior Vice President, Global Business Development and Senior Advisor for Africa

UFO ATUANYA Digitally signed by UFO ATUANYA Date: 2024.08.26 10:25:55 -04'00'

SUBJECT: Evaluation of EXIM's Environmentally Beneficial Goods and Services Mandate (OIG-EV-24-02)

Dear Mr. Ryan,

Thank you for providing the Export-Import Bank of the United States ("EXIM" or "EXIM Bank") management with the Office of Inspector General's ("OIG") draft report for *Evaluation of EXIM's Environmentally Beneficial Goods and Services Mandate (OIG-EV-24-02),* dated August 21, 2024 (the "Report"). EXIM's leadership and management continue to fully support the OIG's work, which we believe complements and enhances EXIM's efforts to continually improve its processes. EXIM Bank is proud of the strong and cooperative relationship it has with the OIG and shares the OIG's commitment to improving EXIM's policies, procedures and operations.

EXIM Bank appreciates the OIG's Evaluation of EXIM's Environmentally Beneficial Goods and Services Mandate and acknowledges the potentially positive economic and environmental impacts of the portfolio. Your recommendations will serve as a guiding framework for implementing necessary measures to increase awareness, outreach, and business opportunities under EXIM's Environmental Exports Program, the program through which EXIM executes on its Environmentally Beneficial Goods and Services Mandate.

OIG has made two recommendations. EXIM concurs with the two recommendations and will move forward with implementing the recommendations.

Recommendation 1: EXIM's Office of Policy Analysis and International Relations should conduct a study with existing EEP exporters, to identify the key factors resulting in the decision to utilize EXIM for financing the EEP export. These key factors should then be assessed for potential inclusion into future outreach efforts with potential U.S. exporters to expand EEP transaction opportunities.

Management response: EXIM concurs with this recommendation. However, EXIM's management has determined that the Office of Global Business Development will take responsibility for addressing this recommendation. The Office of Global Business Development will conduct a study with existing EEP exporters, to identify the key factors resulting in the decision to utilize EXIM for financing EEP exports. These key factors should then be assessed for potential inclusion into future outreach efforts with potential U.S. exporters to expand EEP transaction opportunities.

Recommendation 2: EXIM's Office of the Chief Banking Officer should establish periodic internal reporting of specific EEP outreach efforts by the office such that those efforts can be assessed for effectiveness in identifying and securing EEP authorizations. The reporting should include the type of outreach held, the attendees, and any follow-up meetings resulting from the outreach.

Management response: EXIM concurs with this recommendation. However, EXIM's management has determined that the Office of Global Business Development will take responsibility for addressing this recommendation. The Office of Global Business Development will establish periodic internal reporting of specific EEP outreach efforts by their office such that those efforts can be assessed for effectiveness in identifying and securing EEP authorizations. The reporting should include the type of outreach held, the attendees, and any follow-up meetings resulting from the outreach.

CC:

The Honorable Reta Jo Lewis, President and Chair of the Board of Directors
Brad Belzak, Senior Vice President and Chief of Staff
Hazeen Ashby, Deputy Chief of Staff and White House Liaison
Larry Decker, Senior Advisor to the President and Chair of the Board of Directors
Kenneth Tinsley, Senior Vice President and Chief Risk Officer
Courtney Chung, Senior Vice President and Chief Management Officer
Bryan Rolfe, Senior Vice President, Office of Board Authorized Finance
James Coughlan, Senior Vice President and General Counsel
James Cruse, Senior Vice President, Office of Policy Analysis & International Relations
James Burrows, Acting Chief Banking Officer
Michaela Smith, Director of Audit and Internal Controls Programs

ABBREVIATIONS

CGE	Computable General Equilibrium
CO_2	Carbon Dioxide
CY	Calendar Year
DLP	Direct Loan Program
EBGS	Environmentally Beneficial Goods and Services
ECI	Export Credit Insurance
EEP	Environmental Exports Program
ELMS	EXIM Loan Management System
EXIM	Export-Import Bank of the United States
FY	Fiscal Year
GHG	Greenhouse Gas
GBD	Global Business Development
GDP	Gross Domestic Product
GTAP	Global Trade Analysis Project
IEA	International Energy Agency
ILO	International Labor Organization
IMF	International Monetary Fund
I-O	Input-Output
LGP	Loan Guarantee Program
OIG	Office of Inspector General
SSP	Shared Socio-Economic Pathway
WCG	Working Capital Guarantee

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Export-Import Bank of the United States

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