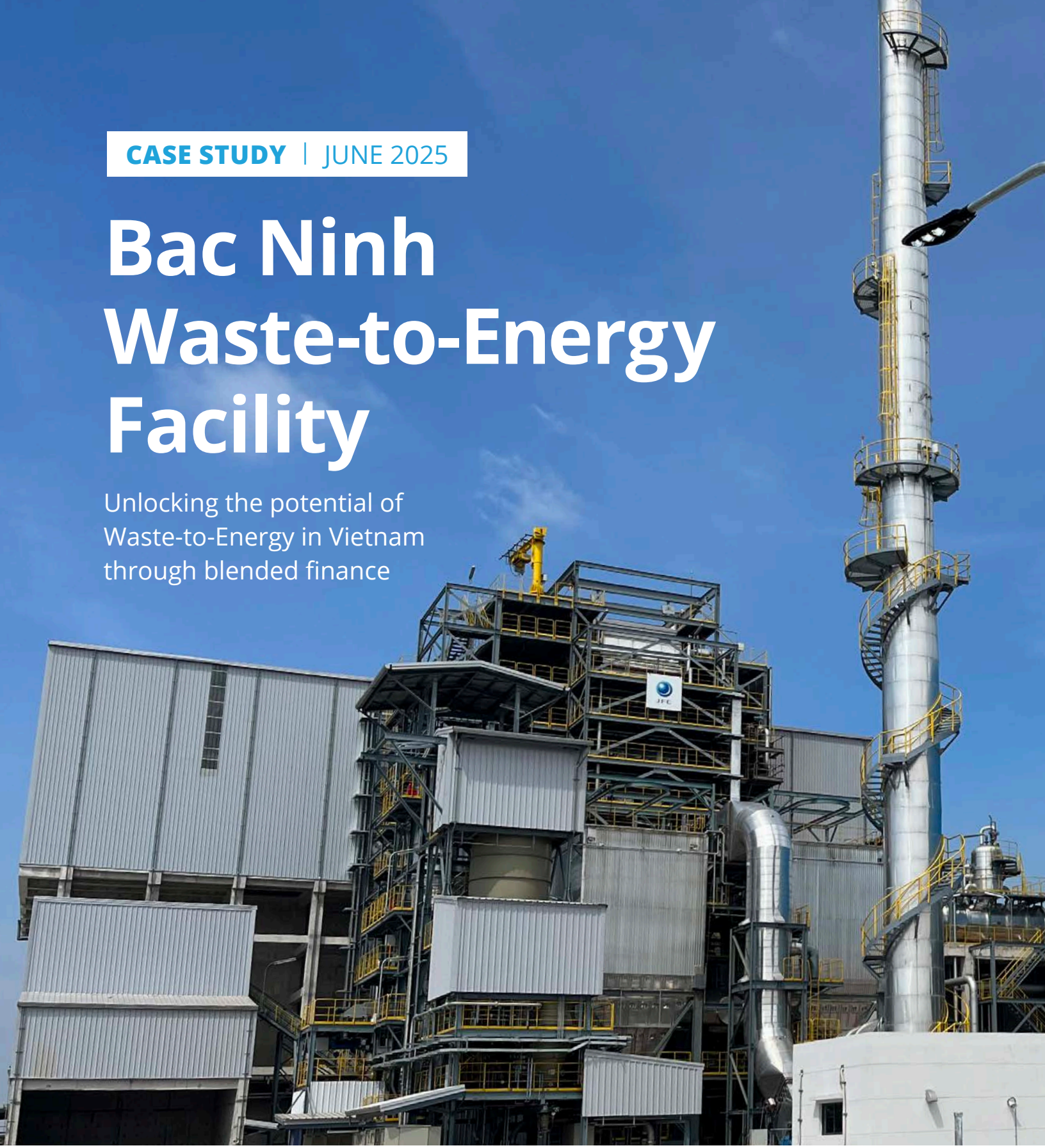

CASE STUDY | JUNE 2025

Bac Ninh Waste-to-Energy Facility

Unlocking the potential of Waste-to-Energy in Vietnam through blended finance

CONVERGENCE
BLENDING GLOBAL FINANCE

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Executive Summary

Vietnam's waste management issues are increasingly urgent. An expanding middle class, combined with rapid industrialization is accelerating the generation of municipal and industrial solid waste. However, the implementation of an adequate waste management system has been impeded by several factors:

i. weak regulatory frameworks have increased investment risk for international financiers prohibitively, preventing their participation;
ii. domestic commercial banks lack the necessary structuring expertise to finance infrastructure projects; and
iii. public sector budgets alone are insufficient to cover waste management investment needs alone.

The resultant financing gap has created a market failure, whereby critical high-impact potential waste solutions like waste-to-energy (WtE) technologies are unable to access the capital required for implementation.

The International Finance Corporation (IFC), using blended finance from the Finland-IFC Blended Finance for Climate Program (BFCP) alongside a market-rate loan for its own account, targeted the key market barriers to financing WtE facilities in Vietnam. Their participation, alongside grant funding support from the Government of Japan, bridged the financing gap by absorbing a level of construction and operational risk that otherwise prohibited the commercial viability of the project. By unlocking access to international financing, blended finance also helped circumvent issues surrounding domestic bank participation without crowding out other sources of commercial finance.

A suite of country-level and project-specific challenges weaken project bankability in the nascent sector of WtE in Vietnam. IFC's utilization of blended finance in the Bac Ninh project demonstrated a series of key insights for overcoming these obstacles and provides a replicable, market-building model to grow the financial and development impact track record of WtE in Southeast Asia.

Key insights from this case study include:

- Blended finance can address multilayered risk barriers that prevent private investment and result in market failure.
- Blended finance can be strategically structured to enhance the capacity and financial standing of local entities.
- In weak regulatory contexts, early engagement between public and private sector stakeholders yields important insights for the deployment of blended finance tools.
- The use of blended finance by MDBs can priortize building market capacity for enhanced development impact, alongside private sector mobilization
- As WtE facilities become a more standardized component of holistic waste management strategies in Southeast Asia, there will be novel applications of blended finance.

SYNOPSIS

DONOR CAPITAL POOL	Finland-IFC Blended Finance for Climate Program (BFCP)
DONOR MANDATE	Catalyze and unlock private financing into climate-smart projects in developing countries typically deemed too risky by banks and other conventional financiers
UNDERLYING PROJECT	Bac Ninh WtE Facility • 11.6MW installed energy capacity • 350 tons per day municipal solid waste • 150 tons per day industrial solid waste
PROJECT SPONSORS	***JV SPV:*** T&J Green Energy Ltd. ***Ownership:*** JFE Engineering Corporation (Japan), Thuan Thanh Environment JSC (Vietnam)
COUNTRY	Vietnam

PROJECT COSTS	**Total cost: $74.2 million**
	• ***Concessional capital:***
	  • BFCP - $15 million
	  • Japan Joint Crediting Mechanism subsidy
	• ***Private Indirect Mobilization:***
	  • T&J Green Energy Ltd.

AGGREGATE IMPACT TARGETS	• Avoid approximately 40,000 tons of greenhouse gas emissions per year • Increase the environmentally sound waste treatment capacity in Bac Ninh province by 500 tons per day • Generate approximately 72,250 megawatt-hours of clean energy per year

Introduction

Rapid urbanization and industrial growth are driving an unprecedented increase in solid waste in Vietnam. Municipal solid waste (MSW) is projected to more than double from 23 million to 47 million tons per year by 2030. Industrial solid waste (ISW), the waste produced by industrial activities, including the by-products rendered by energy generation, such as combustion waste from coal burning, is expected to increase at a similar rate. A confluence of factors – the lack of a stable and adequate regulatory architecture, unfamiliarity with project finance and waste-to-energy technology among domestic commercial banks, and insufficient state budgets – have stalled the evolution of the country's waste management sector. These barriers have:

i. created a market failure in the sector whereby private sector-led waste management projects are effectively cut off from investment;
ii. created a highly fragmented waste management ecosystem which challenges regulatory enforcement, lacks accountability, and obstructs the creation of effective waste management policy; and
iii. prevented the adoption of standardized waste management methods, such as sanitary landfilling and waste-to-energy (WtE) plants.

As a result, solid waste mismanagement has become a pressing national problem in Vietnam. Decades of waste mismanagement have led Vietnam to become the fourth largest marine plastics polluter in the world. Environmentally destructive waste practices, such as open-air incineration, illegal dumping, and unsanitary landfilling continue unchecked. Nearly 70% of MSW in Vietnam is disposed of in landfills, yet only one-fifth meet sanitary landfill standards[1]. Substantial amounts of ISW are estimated to be misprocessed using MSW channels or illegally discharged to reduce treatment costs.

The International Finance Corporation (IFC), the private sector arm of the World Bank Group, aimed to use a market-based approach to address Vietnam's urgent waste mismanagement issues. Specifically, IFC arranged the construction phase financing of the Bac Ninh WtE project, an 11.6 megawatt (MW) WtE facility in the northern industrial province of Bac Ninh. As an industrial hub, waste challenges are particularly profound in Bac Ninh. Moreover, sustained economic growth is increasing electricity demand. With hydroelectric generation near its full installed capacity in Vietnam and the development of other renewable technologies slowed by inefficient contracting processes, near-term electricity demand will be reliant on thermal fuel sources[2]. In this context, IFC saw the Bac Ninh WtE facility not only as an opportunity to promote WtE in Vietnam's transition towards improved waste management practices, but also WtE's role in decarbonization efforts aligned with Vietnam's Nationally Determined Contributions (NDCs) and Just Energy Transition Partnership (JETP)[3].

Bắc Ninh
Vietnam

This case study will focus on how IFC applied blended finance through the deployment of funds from the Finland-IFC Blended Finance for Climate Program (BFCP) to overcome barriers to financing in Vietnam's WtE industry for improved waste management practices at scale. More specifically, how IFC's use of blended finance successfully mitigated the project-specific risks, country-level risks, and counterparty risks endemic to WtE projects in Vietnam, which have systematically prevented commercial participation in the sector to date. As a pioneer transaction in the sector, the Bac Ninh project also enables price discovery for WtE assets in Vietnam, better aligning future investor risk perceptions with real risk.

1 Unsanitary waste processing is the third largest contributor to global methane levels in the atmosphere. Methane gas is estimated to be 80 times more damaging to the atmosphere than carbon dioxide. Unsanitary landfills also pose significant health risks, they increase the incidence of respiratory illness in immediate communities and can contaminate the water table through leaching.

2 In 2030 Vietnam's energy matrix is estimated to be comprised of approximately 45% fossil fuels and 55% non-conventional renewable energy sources. In 2020 there were only four operational WtE plants in Vietnam with a combined installed capacity of 13.5 MW or 1% of the country's estimated 1.5 gigawatts (GW) of potential WtE capacity.

3 A JETP is a financing mechanism designed to deliver large scale financing to emerging markets for the decarbonization of the energy sector that is also inclusive of domestic development priorities. Funding for JETPs is led by public resources as well as the mobilization of private sector capital.

How does Waste to Energy work?

WtE facilities convert MSW and ISW into electricity and heat through a series of steps:

STEP 1 Waste Handling

Waste is collected from consumers or producers, delivered to the WtE facility, and discharged into a large pit. The varying types of waste available to be processed by a WtE plant are known as **the feedstock mix**. A desirable feedstock is mainly comprised of waste with a higher **calorific value**, or energy generation potential, because it burns more efficiently. High calorific value waste typically includes materials derived from wood, such as paper and yard waste. Organic materials, such as produce, are considered to have low calorific value.

STEP 2 Combustion

A crane or claw transfers the waste from the pit into a combustion chamber where it is burned. Ash produced by combustion that remains on the floor of the chamber is known as **bottom ash**. Bottom ash is collected following combustion and can be recycled to recover metals and used as an aggregate in concrete and asphalt. **Fly ash**, ash which is dispersed in the air of the chamber, is captured and appropriately landfilled. An air pollution control system removes pollutants from the combustion gas before it is released into the atmosphere via smokestack. Air Pollution Control Residues (APCR) from flue gases are also captured and securely landfilled.

STEP 3 Energy Generation

The heat generated by combustion heats water in a boiler to create pressurized steam.

STEP 4 Electricity Generation

The pressurized steam enters one or more turbines to generate electricity, which is dispatched into the grid or transmitted to industrial customers.

The sale of electricity is one revenue stream for WtE facilities. Tariffs ($/kWh) are determined prior to the plant's commercial operations date under a power-purchase agreement (PPA) with the offtaker (utility company or private client). WtE facilities also generate revenue by charging fees to municipalities and/or companies for accepting waste at the plant. These are known as tipping fees. Tipping fees are typically calibrated to cover plant operating, maintenance, and overhead costs and a profit margin.

WtE is a partly renewable energy source because the biogenic element within the feedstock mix (i.e., organic materials such as wood, paper, and food) are considered renewable sources. Additionally, while these plants generate greenhouse gas emissions (GHGs), they divert a significant amount of waste from landfills which works to offset the GHGs produced through landfill decomposition (methane, carbon dioxide) by converting them into electricity, while filtering out harmful substances. They also create productive by-products for other uses (bottom ash). WtE schemes have been widely adopted in Europe, North America, Japan, and China.

Box 1. Overview of WtE facilities. Source: US Energy Information Administration.

WtE Investment Environment in Vietnam

Despite the potential of WtE, the sector has remained nascent in Vietnam because of a series of market barriers, including:

i. The Government of Vietnam's (GoV) historically ad hoc approach to WtE implementation.
ii. Vietnam's public-private partnership (PPP) regulatory regime lacks robustness and coherence.
iii. Waste supply contracts and PPAs associated with WtE plants in Vietnam lack effective pricing incentive structures.
iv. Waste characterization and logistical issues.

These challenges have converged to restrict cross-border and domestic private sector investment into the sector. Vietnam's 2011-2020 Power Development Master Plan, the national energy strategy under implementation leading up to the Bac Ninh project, did not include WtE, leaving the sector without a formal integration strategy and limited allocation of public sector funding[4]. Additionally, Vietnam's PPP law fails to sufficiently address key considerations for cross-border investors like foreign exchange guarantees, step-in rights, and revenue-sharing mechanisms. As a result, WtE projects are governed by investment law, which poses unique challenges to securing financing. For example, under Vietnam's investment law, existing waste supply contracts and PPAs do not meet internationally recognized standards because they lack sufficient provisions for debt termination compensation, compensation for grid curtailment, adequate measures to ensure government support in the event of legal or tax regime changes, and effective arbitration procedures[5]. As such, they are often deemed unbankable by most international financiers and would necessitate high-yielding loan structures, making the equity return for sponsors insufficient given the tariff regime offered by the government. With limited access to international creditors, WtE project sponsors must turn to domestic financing sources, such as commercial banks. However, fragmented government oversight and support due to inadequate PPP legislation have prevented local banks from building track records of investing in larger scale infrastructure projects and they are hesitant to enter the sector. Existing pricing incentives, such as tipping fee rates, have also failed to generate tangible private sector investor support for WtE projects. The GoV has been reluctant to increase tipping fees above $10-15 per ton, based on a WtE profit margin of 5%, because of the entrenched public opinion that waste removal should be free or at little cost to the client.

4 In 2021, the GoV introduced the National Electricity Development Plan 2021 to 2030, which prioritizes the acceleration of renewable energy adoption, including WtE, to diversify the national energy matrix. The roadmap outlines the aim to create nearly 1,200MW of installed WtE capacity in the country by 2030.

5 Grid curtailment occurs when a power plant curtails or reduces the amount of electricity produced because of reduced demand from the offtaker. This results in reduced revenue for the plant owner unless otherwise compensated.

The industry-level challenges presented IFC and other potential lenders with a suite of investment-level risks. These key risks are outlined in Table 1.

INVESTMENT RISK	RISK DETAIL
Construction Risk	• Construction cost overruns • Construction delays • Lower than expected operational productivity (waste processing/energy generation)
Legal/Contract Risk	• Waste contracts and PPAs fail to meet international standards • Termination clauses inadequate to recoup debt value, insufficient termination payment linked to PPA, no compensation clause linked to grid curtailment
Waste Supply Risk	• Non-renewal of MSW and ISW contracts • Poor waste quality (low calorific value) • Insufficient waste supply for efficient operation of plant
Tipping Fee Risk	• Potential for tipping fees to decrease
Offtaker Credit Risk	• Bac Ninh government has little to no energy tariff payment track record from WtE • Unknown creditworthiness of government entities and some ISW clients
Currency Risk	• Sharp depreciation of Vietnamese dong (VND) against USD (MSW tipping fee paid in VND) resulting in debt service challenges
Guarantee Risk (JFEE Parent Company, JFEH)	• In the case of substantial credit downgrade for JFEH
Guarantee Risk (TT)	• Downturn in waste management business in Bac Ninh

Table 1. Key lending risks presented by the Bac Ninh WtE project.

In 2014, the GoV took a step towards better integration of WtE plants into the country's waste management ecosystem and energy matrix by establishing a feed-in tariff (FiT) of 10.05 cents/kWh. The objective was to improve the appeal of WtE projects in Vietnam for private sector investors by offering a FiT rate that exceeded those available in already commercially viable renewable energy segments like solar and wind.

In 2019, following this regulatory shift, Thuan Thanh Environment JSC (TT), a leading private industrial waste management company in northern Vietnam, partnered with JFE Engineering Corporation (JFEE), a Japanese engineering firm, to begin the design, construction, and operation of an 11.6MW WtE facility in the Bac Ninh province, owned by joint venture special purpose vehicle (SPV) T&J Green Energy Ltd. (T&J Green Energy). The region, about 30km from Hanoi, is home to 16 industrial parks and has attracted over 1,400 foreign direct investment (FDI) projects from technology and manufacturing multinationals. Sustained industrial expansion has fuelled regional economic growth and, in turn, contributed to rapid urbanization, increasing the volume of waste generated and applying pressure on existing management processes. In 2019, the region produced 1,100 tons per day (tpd) of ISW and 1,000 tpd of MSW. Despite 90% of MSW being properly collected in Bac Ninh, 36% ends up in landfills, while 64% is incinerated in small, low-tech state incinerators with insufficient emissions control systems.

Structure and Governance

CAPITAL STRUCTURE

Construction financing for the Bac Ninh WtE project was structured using structured lending (legal architecture outlined in the Legal Structure Section). Total construction cost was $74.2 million. IFC provided the debt financing, with a 10-year, $15 million A loan for its own account and administered a 10-year, $15 million blended finance *pari passu* loan on behalf of the Finland-IFC Blended Finance for Climate Program, a facility capitalized by the Government of Finland and administered by IFC into investments that yield climate mitigation and adaption outcomes[6]. A subsidy (grant) was provided by the Government of Japan (GoJ) through the Joint Crediting Mechanism (JCM), a climate policy initiative developed to promote GHG reduction projects in developing countries. T&J Green Energy covered remaining project costs through equity. The IFC A loan is fully guaranteed by JFEE's parent company, JFE Holdings (JFEH), and the BFCP loan is fully guaranteed by TT.

SOURCE	INVESTMENT SIZE ($,millions)	SHARE OF PROJECT COST	PRICING	TENOR
IFC A loan (senior)	15	19.5	Market rate	10-year
BFCP loan (senior)	15	19.5	Market rate	10-year
JCM subsidy	-	-	-	-
Sponsor equity	-	-	-	-
Total project cost $ 74.2 M				

Table 2. Bac Ninh WtE financing structure.

Structured lending was needed for the Bac Ninh project because of the high counterparty risk presented by:

i. the unbankable waste supply contracts and PPAs linked to WtE projects in Vietnam, and

ii. unknown credit quality of local governments and private companies involved in the sector.

Typically, large-scale infrastructure and energy projects are

6 Targeted sectors for BFCP include renewable energy, energy efficiency, green buildings, climate-smart agriculture, and forestry.

funded through project finance. Project finance involves the creation of an SPV whose sole purpose, assets, and revenue streams are linked to the construction and operation of a specific underlying infrastructure asset. Importantly, this model "ringfences" or legally separates the SPV's balance sheet from that of its ownership, meaning lenders only have recourse against the SPV in the case of a credit event. However, construction and operational risks (e.g., tipping fee risk) for the Bac Ninh project exceeded what was feasible for lenders absent additional collateral, more stringent debt covenants, or guarantees provided by a creditworthy entity (i.e., investment grade rated parent company). By enabling the IFC A loan to take recourse against JFEE's parent company, JFEH, a Baa3 (Moody's) rated, publicly held company in strong financial standing, and the BFCP loan against TT, structured lending provided the necessary counterparty risk coverage to make the project bankable. Figure 1 below outlines the lending structure used in the project.

Even with the structural benefits afforded by corporate finance, blended finance was vital to solidifying the bankability of the project. Specifically, the presence of the BFCP loan and JCM subsidy had two functions in creating a sound financial structure:

i. it bridged a financing gap that was resulting in market failure, and

ii. it improved the credit standing of the project, creating a bankable financing structure.

First, the BFCP loan was able to absorb the elevated operational risk resulting from the unbankable waste contracts and PPAs without requiring a full guarantee from a creditworthy entity nor pricing in the project risk. Recall that there was no commercial investor appetite from local commercial banks, international financiers, or international development finance institutions (DFIs)/multilateral development banks (MDBs) (including IFC), for the level of perceived risk presented by contract bankability. Furthermore, TT's limited equity base and concentrated revenue streams presented too much balance

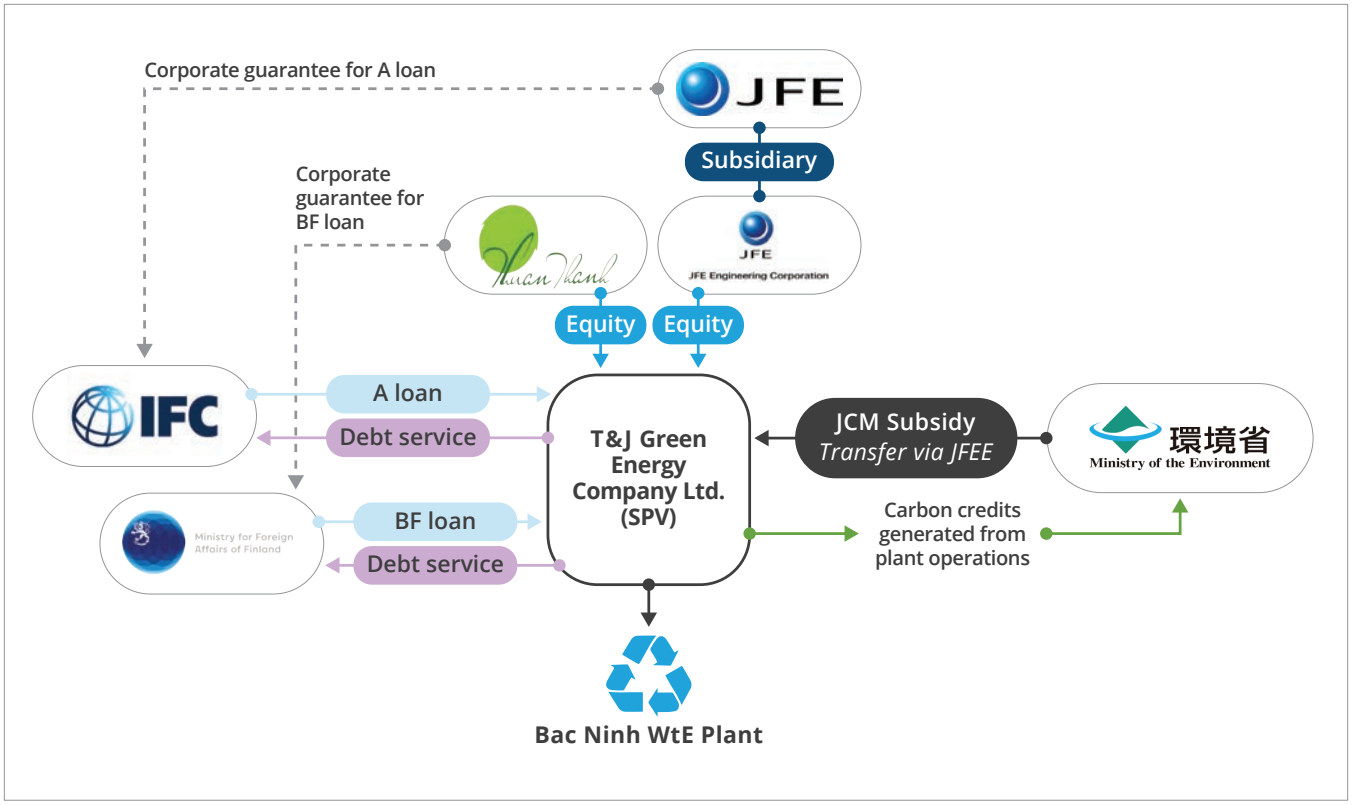


Figure 1. Lending finance structure of the Bac Ninh WtE project.

sheet risk. In the event of default, expected loss was markedly higher with only a corporate guarantee from TT compared to recourse against JFEH. In this context, the BFCP loan was the only viable financing option; it could feasibly absorb the added credit risk of TT and enabled IFC's A loan to receive the necessary full credit support from JFEH.

Second, the combination of the BFCP loan and JCM subsidy enhanced the credit quality of the borrower by:

i. keeping cost of capital within a viable threshold; and

ii. reducing financial risk by allowing for sufficient security measures on the debt.

The JCM grant helped to reduce overall cost of financing given reduced need for debt and equity. Critically for TT, this preserved the company's existing cash base and improved its credit standing. For JFEE, the lower upfront equity contribution allowed the company to meet its required equity hurdle rate. From the perspective of IFC, the subsidy could be treated as part of the project's equity base, strengthening the project's overall debt-to-equity ratio.

Lower financing costs allowed for more prudent debt service reserve account (DSRA) coverage and debt service coverage ratio (DSCR) covenants to be applied to IFC's A loan[7]. Violation of these covenants triggers the JFEE/TT guarantees for the A loan and BFCP loan respectively. The BFCP loan and JCM subsidy enabled the necessary cash reserves to permit these credit risk mitigation mechanisms.

Construction risk, waste supply risk, offtaker credit risk, tipping fee risk, guarantee risk, currency risk, and legal/contract risk are all at least partially mitigated by the presence of the DSRA and DSCR requirements, whose prudency was elevated by the BFCP loan and JCM subsidy. Table 3 below expands upon Table 2 and summarizes additional risk mitigation benefits of the transaction structure beyond the blended finance component.

REFINANCING

T&J Green Energy is in the process of refinancing the BFCP loan using senior local currency loans from domestic commercial banks. With the construction of the facility now complete the project's risk profile has become better aligned with the appetites of local commercial financiers.

A lack of project finance and infrastructure price discovery experience among Vietnamese commercial banks effectively prevents their participation in the development/construction phase of these transactions. Conversely, while legal/contract risks are the primary investment concerns for international creditors in the sector, local lender risk perceptions are markedly more lenient in this respect. With construction risk addressed, the project presented acceptable risk for local lenders and the blended finance loan could be replaced by commercial financing sources.

INVESTMENT RISK	ADDITIONAL MITIGATING EFFECTS OF TRANSACTION STRUCTURE
Construction Risk	• Recourse to JFEH/TT • Sufficient grace period
Legal/Contract Risk	• Recourse to JFEH/TT
Waste Supply Risk	• TT is the primary equity investor. Due to recourse to TT, strong incentive to perform • Supply or pay contract: T&J is compensated for any shortfall in waste supply
Tipping Fee Risk	• Recourse to JFEH/TT
Offtaker Credit Risk	• Recourse to JFEH/TT • FiT payment structure (10.05 cents/kWh) not a considerable burden for utility
Currency Risk	• Recourse to JFEH/TT • Only operating expenses and MSW fees denominated in VND. Depreciation in VND likely to lead to an increase in DSCR
Guarantee Risk (JFEH)	• Recourse to JFEH in the case of substantial downgrade

Table 3. Key investment risks and mitigating effects of the financial structure.

7 DSCR is a measure of a company's ability to pay its debt obligations at a point in time, taken as the ratio of net operating income to total debt service. A ratio below 1 suggests that the borrower is not generating enough cash flow to cover its debt liabilities.

Design and Fundraising

FUNDRAISING

At the time of the Bac Ninh project, IFC was deepening its engagement in Vietnam, including upstream support to reform key investment legislation like the PPP regime. The Vietnamese waste management sector attracted the attention of IFC for multiple reasons. First, were the significant development impact qualities of waste management projects. For example, poorly managed waste is a massive contributor to health risks, particularly in the vulnerable and informal communities that reside near landfills and dumping areas. Moreover, minimizing illegal dumping can reduce marine plastic waste proliferation, reduce GHG emissions, and protect local biodiversity. Second, the waste management sector is a core aspect of IFC's broader strategic mission of creating circularity within the waste system, which focuses on reducing waste, reusing materials, recovering value from waste streams, and creating jobs in the sector. Finally, specific to the Bac Ninh project, IFC had an established relationship with joint sponsor JFEE. JFEE's deep experience in the waste management sector, and WtE specifically, was a significant advantage for project bankability, impact, and replicability potential.

Early structuring options for mobilizing commercial debt included IFC's standard commercial products, such as IFC's Managed Co-Lending Portfolio Program (MCPP), B loans, and parallel loans, alongside IFC's own account financing. However, the unbankability of waste supply contracts and PPAs made Vietnamese WtE projects economically unfeasible for DFIs/MDBs and international commercial banks. Thus, additional risk-mitigation mechanisms were needed.

IFC went through multiple iterations of the financing structure. These included A/B loan structures fully guaranteed by JFEE's parent company JFEH, as well as A/C loan structures with upside income-sharing incentives. IFC and potential co-financiers sought the full backing of JFEH (via JFEE) over a corporate guarantee from its joint venture partner TT because of the latter's high credit risk due to its small equity base, lack of diversified cash flows, and the potential for the Bac Ninh WtE project to cannibalize existing revenue streams. As an investment-grade rated multinational company with diversified global revenue streams, JFEH was considered a creditworthy underwriter in strong financial standing. However, these options were deemed unfeasible for the borrower. The cost of project finance loans was too high given the project's risk profile and negatively impacted equity internal rate of return (IRR). Furthermore, an investment grade guarantee that would have allowed for cheaper debt was not viable because only one of the project shareholders was deemed acceptable credit risk. JFEE was reluctant to guarantee 100% of the project's debt since they only held a minority share in the joint venture.

THE CASE FOR BLENDED FINANCE

While in the process of fundraising, JFEE applied for a grant from the Japanese government via the JCM program to help subsidize project costs and boost equity IRR. Managed by the Japanese Ministry of the Environment and the Ministry of Economy, Trade, and Industry, the JCM enables the transfer and deployment of advanced low-carbon technologies and practices from Japanese companies to partner countries[8]. Under the JCM framework, projects that successfully reduce emissions are monitored, verified, and credited based on the quantifiable volume of emissions reduced. These emission reduction credits are then issued by the project and shared between Japan and the host country in accordance with bilateral agreements. These bilateral agreements ensure that both countries benefit from the emissions reductions, allowing Japanese companies to use their share of the credits to meet domestic emissions reduction targets, while the host country can count its share towards its own climate commitments under its respective NDCs. In 2021, the Bac Ninh project was awarded a grant under the JCM program.

Even with the JCM grant secured a commercially priced project finance loan structure was not viable. Blended finance was required because it could be tailored to target the critical investment barriers preventing the Bac Ninh project from proceeding. In line with blended finance principles, the BFCP loan filled the financing gap by:

i. absorbing a degree of counterparty risk deemed unfeasible by international lenders;
ii. providing capital that was otherwise unavailable in the local market due to limited investment experience in the asset class;

8 Eligible partner countries: Mongolia, Bangladesh, Ethiopia, Maldives, Vietnam, Laos, Indonesia, Costa Rica, Palau, Cambodia, Mexico, Saudi Arabia, Chile, Myanmar, Thailand, and Philippines.

(iii) crowding in private sector participation from the sponsors, including local entity TT; and

(iv) complying with the principle of minimum concessionality.

To the final point, while the BFCP loan was initially expected to improve the creditworthiness of the project by investing on concessional (below-market) terms, it was ultimately determined that the JCM subsidy provided sufficient credit support and equity upside protection. The core purpose of the BFCP loan was to fill the financing gap created by TT's credit risk. The BFCP loan thus bore the key investment risks that no other commercial instrument was willing to take on, moving the project to financial close. Within the final project capital structure, the price of the IFC A loan and expected equity IRR of the sponsors, buffered by the presence of the JCM grant, allowed for the BFCP loan to be fully priced for TT risk.

IFC had proof of success using blended finance in comparable circumstances. In 2019, IFC arranged and led the financing package for the Belgrade WtE project, which included a WtE facility that could process up to 340,000 tons of waste per annum into heat and electricity. This project showcased the economic viability of WtE in unproven markets and those with untested regulatory regimes, especially for complex PPPs. Furthermore, it offered important evidence of the tangible environmental and social benefits that can be generated by WtE facilities, including through landfilling remediation, waste processing that meets international standards, and reducing associated health risks caused by poor waste management practices. Box 2 below provides an overview of the Belgrade WtE project and its financing structure.

Vinča Landfill and Belgrade WtE facility

The project set out to develop a WtE facility at Europe's largest unmanaged dumpsite in the Vinča suburb of Belgrade, Serbia. The project consisted of establishing an Energy from Waste (EfW) Facility, a Landfill Gas-to-Energy (LFG) Facility, a new sanitary landfill, a Leachate Treatment Plant (LTP), and a Construction and Demolition Waste (CDW) Facility. IFC engaged in the project at its early development phase in 2015, when it was approached by the City of Belgrade to help design a PPP structure to execute the project. Until the project, Serbia lacked any formalized legislation for infrastructure PPPs. IFC provided upstream technical assistance, funded through blended finance from the Government of Canada, to improve the regulatory architecture for infrastructure PPPs and improve the efficiency of public sector management of these large projects. With a regulatory ecosystem that met international project development and investment standards, the city could more assuredly attract private sector investment. However, market, construction, country, and other investment risks remained barriers to garnering sufficient long-term investment appetite from international commercial creditors. Additionally, the project was a "first mover" transaction. With no established track record, investors were wary of potential uncertainties related to technology performance.

To overcome these challenges IFC turned to a blended finance structuring approach. A €20 million concessional senior loan from the Canada-IFC Blended Climate Finance Program was leveraged to lower the project's cost of financing, in turn reducing the burden of cost recovery through the city's waste payments. Additional concessional capital, totalling €21 million, was provided by the Green Energy Special Fund and administered by the Taiwan International Cooperation and Development Fund. Remaining debt financing was provided by IFC (A loan, €70 million; syndicated B loan, €65 million), European Bank for Reconstruction and Development (€72 million), Erste Group Bank (€35 million), the Development Bank of Austria (€35 million), and other commercial investors. Additionally, the Multilateral Investment Guarantee Agency guaranteed €97 million for non-commercial risks, covering up to 90% of investor equity into the sponsor company Beo Čista Energija d.o.o.

The Belgrade WtE facility started processing waste in February 2023 and full operations commenced by the end of the year. The facility has the capacity to convert 340,000 tpd of waste into heat and electricity, producing enough electricity to power 30,000 households and enough thermal energy to heat 60,000 households in the winter.

Box 2. Overview of the Vinča Landfill and Belgrade WtE Facility.

Legal Structure and Governance

A privately held joint venture company, T&J Green Energy Company Ltd., was created by Thuan Thanh Environment JSC and JFE Engineering Corporation for the purpose of developing, constructing, and operating the Bac Ninh WtE facility. T&J Green Energy is registered in Bac Ninh, Vietnam.

Thuan Thanh Environment JSC, founded in 2009, is a privately owned waste management company headquartered and operating in Bac Ninh province, Vietnam. The company has four primary lines of business:

i. trading/recycling scrap metal;
ii. treating MSW, ISW, and hazardous waste;
iii. treating wastewater from industrial parks; and
iv. other general waste management services for industrial clients, such as collection, transportation, cleaning, and environmental consulting services.

The Bac Ninh project was TT's second exposure to the WtE sector. Thuan Thanh Environment JSC is the majority shareholder of T&J Green Energy, holding 55% of T&J Green Energy shares.

JFE Engineering Corporation is a subsidiary of JFE Holdings, a publicly held multinational company domiciled in Japan and rated Baa3 (Moody's). JFEH's primary line of business is steel production. It also has diversified operations in engineering, shipbuilding, and real estate development, with an operational history dating back to the early 1900s. JFEE is JFEH's engineering arm and engages in a breadth of sectors including, recycling, pipelines, energy asset development, industrial machinery, sewage and sanitation, and waste management. All JFEE business lines aim to contribute to the achievement of seven Sustainable Development Goals (SDGs)[9]. At the time of the Bac Ninh project, JFEE had participated in 268 WtE facilities globally via engineering, procurement and construction (EPC) contractor, and/or operation and maintenance (O&M) services roles. The facilities have a combined total processing capacity of 92,000 tpd, with more than 80 domiciled outside of Japan (Europe, East Asia, and Southeast Asia). In 2021, WtE projects comprised the largest revenue share of JFEE's business lines. JFEE holds 45% of T&J Green Energy shares.

The EPC contractor for the project was JFEE and T&J Green Energy performed O&M responsibilities[10]. All electricity produced by the facility is sold to the Vietnamese national utility, Vietnam Electricity Corporation under a 20-year PPA using a FiT scheme of $10.05 cents/kWh. Under the lending structure, JFEE's full guarantee, applied to the IFC A loan, grants IFC recourse to JFEE in the event of default. Likewise, the TT guarantee covering the BFCP loan provides IFC, on behalf of BFCP, recourse against TT.

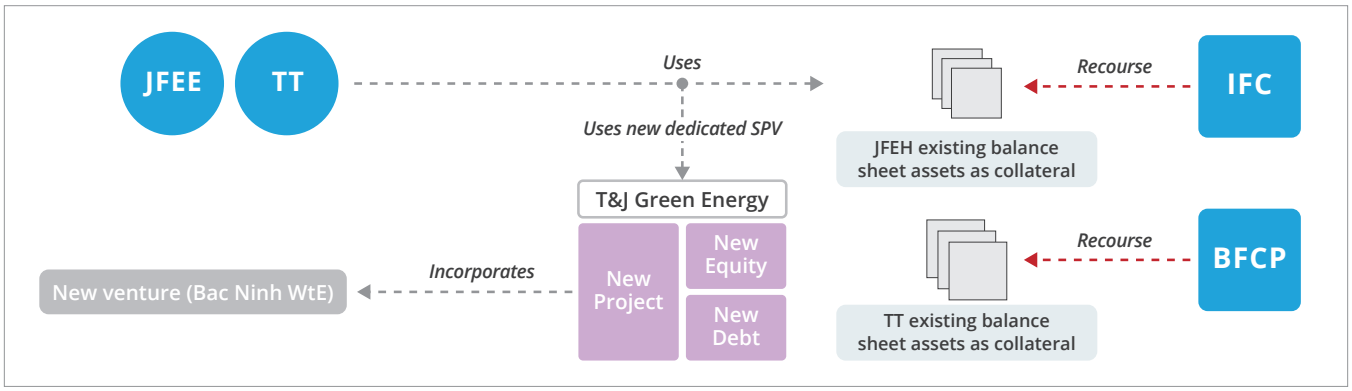


Figure 2. Legal architecture of the Bac Ninh WtE project.

9 SDG 6: Clean water and sanitation; SDG 7: Clean and affordable energy; SDG 9: Industry, innovation and infrastructure; SDG 11: Sustainable cities and communities; SDG 12: Responsible consumption and production; SDG 13: Climate action; SDG 14: Life below water.

10 EPC contracts are legal agreements used in large-scale infrastructure projects that oblige an EPC contractor to deliver to the developer (project sponsor/project owner) a "turnkey" facility or asset that is ready to commence operations by a guaranteed date, at a guaranteed price and that can operate at a guaranteed level of output. The selected EPC contractor either conducts the work themselves or sub-contracts specific responsibilities to other companies. O&M services entail all administrative, operational, maintenance, and general management services required by an infrastructure asset during its productive life.

Operations

ACTIVITY TO DATE AND IMPACT

Construction of the Bac Ninh WtE plant began in January 2022 and was completed in January 2024. The facility is capable of processing up to 350 tpd of MSW and 150 tpd of ISW collected across the Bac Ninh province by TT and features an advanced stoker incineration system with exhaust gas treatment provided by JFEE. The plant employs sophisticated systems for cleaning and monitoring flue gases, ensuring that its thermal waste treatment process is both environmentally responsible and efficient in generating electricity and heat. In addition to tipping fees for collecting waste, the plant also generates revenue by selling electricity to the national grid, with a generation capacity of approximately 72,250 MWh of clean energy annually.

The facility is expected to prevent approximately 40,000 tons of GHG emissions annually by reducing methane emissions and producing renewable energy. This represents an important contribution towards Vietnam's NDCs under the Paris Agreement, which aim for a 9% reduction in GHGs by 2030. The project also aligns with Vietnam's recently announced Power Development Plan 8, the updated national energy strategy which aims to increase the share of renewable energy sources in the country's energy matrix to at least 32% by 2030, with WtE accounting for nearly 1,200MW of capacity.

Currently, coal and liquified natural gas comprise 43% of Vietnam's energy matrix. With power generation capacity expected to more than double in the country by 2030, fossil fuel sources as a share of the energy mix are expected to increase to 45% by the end of the decade. Additionally, Vietnam's coal fleet (75 plants in total) remains quite young, disincentivizing their early retirement while they remain cost-effective. The GoV has been actively implementing strategies to reduce this dependency, including hosting one of the world's first JETPs. The Bac Ninh WtE project, and the WtE sector more broadly, represents an innovative, environmentally sound alternative to coal that can be supported under the JETP framework.

ADDITIONALITY

Given the scarcity of long-term financing for private sector led projects in Vietnam's WtE sector, the private indirect mobilization[11] generated by the joint IFC-BFCP participation is significant. By creating an asset that was aligned to the risk-adjusted return expectations of lenders and project sponsors, blended finance filled this financing void, and in doing so mobilized the necessary investment from both local and international private sector sponsors. The value of the achieved mobilization is underscored by the historical lack of local and central financial means to fund capital intensive WtE projects. With limited public sector resources available to the WtE industry, channeling greater sums of commercial investment becomes even more critical. Moreover, the mobilization of JFEE is particularly notable, as it represents the entry of a leading global WtE company into the Vietnamese WtE market.

The project also marks an important first step in demonstrating the investment case for WtE assets in Vietnam to international financiers, local commercial banks, and private sector sponsors. A greater prevalence of market-based WtE solutions is likely to grow the pipeline of investible opportunities in the sector, reduce budgetary strain on the public sector, and create scaled climate and development impact. As the sector's track record develops the need for subsidization and use of blended finance structures lessens, as perceived and real risk converge, and private sector capital becomes a competitive financing option. IFC has contributed to similar market-building effects in other segments of Vietnam's renewable energy market. Early projects, like the Lotus Onshore Wind project and the Ninh Thuan Solar project, were made possible through blended finance. These projects helped to scale cross-border investment in wind and solar technology in Vietnam by demonstrating their viability, and in turn, reducing perceived risks.

IFC's participation also provided non-financial additionality that would otherwise not have been realized given the industry-level challenges facing the WtE sector. While the expertise of JFEE and TT were vital, this project represented their first WtE investment in Vietnam. In this context, IFC provided regulatory and financial structuring guidance to help navigate the unproven investment environment. Additionally, IFC provided capacity building guidance to assist the sponsor in strengthening their management of environmental and social risks in line with IFC Performance Standards. This included support in developing a Stakeholder Engagement Plan and a Community Grievance Redress Mechanism, which have facilitated ongoing dialogue with stakeholders and created a formal process for addressing community concerns. This has led T&J Green Energy's implementation of community outreach and livelihood development initiatives, which are currently active in eight surrounding villages. Under these plans, the company has made financial contributions to low-income households, conducted monthly outreach meetings with community leaders, sponsored scholarship programs and spurred local employment. Over one-third of T&J Green Energy's staff come from the surrounding villages.

The project's success also bolsters the appeal of manufacturing and technology-based FDI in the Bac Ninh province. The development of a regional waste management ecosystem that meets internationally recognized standards is a signpost of coherent regulation and legislation and robust government oversight and understanding. Looking beyond the Bac Ninh region and the WtE sector, the Bac Ninh project serves as evidence of the importance of an enabling regulatory architecture to facilitate blended finance transactions, as well as what can be done by DFIs/MDBs to support the creation of these frameworks.

11 The MDB Task Force on Mobilization defines private indirect mobilization as financing from private entities provided in connection with a specific activity for which an MDB is providing financing, where no MDB is playing an active or direct role that leads to the commitment of the private entity's finance. This includes sponsor financing, if the sponsor qualifies as a private entity.

Key Insights

i Blended finance can address multilayered risk barriers that prevent private investment and result in market failure.

Vietnamese commercial banks were unwilling to invest in WtE projects due to their limited exposure to the sector and unfamiliarity investing in large-scale infrastructure assets. Likewise, international banks and development finance institutions were deterred by Vietnam's weak regulatory frameworks and the project's insufficient financial backing. These circumstances converged to create market failure in the Vietnamese WtE sector, such that most projects could not raise the necessary financing. IFC filled the financing gap, leveraging blended finance from BFCP. The BFCP loan was used to assume a level of operational risk (presented by the unbankable waste supply contracts and PPAs) and construction risk (presented by cost overruns and delays) that no other investor was willing to bear. Furthermore, it bore TT's credit risk, which was unviable for any alternative financing source. The use of blended finance was pivotal to aligning the project's risk profile to meet the needs of creditors while keeping costs down for sponsors. In this context, blended finance has significant financial and non-financial additionality. Pioneering transactions using blended finance prove the investment case for an asset class, leading to a deepening of investible projects in the sector, and eventually transitioning to wholly commercial markets.

ii Blended finance can be strategically structured to enhance the capacity and financial standing of local entities.

Domestic financiers and sponsors can contribute expert on-the-ground knowledge to a deal to enhance its appeal to investors and boost the development impact potential. In this case, TT had extensive experience in the waste collection and disposal industry, as well as knowledge of navigating regional regulations and securing permits. Nevertheless, the project initially struggled to secure financing due to TT's perceived weak financial standing. Blended finance, via the BFCP loan and JCM subsidy, addressed this critical investment barrier by improving the project's creditworthiness. This support enabled TT to maintain its ownership stake and actively collaborate with JFEE in implementing the project. While JFEE's comprehensive experience in the WtE sector and strong financial standing played an important role in IFC's participation in the project, supporting local leadership by enabling TT's involvement in a WtE project was a significant component of the transaction's overall additionality. Blended finance tools should be strategically designed to not only solve for the financial obstacles preventing individual project viability, but also build local counterpart capacity for long-term engagement in the sector. Furthermore, by taking on the construction risk of the project the BFCP loan unlocked more competitive refinancing from domestic commercial banks in the project phase that better aligned with their unique risk appetites. Involving local counterparts allows more experienced investors, like IFC, to directly help build sectoral and structuring knowledge within emerging market entities.

iii In weak regulatory contexts, early engagement between public and private sector stakeholders yields important insights for the deployment of blended finance tools.

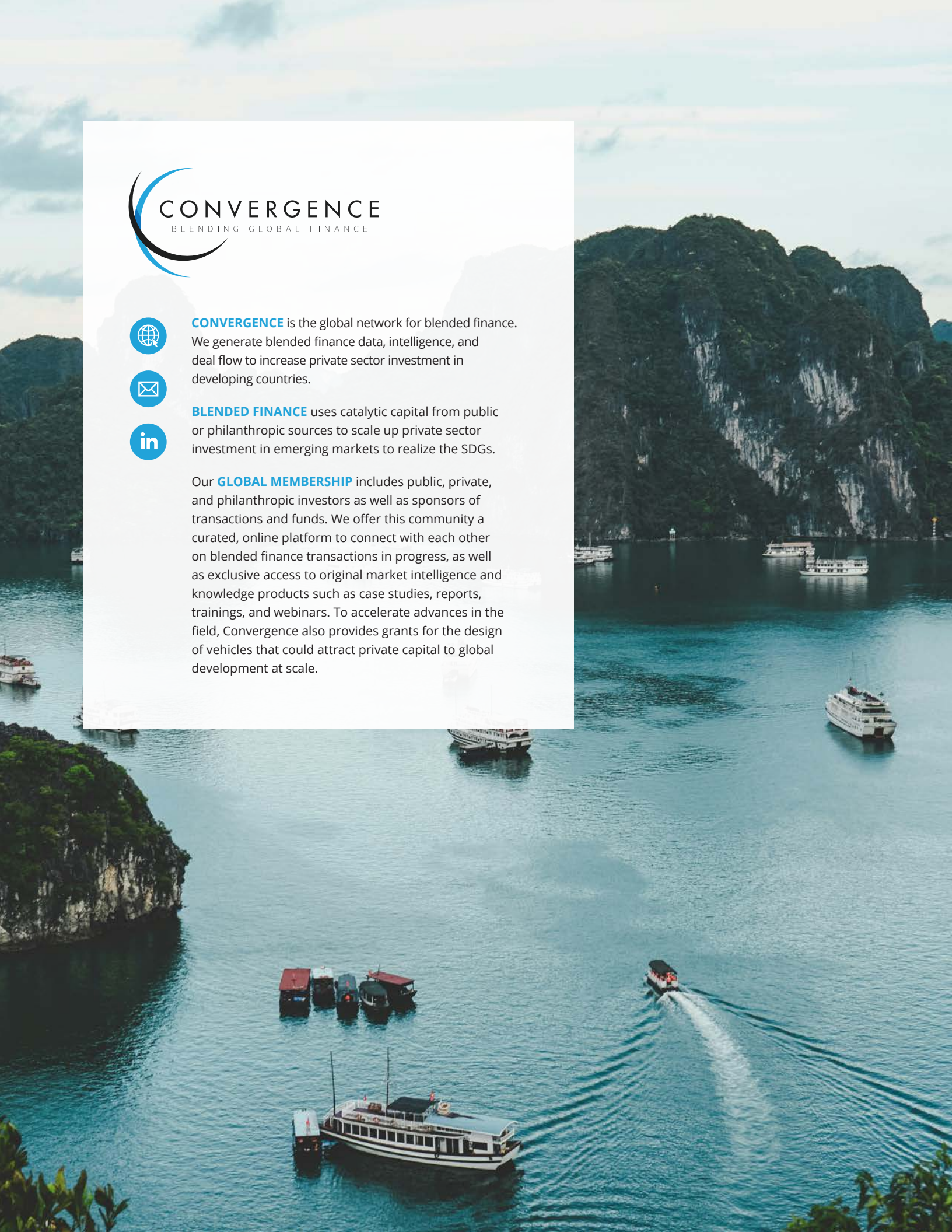
The regulatory landscape for WtE projects in Vietnam presented the Bac Ninh project with several bureaucratic, legal, and contractual issues. Leading up to the Bac Ninh project IFC was initiating upstream support activities with the GoV to ensure key investment legislation, like its PPP regime, met internationally recognized standards. In doing so, IFC was developing its holistic understanding of the infrastructure investment environment, including the link to the WtE sector and where and in what forms blended finance would potentially be most applicable. IFC's early-stage policy engagement laid the groundwork for the strategic shaping of the use of blended finance in the Bac Ninh project and helped inform which key risks could be addressed by regulatory amendments, and which would necessitate the deployment of additional risk mitigation instruments (blended finance). Ultimately, this allowed IFC to tailor the blended finance loan to mitigate specific political and project-specific risks. The Belgrade WtE project also exemplifies this point.

iv The use of blended finance by MDBs can priortize building market capacity for enhanced development impact, alongside private sector mobilization

IFC's engagement in the Bac Ninh project unlocked critical private indirect mobilization to overcome the lack of international creditor, local commercial bank, and public sector investment available to the market. It also enabled: knowledge sharing of WtE practices during the appraisal, development, and construction phases; allowed for the creation and promotion of international performance standards; and bolstered the wider investment appeal of the Bac Ninh region. Overall, this yields positive consequences for improved waste management, renewable energy production, emissions reduction and avoided health and environmental risks. The market demonstration effect of the Bac Ninh project is also of core importance. Early-mover deals deliver asset price discovery and financial and risk modelling benefits on an industry-level. Deeper sectoral understanding among private sector investors and developers will translate to capital mobilization on a wider scale.

v As WtE facilities become a more standardized component of holistic waste management strategies in Southeast Asia, there will be novel applications of blended finance.

The Bac Ninh facility is expected to demonstrate the tangible benefits of WtE plants in reducing landfill waste and curbing the environmental and health risks posed by waste mismanagement. With the sector's expansion, in Vietnam and Southeast Asia, there is potential for increased horizontal and vertical integration across the waste value chain. This includes the consolidation of companies, as well as the concentration of waste collection, segregation, and recycling responsibilities by companies operating at multiple nodes of the industry. As the WtE sector in the region becomes more sophisticated, blended finance will be pivotal to addressing novel risks and the specific needs of larger companies with more complex operations. For example, as WtE technology develops to capture greater efficiency or new processing potential, blended finance can be implemented to ensure acceptable operational risk. Likewise, new types of waste introduce greater complexity of client interactions for WtE asset owners. Blended finance can be implemented to reduce this interface risk by assuaging counterparty concerns.



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