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IMPLEMENTATION COMPLETION AND RESULTS REPORT
ON A LOAN
IN THE AMOUNT OF SDR 96.1 MILLION
(US\$150 MILLION EQUIVALENT)
TO THE
SOCIALIST REPUBLIC OF VIETNAM
FOR A
HOSPITAL WASTE MANAGEMENT SUPPORT PROJECT
February 15, 2019

Health, Nutrition, and Population Global Practice
East Asia And Pacific Region

CURRENCY EQUIVALENTS
(Exchange Rate Effective November 21, 2019)

Currency Unit = Vietnamese Dong (VND)
VND 23110.07= US\$1
US\$1.38 = SDR 1

FISCAL YEAR
July 1 – June 30

ABBREVIATIONS AND ACRONYMS

AAO	Anaerobic-Anoxic-Aerobic
CEHS	Center for Environment and Health Studies
CPF	Country Partnership Framework
CPMU	Central Project Management Unit
CPS	Country Partnership Strategy
CTS	Centralized Treatment System
DOH	Department of Health (Provinces)
DONRE	Department of Natural Resources and Environment
FA	Financing Agreement
GOV	Government of Vietnam
HCW	Healthcare Waste
HCWM	Healthcare Waste Management
ICR	Implementation Completion and Results Report
IRI	Intermediate Result Indicator
ISR	Implementation Status and Results Report
IVA	Independent Verification Agency
M&E	Monitoring and Evaluation
MOH	Ministry of Health
MONRE	Ministry of Natural Resources and Environment
PAD	Project Appraisal Document
PDI	PDO Indicator
PDO	Project Development Objective
PLR	Performance and Learning Review
PPMU	Provincial Project Management Unit
RBF	Results-based Financing
RFM	Results Framework and Monitoring
TAG	Technical Assistance Group
VIHEMA	Vietnam Health Environmental Management Agency

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DATA SHEET

BASIC INFORMATION

Product Information

Project ID	Project Name
P119090	Hospital Waste Management Support Project
Country	Financing Instrument
Vietnam	Investment Project Financing
Original EA Category	Revised EA Category
Partial Assessment (B)	Partial Assessment (B)

Organizations

Borrower	Implementing Agency
SOCIALIST REPUBLIC OF VIETNAM	MINISTRY OF HEALTH

Project Development Objective (PDO)

Original PDO

The project development objective is to reduce environmental degradation and potential risks for human health through the improved management of health care waste in Vietnam's hospitals.



FINANCING

	Original Amount (US\$)	Revised Amount (US\$)	Actual Disbursed (US\$)
World Bank Financing			
IDA-48990	150,000,000	145,060,260	122,354,138
Total	150,000,000	145,060,260	122,354,138
Non-World Bank Financing			
Borrower/Recipient	5,000,000	5,000,000	8,297,512
Total	5,000,000	5,000,000	8,297,512
Total Project Cost	155,000,000	150,060,260	130,651,650

KEY DATES

Approval	Effectiveness	MTR Review	Original Closing	Actual Closing
29-Mar-2011	29-Aug-2011	18-Aug-2014	31-Aug-2017	30-Aug-2019

RESTRUCTURING AND/OR ADDITIONAL FINANCING

Date(s)	Amount Disbursed (US\$M)	Key Revisions
05-Jun-2016	65.68	
21-Jul-2017	79.38	Change in Loan Closing Date(s) Other Change(s)
23-Aug-2019	117.01	Change in Components and Cost Cancellation of Financing Reallocation between Disbursement Categories

KEY RATINGS

Outcome	Bank Performance	M&E Quality
Satisfactory	Satisfactory	Substantial

**RATINGS OF PROJECT PERFORMANCE IN ISRs**

No.	Date ISR Archived	DO Rating	IP Rating	Actual Disbursements (US\$M)
01	01-Oct-2011	Satisfactory	Satisfactory	0
02	03-Mar-2012	Satisfactory	Satisfactory	1.00
03	02-Dec-2012	Moderately Unsatisfactory	Unsatisfactory	5.30
04	23-Jun-2013	Moderately Unsatisfactory	Unsatisfactory	7.37
05	29-Sep-2013	Moderately Unsatisfactory	Moderately Unsatisfactory	7.37
06	05-Apr-2014	Moderately Unsatisfactory	Moderately Unsatisfactory	11.75
07	02-Nov-2014	Moderately Unsatisfactory	Moderately Unsatisfactory	16.76
08	02-Apr-2015	Moderately Unsatisfactory	Moderately Unsatisfactory	16.76
09	06-Oct-2015	Moderately Satisfactory	Moderately Satisfactory	49.76
10	07-Apr-2016	Moderately Satisfactory	Moderately Satisfactory	55.56
11	21-Sep-2016	Moderately Satisfactory	Moderately Satisfactory	73.17
12	08-Mar-2017	Moderately Satisfactory	Moderately Satisfactory	77.11
13	14-Sep-2017	Moderately Satisfactory	Moderately Satisfactory	79.38
14	07-Mar-2018	Satisfactory	Moderately Satisfactory	88.44
15	16-Aug-2018	Satisfactory	Moderately Satisfactory	109.69
16	20-Feb-2019	Satisfactory	Moderately Satisfactory	117.01
17	28-Aug-2019	Satisfactory	Moderately Satisfactory	117.01

**SECTORS AND THEMES****Sectors**

Major Sector/Sector (%)

Health 60

Public Administration - Health 20

Health 40

Water, Sanitation and Waste Management 40

Sanitation 30

Waste Management 10

Themes

Major Theme/ Theme (Level 2)/ Theme (Level 3) (%)

Human Development and Gender 50

Health Systems and Policies 50

Health System Strengthening 50

Environment and Natural Resource Management 49

Environmental Health and Pollution Management 24

Air quality management 8

Water Pollution 8

Soil Pollution 8

Environmental policies and institutions 25

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I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

A. CONTEXT AT APPRAISAL

Context

1. **In the last two decades before the project appraisal, Vietnam had a sparkling economic performance, integrated with the global economy and industrial development based on the private sector, followed by increasing urbanization.** Since the late 1980s, the country has been in transition from centrally planned to market economy. From 2000 to 2011, Vietnam's economy grew at 6.2 percent yearly. The transfer from an import-substitution strategy to an export-orientation strategy has been in effect since the early 1990s, leading to the reformulation of macroeconomic, trading, and sectoral policies. As a result, the industrial sector experienced gradual productivity gains, as the country's economy became more open and gained deeper integration with regional and the world economies.¹ To support this integration process, the structure of the industrial sector was changed by the creation of export processing and industrial and economic zones, attracting the interest of foreign and non-state investors. Between 2000 and 2011, the number of non-state enterprises increased over 10 times and the industrial sector became gradually more capital intensive.

2. **As a result of this fast economic growth, the Government of Vietnam (GOV) was able to reduce poverty and provide substantial social policies.** Poverty rates in Vietnam have declined gradually in the past two decades: from 58 percent in 1993 to 28.9 percent in 2002, 14.5 percent in 2008, and 12 percent in 2011. Complementarily, the Government financed policies addressing the most vulnerable communes in the ethnic minority and mountainous areas to improve households; develop infrastructure; and provide essential public services such as electricity, schools, health clinics, small irrigation systems, roads, clean water, and sanitation, to enhance the people's awareness for better living standards and quality of life.

3. **Despite all the progress achieved in the last two decades, high economic performance posed environmental challenges and there was a need to manage emerging environmental issues to reduce potential consequences associated with their negative impact on human beings, especially on the poor.** A study from the London School of Economics and Political Science (Narloch and Bangalore 2018), combining geospatial data on eight environmental risks and household surveys' data in Vietnam from 2010 to 2014, found that (a) at the district level, the incidence of poverty is higher in high environmental risk areas; (b) at the household level, poorer households face higher environmental risks; (c) for some risks the relationship with household-level consumption varies between rural and urban areas; and (d) environmental risks explain consumption differences between poor and non-poor households. The study concludes that, in many aspects, Vietnam's poor are disproportionately exposed to environmental risks. Given the growing pressures due to climate change, addressing such risks should be the focus of poverty reduction efforts. The GOV, at project appraisal, was aware of the need for better environmental management among policy makers.

4. **At project appraisal, the health sector in Vietnam was evaluated as a significant generator of environmental risks and social complaints.** In 2010, Vietnam had 1,186 hospitals generating 350 tons per

¹ Vietnam became a member of the Asian Free Trade Area (1995) and the World Trade Organization (2006).



day of healthcare solid waste and about 150,000 m³ of wastewater, but surveys conducted during project preparation found that only 7 percent of these hospitals were able to properly treat hazardous solid waste and only 6 percent of hospital wastewater treatment plants met all the required parameters of effluent quality.² Most of the solid waste in hospitals were burned in incinerators, generating higher-than-standard concentrations of hazardous substances and black smoke. Medical waste also caused high levels of injuries among hospital staff, with contaminated sharp instruments and other infections, according a rapid assessment conducted by the Ministry of Health (MOH) in a sample of hospitals. Non-burning technologies, based on waste burying, increased the risk of waste spillage due to inadequate storage and transportation. To address these challenges, which received increasing complaints from communities and the media, the GOV introduced and encouraged the use of non-burning solid waste technologies in hospitals, including autoclaves and microwave disinfection. Wastewater treatment was also inappropriate in most hospitals because it contained enteric pathogens as well as chemical and pharmaceutical residues that affected the biological treatment process of urban wastewater. Communities, according to rapid surveys conducted by the MOH, often complained about the spread of diseases from hospital waste during floods.

5. **Before the project appraisal, the MOH, following the promulgation of Vietnam’s Environmental Protection Law of 2005,³ issued regulations on healthcare waste management (HCWM) in 2007.⁴** The National Strategy for Healthcare for 2011–2020 required that by 2020 all hazardous healthcare solid waste and all wastewater from hospitals and health units would be appropriately treated. To implement the new regulations, in 2010, the MOH established the Vietnam Health Environmental Management Agency (VIHEMA)⁵ with key institutional responsibilities for HCWM within the health sector, such as (a) implementation of environmental strategies and master and action plans, (b) preparation of legal documents and submission for approval, (c) provision of training and guidance for health workers, (d) conduct of environmental assessments for monitoring programs, (e) identification of environmental violations and recommendation of sanctions, (f) production of reports and information and creation of health environment databases, and (g) management and allocation of budgets for environmental protection projects in the health sector.

6. **Given the commitment of the GOV to universal health coverage and expansion of health facilities, HCWM, at project appraisal, was a strategic step to avoid environmental disruptions in the health system.** The 2008 Health Insurance Law called for universal health insurance in 2014. In 2011, the MOH launched the five-year plan for Vietnam’s health sector (2011–2015) promoting an increase in services infrastructure and shifting toward integrated health system strengthening initiatives and participation of the private sector in services delivery. This plan required total compliance in managing hazardous healthcare waste (HCW) under responsibilities of the health units. Hospital directors, with the

² Surveys were conducted in 2009 by the MOH, Administration of Health Services, and the Institute of Occupational and Environmental Health.

³ Law No. 52/2005/QH11, provides the overarching legal framework that enables the Ministry of Natural Resources and Environment (MONRE) to (a) provide overall coordination of environmental policies, (b) issue registry codes to hazardous waste generators (including hospitals) and licenses to waste management operators, (c) appraise environmental master plans and waste treatment technologies, (d) generate environmental ‘blacklists’ and propose solutions to the blacklisted agencies; (e) establish and operate environment monitoring systems, (f) proceed with intersectoral coordination on environmental issues, and (g) regulate and coordinate environmental inspection.

⁴ Decree 43/2007/QĐ-BYT.

⁵ Following the Prime Ministerial Decision 16/2007/QĐ-TT which allows the creation of environmental agencies in all ministries.



introduction of hospital autonomy (Government Decree 43), started to be responsible for all HCWM including maintaining infection control committees, establishing appropriate management procedures, and allocating resources for investment and maintenance of hospital waste management facilities. To support these efforts, in 2009, the GOV prepared a National Master Plan for Hospital Wastewater Treatment (at an estimated cost of US\$300 million), which could be partially financed by government bonds.

7. **The Hospital Waste Management Support Project was fully aligned with the World Bank's Country Partnership Strategy (CPS) in Vietnam for 2007–2011.** Following the GOV's awareness about environmental risks in the last decade, the World Bank had supported specific environmental management initiatives such as wastewater treatment and vehicular air pollution. The World Bank CPS, at the time of the project appraisal, stated in its Pillar 3 the need for more sustainable management of natural resources and reduced environmental degradation. The project team, based on the new country's legal framework, the current Bank country strategy and following the health authorities' request, addressed the need for better HCWM, considering the major risks that such hazardous HCW caused to humans and the environment.

Theory of Change (Results Chain)

8. **The project was designed to improve the life of Vietnamese people by reducing environmental risks with the interventions in the project hospitals and providing better environmental quality in the hospital surrounding areas.** In order to achieve this impact, the government of Vietnam was managed to attain a set of major outputs, including: (i) an adequate policy and regulatory framework for health care waste management at the central and provincial hospitals; (ii) investments to improve hospital capacities and skills for healthcare waste management, and; (iii) monitoring and surveillance systems to guarantee the achievement of adequate hospital environmental standards. These outputs facilitated the transformations making the project central and provincial hospitals to use their new or renovated hospital waste management facilities accordingly the environmental policies and regulation. The main outcome of this results chain was the reduction of environmental degradation and potential risks for human health producing the expected project impact, as shown in Figure 1 on the theory of change.

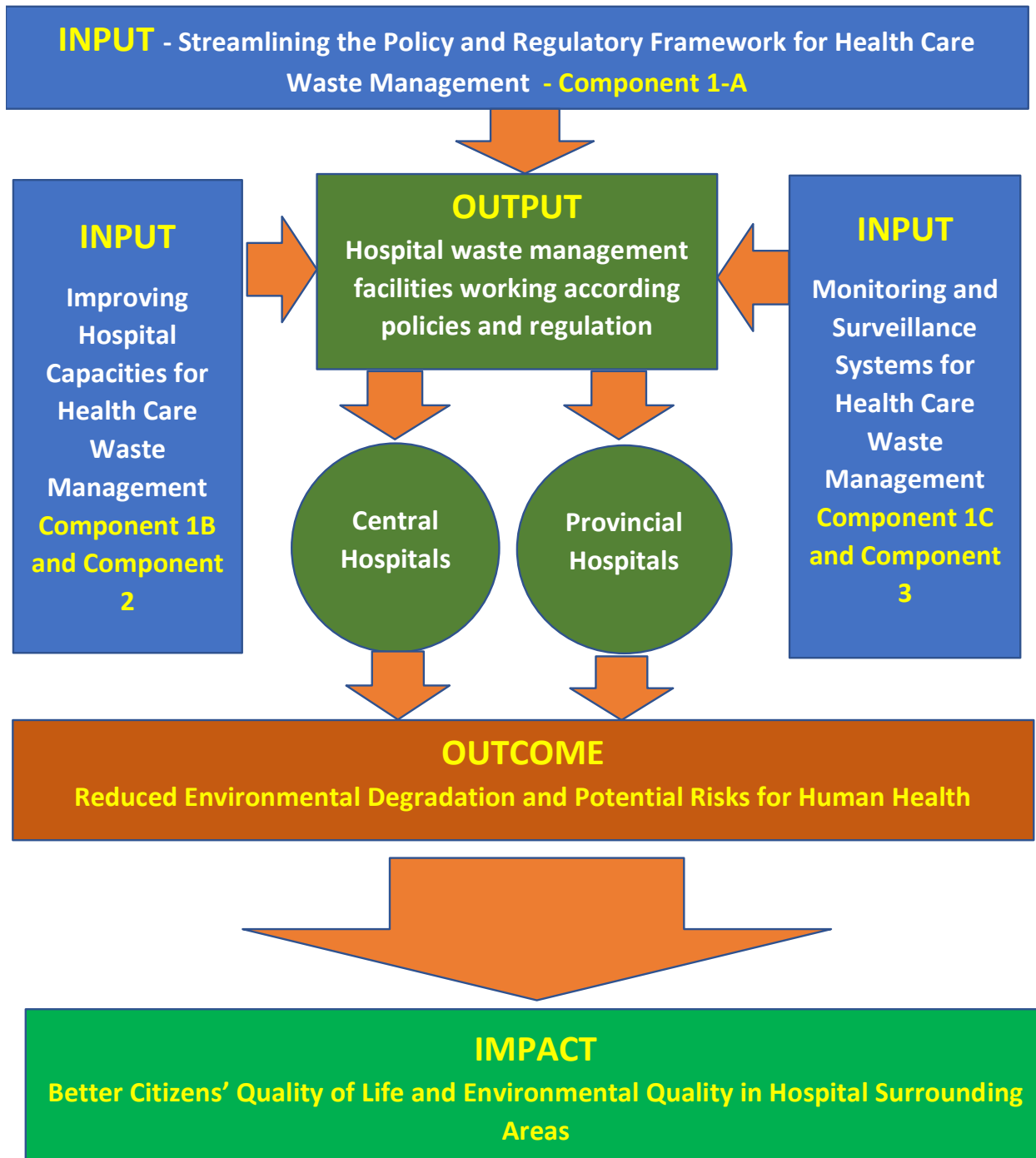
9. **The project was consistent with the overall government regulatory framework for HCWM, enabling the implementation of the HCWM policy in Vietnam.** It was structured as a sector investment loan and used for the disbursement of results-based financing (RBF) instruments, contributing to the improvement of solid waste management and wastewater treatment at the central and provincial hospitals by allowing these hospitals to invest in critical infrastructure, strengthening human resources skills and capacities, and creating sound systems of monitoring and evaluation (M&E) of the project results.

10. **The core set of activities in the project was the improvement of the HCWM systems including the treatment facilities in the beneficiary hospital.** Beneficiary central and provincial hospitals were selected to receive the project's investments based on their potential environmental risks in more densely populated areas. The main outputs of the investments were infrastructure construction/upgrades and provision of supplies and consumables for wastewater or solid waste management, as well as institutional capacity strengthened, and staff trained for HCWM and occupational health practices. Outcomes were reflected in reduced environmental degradation and lower risks for human health in the hospital areas as well as improved capacity of the hospitals to manage environmental risks from their healthcare activities



generating a greater impact in the communities' quality of life and improving the environment in the hospital surrounding areas.

Figure 1. Theory of Change





11. **Considering that hospital waste management was technically a new field for the client experience, the use of the Investment Project Financing (IPF) framework was the appropriate investment instrument to assure that the project funds would be used for the right purpose and the right choice of technology.** This allowed the Bank to intervene as needed in case of off-track of funds and investments. The project funded a Technical Assistance to support the institutional and regulatory framework necessary to improve the hospital waste management mechanisms and to increase hospital leaderships and health staff's awareness and skills to improve hospital waste management in the Vietnam.

12. **Besides increasing the hospitals' capacity to manage and treat solid waste and wastewater, the project was designed to improve the regulatory framework for HCWM as well as to create a sound process for M&E, enabling VIHEMA to improve health environment regulations, when necessary, and establish surveillance systems for HCWM.** The implementation and results of the project investments were monitored by four independent verification agencies (IVAs)⁶, which were identified during project preparation. The M&E instruments used by the IVAs consisted of guidelines/manuals for independent verification, balanced scorecards (set of indicators and targets), and verification questionnaires. During project implementation, the documents for independent verification were adjusted through three workshops between the Central Project Management Unit (CPMU) and four IVAs to be aligned with the revised and new regulations on waste management and environmental health and learn from experience. Based on the IVAs and hospital reports, the CPMU created central databases grouping the information produced by each provincial/hospital project waste management unit. A set of indicators about the quality of the HCWM system and results of opinion surveys about the quality of the environmental outputs of these hospitals were systematically produced, processed, evaluated, and disseminated by the CPMU.

Project Development Objective (PDO)

13. **The PDO, according to the project Financing Agreement (FA), is “to reduce environmental degradation and potential risks for human health through improving management of healthcare waste in the Recipient’s hospitals.”**⁷ The PDO has two intended outcomes or specific objectives: The efficacy of both outcomes was measured separately according to its respective indicators: (i) Objective 1 – Reduce environmental degradation and potential risks for human health; (ii) Objective 2 – Improving management of healthcare waste in the Recipient’s hospitals” .

Key Expected Outcomes and Outcome Indicators

14. **The Results Framework and Monitoring (RFM) was originally framed with 4 PDO indicators (PDIs) and 13 intermediate results indicators (IRIs).** According to the PAD, the four PDIs are the following: (a) increased share of hospitals' wastewater meeting the environmental standards; (b) increased share of

⁶ The project results were verified by four IVAs: (a) the National Institute of Occupational and Environmental Health, (b) the Pasteur Institute of Nha Trang, (c) the Central Highland Institute of Hygiene and Epidemiology, and (d) the Institute of Public Health Ho Chi Minh City.

⁷ The PDO in the Project Appraisal Document (PAD) is “to reduce environment degradation and potential risks for human health through the improved management of healthcare waste in Vietnam’s hospitals” which means mostly the same as what was written in the project FA. Therefore, the PDO analysis will be concentrated in the project recipient’s hospitals and not in all Vietnam hospitals.



properly segregated and treated infectious healthcare waste; (c) increased number of healthcare staff following correct occupational safety practices, including usage of personal protective equipment and an increased number of hospitals with better waste segregation, collection, and storage systems; and (d) improved perception among communities adjacent to project hospitals about healthcare waste management risks being properly managed.

15. **The PDIs measured outcomes related to the project objective, while the IRIs measured the project results linked with the implementation of the three project components.** Annex 1 (Results Framework and Monitoring) presents in detail the PDIs and the IRIs, describing their baselines and targets, as well as their link with the project components. Annex 1A (Project Efficacy Analysis) presents in detail the efficacy and results achieved by these indicators and its relationship with the project objectives and components.

Components

16. **The project was structured in three components.**

17. **Component 1: Policy and Institutional Environment Strengthening (US\$9 million) had three subcomponents:**

- **Subcomponent 1-A: Streamlining the policy and regulatory framework for healthcare and waste management (US\$1.5 million).** This subcomponent was dedicated to produce and update policies and regulatory instruments, environmental standards, and guidelines for HCWM and strengthen the Executive Committee for Environmental Protection in the health sector as an institutional platform for dialogue with other public authorities dealing with environment policy and knowledge dissemination to the health institutions at the central and provincial levels.
- **Subcomponent 1-B: Strengthening capacities for healthcare waste management (US\$1.1 million).** This subcomponent was spent on equipping institutions responsible for implementing, operating, regulating, and monitoring HCW with adequate skills and knowledge to fulfil their responsibilities as prescribed in the relevant laws and regulations.
- **Subcomponent 1-C: Strengthening monitoring and surveillance systems for healthcare waste management (US\$6.4 million).** This subcomponent was for enhancing the systems and capacities for improved monitoring and enforcement and improving capacities and infrastructure at the central- and provincial-level facilities to monitor pollutant environmental standards and HCWM practices.

18. **Component 2: Hospital Waste Management Improvement Facility (US\$134 million).** This was the core component of the project. This component provided grants to finance HCWM subprojects in eligible central and provincial hospitals, prioritizing those hospitals highlighted in the Provincial Healthcare Waste Management Plans and using result-based financing (RBF) instruments.

19. **Subcomponent 2-A (US\$40 million) financed central hospitals, while Subcomponent 2-B (US\$94 million) financed provincial hospitals.** The grants related to this component financed infrastructure construction and equipment for wastewater or solid waste treatment and management; strengthening of



institutional capacity, such as enabling infection control committees in hospitals and staff training in wastewater management-related activities; and provision of supplies and consumables for healthcare waste management and treatment in the hospitals. The results from the investments under each grant were verified by the IVA designated by the CPMU and monitored through the Government's regular systems, including internal monitoring by the MOH and inspections by enforcement agencies such as provincial Department of Natural Resources and Environment (DONRE), MONRE, and the Environment Police of the Ministry of Public Security.

20. **Component 3: Project Implementation Support and Coordination (US\$7 million).** This component supported the establishment of the CPMU under the MOH and the coordination between the CPMU and the other concerned ministries and agencies for project implementation. It also financed consulting services for technical issues, project management and supervision, procurement, disbursement, financial management, project audit, independent technical verifications, and training of project management staff and training workshops for the preparation of grant applications, as well as provision of office equipment and vehicles and other expenses for the government management units such as the CPMU, IVAs, and Provincial Project Management Units (PPMUs).

21. **The total project cost, which was originally estimated as US\$155 million, consisted of US\$150 from a lending instrument of specific investment loan and US\$5 million as counterpart funds from the central and local governments.** The counterpart funds were used to pay salaries of the CPMU and PPMU teams and other related expenses to enable project implementation by the Government.

B. SIGNIFICANT CHANGES DURING IMPLEMENTATION (IF APPLICABLE)

Revised PDO and Outcome Targets

22. **The PDO remained unchanged during the project's life.** However, the RFM was improved during the first project restructuring. The project was restructured three times: the first in June 23, 2016, the second in July 25, 2017, and the last in August 22, 2019. The first project restructuring removed the RFM from the FA and transferred it to the Project Operations Manual. The second restructuring revised the project description slightly and extended the project closing date from August 31, 2017, to August 31, 2019. The third project restructuring canceled US\$5.0 million of the loan amount.

23. **Another important change was the increase in the number of hospitals benefited by the project.** During the project preparation, as can be seen in the PAD, the project will finance grants for 150 hospitals. However, in 2015, the number of benefited hospitals was increased to 218 (including 1 centralized treatment system (CTS) for healthcare solid waste). Eight hospitals received two separate grants (one for solid waste and one for wastewater), making the total number of grants and independent verifications 226.

24. **Changes in the first restructuring.** The first project restructuring was part of an omnibus restructuring of 13 projects to increase flexibility in the RFM management when necessary. This restructuring deleted the project's RFM from the Supplemental Letter No. 2 of the FA and included it in the project Operations Manual. The proposed level 2 restructuring responded to the request from the State Bank of Vietnam, received on May 10, 2016, as part of the omnibus amendment of financing agreements to assist the facilitation of timely and successful implementation activities and results. The



request was to move the project performance indicators from the Supplemental Letter No. 2 of the FA to project Operations Manuals to limit the need for future amendments to adjust monitoring indicators only.

25. **Changes in the second restructuring.** The second project restructuring introduced small changes in the original FA to make the redaction more precise and flexible and to change the project closing date, as described in table 1.

Table 1. Changes in the Project Components Comparing the Original FA and the Amendment of July 25, 2017

Parts of the FA	Text in the Original 2011 FA	Changes in the 2017 Amended FA
Part I (b) of Schedule 1	(b) Strengthening institutional capacity for healthcare waste management, including (i) development of training modules and training plans; (ii) training of trainers at central government level; (iii) training of leaders, administrators, and technical staff in central and provincial government health agencies, healthcare facilities, and preventive health centers; and (iv) training of staff in healthcare facilities	(b) Strengthening institutional capacity for healthcare waste management, including: (i) development of training modules and training plans; (ii) training of trainers at central government level; and (iii) training of leaders, administrators, and technical staff in central and provincial government health agencies, healthcare facilities, and preventive health centers
Part 1 (c) of Schedule 1	Strengthening monitoring and surveillance systems for healthcare waste management, including (i) provision of equipment, facilities, and vehicles and (ii) development of a web-based software application to provide information on healthcare waste management practices	Strengthening monitoring and surveillance systems for healthcare waste management, including: (i) provision of equipment, facilities, and vehicles and (ii) upgrade of a web-based software application to provide information on healthcare waste management practices
Paragraph (e) of Section I.C. 1 of Schedule 2	Each Sub-Project proposal shall include a Healthcare Waste Management Plan, satisfactory to the Association, and prepared in accordance with the provisions of the Environmental Guidelines.	Each Sub-Project proposal shall include a Healthcare Waste Management Plan, satisfactory to the Association, and prepared in accordance with the provisions of the Environmental Guidelines. All Healthcare Waste Management Plans included in Sub-Project proposals for Central Hospitals shall be subject to the Association's prior review.
Section I.C.3 of Schedule 2	Without limitation to the provisions of the above paragraph 2 of Section I.C of this Schedule 2, unless the Association shall otherwise agree in writing, Grants' proceeds shall be disbursed to Beneficiaries in accordance with the following provisions: (a) fifty percent (50%) of the Grant amount will be disbursed upon signing of Grant Agreement between the Recipient and the Beneficiary; (b) forty percent (40%) of the Grant amount will be disbursed upon receipt by the CPMU of a satisfactory progress report, and; (c) ten percent (10%) of the Grant amount will be disbursed upon a receipt by the	Deleted. The rationale for the deletion of this section is the need to more flexibility on the provisions schemes to attend the needs of each individual grant disbursement which are different. The previous rigid scheme of provisions did not work and was one of the problems causing delays in the project implementation and grants disbursement process.



Parts of the FA	Text in the Original 2011 FA	Changes in the 2017 Amended FA
	CPMU of a satisfactory report from an IVA on the results produced by the Beneficiary under the relevant Sub-Project.	
Section IV.B.2 of Schedule 2	The closing date is August 31, 2017	The closing date is August 30, 2019.

26. **Changes in the third restructuring.** The last project restructuring only cancelled, by request of the Ministry of Finance of Vietnam, the amount of SDR 3.6 million (US\$5 million equivalent) and this cancellation did not compromise the achievement of the PDO and results targets. In fact, out of 225 hospitals, 216 hospitals had completed their grant activities before the end of August 2019 according to the independent results verification and two hospitals are on track to finalize them in the six months following project completion.

27. **Changes in the project RFM.** The RFM was formally revised in the Aide Memoire of the Implementation Support Mission of January 11–15, 2016. This Aide Memoire included, in its Annex 2, updates and revisions to the RFM, which were included in a revised version of the Project’s Operation Manual following the agreed changes in the first project restructuring transferring the RFM from the FA to the Operation Manual. The new RFM used updated and more reliable and consistent data (including the previously inexistent indicators protocols) to guarantee more precision to the project indicators. On the other hand, the reviewed RFM also reflects a higher number of hospitals included as beneficiaries of the project. The PAD suggested 150 beneficiary hospitals, and after implementation, this number was increased to 218 (with 225 grants given that 8 hospitals received two grants and 1 grant for CTS).

Revised PDO Indicators

28. **The PDIs did not change during project implementation despite changes in their targets.** At project preparation, the RFM did not use any baseline survey nor realistic estimations to set the targets associated with the PDIs and IRIs, especially in the technical aspects related to meeting environmental standards. Therefore, the RFM was reviewed in 2016 adjusting the targets for two of the four PDIs, as can be seen in table 2. The major justification for such reductions is the fact that the original design was supporting about 150 hospital, but the total number of beneficiary hospitals increased to 218 in 2015 and an additional number of satellite hospitals were also included to be benefited from the invested cluster treatment systems for solid waste. The original targets were based in inaccurate 2010 data estimations. The new revised denominators were based on 2015 data surveys generating a sound baseline and most of the grant amounts were adjusted to reflect this more accurate data. Given the increased number of beneficiary hospitals, the original targets were rough estimates without knowing the number and names of project hospitals. As consequence, the use of 2015 data as a baseline, instead of 2010 data, required changes and adjusting the targets according to more realistic assumptions.

Table 2 - Changes in the PDIs’ End Targets during Project Implementation

PDIs	PDI End Targets (2011)	PDI End Targets (2015)
Increased share of hospitals’ waste water meeting the environmental standards	40%	23%



PDI	PDI End Targets (2011)	PDI End Targets (2015)
Increased share of properly segregated and treated infectious HCW	40%	28%
Increased number of healthcare staff following correct occupational safety practices, including usage of personal protective equipment (no change in target)	90%	90%
Improved perception among communities adjacent to the project hospitals about health waste being properly managed	90% (2017)	90% (2019)

29. **The IRIs also changed during the RFM formal review in early 2016.** According to the Aide Memoire of the Implementation Support Mission of January 11–15, 2016, the agreed Results Framework dropped five IRIs (four for Component 1 and one for Component 3) and add one new indicator and one new sub-indicator in Component 1. Some indicators were revised to better measure the project performance and ensure reliable and adequate information for such measurements. On the other hand, some indicators were dropped due to irrelevance or duplication (they were already measured by other indicators). Some original project activities were dropped from the project design because they started using other sources of funding. The RFM also reviewed and added some indicators to reflect the new interventions included during project implementation to attend to the needs for investment and training. The substantive changes in the IRIs were an extension of the accomplishment of the targets by two years, consistent with the proposed extension of the project closing date. Table 3 shows changes in the IRIs along the project, resulting in a reduction from 24 to 17 targets and sub-targets. More details are shown in annex 1.

Table 3. Changes in the IRIs and Targets and Sub-Targets along Project Implementation

24 IRI Targets and Sub-Targets According to the PAD (2011) –	Final Target (2017)	17 IRI Targets and Sub-Targets According to the January 11–15, 2016 Implementation Supporting Mission	Final Target (2019)
Component 1: Policy and Institutional Environment Strengthening			
Increased knowledge and skills of key health personnel in healthcare waste management standards and practices	5,463	Increased knowledge and skills of key personnel in healthcare waste management standards and practices	6,677
1. Trainers	276	1. Trainers	290
2. Leaders of health, DONRE, Environment Police, other agencies	2,545	2. Leaders of health, DONRE, Environment Police, other agencies	2,545
3. HCMW administrators in DOH, healthcare facilities, preventive health centers	2,332	3. HCMW administrators in DOH, healthcare facilities, preventive health centers	2,332
4. Technical staff in environment monitoring agency	310	4. Technical staff in environment monitoring agency	310
		5. HCW treatment system operator (<i>new sub-indicator</i>)	1,200
The number of new revised policies, regulatory documents adopted and applied HCWM studies published and disseminated	13	The number of new or revised policies, regulatory documents completed	13
5. Policy and administrative documents	4	6. Policy and administrative documents	4
6. Technical regulations	4	7. Technical regulations	4
7. Technical guidance manuals	5	8. Technical guidance manuals	5



24 IRI Targets and Sub-Targets According to the PAD (2011) –	Final Target (2017)	17 IRI Targets and Sub-Targets According to the January 11–15, 2016 Implementation Supporting Mission	Final Target (2019)
8. Workshops with stakeholders	0	<i>Dropped because no target was established, but several workshops with stakeholders were delivered during the project life.</i>	-
9. Fully functional executive Committee for Environmental Protection in the Health Sector having regular intersectoral meetings	1 per year	<i>Dropped: No longer relevant as the institutional arrangement was changed</i>	—
Four scientific institutes/Regional reference labs and provincial preventive health centers have strengthened capacity for testing of solid and liquid healthcare waste		<i>Dropped: The Government stopped the use of the project funds for capacity-building activities, limiting the use of these funds for training activities. On the other hand, provincial preventive health centers started to be financed by other sources.</i>	—
10. Regional	4		
11. Provincial Preventive Health Centers	5		
Central and Provincial hospitals receiving scheduled environmental monitoring visits		<i>Dropped: integrated with the IVA reports. The regulation requires quarterly monitoring visits by professional environment monitoring agencies included in the IVA reports. Based on this the indicator became irrelevant.</i>	—
12. Central Hospitals	50%		
13. Provincial Hospitals	35%		
14. Functional web-based software application to provide up-to-date and transparent information about the status of HCMW in hospitals	250	<i>Dropped: the software was financed by other sources</i>	—
—	—	9. Reduced number of hospitals in blacklist issued in the Decision 1788 by Prime Minister (new indicator)	32
Component 2: Hospital Waste Management Improvement Facility			
15. Number of HCWM plans approved	60	10. Number of HCWM plans approved by regulatory authority	68
16. Number of hospital grants approved	150	11. Number of hospital grants approved	198
17. Number of hospital grants completed	150	12. Number of hospital grants completed	185
Number of hospitals meeting:		7. Number of hospitals meeting:	
18. waste water standards	140	13. waste water standards	110
19. solid waste standards	140	14. solid waste standards	114
20. HCWM practice standards	140	15. HCWM practice standards	185
Component 3: Project Implementation Support and Coordination			
Smooth implementation and monitoring of grant implementation		<i>Dropped: no longer relevant</i>	—
21. credit resources committed	100%		
22. credit resources disbursed	100%		
23. Effective Monitoring - M&E framework indicators updated regularly	100%	16. Progress report and audit report are submitted with satisfactory quality and timely manner (refurbished)	100%
24. Effective CPMU and TAG support to Component 2 beneficiaries	80%	17. Effective CPMU and TAG support to Component 2 beneficiaries	80%

Note: DOH = Provincial Departments of Health. TAG = Technical Advisory Group



Revised Components and Project Funding

30. **The small changes introduced in the second restructuring responded to an increase in the number of hospitals financed by the project and the need to update the project’s implementation scheme.** Table 1 provided a detailed description of the changes introduced in the project. During project implementation, the number of hospital grants increased from 150 to 225 and the number of benefited hospitals from 150 to 217 and 1 CTS (8 hospitals received two separate grants for solid waste and waste water treatment systems). Some precision was introduced in the redaction of some of the activities listed in the FA.

31. **The third restructuring included changes in the project costs.** An amount of US\$5 million equivalent in the loan was unused and cancelled, on the Government’s request, to recommit this amount for IDA projects in FY2020. Table 4 shows the reallocation of the project funding according the original allocations and the final allocations after the August 2019 restructuring.

Table 4. Project Financing: Original (2011) and after Changes in August 2019

Original Project Financing According to the PAD			Project Financing after the 2019 Restructuring		
Components	US\$, millions	%	Components	US\$, millions	%
Component 1	9.0	6.0	Component 1	8.5	5.9
Component 2	134.0	89.3	Component 2	129.8	89.5
Component 3	7.0	4.7	Component 3	6.7	4.6
Total	150.0	100.0	Total	145.0	100.0

32. **At February 15, 2020, the cumulative withdrawn amount was US\$120.7 million, or 92.2 percent of disbursement ratio.** It is important to highlight that the resources cancellation in the third restructuring and the fact that the project has disbursed less than the original committed loan amount could be attributed to constraints in the government budget allocation for the project, which systematically limited the amount of resources allocation under the project disbursement needs. This kind of problem is affecting most of Bank projects in Vietnam requiring a systemic solution, such as negotiations between the Bank and the Government to get extended periods for projects implementation.

Rationale for Changes and Their Implication on the Original Theory of Change

33. **The changes introduced during the project implementation resulted from the lessons learned from the earlier years of the project implementation and were consistent with the original theory of change.** The project performed unsatisfactorily in terms of its development objective and implementation performance from 2012 to 2015 due to (a) lack of the Government’s familiarity with the RBF project concept; (b) complicated processing procedures and lack of capacity in health waste management, particularly in the selection of appropriate solutions and technologies, by the provincial hospitals and health authorities; and (c) weak capacity of the CPMU and the PPMUs. The project’s disbursement remained very low until 2015 due to slow progress on approval procedures for grants, procurement plans, and bidding documents at both the central and provincial levels. The Government decided to halt the new investments but reviewed the past ones, learned the lessons, and improved its institutional arrangements and implementation capacities. The changes introduced under the 2015–2017 restructuring process contributed to increasing the implementation capacity at the central and provincial levels, hence speeding



up disbursement in the following years. They also contributed to allow better measurement of the project results, contributing effectively to achievement of the PDO.

II. OUTCOME

34. **The assessment of outcomes is analyzed in one phase.** The reason for using one phase is based on the following arguments:

- (a) The project scope was expanded along its implementation, as the number of beneficiary hospitals, expected to be 150, expanded to 217 and one Centralized Treatment System (CTS) totalizing 218 units for healthcare solid waste and the project included, as part of its beneficiaries, the satellite hospitals in the provincial cities and district areas where the project was implemented, making the accomplishment of the development objective more ambitious.
- (b) The project's RFM did not have substantial changes along its implementation, only adjusting the final targets according to more accurate evidence and reducing or replacing a small number of IRIs irrelevant to the project design and country context.
- (c) The PDIs were kept the same before and after the 2015 restructuring and the IRIs had no substantial changes.
- (d) The introduced changes, based on the best practices from other World Bank-financed projects, did not affect the assessment of the overall project implementation and helped improve the measurement of the project results in the new context.

A. RELEVANCE OF PDOs

Assessment of Relevance of PDOs and Rating

Rating: High

35. **The Project has two PDOs: Reduce environmental degradation and potential risks for human health (PDO1) and Improve management of healthcare waste in the Recipient's hospitals (PDO2). The relevance of both parts of the PDO is High.** Both PDOs are relevant because in the context of Vietnam improperly treated healthcare wastewater from hospitals increases the risks of infections, diseases, and chemical contamination that affect human health. At the same time, burning technologies for hazardous hospital waste creates atmospheric pollution, increasing the risks for respiratory diseases and affecting the health of the human population living near the hospitals.

36. **Both PDOs responded to the needs of the current Vietnam laws, policies, and strategies relating to waste management,** particularly Decision No.2149/QĐ-TTg-2009, which approved the National Strategy on Management of all kinds of Solid Waste until 2025 and the vision to 2050 and Decision No. 491/QĐ-TTg-2018, which made amendments to this strategy. Such documents establish that by 2025, the management system for solid waste should have waste segregated at source, collected, recycled, and effectively managed, with appropriate and advanced technologies, encouraging HCW treatment by cluster models. Article 72 of the Environment Protection Law (number 55/2014/QH13), defined that



hospitals and health facilities must segregate HCW from the sources, collect, store, and manage solid HCW following technical standards. Decision No. 1930/QĐ-TTg-2009 provided directions for drainage in urban areas and industrial zones for 2025 and the vision to 2050, in which it defines that, by 2015, all wastewater from hospitals must be treated and meet the approved national standards before disposal into the general drainage systems in urban areas.

37. **The MOH, with the financial support from the project, developed policies, norms, and actions to improve hospitals' waste management quality, aiming at clients' safety and satisfaction.** Several policies, legal documents, standards, and technical guidelines were developed or updated with the project's support. These documents have potentially significant positive impacts for healthcare hazardous waste management in Vietnam. Many public hospitals that benefited from the project built new or upgraded existing infrastructure, of which special focus was paid to improving HCWM and controlling hospital infection. In 2015, the MOH approved the set of National Criteria for hospital quality assessment with some specific criteria related to HCWM, environment, and hygiene within hospitals. Awareness on environment protection in healthcare activities of hospital managers and health staff has been significantly improved.

38. **The project was relevant as it contributed in significant part to improve and implement current environment regulations, in general, and in the health sector.** It contributed to create the capacity building and facilities of VIHEMA and four IVAs to better manage, monitor, and evaluate environmental risks in the health sector. These technical and administrative structures will maintain their relevance to monitor and manage environment risks after project closing.

39. **Both PDOs were kept relevant to the CPS 2012–2016, as stated in Section 2 (Environment and Natural Resources Sustainability) and in the Strategy's Pillar 2 where the World Bank states its support to "measures for pollution reduction and prevention from various sources in order to improve the physical environment and mitigate adverse health and economic impacts."**⁸ The PDOs are also relevant to the current Country Partnership Framework (CPF) 2018–2022 and the Performance and Learning Review (PLR) 2019-2022, where the project is mentioned as a successful achievement in the Pillar 2.2 (Environmental Protection and Management) (World Bank 2017). Both, the CPS 2012–2016 and the CPF 2018–2022 were developed in coordination with the National Strategy for Social-Economic Development (2010–2020) and the National Plan for Social-Economic Development (2016–2020). Environmental issues are one of the three focus of the CPF 2018-2022 which makes this project even more relevant now.

B. ACHIEVEMENT OF PDOs (EFFICACY)

Rating: High

40. **The overall efficacy rating of the Project is the result of the achievements of their revised indicators, which are rated High (see details in Annex 1 and Annex 1-A, as well in the text below).**

41. **Achievement of the first Project Development Objective (PDO1): Reduce environmental degradation and potential risks for human health: High.** Two PDIs measured the progress and compliance of the project. The first was the *percent of hospitals that have healthcare staff following correct occupational safety practices, including the use of personal protective equipment (PDI 3)*, which surpassed

⁸ World Bank. 2011. Paragraph 69, Outcome 2.2: Strengthened environmental protection and management.



by 111% the revised target. The totality of the project hospitals accomplished this indicator according to the independent verifications of the grant results based on rapid surveys. The second PDI – *Improved perception among communities adjacent to project hospitals about health waste being properly managed (PDI4)* – also surpassed in 111% of the revised target. All communities surrounding the project hospitals demonstrate high levels of satisfaction with the way that hospitals were managing wastewaters and solid waste.

42. **Additional evidence could be given to the achievement of these two PDO’s, according data collected by the CPMU.** In the case of the PDI 3, table 5 shows that during the Project life, all project hospitals accessed surveys about correct occupational safety practices in different years and 92 percent of the workers in 2019 are accomplishing this indicator in all surveyed hospitals. According to the Project monitoring results consolidated by the IVA reports, 99.5 percent of all hospitals surveyed in different years have achieved this indicator. About 96 percent of the workers working in HCWM activities wore masks when working, 97 percent wore gloves when treating infectious material and 99 percent wore special uniforms when working.

Table 5. Percentage of Surveyed Hospitals Where Health Workers Accomplished Correct Occupational Safety Practices

Year	Number of Hospital Grants	Number of Health Workers Who Answered	Number of Health Workers Who Accomplished	Percentage of Health Workers Who Accomplished	Percentage of Hospital Grants Achieved
2014	2	636	569	89.5	100.0
2015	13	3,059	2,650	86.6	100.0
2016	7	1,430	1,112	77.8	100.0
2017	44	8,490	7,896	93.0	100.0
2018	77	14,911	14,291	95.8	100.0
2019	74	10,296	9,458	91.9	98.6
Total	225	38,822	35,976	92.7	99.5

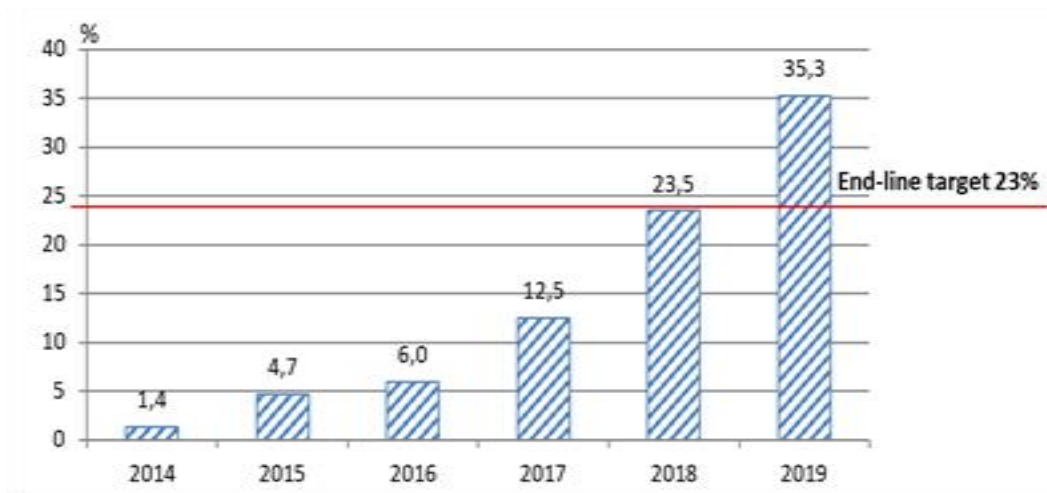
Source: CEHS 2019.

43. **For PDI 4, surveys also show remarkable outcomes. In 225 hospital grants surveyed along the project life, from the 5,500 surveyed persons living close to the hospitals, 95 percent provided good feedback.** The results of the final independent evaluation (CEHS 2019) also provided positive responses, given that most of the communities adjacent to the evaluated hospitals found a remarkable improvement: all 60 surveyed hospitals (100 percent) received positive feedback from over 97 percent of the population living in the surrounding communities.

44. **Achievement of the second Project Development Objective (PDO2): Improving management of healthcare waste in the Recipient’s hospitals: High.** Two PDIs (1 and 2) and 17 IRIs sub-indicators measured the achievement of the second PDO. The first PDI was *Increased share of hospitals’ wastewater meeting the environment standards (PDI1)* and the second was *Increased share of properly segregated and treated infectious HCW (PD12)*. These indicators were measured by the IVAs following MONRE/VIHEMA and Project established parameters. Both PDIs revised targets were surpassed in the final evaluation with accomplishment percentages of 131.7 and 117.9, respectively. Figures 2 and 3 show the percentage of accomplishment of both PDIs along the Project life according report from the project independent final evaluation.

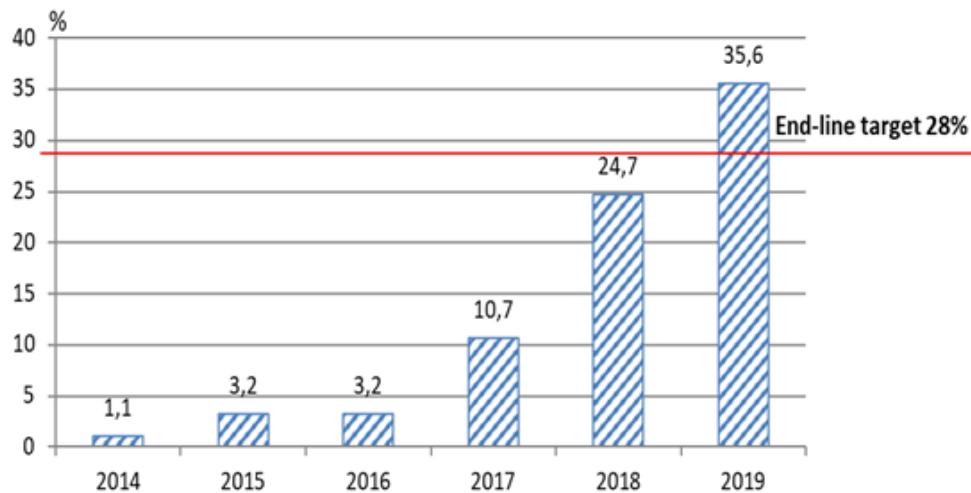


Figure 2. Evolution of the Percentage of Hospitals in Vietnam Meeting Wastewater Environmental Standards Provided by Project (P119090) (2014–2019)



Source: CEHS 2019

Figure 3. Evolution of the Percentage of Hospitals in Vietnam Meeting Solid Waste Environmental Standards Provided by the Project (P119090) (2014–2019)



Source: CEHS 2019

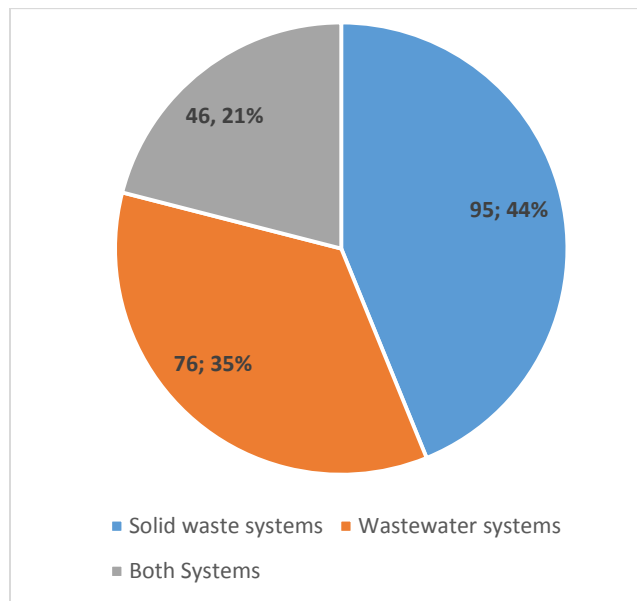
45. Regarding the 17 sub-IRIs used to measure the efficacy of the project, 13 were surpassed, 3 were achieved or substantially achieved, and 1 was partially achieved. Table 1.2 of annex 1 shows details related to the accomplishment of the project IRIs. As can be seen, two sub-indicators related to the numbers of trained HCWM administrators in the DOH and healthcare and training of the technical staff in environment monitoring, were substantially achieved. The only indicator that was partially achieved was the number of new/revised regulations, where only 75 percent of the revised target was achieved. However, the government and the project team did not seem it as a problem, given that all relevant environmental aspects were included in the new and revised regulations. The quantitative number of regulations is not important if the comprehensiveness of the regulations is sufficient to face the environmental problems to be tackled.



Other Aspects of the Achievement of the PDO

46. **Beyond the project indicators, other aspects of the project objectives were also recorded.** Regarding PDO1, interviews with hospital managers and hospital workers revealed that hospital infections among patients and hospital workers reduced after the investments in HCWM. On the other hand, project funds were allocated according to investments in solid waste management and wastewater management. As can be seen in figure 4, out of 225 hospitals, 95 hospitals (44 percent) were financed to install or upgrade solid waste systems, followed by wastewater systems (76 hospitals or 35 percent) and the rest (46 hospitals or 21 percent) invested in both systems.

Figure 4. Number of Project Beneficiary Hospitals



Source: CPMU Statistical Records

47. **Improvement of the facilities for HCWM.** A survey applied in a sample of the project hospitals and included in the GOV's Final Project Evaluation Report (CEHS 2019) shows that 94.3 percent of the hospitals have appropriate areas for wastewater treatment, 91.2 percent have sufficient areas for solid waste treatment, 90.9 percent have sufficient room for storage of infectious waste, 100 percent have sufficient room for storage of hazardous waste, 89.3 percent have sufficient areas for storage of recycled waste, and 100 percent have internal paved roads/pathways between hospital waste storage and treatment areas.

Justification of Overall Efficacy Rating

48. **The project efficacy is considered High because the high level of achievement of PDIs and IRI targets in both PDOs.** Table 6 presents the level of the project achievement, including development indicators and IRIs. As can be seen, 100 percent of the targets related to PDIs were surpassed and 94 percent of all 17 sub-IRIs (all of them related to PDO2) were surpassed, achieved, or substantially achieved. Given the overall achievement against the Results Framework targets, the efficacy of the project is considered High.



Table 6 – Summary Indicators’ Achievement (Based on Data from Tables 1-A-2)

Ratings Categories and Correspondent Interval	Kind of Indicators		
	PDO Indicators	IRI	Total Rating
PDO 1 - Reduce environmental degradation and potential risks for human health			
Surpassed (>100%)	2	-	2
Achieved/Substantially Achieved (85% to 100%)	-	-	-
Partially Achieved (65% to 84%)	-	-	-
Not Achieved (<65%)	-	-	-
Total Indicators PDO1	2	-	2
Percentage of Surpassed, Achieved and Substantially Achieved	100%	-	100%
PDO 2 - Improving management of healthcare waste in the Recipient’s hospitals			
Surpassed (>100%)	2	13	15
Achieved/Substantially Achieved (85% to 100%)	-	3	3
Partially Achieved (65% to 84%)	-	1	1
Not Achieved (<65%)	-	-	-
Total Indicators PDO1	2	17	19
Percentage of Surpassed, Achieved and Substantially Achieved	100%	94%	95%
All Project Indicators			
Surpassed (>100%)	4	13	17
Achieved/Substantially Achieved (85% to 100%)	-	3	3
Partially Achieved (65% to 84%)	-	1	1
Not Achieved (<65%)	-	-	-
Total Indicators	4	17	21
Percentage of Achieved, Surpassed and Substantially Achieved	100%	94%	95%

C. EFFICIENCY

Assessment of Efficiency and Rating

Rating: Substantial

49. **The original design of the economic analysis in the PAD presented arguments to estimate the potential benefits of the project.** However, the project design did not include some of the impact indicators to calculate these benefits. Variables such as the number of patients/health workers infected and treated due to hospital infections, number of health workers injured by sharp objects, number of people living around hospitals who were infected and died due to direct HCW-related diseases, and the income from segregation and selling of treated hospital waste were not measured during project implementation, because: (a) they are difficult and costly to be measured and; (b) environmental quality of the areas surrounding the hospital could be affected by many other factors such as industrial pollution, vehicles, unproper water and sanitation systems at households and others.

50. **However, the final project evaluation (CEHS 2019) implemented a survey in 34 hospitals providing enough evidences of the project efficiency.** On the other hand, during the project life, some indicators systematically measured the use of protection equipment by health workers and behavioral changes in the health workers that assure substantial reductions in risks. Evaluation of the project benefits in the hospital environment among communities and health workers were systematically measured through community surveys from 2014 to 2019. The summary of the project efficiency assessment is described in the paragraphs 51 and 52.



51. **The project provided technical and allocative efficiency gains.** A complete analysis of the project efficiency is presented in annex 6. This analysis found that the substantial project efficiency along the project life benefited from technical efficiency gains associated with the following:

- (a) Achieved project development goals with lower unitary investment costs per hospital and increased number of benefited hospitals by using the total project investment.
- (b) Lower costs per kg of solid waste treated, comparing the situation before and after project implementation and higher volume of wastewater treated than what was expected in the Economic and Financial Analysis of the PAD⁹. In both cases the quality of the outputs (environment protection and reduced risks for human life) is what really matters.

52. **Other aspects of the project efficiency are the following:**

- (a) Substantial allocative efficiency was achieved because the costs related to solid waste self-treatment by using the project technology are lower than the costs of contracting external providers of healthcare solid waste treatment.
- (b) The project invested in the top wastewater management technologies which save hospital physical space and reduce costs when compared with other technologies, ensuring environmental quality according to the required technical standards of healthcare wastewater treatment applied in Vietnam.
- (c) The hazardous solid waste treatment using non-burning technology supported by the project had lower investment and recurrent costs than the expenditures related to burning technology used previously by the same hospitals.
- (d) Non-burning technologies used by the project are also less costly than the corresponding fees to be paid to private companies for solid waste treatment in the project hospitals where the new equipment was installed but could be more costly than burning technologies in satellite hospitals given the additional costs of segregation and transportation of the hazardous or infectious waste to the central hospitals where the equipment is installed.
- (e) The HCWM investments financed by the project are leading to positive effects in occupational safety of health staff and in patients' health. They are also reducing the associated costs to treat hospital infections. A survey conducted by the Center for Environment and Health Studies (CEHS, 2019) showed that, besides helping improve knowledge and practice of health workers, the project's support helped reduce, by 12 percent, staff hospital infections after project implementation, and the number of hospitalized patients treated by antibiotics due to hospital infections was reduced by 50 percent in the situations pre and post project implementation. This evidence shows that if

⁹ According the Economic and Financial Analysis (Annex 5) of the PAD, the expected average volume of wastewater to be treated per bed was 65 cubic meters. The project final evaluation found that the measured average volume of wastewater treated using the project acquired technologies was 67 cubic meter per bed.



hospitalized patients are prevented from contracting nosocomial infections, a large amount of money can be saved for both the patient’s family and hospitals.

- (f) Opinion polls conducted for the communities living in the adjacent areas of the project hospitals revealed that 94.7 percent of these hospitals had good feedback on the performance of their HCWM systems and activities and contributed to more healthy lives.
- (g) The project hospitals have been benefited by additional monetary income from sales of recycled HCW. However, it is expected that the income from selling HCW can be increased over time to partially finance the sustainable operations of the HCWM systems, both the logistics processes and treatment facilities.

53. **All above listed achievements in regular circumstances could be sufficient to consider the project efficiency as High. However, some constraints led this evaluation consider the project efficiency as Substantial.** First, the project had a poor performance in its first three years of implementation, affecting the efficiency of the project quality of entrance. Second the Government of Vietnam set yearly budget allocation caps which were lower than the project need, and, as consequence, the project needed to be extended by two years to achieve intended project targets. This is not only a specific problem of this project, but affected the whole Bank’s portfolio in Vietnam, requiring structural changes in the projects’ design in the country including longer periods of project execution.

54. **Besides the project was extended for two additional years, the number of hospitals that benefited by the project increased by 45 percent (150 versus 218) without any additional funds.** So, more hospitals benefited. The cancellation of US\$5 million of the loan, in 2019, as unused funds, did not stem from the project’s underperformance.

D. JUSTIFICATION OF OVERALL OUTCOME RATING

55. **The overall project outcome rating is Satisfactory (S).** As can be seen in table 7, technically, the project: (i) maintained high relevance throughout implementation; (ii) the activities financed by the project were substantially efficient, and; (iii) the project efficacy was high during project implementation. However, project shortcomings related to the modest M&E design (leading to downward revision of the targets in one of the restructurings), poor performance (both DO and IP) during the first three years of implementation and delayed disbursement (including two more months extension for disbursement grace period) lead this ICR to downgrade the overall rating to Satisfactory.

Table 7. Summary of the Overall Outcome Ratings

Dimensions	Ratings
Relevance of Objective	High
Efficacy	High
Efficiency	Substantial
Overall Outcome	H/H/S= 6

56. **Despite that, the project had remarkable achievements and could be considered a bench-mark in the history of the hospitals waste management in the country.** It contributed to: (a) implementing a sound legal framework or hospital waste management in the country; (b) increasing the efficiency and



efficacy of the hospitals by enabling them to use the ultimate technologies for solid waste and wastewater management; (c) reducing human risks to infection for HCW, which contains pathogens, sharp tools such as needles, toxic chemicals, and other hazardous substances, benefiting health workers and patients directly; (d) reducing the negative effects of hospital pollutants in water sources, soil, and atmosphere; and (e) drafting a business model for segregation and recycling of hospital waste with high potential to generate income to contribute to the sustainability of the hospital waste management activities after the project completion.

E. OTHER OUTCOMES AND IMPACTS

Gender

57. **Women were key participants in the project and played a central role in the hospitals' waste management processes and were the most direct project beneficiaries.** In 2013, women represented 62 percent of the health workforce in Vietnam. This participation is still higher in some categories such as nurses (84 percent), elementary and secondary pharmacists (78 percent), and medical technicians (68 percent). Most of the personnel trained in the hospitals by the project were women. Many women working in hospitals are housewives who have direct experience and good waste management practices at home. While implementing waste management strategies themselves, women were able (more than men) to mobilize, demonstrate, and guide other people in the implementation process of HCWM. On the other hand, being the majority of health workers at hospitals, women benefited more than men from safety measures to avoid accidents and contamination caused by hazardous hospital waste.

Institutional Strengthening

58. **Substantial improvements have been made to strengthen institutions associated to the hospital waste management processes in Vietnam.** With the project funds, the GOV was able to strengthen the MOH and the Provincial Departments of Health in their structures related to regulating, implementing, monitoring, and evaluating the hospital waste management processes in the country. The project funds contributed to enhance institutional capacities and skills of the IVAs and VIHEMA in their regulatory and monitoring roles of the waste management outcomes in the Vietnam hospitals. The project equipped about one-third of the country hospitals to manage hazardous waste, including tasks such as segregation, recycling, treatment, disposal, evaluation, and prevention of accidents with hazardous hospital waste. The overall HCW regulatory framework, including the regulations, guidelines, trainings, and other aspects of the experience built during project implementation, will be applied nationwide to project and non-project hospitals and health facilities.

59. **Based on the project activities, in 2015, the MOH approved a set of national criteria for hospital quality assessment and, among 83 criteria, there are several specific criteria related to HCWM, environment, and hygiene within hospitals.** The project supported the issuance of (a) two circulars on guidelines for collaboration in state management of environment protection in health facilities and HCW; (b) three decisions relating to environment protection in health service; (c) three guidelines on technical standards on healthcare wastewater management, incinerator, and microwave to treat infectious HCW; and (d) four handbooks and three guidelines on the management of HCW in hospitals and on observation techniques for environment and lab tests. Hospital managers' and health staff's awareness on



environment protection in healthcare activities have significantly improved, resulting in clean and environment-friendly hospitals, with effective management of medical waste.

Mobilizing Private Sector

60. **Most of the project contractors who supplied the equipment and construction are private contractors.** The project helped push this industry in Vietnam as many private companies are involved in supply, operation, and maintenance of the invested systems. The project also promoted healthy competition for HCWM between the public and private sectors. Toward the latter years of the project, many more private companies were established to provide HCWM services to many hospitals in Vietnam.

61. **The project also reached out to private companies to disseminate the regulations for HCWM and ensure that they follow the regulations.** The project conducted four conferences to disseminate legal documents and technical guidelines on HCWM in the northern and southern regions; one workshop to share experiences on treatment of HCW by public-private partnerships; seven workshops to disseminate the mandatory rules for HCWM for hospitals and health centers to contracting private companies at the provincial and district levels in 63 provinces/cities; and two training workshops to share experiences in the implementation of the 'Green, clean, and beautiful hospitals' model in Hanoi and Ho Chi Minh City. These dissemination efforts increased awareness and will of the private companies to follow waste management regulations.

Poverty Reduction and Shared Prosperity

62. **The project targeted environmental risk areas where the incidence of poverty is higher benefiting the overall population and especially the most vulnerable groups.** Reduction of environmental and health risks lead to the reduction of illness, for which treatment is costly, especially for the poor people. The good treatment and disposal of HCW in the landfill also reduced health risks for waste collectors and scavengers who make their living in the landfills. Given that poorer households face higher environmental risks, the project benefited poor populations exposed to these environmental risks. According to the results of the final project evaluation (CEHS 2019), most of the communities adjacent to the evaluated hospitals (a) improved their awareness of healthcare waste treatment near hospitals areas and (b) reduced their risks to infections and diseases because of better quality water from wastewater treatments and better quality of the air and soil from adequate solid waste management, which contributed to improving their living standards.

III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME

A. KEY FACTORS DURING PREPARATION

63. **The project was a pioneer in Vietnam in the use of RBF in the health sector.** Being prepared in 18 months from the activity initiation summary and the PAD approval,¹⁰ the project was innovative by introducing RBF mechanisms to finance the hospital grants. The project FA included the corresponding

¹⁰ The activity initiation summary was issued on August 9, 2009, and the PAD approval was on April 3, 2011. The project preparation length was 18 months, which was the average time for health, nutrition, and population project preparation in the World Bank at that time.



arrangements as follows: 50 percent of the grant upon signing of Grant Agreement between the MOH and the investment owner; 40 percent after six months, upon submission of the progress report and meeting a pre-defined progress benchmark accepted by CPMU; and the final 10 percent upon acceptance of the IVA on the result produced by the hospital. The RBF mechanism was maintained during project implementation, but the arrangements on the grant transfers were considered not flexible, being excluded from the FA in the second project restructuring in July 25, 2017.

64. **The RFM included in the PAD was conceptually good but not fed with accurate indicators and targets.** The project team selected a good set of relevant indicators (PDIs and IRIs) to measure the development objectives, based on advanced literature and international practices and evidence. However, there was no database with concrete evidence to build the indicators' targets. All indicators' baselines were set as zero in the PAD. On the other hand, as described in the efficiency analysis, the PAD did not design the indicators to follow up the project benefits and the project efficiency and effectiveness.

65. **The list of beneficiary hospitals receiving project grants was far from being completed when the project was approved and, therefore, most of the targets related to the project indicators were set based on assumptions or were not established during the project preparation phase.** Additionally, the PAD did not include the RFM indicators' protocols to have precise criteria to calculate these indicators. As a result, the progress in the achievement of the development objective ratings in six project Implementation Status and Results Reports (ISRs), from December 2012 to October 2015, were classified as Moderately Unsatisfactory. Given these circumstances, the project RFM had to be adjusted during project implementation, as can be seen in the section IV of this Implementation Completion and Results Report (ICR).

B. KEY FACTORS DURING IMPLEMENTATION

66. **The project, after being signed by the GOV and the World Bank, was effective in six months and was implemented in eight years (including a two-year extension), complying with all the FA provisions.** Pursuant to the project FA (credit number 4899-VN) signed on May 31, 2011, this agreement was effective from August 29, 2011, to August 31, 2017, and was amended for extending the closing date to August 30, 2019. In the FA, the GOV's responsibility, clearly defined in Schedule 2, comprised 33 provisions on implementation arrangements, monitoring, reporting, evaluation, procurement, and financial management. The GOV complied with all the 33 provisions.

67. **The project achieved the PDO, contributing to reducing the environmental pollution caused by waste generated by hospitals in Vietnam.** The PDIs exceeded the targets after restructuring. The hospitals supported by the project have contributed to the treatment of 30 percent of national healthcare wastewater, remarkably exceeding the end line target of 23 percent, and the treatment of 32 percent of hazardous waste nationwide, exceeding the target at the end of the period (28 percent). Most hospitals have a high proportion of health workers complying with occupational safety regulations, and the majority of the communities around hospitals have positive opinions about the waste management activities of the hospitals.

68. **Despite these good results, there were shortcomings during the first three years of project implementation, causing the project schedule to be significantly delayed.** This affected the evaluation of the project IP ratings, which were Unsatisfactory, from December 2012 to September 2013, and Moderately Unsatisfactory, from September 2013 to April 2015. Among the causes for these



shortcomings, there are two that deserve more attention: the lack of familiarity of the RBF model adopted by the project (first time in Vietnam) and the lack of interagency coordination between the CPMU and the respective beneficiaries/subunits responsible for implementing the various components in the project. These issues created the following problems: (a) delays in the establishment of a CPMU technical assistance group to speed up the project's implementation and assist local governments and project hospitals on a demand basis, as planned during project preparation; (b) delays in project staff training, both at the central and provincial levels, avoiding the creation of skills to implement project arrangements;¹¹ (c) lack of VIHEMA's authority and accountability to have sound implementation of the project's Component 1; and (d) slow preparation of the grant's procurement and bidding, which were also extensively delayed.

69. **To address these shortcomings, the GOV followed the World Bank recommendations and adopted the following measures:** (a) increasing accountability at work by the appointed full-time key staff, especially the team leads of the CPMU; (b) enhancing VIHEMA's authority, enabling better coordination and decision-making mechanisms with other project implementation agencies, and increasing VIHEMA's enforcement capacity for monitoring and surveillance of environment standards; (c) creating the PPMUs¹² and providing capacity building to enable their institutional management authority and guarantee the implementation of project activities; and (d) amending the project FA to create more flexible RBF mechanisms to manage and implement the grants. After all these measures the project delays in procurement, bidding, and financial management were substantially addressed, creating more favorable conditions to implement the subprojects. All these measures improved the coordination between the CPMU, PPMUs, and all-level hospitals to ensure the project successful implementation.

70. **RBF mechanisms, maintained throughout the project life, were the backbone innovation for implementation arrangements in this project given specific characteristics of the investments in healthcare waste treatment systems.** The project required not only the completion of the implementation of the hospital waste management systems, but also the reliable and sustainable operations of such systems. Good practices for healthcare waste management were the core of what the project was intended. This helped the stakeholders, including the contractors, to be accountable for the investments to ensure the efficient use of project funds and the environmental improvement of the hospitals and surrounding neighborhoods.

71. **The changes initiated by the GOV during implementation positively affected the project performance and ratings until its closing as recorded in the ISRs.** The development objective rating was Moderately Satisfactory from October 2015 to March 2018 and Satisfactory from March 2018 to August 2019 (end of project). However, the implementation performance rating progressed to Moderately Satisfactory from October 2015 until the project closing date, given some remaining delays in procurement and disbursement.

¹¹ It was mentioned in the final government report (CEHS 2019) that key personnel of the project were found to have concurrent employment, limiting their time for training and other project implementation tasks.

¹² This was not previewed in the PAD, as can be seen in paragraph 125: "At the provincial or hospital level, there will be no new project management units for implementation of this project. Grant application preparation and implementation will be carried out by Department of Health or hospitals under the respective Provincial People's Committee, and by central hospitals under the direct management of MOH."



72. **Provinces and hospitals were eligible for selection by the project according to the use of specific criteria.** Provinces were selected after developing a provincial plan for management of HCW according to the Project's recommended template. Many of the selected provinces were those located in disadvantaged, mountainous, and ethnic minority areas. Many project hospitals were included in the blacklist of institutions causing serious environmental pollution. Selected hospitals were those with a minimum number of 200 beds, according to an agreement between the MOH and World Bank, and those located in crowded population areas in the selected provinces. These criteria helped to include hospitals in more disadvantaged areas, contributing to improve equity in the achievement of environmental quality among communities as well as guarantee a minimum economic scale to assure efficiency for the project investments.

IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME

A. QUALITY OF MONITORING AND EVALUATION (M&E)

M&E Design

Rating: Modest

73. **The project extensively used international literature and discussion with specialists and government authorities to set up its RFM.** However, as stated earlier, there was weak evidence and databases to set up realistic targets and mechanisms to generate the indicators' baselines at project design. For the first three years of implementation, the project was rated Unsatisfactory due to the weak performance and delay in the implementation. No indicator protocols and baselines were used to set up the RFM. On the other hand, the lack of a list of beneficiary hospitals created difficulties in establishing realistic targets for the indicators given that most of them should be associated with the hospital's performance to manage and reduce wastewater and solid waste. As a consequence, there were no results to be followed up and informed about the PDIs and IRIs.

M&E Implementation

Rating: Substantial

74. **In 2015, the CPMU started to review and implement the project RFM, creating a sound database to follow up closely the performance of the project indicators.** The first project restructuring, in June 2016, opened the opportunity to revise the project indicators' definitions, metrics, and targets, giving more flexibility to this process by moving the RFM from the FA to the project's Operations Manual. Based on the complete list of beneficiary hospitals in 2016, this review process was able to establish the database for each benefited hospital, as well as surveys, hospital scorecards, and systematic evaluations from the IVAs to ensure accuracy of the indicators. Each indicator was precisely defined by specific protocols, describing the data sources and the way to collect and treat the information. Opinion surveys started to be applied to the communities surrounding the hospital areas to evaluate the project's environmental impact according to the beneficiaries' perception. Verification reports from the IVAs, regarding the accomplishment of environmental standards for wastewater and solid waste by each hospital, were also produced systematically. This process allowed continued project monitoring and systematic update of the RFM from 2015 to project closing. Besides the RFM database, managed centrally by the CPMU, the IVAs



created hospitals scorecards to follow up the quality of the wastewater and solid waste treatment processes and detailed databases to record and follow up the environmental standards measured by periodic verifications in each hospital.

75. **In addition to the strengthening of the RFM, the CPMU contracted a consulting firm to implement an in-depth evaluation of the project impact using a sample of the project hospitals.** As mentioned in several parts of this ICR, the CPMU contracted the consulting firm CEHS to evaluate several aspects of the project not captured by the RFM, such as impact of the project on hospital workers and inpatients' safety and health and comparison of the waste management and treatment costs according to different technologies and other aspects. This in-depth evaluation, focused on 2015–2018, took as reference the project documents and was based on data collection, quantitative interviews to provide evidence on the initial impact, intervention results and outputs of the project, and qualitative studies to evaluate achievements and performance.

M&E Utilization

Rating: Substantial

76. **After the first project restructuring and review of the project indicators, a functional RFM allowed the CPMU and the PPMUs to consistently use the RFM databases for project management purposes.** The project benefited from having individual databases for each hospital grant, contributing to identify shortcomings, redirect investments, and coordinate action plans with counterparts to improve project implementation. Hospitals environment scorecards developed by the IVAs were used by the local governments and hospitals to monitor and plan improvements for the hospitals' environmental performance, when necessary. Most of the improvements in the PDO and implementation performance after 2015 were associated with better use of the project RFM, which worked as a control panel to alert and orient project interventions.

Justification of Overall Rating of Quality of M&E

77. **The overall project rating for M&E is Substantial.** The project introduced changes in the culture of using data for hospital waste management in Vietnam, creating awareness for the hospital management and local health authorities about the need to systematically maintain databases and evaluation on the solid waste and wastewater standards according to acceptable parameters in all hospitals. The creation of the IVAs and its collaborations with other institutions like VIHEMA consolidated a system of indicators that will last in the future administration of hospital waste in the country. The shortcomings of the RBF during project preparation and in the first three years of project implementation were reversed in the last five years, thus creating a sound and realistic database to evaluate project performance. The in-depth evaluation conducted by CEHS generated evidence to guide future interventions and highlight some important aspects of the project economic analysis.

B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE

Financial Management

78. **Despite a difficult start and unsatisfactory performance until 2015, with very little project disbursement, the project's financial management performance was considered satisfactory in the last years of project implementation.** The project disbursement process was affected by the requirement for



obtaining yearly budget allocation in the government budget plan every year. No disbursement was allowed if the budget was not allocated. This process has generated cumulative delays in the disbursement process of investment projects in Vietnam and it is considered one of the reasons that justified the project implementation extension of two years and the implementation performance rating of Moderately Satisfactory. Other projects in Vietnam experienced similar problems.

79. **At project closing, the accumulative funds withdrawal amount was US\$118 million and more committed funds (estimated in US\$5 million) should be spent until the project disbursement deadline of February 29, 2020, despite the difficulty to approve additional budget expenditures for 2019. Considering** that the last project restructuring cancelled US\$4.94 million of the loan, the current disbursed amount at project closing represents 89 percent of the total project available funds of US\$145.06 million. The project was able to disburse most of the activities, spending less resources than originally planned. However, the counterpart funds, estimated at US\$5 million at project design, were increased, representing an amount of around US\$8 million at closing date, due to increases in expenditures associated with the preparation of investments in the provincial and district hospitals. The project has complied with all the planned external audits of the project financial statements, including the last for 2018, which were submitted on time to the World Bank on June 30, 2019.

Procurement

80. **Overall, the procurement performance under the project was assessed as Moderately Satisfactory, despite it starting slowly and facing some challenges at the beginning.** Since 2016 until the project closing date (August 30, 2019), the procurement processing by more than 70 implementing agencies significantly improved, compared to the performance during the first half of project (from 2011 to 2015), which was assessed mainly as Unsatisfactory or Moderately Unsatisfactory.

81. **Procurement implementation was highly decentralized in 55 provinces/cities and was conducted by more than 70 agencies with a disbursed amount of nearly US\$100 million.** Given that the GOV was policy oriented to increase hospital autonomy, many hospitals started to be responsible to conduct the procurement processes for their grant activities. Since mid-2018, all 450 contracts under the project were awarded and all 444 decentralized contracts were completed and liquidated with full payment six months before the closing date. In the last six months of the project life, independent verification for all the decentralized contracts were fulfilled as the RBF scheme was adopted under this project.

82. **The key constraints and weaknesses of different implementation stages were identified.** During the initial stage, they were, among others, (a) no experience for procurement of environment-related equipment/items; (b) lack of proper understanding and application of the World Bank's procurement regulations/guidelines; (c) lack of experience in the World Bank's procurement practices by the DOHs and heavy reliance on external procurement agencies which were not experienced with the World Bank procurement; (d) delayed approval in the provincial Procurement Plans due to regulation differences and inconsistencies between the World Bank and country's system; and (e) no staff rotation and lack of clear responsibilities at the local level. The CPMU could not provide adequate training and assistance in procurement processes to the PPMUs at the project beginning. There was also a lack in the capacity for contract monitoring and administration, leading to noncompliance of contract provisions including payment schedules, completion delays, or contract extensions without validation.



83. **Procurement problems were identified on time either by regular supervision support missions conducted by the CPMU and the World Bank or, during the World Bank's ex post review missions.** Good lessons for improved implementation were drawn and shared among the implementing agencies by different means like workshops, study visits, and so on. Most of the procurement problems were addressed following the CPMU's and the World Bank's recommendations for corrections and mitigation measures, by the respective implementing agencies at the provincial and central hospitals. The procurement capacity of the PPMUs significantly improved in the latter years by regular and ad hoc trainings, hands-on support at provincial requests, timely review of procurement documents and proposals, and consultation of solutions by the CPMU.

Social and Environmental Safeguards

84. **The project was committed to improving the quality of the hospital waste management in the areas where it was implemented, but no specific social safeguards such as OP 4.10 (Indigenous People) or OP 4.12 (Involuntary Settlement) were triggered during the project preparation.** The PAD mentioned that some applied research was conducted to know the social perception (not in areas surrounding the hospital) regarding hazardous HCW. During project implementation, systematic surveys were applied to the population living in the hospital areas, revealing that most of the beneficiaries approved the project improvements and benefits brought by project implementation.

85. **Compliance with the legal requirements and environmental safeguards were at the center of the project development objective and responsibilities.** Most of the beneficiary hospitals complied with the Government's legal environment requirements. Of 217 hospitals and 1 CTS financed by the project, 212 completed the Environmental Impact Assessment or Environmental Mitigation Plan at project closing. About 77 percent of the hospitals investing in wastewater treatment systems got the discharge permits and all others have submitted documentation to the competent authorities for review and approval. On the other hand, 84 percent of the project hospitals were issued with the certificate for the project environmental protection works or submitted the required documentation to be certified by the environmental authorities.

86. **At the end of the project, one minor problem got the attention of the GOV authorities and the World Bank.** All investments and activities under the grant for the centralized treatment plant for hazardous medical solid waste in Quang Ngai Province (CTS project) was completed with investments of about US\$2.3 million. However, the pilot operation was stopped as the residents prevented the transportation of medical solid waste to the plant due to the unsolved complaints from the local communities on the environmental impacts from the nearby old landfill, which was funded by the Asian Development Bank. Though the residents agreed to have the pilot operation of the plant, they required the provincial government to implement the environmental improvement measures, which were long promised. The Government and the World Bank are aware that a prompt solution is needed for this problem.

C. BANK PERFORMANCE

Quality at Entry

Moderately Satisfactory



87. **The project was solidly prepared using comprehensive background and global references about hospital solid waste and wastewater management.** Lessons learned from international experience and national expertise detailed the benefits of the new waste management technologies that would be applied by the hospitals selected by the project. The momentum related to the project preparation was also benefited by new legal framework, regulations, and institutions (such as VIHEMA) related to hospital waste management.

88. **Despite all these quality preparations, some problems prevented the project from having a better start, as summarized as follows:** (a) the full list of hospitals to be benefited by the project was not established at the end of project preparation; (b) the project indicators were not built on solid baselines, targets, and protocols preventing to start prompt follow-up of the project outcomes; and (c) the institutional arrangements, in a new context of RBF, were weak and were not considered adequately by the preparation teams to implement the project at local/hospital units. All these questions are part of the factors to understand the problems and delays in the first years of project implementation.

Quality of Supervision

Satisfactory

89. **The project was effective from August 29, 2011, to August 31, 2017, and was amended for extending the closing date of August 30, 2019, delivering 18 supervision missions (two visits per year).** According to the borrowers' evaluation report, the World Bank has performed the M&E activities well, submitting to the MOH 103 recommendations/topics that need adequate attention and directions to ensure that the project objectives are achieved before the closing date.

90. **Since the first year of project implementation, the World Bank recommended that the CPMU make the necessary adjustments to improve project performance.** The World Bank recommended the GOV to review the project institutional arrangements by (a) creating a full-time task team at the CPMU to strengthen its coordination with provinces and beneficiary hospitals and (b) establishing a technical advisory group to promote assistance and training to project staff on the new RBF mechanisms. The accomplishment of these tasks was crucial to speed up the preparation of the list of hospitals to be benefited and to make the right arrangements for the definition and implementation of project RFM.

91. **Despite the implementation constraints at the beginning, the World Bank's coordination efforts resulted in good outcomes after the second half of 2015.** According the January 2016 implementation support mission, the World Bank realized that "overall, the implementation performance of the Project for the last 6 months has progressed as expected. The intensive efforts from the different implementing agencies, especially from the CPMU has gained initial results and laid the foundation for accelerating the implementation in a more stable manner in the coming years. All the targets set for December 31, 2015 - which were considered rather ambitious - were achieved or over-achieved (...) The project has turned to a new phase of extensive implementation which requires both CPMU and PPMUs to maintain the momentum that they have built over the last year to keep the expected progress." The World Bank had a crucial role, leading the GOV to achieve its outcomes in the following aspects: (a) the preparation of the majority of the hospital grants at the central and provincial levels, where the World Bank had an active role in reviewing the technical specifications and supporting the preparation of the investment proposals; (b) the support to the preparation of the two first restructuring processes, highlighting the reviewed RFM included in the project Operations Manual; and (c) the support for the preparation of the procurement plans for the hospitals' waste management specifications financed by the project.



Justification of Overall Rating of Bank Performance

Rating: Satisfactory

92. **Considering the World Bank's leadership in supporting the project turnaround to achieve high levels of efficacy, the World Bank's performance could be rated Satisfactory.** The World Bank supported the GOV, at the central and local levels, to overcome the project design constraints and the delays in the first years of implementation by (a) promoting changes in the project governance, (b) enabling local governments and hospitals teams to build systems to treat wastewater and manage hazardous solid waste by training and advising the project teams on time and effectively, and (c) implementing a sound M&E system to measure the project outcomes.

D. RISK TO DEVELOPMENT OUTCOME

Rating: Moderate

93. **Sustainability.** The project enabled the use of new technologies for wastewater and solid waste treatment for 30 percent and 32 percent of the hospitals in Vietnam, respectively, using the project financing funds. However, the GOV will not ask for more similar loans and will complete the hospital waste treatment and management using domestic funds, following the National Plan 2015–2020, which aimed to have 95 percent to 100 percent of all health waste treated by 2020. The project established a new path to waste management that was adopted for other hospitals in Vietnam. These hospitals were financed by other donors and by domestic central and local, public and private funds, such as Environment Protection Fund, managed by the Ministry of Natural Resource and Environment. Additionally, the use of retaining revenues of the hospitals for environmental protection and the creation of Public-Private Partnership are other sources in use to finance the improvement of hospitals environmental sustainability. Using the framework created by the project, about 90% of hospitals/facilities in Vietnam have currently proper healthcare waste management systems financed from different sources. On the other hand, at the project closing (according CEHS, 2019), 92 percent of beneficiary hospitals have funded budget plans for maintenance of infrastructure and equipment supported by the project. However, beyond the sustainability of the financial funds for hospital waste management, are the positive sustainability gains on awareness, training of personnel and policy implications brought by the project which are irreversible once became part of the consciences and culture of hospital personnel and communities.

94. **Choice of service.** Though the cost for HCWM in hospitals is included in the patient's fee, some hospitals still prefer to contract out the treatment of healthcare solid waste instead of having it treated by the project-financed treatment systems. As mentioned earlier, many environmental and waste treatment companies have been established in the last few years, mainly using burning technology or burial and with much bigger capacity, hence having lower price for treatment, despite the fact that these technologies/methods are not recommended. This situation was not predicted at project preparation. Further, the increase of hospital financial autonomy also required hospitals to reduce the costs though they are fully aware of the advantages of non-burning technologies that the project promoted.

95. **Technological options.** Before project implementation, hospitals in Vietnam used burning technologies for solid waste treatment and processes to segregate hazardous waste were not strictly required and followed. The shift to non-burning technologies and specific standards to treat, recycle, and eliminate hazardous waste (by processes such as steam sterilization, microwaving, hygiene burying, and others) requires constant investments in human capital, technology updating and knowledge, legal framework updates, and others. Given that the investments would be financed subject to acceptable



verified results, the management's decision to use these new and more reliable technologies, which are eventually more costly and complex despite higher benefits to the populations, could be at risk. To mitigate this risk, the CPMU, during project implementation, promoted (a) agreements for development of the provincial HCWM plans, (b) guidelines to select appropriate hospital waste management technologies, (c) mandatory appraisal from the MOH for investments in central hospital waste management, (d) capacity-building activities in hospitals before the deployment of waste management health facilities' plans, (e) establishment of an advisory group to provide technical support for hospitals, (f) improvement of VIHEMA's capacity to evaluate technologies for HCW treatment, and (g) training activities and communication to improve knowledge and attitude of managers and staff at the beneficiary hospitals and other health facilities.

96. **Cluster models.** As discussed earlier, cluster models are a better way to guarantee a centralized process of HCW treatment and monitoring. However, some problems associated with sustainability and less-costly options with contracting out service (most of them rely on burning technologies) are driving the preference of many small hospitals. Given this situation, the beneficiary hospitals/provinces need to find a sustainable solution to expand the use of the cluster model and reduce the treatment cost to fairly compete with other treatment facilities.

V. LESSONS AND RECOMMENDATIONS

Main Lessons Learned

97. **Aligning the Project investment plans with provincial plans, preparing them up-front, and having them reviewed by multiple provincial stakeholders increased provincial ownership.** This project based its investments on the provincial plans for facility investment and then applies additional filters to ensure the efficiency and equity of the subset of facilities supported by the project. The Project also highlighted the effectiveness of using the PPMUs under the provincial Departments of Health (DOH) for project coordination. Implementation of project activities should not rely only on the passage of policies and development of guidelines at the national level. To this end, this project has ensured that no provincial-level project activities were contingent on new national decisions or policies.

98. **The coordination between the MOH, environmental agencies, and provinces brought positive results.** Public environmental agencies were consulted and support the health facilities in the process of construction and operation of solid waste and wastewater treatment systems at the beneficiary hospitals. In addition, these agencies conduct supervision, monitoring, and inspection as a condition to issue permits for waste discharge of health facilities according specified criteria. On the other hand, they also actively provide advice to the provincial People's Committees in approval of and promulgation of plans for collecting, transporting, and handling hazardous HCW in the provinces and coordinating with all stakeholders on these plans' implementation processes.

99. **Targeting the more visible problems is crucial to have support from the public in health environment management projects.** Many health facilities included in the blacklist of seriously polluted institutions under the Prime Minister's decision needed to quickly build/renovate their HCW treatment systems. The project has invested in HCWM systems in 40 (original target of 32) of these hospitals/health facilities during the project life. After independent verification from the IVAs, these hospitals met the national environmental standards and were excluded from the blacklist.



100. **Training and communication are crucial in the implementation of health waste management projects.** Providing training for hospital management and staff, such as health workers and staff in charge of operating HCWM systems at hospitals, was not only a complement but a central activity to enable the results of the investment in construction of HCW treatment systems for 218 hospitals (including 1 CTS) across the country. Trained staff changed their behavior in favor of more environmentally friendly health units and promoted more collaboration among their peers, the community, and the authorities regarding the tasks related and needs to improve waste managing processes. The support from the public is very important. It is necessary to engage the people living close to the hospitals right from the beginning of the subproject implementation. They would help monitor the implementation and the operations of the systems and provide timely feedback to the hospitals to improve their waste management performance.

101. **The involvement of the private sector in the hospital waste management needs to be anticipated in the project design to avoid unexpected consequences.** The project design spent considerable attention on the development of treatment clusters for solid waste management in the public hospitals but did not anticipate the rapid development of private establishments of centralized HCW treatment, as well as the early adoption of hospital autonomy, which challenged the efficiency and sustainability of the cluster model adopted by the project.

102. **The implementation of waste management processes needs to follow technical rules, provide incentives to staff in charge, and create maintenance funds.** The stability and sustainability of the new hospital waste management systems rely on efficient training and staff knowledge improvement about the related technological processes as well as strictly comply with the operation procedures recommended by the manufacturers. In addition, to maintain the operation team with professional and technical qualifications working stably at hospitals, it is necessary to have solutions such as good salaries and incentives like promotion and benefits at work. It is also necessary to sign contracts with specialized/technical maintenance companies to provide supplies and spare parts in accordance with the manufacturer's recommendations.

103. **Systems and technologies for wastewater treatment financed by the project are highly suitable and efficient.** Despite higher costs, these systems produce qualified effluents that meet the prescribed national standards. All hospitals confirmed that the wastewater treatment systems are invested in accordance with their needs and are operating well, saving area and cost, ensuring the quality of the effluents. The appropriateness of the treatment technology is very important to ensure quality and economic efficiency in long-term use.

104. **The RBF project needs more time for the concerned agencies and staff to gain familiarity, especially when the implementation is highly decentralized like this project.** The government did not have enough efforts and capacity to understand and operationalize the RBF mechanisms in the very beginning of the project due to lack of experience and staff skills at the central and local government with the institutional arrangement to implement this instrument. This was one of the reasons for two years of implementation delay. As lesson learned, it is recommended that capacity building for project management at all levels is very important to be strengthened since the project preparation. Mobilization of adequate and qualified staff at the CPMU and PPMUs, especially the group of advisers, is crucial to the success of the implementation. Knowledgeable and dedicated project managers at the central and provincial levels play a very important role. Therefore, during project preparation, a capacity-building strategy and relevant institutional arrangements should be carefully designed.



Recommendations

105. **Based on the project results, the MOH should organize workshops/meetings with the Government and stakeholders** (including the private sector) to disseminate the implementation results, commitments among the parties, lessons learned, difficulties, challenges, and solutions to improve the overall HCWM for all health facilities nationwide.

106. **Reasonable financial mechanisms for the operation of cluster treatment systems for hazardous healthcare solid waste are needed** to attract more satellite hospitals to have their waste treated by the project-financed cluster treatment systems. The concerned provincial and health authorities and hospitals are required to consider different options to make use of the cluster treatment systems for healthcare solid waste, which have been operational below their design capacity, to reduce the cost of treatment and increase efficient operation of the invested systems.

107. **Search for solutions to avoid stoppage of the hospital waste treatment services due to broken treatment equipment/facilities.** While strictly following the maintenance schedule, hospitals should establish a list of maintenance and repair service providers at affordable costs to keep the systems working properly without interruptions.

108. **Expand the comprehensive online and paper-based HCWM Information System at the MOH** by creating a mandatory reporting system of the waste management situation at all health facilities and creating financial incentives and sanctions for the DOHs/hospitals to update the indicators required by this system. This would help increase reliable information to facilitate timely and proper interventions, when necessary.

109. **Keep active, at the MOH, the training systems for managers, leaders, and workers in the hospitals related to the different functions and roles for health waste management to follow the standards and regulations in place.** This system, according to the demand, should also advise and propose effective solutions to solve difficulties for the beneficiaries, especially to assist the healthcare solid waste treatment clusters to operate in accordance with the province and MOH rules and norms.



ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS

A. RESULTS INDICATORS

A.1 PDO Indicators

Objective/Outcome: Reduce environmental degradation and potential risks for human health

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Increased share of hospitals' wastewater meeting the environmental standards	Percentage	0.00	40.00	23.00	30.30
		29-Aug-2011	31-Aug-2017	31-Aug-2017	30-Aug-2019

Comments (achievements against targets):

The achieved result of this indicator surpassed the formally revised target: 132%

Estimated as incremental contribution by project to environmentally safe discharge of hospital wastewater. The denominator is the published volume of health care wastewater for 2017 according the Ministry of Health Statistical Yearbook the Ministry of Health and the numerator is the volume of health care waste water treated by the project hospitals (average 0.65m3/day/bed) according the project databases.



Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Increased share of properly segregated and treated infectious health care waste	Percentage	0.00	40.00	28.00	33.00
		29-Aug-2011	31-Aug-2017	30-Aug-2019	30-Aug-2019

Comments (achievements against targets):

The achieved result of this indicator surpassed the formally revised target: 114%

Estimated as incremental contribution of the project to environmentally safe treatment of hazardous solid waste. The denominator is the published volume of health care hazardous solid waste in 2017 according the statistical yearbook of the Ministry of Health and numerator is the volume of health care waste water treated by the project hospitals (average 0.2 kg/day/bed).

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Increased number of health care staff following correct occupational safety practices, including usage of personal protective equipment	Percentage	0.00	90.00	90.00	100.00
		29-Aug-2011	31-Aug-2017	31-Aug-2017	30-Aug-2019



Comments (achievements against targets):

The achieved result of this indicator surpassed the formally revised target: 111%

Obtained through independent verification of grant results. The hospitals are considered they pass the final verification when 70% percent of their staff pass independent verification test in rapid surveys.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Improved perception among communities adjacent to project hospitals about health waste being properly managed	Percentage	0.00 29-Aug-2011	90.00 31-Aug-2017	90.00 31-Aug-2017	100.00 30-Aug-2019

Comments (achievements against targets):

The achieved result of this indicator surpassed the formally revised target: 111%

Obtained through independent verification of grant hospital results. The numerator is the total number of hospitals that pass the indicators for communities' satisfaction about the project hospitals' improved healthcare waste managed, conducted through interviews with the population living nearby the hospital. The denominator is the total number of hospitals which undergone the independent verification in the reviewing year.



A.2 Intermediate Results Indicators

Component: Comp. 1: Policy and Institutional Environment Strengthening

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
The number of new or revised policies, regulatory documents adopted and applied HCWM studies published and disseminated	Number	0.00 29-Aug-2011	13.00 31-Aug-2017	13.00 31-Aug-2017	15.00 30-Aug-2019
Number of Policy and administrative documents	Number	0.00 29-Aug-2011	4.00 31-Aug-2017	4.00 31-Aug-2017	5.00 30-Aug-2019
Number of Technical regulations	Number	0.00 29-Aug-2011	4.00 31-Aug-2017	3.00 31-Aug-2017	3.00 30-Aug-2019
Number of Technical guidance manuals	Number	0.00 29-Aug-2011	5.00 31-Aug-2017	5.00 31-Aug-2017	7.00 30-Aug-2019
Comments (achievements against targets):					



Surpassed: (115%)

End target extended from august 2017 to august 2019 keeping the same target values.

Technical regulations are drafted and submitted to the authority agency for appraisal and approval.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Improved knowledge and skills of key health personnel in health care waste management standards and practices	Number	0.00 29-Aug-2011	5463.00 31-Aug-2017	6663.00 31-Aug-2017	6994.00 30-Aug-2019
Number of trainers trained passing the final test	Number	0.00 29-Aug-2011	276.00 31-Aug-2017	290.00 31-Aug-2017	310.00 30-Aug-2019
Number of leaders of health, DONRE, Environment Police, other	Number	0.00 29-Aug-2011	2545.00 31-Aug-2017	2545.00 31-Aug-2017	2398.00 30-Aug-2019



agencies trained and passed the final test					
Number of HCWM administrators in DOH, health care facilities, preventive health centers trained and passed the final test	Number	0.00 29-Aug-2011	2332.00 31-Aug-2017	2332.00 31-Aug-2017	2752.00 30-Aug-2019
Number of technical staff in environment monitoring agency trained and passed the final test	Number	0.00 29-Aug-2011	310.00 31-Aug-2017	310.00 31-Aug-2017	292.00 30-Aug-2019
Number of HCW treatment system operators trained and passed the final test	Number	0.00 29-Aug-2011	1200.00 31-Aug-2017		1242.00 30-Aug-2019
Comments (achievements against targets): Surpassed: (105% over the revised target)					
End target extended from August 2017 to August 2019. All original training was completed in 2017 according the original schedule. However, the total trained health personnel counted in this indicator includes the HCW treatment system operators trained and passed the final test (1242 operators)					



from august 2017 to august 2019, given that the project conducted additional trainings for these operators in 215 hospitals. This training was not included originally in the PAD as part of this indicator but it was considered key to the PDO achievement.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Reduce number of hospitals in black list issued in the Decision 1788 by Prime Minister	Number	0.00	32.00		40.00
		29-Aug-2011	31-Aug-2017		30-Aug-2019

Comments (achievements against targets):

Surpassed: 125%

This indicator was not originally in the PAD. It was added in the 2016 review, following the issuance of the Prime Minister Decision number 1788. The indicator considers the number of hospitals took out of the black list, after results verification, by receiving and completing investments in waste management from the project.

This indicator substitutes three indicators included in the original PAD and dropped after the 2016 review (confirmed in the 2017 restructuring), as follows:



(i) Four scientific institutes/regional reference labs and provincial health centers have strengthened capacity for testing of solid and liquid health care waste. This indicator was dropped but the mentioned institutes were created and operated satisfactorily during the project implementation;

(ii) Central and provincial hospitals receiving scheduled environmental monitoring visits. This indicator was dropped but scheduled visits to the hospitals were received satisfactorily and was part of the regular project implementation activities;

(iii) Functional web-based software application to provide up-to-date and transparent information about the status of HCWM in hospitals. This indicator was dropped but information was regularly produced by hospitals and collected by VIHEMA, the 4 IVAs and provincial health centers and received by the CPMU.

Component: Comp. 2: Hospital Waste Management Improvement Facility

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of Health Care Waste Management Plans approved by regulatory authority	Number	0.00 29-Aug-2011	60.00 31-Aug-2017	68.00 31-Aug-2017	72.00 30-Aug-2019

Comments (achievements against targets):



Surpassed: 106% over the revised target. After 2017 no new plan was approved and recorded as the project had identified all the hospitals and provinces to participate in the project.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of hospital grants approved	Number	0.00	150.00	198.00	225.00
		29-Aug-2011	31-Aug-2017	30-Aug-2019	30-Aug-2019

Comments (achievements against targets):

Surpassed: (150%)

All hospital grants were approved until 2017.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of hospital grants completed	Number	0.00	150.00	185.00	225.00
		29-Aug-2011	31-Aug-2017	30-Aug-2019	30-Aug-2019



Comments (achievements against targets):

Surpassed (150% over the original targeted and 122% over the revised target)

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of hospitals meeting: (a) wastewater standards; (b) solid waste standards; (c) HCWM practice standard	Number	0.00 29-Aug-2011	140.00 31-Aug-2017	185.00 31-Aug-2017	218.00 30-Aug-2019
Number of hospitals meeting wastewater standards	Number	0.00 29-Aug-2011	140.00 31-Aug-2017	110.00 30-Aug-2019	122.00 30-Aug-2019
Number of hospitals meeting solid waste treatment standards	Number	0.00 29-Aug-2011	140.00 31-Aug-2017	114.00 30-Aug-2019	141.00 30-Aug-2019
Number of hospital meeting HCWM practice standards	Number	0.00 29-Aug-2011	140.00 31-Aug-2017	185.00 30-Aug-2019	218.00 30-Aug-2019

Comments (achievements against targets):

Surpassed/Achieved (100% over the revised target)



Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Health personnel receiving training (number)	Number	0.00 01-Mar-2011	0.00 01-Mar-2011	0.00 30-Aug-2019	0.00 30-Aug-2019
Comments (achievements against targets): This indicator never was in the original PAD nor in the revised list of indicators. Probably was inserted in the system by mistake or it is a glitch in the Operational Portal System.					

Component: Comp. 3: Project Implementation Support and Coordination

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Effective CPMU and TAG support to Component 2 beneficiaries	Percentage	0.00 29-Aug-2011	100.00 31-Aug-2017	80.00 30-Aug-2019	89.10 30-Aug-2019
Comments (achievements against targets): Partially Achieved/Surpassed: (111% over the revised target)					



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Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Progress reports and audit reports are submitted with satisfactory quality and timely manner	Yes/No	N 29-Aug-2011	Y 31-Aug-2017	Y 30-Aug-2019	Y 30-Aug-2019

Comments (achievements against targets):

Achieved. This indicator was created on the 2017 restructuring process. It substituted two indicators that were dropped from the original PAD: (i) Smooth implementation and monitoring of grant implementation, and; (ii) Effective Monitoring, which were vague and to not have specified metrics.



B. KEY OUTPUTS BY COMPONENT

Objective/Outcome - The project development objective is to reduce environmental degradation and potential risks for human health through the improved management of healthcare waste in Vietnam’s hospitals.	
Outcome Indicators	<ol style="list-style-type: none"> 1. Increased share of hospitals' wastewater meeting the environmental standards; 2. Increased share of properly segregated and treated infectious healthcare waste; 3. Increased number of health care staff following correct occupational safety practices, including usage of personal protective equipment; 4. Improved perception among communities adjacent to project hospitals about health waste being properly managed
Intermediate Indicators - Component 1 - Policy and Institutional Environment Strengthening	<p>Number of new or revised policies, regulatory documents adopted and applied HCWM studies published and disseminated:</p> <ol style="list-style-type: none"> 1. Number of Policy and administrative documents 2. Number of Technical Regulations 3. Number of Technical Guidance Manuals <p>Improved knowledge and skills of key health personnel in health care waste management standards and practices</p> <ol style="list-style-type: none"> 4. Number of trainers trained passing the final test 5. Number of leaders of health, DONRE, Environment Police, other agencies trained and passed the final test 6. Number of HCWM administrators in DOH, health care facilities, preventive health centers trained and passed the final test 7. Number of technical staffs in environment monitoring agency trained and passed the final test 8. Number of HCW treatment system operators trained and passed the final test 9. Reduce number of hospitals in blacklist issued in the Decision 1788 by Prime Minister
Intermediate Indicators - Component 2: Hospital Waste Management Improvement Facility	<ol style="list-style-type: none"> 10. Number of Health Care Waste Management Plans approved by regulatory authority 11. Number of hospital grants approved 12. Number of hospital grants completed 13. Number of hospitals meeting wastewater standards 14. Number of hospitals meeting solid waste treatment standards 15. Number of hospital meeting HCWM practice standards



Component 3: Project Implementation
Support and Coordination

16. Effective CPMU and TAG support to Component 2 beneficiaries

17. Progress reports and audit reports are submitted with satisfactory quality and timely manner



ANNEX 1A. RESULTS FRAMEWORK - EFFICACY

Ratings Methodology

1. Levels of achievement. The methodology to define the level of achievement of each indicator is the following: for quantitative indicators, the actuals determined at the end of the project are compared with their expected revised targets. If the actual (result) at the end of the project indicates an achievement above 100 percent, the target is classified as surpassed. If the actual is between 85 percent and 100 percent, it is classified as achieved (when 100 percent) or substantially achieved. If it is between 65 percent and 84 percent, it is classified as partially achieved, and if it is lower than 65 percent, it is classified as not achieved. For qualitative indicators (such as yes or no), the accomplishment is classified binary as achieved (yes) or not achieved (no).

2. Achievement calculation formula. The criteria used to calculate the achievement of each indicator are the following. If the baseline is not zero, the percentage of achievement is the difference between what was intended (baseline) and actuals, divided by the difference between the target and the baseline. If the baseline is zero, the level of achievement is the coefficient between the actual value and the target. If the target is lower than the baseline, it is the coefficient between the actual and the baseline.¹³

Results of the Project

3. Tables 1.1 and 1.2 summarize the results of the project efficacy or the aggregate level of the achievement

Table 1.1. Summary Table Indicators' Achievement (Based on Data from table 1.2)

Table with 4 columns: Ratings Categories and Correspondent Interval, PDO Indictors, IRI, Total Rating. It details achievement levels for two PDOs: 'Reduce environmental degradation and potential risks for human health' and 'Improving management of healthcare waste in the Recipient's hospitals'.

¹³ A = (Ia - Ib) / (It - Ib), where A is the achievement, Ia is the indicator's actual; Ib is the indicator's baseline and It is the indicator revised target. In the case of the current project, all baselines were zero and then the formula was simply A = Ia / It.



Total Indicators PDO1	2	17	19
Percentage of Surpassed, Achieved and Substantially Achieved	100%	94%	95%
All Project Indicators			
Surpassed (>100%)	4	13	17
Achieved/Substantially Achieved (85% to 100%)	-	3	3
Partially Achieved (65% to 84%)	-	1	1
Not Achieved (<65%)	-	-	-
Total Indicators	4	17	21
Percentage of Achieved, Surpassed and Substantially Achieved	100%	94%	95%

Table 1.2. Level of Achievement of the Project Indicators

Indicators	Baseline	Revised Target	Actual Values	Ratio of Achievement	Level of Achievement
PDis					
1. Increased share of hospitals’ wastewater meeting the environmental standards (percentage)	—	23.0	30.3	131.7	Surpassed
2. Increased share of properly segregated and treated infectious HCW (percentage)	—	28.0	33.0	117.9	Surpassed
3. Percent of hospitals that have health care staff following correct occupational safety practices, including usage of personal protective equipment (percentage)	—	90.0	100.0	111.1	Surpassed
4. Improved perception among communities adjacent to project hospitals about health waste being properly managed (percentage).	—	90.0	100.0	111.1	Surpassed
IRIs					
1. Improved knowledge and skills of key health personnel in HCWM and practices (A: trainers)	—	290	310	106.9	Surpassed
2. Improved knowledge and skills of key health personnel in HCWM and practices (B: leaders of health, managers/officials of DONRE, Environment Police, and other agencies)	—	2,545	2,398	94.2	Substantially Achieved
3. Improved knowledge and skills of key health personnel in HCWM and practices (C: HCWM administrators in DOH, health care)	—	2,332	2,752	118.0	Surpassed
4. Improved knowledge and skills of key health personnel in HCWM and practices (D: Technical staff in environment monitoring)	—	310	292	94.2	Substantially Achieved
5. Improved knowledge and skills of key health personnel in HCWM and practices (E: HCW treatment system’s operators)	—	1,200	1,242	103.5	Surpassed
6. The number of new revised policies, regulatory documents completed (A: Policy and administrative documents)	—	4	5	125.0	Surpassed



Indicators	Baseline	Revised Target	Actual Values	Ratio of Achievement	Level of Achievement
7. The number of new revised policies, regulatory documents completed (B: Technical regulations)	—	4	3	75.0	Partially Achieved
8. The number of new revised policies, regulatory documents completed (C: Technical guidance manuals)	—	5	7	140.0	Surpassed
9. Reduced number of hospitals in blacklist issued in the Decision 1788 by Prime Minister	—	32	40	125.0	Surpassed
10. Number of HCW management plans approved by regulatory authority	—	68	72	105.9	Surpassed
11. Number of hospital grants approved	—	198	225	113.6	Surpassed
12. Number of hospital grants completed	—	185	225	121.6	Surpassed
13. Number of hospitals meeting waste water standards	—	110	122	110.9	Surpassed
14. Number of hospitals meeting solid waste standards	—	114	141	123.7	Surpassed
15. Number of hospitals meeting HCWM practice standards	—	185	218	117.8	Surpassed
16. Progress report and audit report are submitted with satisfactory quality and timely manner (yes or no)	—	Yes	Yes	100.0	Achieved
17. Effective CPMU and TAG support to Component 2 beneficiaries (percentage)	—	80.0	89.1	111.4	Surpassed

Table 1.3. List of the Project’s Beneficiary Hospitals

No.	Hospitals by Province	Solid Waste Management System	Wastewater Management System
I	Central Hospitals (20)		
1	Central EYE hospital		1
2	Central Lung hospital		1
3	Central Traditional Medicine Hospital		1
4	Central Hospital for Acupuncture		1
5	Central Hospital of Odontology-Stomatology,		1
6	Viet Nam-Thuy Dien Uong Bi hospital		1
7	Viet Nam-CuBa Dong Hoi Friendship hospital		1
8	Hospital for Nursing and Rehabilitation		1
9	Central Hospital No. 1 for Psychology		1
10	Da Nang C hospital		1
11	Can Tho Central hospital		1
12	74 Hospital	1	1
13	Marine Medicine hospital		1
14	E Hospital		1
15	Tue Tinh hospital		1
16	Le Huu Trac hospital for burn diseases		1
17	Central hospital for Pediatrics		1



No.	Hospitals by Province	Solid Waste Management System	Wastewater Management System
18	Hue Central Hospital		1
19	Group of hospitals Bach Mai (Bach Mai, Tropical Disease, ENT, Dermatology, Gerontology)		1
20	Thong Nhat hospital		1
II	Provincial Hospitals by Province (205)		
	An Giang		
1	An Giang hospital for obstetrics and pediatrics	1	1
2	Tan Chau Regional hospital	1	1
	Ba Ria - Vung Tau		
3	Le Loi general hospital	1	
	Bac Lieu		
4	Bac Lieu General hospital	1	1
5	Gia Rai General hospital	1	
6	Phuoc Long General hospital	1	
	Bac Giang		
7	Bac Giang General hospital		1
8	Bac Giang Tuberculosis and Lung diseases	1	1
9	Hospitals for Nursing and Rehabilitation		1
10	Luc Ngan General regional hospital	1	
11	Bac Lieu General hospital	1	
	Bac Kan		
12	Bac Kan General hospital	1	
	Ben Tre		
13	Nguyen Dinh Chieu General hospital	1	1
14	Ben Tre hospital for traditional medicine		1
15	Ba Tri General hospital	1	1
	Binh Dinh		
16	Binh Dinh General hospital		1
17	Qui Nhon General hospital		1
18	Bong Son General hospital		1
19	Phu Phong General hospital		1
	Binh Phuoc		
20	Binh Phuoc General hospital	1	1
21	Binh Long General hospital	1	1
22	Phuoc Long General hospital	1	1
	Binh Thuan		
23	Binh Thuan General hospital	1	1
24	Southern regional General hospital	1	
25	Northern regional General hospital	1	
26	La Gi General hospital	1	
	Ca Mau		
27	Ca Mau hospital for obstetrics and pediatrics	1	
28	Ca Mau general hospital	1	
29	Southern regional General hospital	1	
30	Nam Can General hospital	1	



No.	Hospitals by Province	Solid Waste Management System	Wastewater Management System
31	Cai Nuoc General hospital	1	
32	Tran Van Thoi General hospital	1	
	Cao Bang		
33	Cao Bang General hospital	1	1
34	Quang Uyen General hospital	1	
35	Trung Khanh General hospital	1	
36	Hoa An General hospital	1	1
	Can Tho (Grant 1)		
37	Traditional Medicine hospital		1
38	O Môn hospital		1
	Can Tho (Grant 2)		
39	Hospitals for obstetrics and pediatrics		1
	Can Tho (Grant 3)		
40	Can Tho hospitals for Lung and Tuberculosis	1	
	Da Nang		
41	Da Nang hospital for psychology		1
42	Son Tra general hospital		1
43	Cam Le district		1
	Đac Lac		
44	Hospital for Lung and Tuberculosis	1	1
45	333 hospital	1	
46	Buon Don General hospital	1	1
47	Krong Nang General hospital	1	1
48	BVĐK H Lak General hospital	1	
49	Cu M'Gar General hospital		1
50	Krong Pak hospital General hospital		1
	Đac Nong		
51	Dak nong General hospital	1	
52	Cu Jut central hospital	1	
53	Krong No general hospital	1	
54	Đak Song general hospital	1	
55	Tuy Đức general hospital	1	
56	Đak R'láp general hospital	1	
57	Đak G'long general hospital	1	
58	Đak Mil general hospital	1	
	Dien Bien (Grant 1)		
59	Đien Bien general hospital	1	
	Dien Bien (Grant 2)		
60	Tuan Giao general hospital	1	
	Dong Thap (Grant 1)		
61	Dong Thap general hospital	1	1
62	Hong Ngu general hospital	1	
63	Thap Muoi regional general hospital	1	
64	Sa Dec regional general hospital	1	1
	Dong Thap (Grant 2)		



No.	Hospitals by Province	Solid Waste Management System	Wastewater Management System
65	Dong Thap hospital for Lung and Tuberculosis	1	1
	Ha Giang (Grant 1)		
66	Ha Giang general hospital	1	
67	Hoang Su Phi general hospital		1
68	Bắc Quang general hospital		1
	Ha Giang (Grant 2)		
69	Na Tri general hospital	1	
70	Dong Van general hospital	1	
71	Quang Binh general hospital	1	
72	Hospital for Tuberculosis and Lung diseases	1	
	Ha Tinh		
73	Ha Tinh township general hospital	1	
74	Huong Son general hospital	1	
75	Hong Linh general hospital	1	
	Hai Duong		
76	Pediatrics hospital	1	
77	Tu Ky general hospital	1	
78	Kinh Mon general hospital	1	
	Hai Phong (Grant 1)		
79	Hospital for Tuberculosis and Lung diseases		1
80	Obstetric hospital		1
81	Pediatric hospital		1
82	An Dương general hospital		1
83	Tien Lang general hospital		1
84	Kien Thuy general hospital		1
85	An Lao General hospital		1
	Hai Phong (Grant 2)		
86	Viet Tiep Friendship hospital		1
87	Kien An general hospital		1
88	Thuy Nguyen general hospital		1
	Hoa Binh		
89	Hoa Binh general hospital	1	1
90	Tan Lac general hospital	1	1
91	Lac Thuy general hospital	1	1
	Hung Yên		
92	Khoai Chau general hospital		1
	Khanh Hòa		
93	Khanh Hoa general hospital	1	1
94	Cam Ranh general hospital	1	
95	Ninh Hoa general hospital	1	1
96	Den Khanh general hospital	1	
97	Hospital for traditional and rehabilitations general hospital		1
	Kien Giang (Grant 1)		
98	Kien Giang general hospital	1	1



No.	Hospitals by Province	Solid Waste Management System	Wastewater Management System
99	Kiên giang Hospital for Traditional medicine		1
	Kien Giang (Grant 2)		
100	Hospital for tuberculosis	1	1
	Kon Tum		
101	Hospital for traditional medicine	1	
102	Ngoc Hoi general hospital	1	
	Lai Chau		
103	Lai Chau general hospital	1	1
104	Than Uyen general hospital	1	
	Lao Cai		
105	Lao Cai general hospital	1	
	Lam Dong		
106	Lam Dong general hospital		1
	Long An (Grant 1)		
107	Long An general hospital	1	1
	Long An (Grant 2)		
108	Can Giuoc General hospital	1	1
109	Long An general hospital	1	
110	Hau Nghia general hospital	1	
111	Dong Thap Muoi general hospital	1	
	Nam Dinh		
112	Nam Dinh general hospital	1	
	Ninh Binh (Grant 1)		
113	Obstetric and Pediatric Hospital	1	
	Ninh Binh (Grant 2)		
114	Nho Quan general hospital	1	
	Ninh Binh (Grant 3)		0
115	Kim Son general hospital	1	
	Ninh Thuan (Grant 1)		
116	Ninh Thuan General Hospital	1	
	Ninh Thuan (Grant 2)		
117	Ninh Thuan general hospital		1
118	Ninh Son regional hospital	1	
	Nghe An (Grant 1)		
119	Nghe An Hospital for Tuberculosis and Lung Diseases		1
120	Tay Nam regional hospital		1
	Nghe An (Grant 2)		
121	General Hospital Huu Nghi Nghe An	1	
122	Dien Chau general hospital	1	
123	Do Luong general hospital	1	
124	Nghe An hospital for Tuberculosis and Lung Diseases	1	
125	Tay Bac Nghe An general hospital	1	
126	Quynh Luu general hospital	1	
127	Thanh Chuong general hospital	1	
128	Yen Thanh general hospital	1	



No.	Hospitals by Province	Solid Waste Management System	Wastewater Management System
	Phu Tho		
129	Phu Tho provincial hospital	1	
130	Tam Nong general hospital	1	
131	Phu Tho general hospital	1	
132	Cam Khe general hospital	1	
	Phu Yen		
133	Phu Yen provincial hospital		1
134	Song Cau general hospital		1
135	Obstetric and Pediatric hospital		1
	Quang Binh (Grant 1)		
136	Bo Trach general hospital	1	
137	Le Thuy general hospital	1	
138	North Quang Binh general hospital	1	
	Quang Binh (Grant 2)		
139	Minh Hoa general hospital	1	1
140	Tuyen Hoa general hospital	1	
141	Dong Hoi general hospital	1	
142	Quang Ninh general hospital	1	
	Quang Nam (Grant 1)		
143	Quang Nam Provincial hospital		1
144	Northern regional hospital	1	1
145	Quang Nam regional hospital		1
	Quang Nam (Grant 2)		
146	Que Son district health center		1
147	Nong Son district health center		1
148	Nam Tra My district health center		1
149	Tay Giang district health center		1
	Quang Nam (Grant 3)		
150	Quang Nam Pediatric hospital		1
	Quang Ngai (Grant 1)		
151	Dang Thuy Tram hospital	1	
	Quang Ngai (Grant 2)		
152	Quang Ngai general hospital		1
	Quang Ninh		
153	Cam Pha regional hospital	1	
154	Hai Ha general hospital	1	
	Quang Tri		
155	Trieu Hai general hospital		1
156	Vinh Linh Regional hospital		1
157	Quang Tri regional hospital		1
	Quang Tri		
158	Quang Tri general hospital	1	
159	Trieu Hai regional hospital	1	
160	Vinh Linh district health centre	1	
	Soc Trang		



No.	Hospitals by Province	Solid Waste Management System	Wastewater Management System
161	Soc Trang Provincial Hospital	1	1
162	Vinh Chau general hospital	1	1
163	Nga Nam general hospital	1	1
164	Ke Sach general hospital		1
165	Long Phu general hospital		1
	Son La (Grant 1)		
166	Son La provincial hospital	1	
167	Moc Chau general hospital	1	1
168	Thao Nguyen general hospital		1
	Son La (Grant 2)		
169	Hospital for rehabilitation		1
170	Thuan Chau general hospital	1	
171	Song Ma general hospital	1	
	Tay Ninh		
172	Tay Ninh provincial hospital	1	
	Thai Binh (Grant 1)		
173	Thai Binh Provincial hospital		1
174	Hospital for Tuberculosis and Lung Diseases		1
175	Phu Duc general hospital		1
	Thai Binh (Grant 2)		
176	Dong Hung general hospital	1	
	Thai Binh (Grant 3)		
177	Thai Binh district health centre		1
	Thanh Hoa (Grant 1)		
178	Thanh Hoa hospital for Obstetrics and Pediatrics		1
179	Hoang Hoa general hospital		1
180	Ha Trung general hospital		1
181	Quan Hoa general hospital		1
	Thanh Hoa (Grant 2)		
182	Ba Thuoc general hospital	1	
183	Trieu Son general hospital	1	
184	Thanh Hoa Pediatric hospital	1	
185	Nong Cong general hospital	1	
186	Ngoc Lac general hospital	1	
187	Hau Loc general hospital	1	
188	Thach Thanh	1	1
189	Quan Hoa general hospital	1	
190	Tinh Gia general hospital	1	
	Thanh Hoa (Grant 3)		
191	Thanh Hoa provincial hospital	1	
192	Thanh Hoa general hospital		1
	Tien Giang		
193	Tien Giang general hospital		1
194	Cai Lay general hospital	1	1
195	Go Cong general hospital	1	1



No.	Hospitals by Province	Solid Waste Management System	Wastewater Management System
196	Cai Be general hospital		1
	Tra Vinh		
197	Tra Vinh provincial hospital		1
198	Obstetrics and Pediatric hospital	1	
199	Tieu Can regional hospital	1	
200	Cau Ngang general hospital	1	1
	Tuyen Quang		
201	Tuyen Quang provincial hospital	1	
202	Ham Yen general hospital	1	1
	Vinh Long		
203	Vinh Long provincial hospital	1	
	Vinh Phuc		
204	Phuc Yen Regional hospital	1	1
	Yen Bai		
205	Yen Bai hospital for obstetrics and pediatrics	1	
	CTS		
	CTS Quang Ngai	1	
	Total	143	123

**ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION****A. TASK TEAM MEMBERS**

Name	Role
Preparation	
Supervision/ICR	
Anh Thuy Nguyen	Task Team Leader(s)
Hoang Xuan Nguyen	Procurement Specialist(s)
Mai Thi Phuong Tran	Financial Management Specialist
Andre C. Medici	Team Member
Nga Nguyet Nguyen	Team Member
Sita Ramakrishna Addepalli	Environmental Specialist
Nguyet Minh Nguyen	Procurement Team
Dung Thi Thuy Dao	Team Member
Nga Thuy Thi Nguyen	Procurement Team
Vinh Quang Nguyen	Team Member
Nga Thi Anh Hoang	Procurement Team
Sang Minh Le	Team Member
Ha Thi Thu Nguyen	Procurement Team
Quang Nhat Nguyen	Team Member
Thao Thi Mai Pham	Social Specialist

B. STAFF TIME AND COST

Stage of Project Cycle	Staff Time and Cost	
	No. of staff weeks	US\$ (including travel and consultant costs)
Preparation		
FY10	20.892	133,030.82



FY11	39.156	192,757.74
FY12	.940	1,441.96
Total	60.99	327,230.52
Supervision/ICR		
FY10	0	185.14
FY11	1.750	33,815.16
FY12	26.043	135,402.04
FY13	35.608	84,214.61
FY14	48.193	174,389.49
FY15	53.242	182,038.31
FY16	54.306	122,974.12
FY17	34.147	68,701.99
FY18	31.500	119,337.75
FY19	23.806	92,983.24
FY20	16.938	100,817.39
Total	325.53	1,114,859.24



ANNEX 3. PROJECT COST BY COMPONENT

Components	Amount at Approval (US\$, millions)	Actual at Project Closing (US\$, millions)	Percentage of Approval (%)
Component 1: Policy and Institutional Environment Strengthening	9.00	8.50	94.44
Component 2: Hospital Waste Management Improvement Facility	134.00	129.80	96.87
Component 3: Project Implementation Support and Coordination	6.40	6.70	104.69
Total	150.00	145.00	96.67



ANNEX 4. EFFICIENCY ANALYSIS

Methodology to Assess Project Efficiency

- 1. The economic analysis in the PAD was designed to estimate the costs and present value benefits of the project interventions.** It initially considered that decisions to invest in hospitals' waste management systems were made to comply with national policies and were not based on economic cost-benefit criteria. Therefore, it would be difficult to assign a monetary value to the expected benefits because they are distributed over a long period of time to several different population groups. Despite these arguments, the PAD had an exercise to estimate the potential project benefits¹⁴ at US\$6.3 million per year. These benefits compared the project's original investments costs with recurrent costs per year, allowing to estimate the net present value of the accumulated benefits under Component 2 over 10-, 15-, and 20-year horizons, at US\$36.6 million, US\$58.8 million, and US\$77.96 million, respectively (at 3 percent discount rate), and US\$22.9 million, US\$31.1 million, and US\$35.8 million, respectively (at 12 percent discount rate).
- 2. However, the project did not design the impact indicators to estimate the project benefits.** Variables such as the number of patients/health workers infected and treated due to hospital infections, number of health workers injured by sharp objects, number of people living around hospitals who were infected and died due to directly HCW-related diseases, and the income from segregation and selling of treated hospital waste were not considered in the project design and/or in project implementation, creating difficulty in evaluating the project's efficiency and effectiveness at this final assessment according to the proposed PAD methodology.
- 3. During project implementation, most of the loan budget (about 90 percent) was allocated for Component 2 (increased number of hospitals meeting healthcare waste management standards).** Hospital investments in waste management systems are the potential source for generating benefits according to the project objectives. It is estimated that investments in wastewater and solid waste management and treatment in the hospitals have improved working conditions and lives for hospital workers and communities, reduced their risks to be infected or injured, and improved the quality of the environment surrounding the hospitals. Benefits should be higher if the project investments are able to address a large number of hospitals and communities with lower unitary costs per project investment.
- 4. As such, the efficiency analysis will be concentrated in the project technical efficiency¹⁵ and other aspects.** Additional economic analysis looked at project allocative efficiency, based on the technologies used; project sustainability; and a broader discussion on the project benefits, considering some additional parameters from the project databases.

¹⁴ These benefits are based in the impact from reduced hazardous solid waste due to thorough segregation, the income from sales of segregated recycled waste, the cost reduction from injuries prevented per year and health treatment costs, the population income losses, and the notional income from emission reduction.

¹⁵ Technical efficiency is the effectiveness with which a given set of inputs is used to produce an output.



Technical Efficiency

5. **Technical efficiency in hospital waste management increases when more inputs could be acquired with the project investment at lower unitary costs per output (hospitals with waste management systems installed).** As can be seen in table 4.1, between the appraisal and the project closing, the number of benefited hospitals with waste management investments increased while the total amount of investments decreased. The average cost of the investments in the hospitals reduced by 37 percent from project appraisal to closing. Technical efficiency of the project improved during the implementation, given that the project benefited more hospitals with lower unitary costs.

Table 4.1. Hospital Waste Management Project: Number, investments and Average Cost at Appraisal and Closing (2011–2019)

Hospitals	Number (Hospitals)		Total Investment (US\$, millions)		Average Cost (US\$, thousands)	
	Appraisal	Closing	Appraisal	Closing ^a	Appraisal	Closing
Total	150	225	134	127.3	893.3	565.8

Note: a. Total investments at closing correspond to the actuals in July 2019. At this point, 90.2 percent and 83.6 percent of the investments in central and provincial/district hospitals were already disbursed, respectively.

6. **The costs of solid waste treatment reduced during project implementation in 34 project hospitals surveyed according to the recipient’s Final Project Report (CEHS 2019).** Table 4.2 shows that the nominal cost per kg of the healthcare hazardous solid waste treated was reduced, on average, 14.2 percent from 2015¹⁶ to 2018 in nominal Vietnamese Dong.¹⁷ Part of the cost reduction could be explained by efficiency gains in the operation of the related processes and equipment.

Table 4.2. Average Cost for Treatment of Healthcare Hazardous Solid Waste before and after Project Interventions (2015–2018)

No.	Types of Hazardous Waste	Before Project (2015)			After Project (2018)		
		Number of Hospitals	Quantity to Be Treated (kg/day)	Cost (VND/kg) (in 2018 prices)	Number of Hospitals	Quantity to Be Treated (kg/day)	Cost (VND/kg)
1	Infectious and sharp waste						
1.1	Infectious and sharp waste	34	215	20,640	34	240.2	19,270
1.2	Infectious and non-sharp waste	34	1,584	20,722	34	1,632.4	17,580
1.3	Anatomical waste	31	226	19,729	31	260.1	18,978

¹⁶ The baseline survey for these 34 hospitals was conducted in 2014 (considered before project implementation).

¹⁷ Values for 2015 were adjusted according Vietnam inflation rates (2.67 percent in 2016, 3.52 percent in 2017, and 3.54 percent in 2018).



No.	Types of Hazardous Waste	Before Project (2015)			After Project (2018)		
		Number of Hospitals	Quantity to Be Treated (kg/day)	Cost (VND/kg) (in 2018 prices)	Number of Hospitals	Quantity to Be Treated (kg/day)	Cost (VND/kg)
2	Noninfectious and hazardous waste	32	100	23,728	34	130	18,920
3	Total of waste and average cost	34	2,125	20,985	34	2,262.7	17,996

Source: CEHS 2019.

7. **The costs for wastewater treatment were slightly lesser than expected in the same sample of 34 project hospitals according to the Final Project Evaluation Report (CEHS 2019).** However, the capacity of the hospital wastewater treatment system financed by the project was increased as was the actual treatment capacity and quality of the effluents. The evaluation results showed that the operating costs of the newly financed wastewater treatment system were reduced to less than 1 percent (or stayed basically the same) compared to the operating cost per cubic meter of wastewater before the project, as can be seen in table 4.3. Moreover, all output indicators in these hospitals met environmental standards, which did not happen before the financing.¹⁸

Table 4.3. Capacity and Operating Costs of Hospital Wastewater Treatment System before and after Project Investments (2015–2018)

No.	Contents	Before Investment (2015) in 2018 Prices	After Investment (2018)
1.	Treatment capacity according to design (Average m ³ /day)	397.6	505.0
2.	Actual processing capacity (Average m ³ /day)	248.9	302.6
3.	Operating costs (Average VND/m ³)	5,410	5,404
4.	Total operating costs (VND/day)	1,223,715	1,635,250

Source: CEHS 2019.

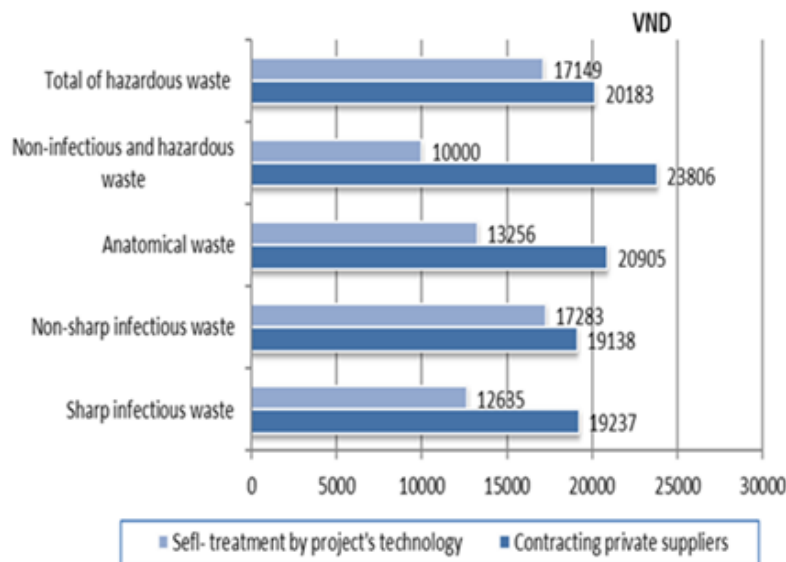
Other Aspects of the Project Benefits' Analysis

8. **Other aspects to be considered in the benefit's analysis include allocative efficiency, technology options used by the project, and other project benefits,** including some partial findings from the Final Project Evaluation Report (CEHS 2019) about the benefits for patients/health workers, population living in areas surrounding the hospital, and income from segregation and selling of hospital waste.

¹⁸ Before the project, all the required standards for treatment of hospital wastewater were not met, seriously violating the environment protection regulations that were in place. Hundreds of hospitals were included in the blacklist for violating the environmental protection regulations. Many hospitals were punished for violation of environmental regulations by the central or provincial environmental agencies. Despite the increasing capacity of wastewater treatment, what really matters is the accomplishment of the environmental standards after using the new technologies.



Figure 4.1. Comparison between Fees for Contracting a Private Supplier and Fee for Self-treatment of Hazardous Solid Waste by Project Technologies



Source: CEHS 2019.

9. Regarding the project allocative efficiency,¹⁹ a comparison of the costs related to solid waste treatment between external providers and self-treatment by using the project technology shows that the last is less costly, justifying the investment allocations in the hospitals' solid waste self-treatment. Figure 4.1 shows that the costs per kg of hazardous waste self-treatment by the project technology (in Vietnamese Dong) are, on average, 15 percent lower than fees for contracting a private supplier in 2018, justifying the allocations of the project investment in public hospitals. Figure 4.1 also shows that lower costs in self-treatment by the project technologies are verified in noninfectious and hazardous waste, anatomical waste, non-sharp infectious waste, and sharp infectious waste.

10. The project invested in hospital's wastewater treatment for 123 beneficiary hospitals using Anaerobic-Anoxic-Aerobic (AAO) technology.²⁰ The project has invested mostly in modern AAO (82.9 percent) and Anaerobic-Anoxic technology (17.1 percent). These modern wastewater treatment technologies were appreciated by the beneficiary hospitals for their efficiency and environmental friendliness. About 123 hospitals using these technologies met the environmental standards for wastewater treatment and were certified by the IVAs. When evaluated, the authorities of the 34 hospitals in the sample considered that the AAO wastewater treatment systems had advantages, such as saving

¹⁹ Allocative efficiency, in this case, occurs when the project distribution of funds is optimal, generating lower operational costs than alternative funds allocations. It also could be associated with the opportunity costs of the project investments in relation to other allocations.

²⁰ AAO technology consists of three processes: (a) anaerobic process, where pollutants are decomposed by microorganisms under oxygen-free conditions or called anaerobic/anaerobic; (a) anoxic process, where pollutants continue to be decomposed by microorganisms under conditions of oxygen but unsaturated, or in the absence of oxygen, microorganisms in this stage are heterotrophic; and (c) aerobic process, where contaminants continue to be decomposed by microorganisms in conditions of sufficient oxygen supply (by oxygen concentrators).



space and costs, compared with other systems, and ensuring environmental quality according to the national technical standards of healthcare wastewater treatment. The appropriateness of this wastewater treatment technology, together with the status and needs of the hospitals, is key to ensure quality and economic efficiency in long-term use. A strong signal of how the treatment technology used by the Project was efficient is the comparison between the expected average volume of wastewater to be treated (65 cubic meters per bed) according the PAD Economic and Financial Analysis (Annex 5) and the measured average volume of wastewater treated using the project acquired technologies (67 cubic meter per bed) according the IVA's evaluation.

11. **For solid waste treatment, the project applied modern non-burning technology for the treatment of infectious HCW.** This environment-friendly technology using autoclaves or microwave systems eliminates the emission of hazardous gases while disinfecting and reducing the volume of solid waste to be treated. In the sample of 34 hospitals surveyed, the technology selected by most of the hospitals is steam sterilization or autoclaves (28 of 34 hospitals). Only a few hospitals selected dry or microwave sterilization (6 out of 34 hospitals). As mentioned earlier, results of the final report (CEHS 2019) assessment in these 34 hospitals showed that the expenditures of the hazardous solid waste treatment using non-burning technology supported by the project are lower than the burning technology used previously by these hospitals and are less costly than the fee paid to external contractors/private companies.

12. **The project benefits for patients and health workers are sound after the utilization of the new HCWM processes and technologies.** Treatment of HCW from the project investments results in positive effects in occupational safety of health staff and patients' health. Review results from the 34 hospitals in which the survey was conducted by CEHS (2019) showed that besides helping improve knowledge and practice of health workers, the project's support helped reduce, by 12 percent, hospital staff infected due to hospital infections after project implementation. There is also some evidence that fewer hospitalized patients acquired diseases relating to nosocomial infections, and the number of hospitalized patients treated by antibiotics was reduced by 50 percent in the situations pre and post project implementation. This evidence shows that if hospitalized patients are prevented from contracting nosocomial infections, a large amount of money can be saved for both the patient's family and hospitals.

13. **The population living in the hospital areas also benefited from the HCWM investments in the project hospitals.** Opinion surveys were conducted for the communities living in the areas surrounding the hospitals, asking the perception among communities adjacent to project hospitals about health waste being properly managed.²¹ During the project life, 225 hospitals were surveyed, revealing that 94.7 percent of these hospitals had good feedback on the performance of their HCWM activities. The results of the final project evaluation (CEHS 2019) at 60 hospitals also provided positive data showing that most of the communities adjacent to the evaluated hospitals found a marked improvement in HCWM at

²¹ This indicator is one of the project IRIs. The IVA conducted the survey with the surrounding communities using the following rule: at least 70% of surveyed households need to respond positively to the questionnaires to allow the invested hospital to pass in the result verification scorecard. Verification for this parameter was conducted in all the beneficiary hospitals and the number of hospitals that passed this parameter/result is 100%. On the other hand, 94.7% is the average for all the positive responses to the questionnaires by all the surveyed households which is higher than the passing score of 70% as required.



hospitals. All 60 hospitals (100 percent) received positive feedback from over 97 percent of the surrounding communities.

14. **Hospital's income from sale of recyclable HCW.** The project created incentives for the hospitals to reuse, recycle, and sell recyclable HCW and these incentives will be mandatory after 2025 to increase the sustainability of the hospitals' HCWM processes. The final report reviewed the income from the recyclable HCW in the 34 surveyed hospitals (CEHS 2019) showing that for each collected 1,000 kg of HCW, 30.6 kg of recyclable waste was produced in 2018, and the total income for selling the recyclable HCW in these 34 hospitals was VND 231,258,074 (close to US\$9,933 or US\$292 per hospital). It is expected that the improvement of the activities related to segregate recycled HCW could increase the income from selling recyclable waste, contributing to increase the hospital waste management systems' sustainability.

Final Considerations

15. **This analysis concludes that the project's efficiency was substantial along the project life and benefited from good technical efficiency associated with the following:**

- (a) Achieved project development goals with lower unitary investment costs per hospital and increased number of benefited hospitals by using the total project investment.
- (b) Lower costs per kg of solid waste treated, comparing the situation before and after project implementation and higher volume of wastewater treated than what was expected in the Economic and Financial Analysis of the PAD. In both cases the quality of the outputs (environment protection and reduced risks for human life) is what really matters.

16. **Other aspects of the project efficiency are the following:**

- (a) Substantial allocative efficiency was achieved because the costs related to solid waste self-treatment by using the project technology are lower than the costs of contracting external providers of healthcare solid waste treatment.
- (b) The project invested in the top wastewater management technologies which save hospital physical space and slightly reduce costs when compared with other technologies, ensuring environmental quality according to the technical standards of healthcare wastewater treatment used in Vietnam.
- (c) The hazardous solid waste treatment using non-burning technology supported by the project represents lower investment and recurrent costs than the expenditures related to burning technology used previously by the same hospitals.
- (d) Non-burning technologies used by the project are also less costly than the corresponding fees to be paid to private companies for solid waste treatment using the same non-burning technologies.



- (e) The HCWM investments financed by the project are leading to positive effects in occupational safety of health staff and in patients' health. They are also reducing the associated costs to treat hospital infections.
- (f) Opinion surveys conducted for the communities living in the adjacent areas of the project hospitals revealed that 94.7 percent of these hospitals had good feedback on the performance of their HCWM systems and activities and contributed to more healthy lives.
- (g) The project hospitals have been benefited by some small additional monetary income from sale of recyclable hospital waste. However, it is expected that such income from sale of recyclable HCW would be increased over time due to better segregation, contributing to increase the hospital waste management systems' sustainability.



ANNEX 5. BORROWER, CO-FINANCIER AND OTHER PARTNER/STAKEHOLDER COMMENTS

1. The ICR mission was conducted in July 2019. The team visited a sample of the sites where the hospitals benefited by the project were placed and had meetings with key stakeholders and beneficiaries including VIHEMA, CPMU, selected PPMUs, central hospitals, sub-national hospitals. Below are the contributions from CPMU, consolidating the comprehensive review of the project implementation on different operational and technical aspects

I. Background

2. According to the United Nations' World Population Report, Vietnam had 89 million people in 2010. Results of the April 2019 Population and Housing Census showed that Vietnam's population is 97.6 million. In 2009, Vietnam was ranked as a middle-income country with gross national income per capita of US\$1,010. In 2018, the gross national income was estimated at US\$2,587 as a result of impressive economic development in Vietnam accompanied by challenges in environment damages. The GOV considers environment sustainability as one of the pillars of the National Social-Economic Development Plans for 2011–2015 and 2016–2020. Waste management (including HCW) was included as one of indicators that the Government must report to the National Assembly about implementation of the National Social-Economic Development Plans.

3. 'More Sustainable Management of Natural Resources and Reduced Environmental Degradation' is one of the four pillars of the World Bank CPS for Vietnam. Mitigation of environmental degradation is reflected in the CPS outcome 'Improved management effectiveness of household and industrial pollution'. The rapid development of Vietnam during the last decade has led to substantial degradation of natural resources. The need for better HCWM in Vietnam can be viewed within the context of this environmental awareness, considering the major risks that such hazardous waste presents to humans and the environment.

4. At the time of formulating the project in 2010, Vietnam had 1,186 hospitals with capacity of 187,843 patient beds. The healthcare sector was estimated to generate about 350 tons per day of HCW (including 40 tons per day of hazardous waste) and about 150,000 m³ of wastewater. Incineration has been the most popular technology for healthcare solid waste treatment in Vietnam. HCW also poses occupational hazards through injuries caused by contaminated sharp instruments and contact with other infectious or hazardous material. Untreated HCW also possessed risks to neighboring communities if improperly transported and also to garbage pickers. It was estimated that in 2015, solid HCW was 500 tons per day, and by 2020 it will be 800 tons per day. For hazardous waste, the total estimated volume is approximately 800,000 tons per year, according to MONRE's report 'Status of waste in Vietnam 2015'. Burning was the most popular technology for treatment of HCW.

5. The Environmental Protection Law No 52/2005/QH11 provides the overarching legal framework. The cross-sectoral nature of environmental protection, accompanied by a significant degree of delegation of implementation responsibility to provincial governments, creates a challenge for environmental



protection. To manage this complexity, the Government has issued an intersectoral Circular No. 02/2009/TTLT-BCA-BTNMT to regulate and facilitate cooperation, information exchange, inspection, sanctions, and capacity building between the Environmental Protection Agency and following agencies including the Environmental Management Administration under MONRE, the Environment Police under the Ministry of Public Security, the Ministry of Construction, the Ministry of Science and Technology, and VIHEMA.

6. Responses of the GOV toward healthcare environment protection and management of HCW are comprehensive. Vietnam's legal framework for healthcare environment protection and management of HCW are complete. The Law on Environment Protection, No.55/2014/QH13, Article 72 promulgates that healthcare solid waste must be classified at emission source, collection, transportation, storage, and disposal to ensure environmental technical standards.

7. Decision No. 2149/2009/QĐ-TTg approved the National Strategy on integrated management of solid waste by 2025 and the vision to 2050. Decision No. 491/2018/QĐ-TTg approved the adjustment of this national strategy. It defined that, by 2025, a solid waste management system will be built such that waste is sorted at the emission source, collected, reused, recycled, and thoroughly treated with advanced and appropriate technologies, thus encouraging the treatment of HCW in a cluster model. Decision No. 1930/2009/QĐ-TTg approved the orientation for drainage of urban areas and industrial parks in Vietnam up to 2025 and a vision to 2050, in which, by 2015, all hospital wastewater will be treated to meet national standards before being discharged into the public system.

8. With Decision No. 4043/QĐ-BYT, dated October 10, 2013, of the MOH intersectoral collaboration to protect the health environment and manage HCW has been strengthened and improved by the establishment of the Intersectoral Committee for Environment Protection in healthcare activities with participation of line ministries and other sectors and the MOH and MONRE playing very important roles. Circular No. 48/2014/TTLT-BYT-BTNMT, dated December 22, 2014, guides state management and collaboration in healthcare environment protection. This circular creates the legal framework for the health sector to collaborate with the environment sector, especially with Environment Police Force in management of HCW, to ensure they are appropriate with local context and conditions where the health facilities are located. However, multisectoral collaboration was not as effective as expected and key functions currently are focusing on inspection, examination, and sanction. Collaboration, considered to be helpful for parties to solve weakness in management of HCW, is not yet regularly and effectively conducted.

9. Decision No. 2038/QĐ-TTg, dated November 15, 2011, was approved by the Prime Minister in the Master Plan for Management of Healthcare Waste for 2011–2015 and orientation to 2020. The comprehensive plan identified objectives to treat hospitals' healthcare solid waste and wastewater until 2015 for different levels of the health system. The plan defined a vision until 2020 to ensure that all health facilities treat HCW according to the national standards and criteria for environment.

10. The joint ministries Circular No. 58/2015/TTLT-BYT-BTNMT, dated December 31, 2015, on the management of HCW is a basis for application and implementation of health environment protection in the healthcare activities, including examination and treatment facilities, research and training institutions on health science and pharmacy, and enterprises producing medical and pharmaceutical products. Almost



all public hospitals have been financed to build new or upgrade infrastructure. Hospital environment protection, management of HCW, and infection control have been strengthened and have become hospital routine activities.

11. In 2015, the MOH approved the National Criteria for annual assessment of hospital quality. Among 83 criteria to be used in the assessment, there are a number of criteria for evaluation of management of HCW activities and hospital environment and hygiene. Awareness on environment protection by hospital managers and health staff has been improved. Because of better awareness, hospitals are currently green, clean, and environment-friendly and manage waste emission at source better.

12. The project has supported the Government in the development of the comprehensive and updated legal framework on HCW treatment, establishment of effective multisectoral collaboration, and strengthened ownership role of provincial authorities and hospitals. The project has supported 218 hospitals (217 hospitals and one centralized treatment system) to build and operate effective systems for treatment of healthcare solid waste and wastewater and meet the Vietnam environmental standards, with more than 90,000 health managers and staff and other relevant sectors being trained.

13. In implementation of Subcomponent 2-B, the project has applied criteria for selection of provinces and beneficiary hospitals.

14. **Criteria for selection of provinces.** Provinces that are eligible for selection have to satisfy the following criteria: (a) develop a provincial plan for management of HCW, using the project's recommended template; (b) be located in disadvantageous, mountainous, and ethnic minority areas; and (c) have hospitals in the blacklist of institutions causing serious environment pollution according to Decree No. 64/2003/QĐ-TTg and Decree No. 1788/2013/QĐ-TTg of the Prime Minister.

15. **Criteria for selection of beneficiary hospitals.** To be eligible for selection, hospitals should:

- (a) Be operating public hospitals at the provincial, inter-district, and district level;
- (b) Have minimum number of beds according to an agreement between the MOH and World Bank. At the time of the project's formulation and appraisal, the number of beds in the hospital should be 200. After restructuring, to meet local needs, the criteria were adjusted, by which hospitals with 100–150 beds could meet the criteria;
- (c) Be located in crowded population areas or poor and difficult provinces;
- (d) Be at a High risk to cause environment pollution;
- (e) Be in the blacklist and have a hospital plan for management of HCW using the project's template (no assessment on quality);
- (f) Have no other project or budget from other project, which is insufficient for investment in the waste management system;
- (g) Have high load of patients;



- (h) Have the building of the treatment system inside the hospital area with no fee for clearance operations; and
- (i) Select non-burning technologies.

16. Depending on the hospital size and selected technologies, capital to be granted for hospitals will range from US\$300,000 to US\$2 million.

17. At the start, the project applied a round/region approach in supporting hospitals, where the Mekong delta river will be first supported and then the middle part and other regions. After the restructuring in 2014, to meet actual needs, speed up project implementation, and increase coverage, any hospital that required funds to complete all the procedures were granted funds, regardless of which region it belonged to.

18. The current World Bank project is designed to fill gaps from other sources of financing and also address the shortcomings observed from earlier investments HCWM. At the time of project formulation in 2010, development partners provided significant support for the MOH to strengthen HCWM. The support included the following:

- (a) An Austria-funded project, which provided the MOH financial assistance to install two chamber incinerators in 25 hospitals.
- (b) French technical assistance to develop a master plan for healthcare solid waste treatment that has received further inputs through the World Health Organization's support and from international development agencies such as the World Bank and Asian Development Bank.
- (c) Kreditanstalt für Wiederaufbau had integrated support for HCWM into its health projects as environmental safeguard polices, including allocating budgets to construct and install both solid waste and wastewater treatment facilities in hospitals. The World Health Organization has been supporting the MOH in developing guidelines and action plans for hospital waste management and providing training courses for hospital managers.
- (d) The Global Environmental Facility is initiating a program to demonstrate non-burning technology for infectious waste treatment in three hospitals.
- (e) The Japan International Cooperation Agency has supported HCWM improvement in selected facilities in the past and plans to do more in the future.

19. The legal framework, mechanisms of coordination, and collaboration in HCWM significantly contributed to the successful implementation of the project. Coordination and collaboration among ministries and sectors, especially the Ministry of Planning and Investment, the MOH, MONRE, the Ministry of Construction, the MOH, the Government Office, and other levels relating to the health environment, investment in project implementation, and provincial levels made significant improvement. The Government established a National Steering Committee on health environment management with the participation of representatives from relevant ministries. The MOH has established a VIHEMA. The



strengthened coordinating role of the provincial People's Committee in project implementation and participation of beneficiary hospitals in the PPMU, planning and implementation of investment, and efficient use of invested facilities will maintain sustainability after the project's closure.

20. During the implementation process, the project has faced risks. A number of risk mitigation solutions had been implemented to overcome risks. The main risks of the project included the following: (a) changes in laws and sub-laws related to HCWM, construction, licensing processes, environmental impact verification, and so on for which the beneficiary hospitals had to revise the grant or license application procedures, which was time consuming and (b) the project implementation model and result-based financial allocation are the new and first ever mechanism applied for the MOH. The project management mechanism in the first phase was not appropriate through the application of a centralized project management and implementation model at the central level, no full-time staff at the CPMU and no separate PPMU, limited coordination between relevant sectors and unclear responsibilities within the CPMU, and failure to establish a national advisory team of consultants and so on. These factors contributed to the delay and the slow, inefficient implementation of project activities in the first stage.

21. The project, together with the World Bank, overcame the abovementioned issues by undertaking a number of solutions, including (a) asking the World Bank to stop implementing the project during January to August 2014 to restructure the project through review of project management modality and project implementation, adjust investment addresses and criteria for selecting provinces and beneficiary hospitals, and propose restructuring the CPMU and project activities according to Aide Memoire dated April 2014; (b) rearranging the CPMU, with a clear task assignment and coordination mechanism, recruiting full-time project staff, and setting up specialized teams to assist the CPMU; and (c) establishing a PPMU at the provincial level.

II. Implementation of Project Development Objective

22. With the abovementioned problems, solutions have been implemented to achieve four PDIs. As analyzed earlier, the project was suspended during January–August 2014 for restructuring. Then, in November 2017, the World Bank agreed for the project to be extended for two more years, which would end on August 30, 2019, to ensure project implementation. Although the project lasted for two more years, there was no change in the content of the PDO. However, there were some adjustments in the IRIs and some activities, but these changes did not affect the PDO. The changes will be further analyzed in the section to evaluate indicators.

23. The project achieved all the defined objectives and therefore contributed to reduce the environmental pollution caused by HCW generated by the hospitals and health facilities in Vietnam. The development indicators of the project exceeded the final targets after restructuring. Appendix 1 of the Project End Line Evaluation Report shows the following: (PDO1): hospitals supported by the project have contributed to treating 35.3 percent of healthcare wastewater of Vietnam, exceeding the final target (23 percent); (PDO2) 35.6 percent of hazardous healthcare solid waste of Vietnam was treated, exceeding the final target (28 percent); (PDO3) most hospitals have a high proportion of health workers complying with the occupational safety regulations (over 90 percent); and (PDO4) the majority of the communities around the hospitals have positive opinions (over 90 percent) about the HCWM activities of the hospitals. Up to



now, all three objectives of the project have been achieved through the achievement of all output indicators.

24. The participating provinces have contributed to achievement of the PDO. The hospitals that were financed in 52 provinces of the project have achieved the waste outcome verification standards. Especially, the 39 hospitals that were blacklisted met requirement standards through independent verification for waste outcome after treatment and have qualified for processing procedures for removal from this list.

25. According to the original design, the project is in line with the development needs of the health system and the goal of developing an HCWM system. The process of implementation has exceeded defined targets. After the end of the project, with the hospitals' autonomy, ensuring sustainability and private participation, the project remains relevant.

III. Analysis of the Results Framework

26. All PDIs and IRIs were achieved during project implementation. After project restructuring, some IRIs were removed, supplemented, or combined to make them appropriate and closest to the measurement of interventions. For details of the changes see in annex 1 of the Project End Line Evaluation Report 2019 and annex 1 of the PAD 2010.

27. Specific changes are as follows:

- Component 1: Removed 4 IRIs (in PAD) and added one IRI
 - Removed IRI: 'Annual meetings of the National Steering Committee on Health Environment'.
 - Removed IRI 'Application of web-based software for periodic reporting on medical waste management ...'.
 - Removed IRI 'Four regional epidemiology/sanitation institutes and preventive medicine centers have improved their capacity to verify liquid and solid wastes ...'.
 - Removed IRI 'Central and provincial hospitals are periodically monitored for the environment'.
 - Added one IRI in Component 1 (can be seen in annex 1 of the Project Completion Evaluation Report 2019) 'Reducing the number of hospitals in the blacklist issued under the Prime Minister's Decision 1788': this index is supplemented and monitored since 2016. Actual results achieved (39 blacklisted) against the planned number of hospitals (32). The addition of this index is extremely important because it will contribute to solving a huge problem of the health sector, which is to reduce the level of environmental pollution caused by healthcare activities.

- Component 3: Removed two IRIs and added one IRI



- Removed IRI 'Implement the invested project and regularly monitoring project implementation'
- Removed IRI 'Effective monitoring'
- Added one new IRI: 'Progress report and audit report submitted with satisfied quality and timely'

28. There were changes in the calculation of indicators in PDO2 on solid waste. In the beginning, the formula was calculated only for hospitals that were to later play the role of hospital leads for the waste solid treatment cluster. After implementation of the cluster model, the formula was adjusted to calculate solid waste at the lead hospital and 50 percent of solid waste of satellite hospitals according to the signed agreement for the appropriate situation.

29. Changes in PDIs and IRIs have not influenced the analysis of the project's Results Framework. Databases of the abovementioned changes of IRIs have been established and monitored during project implementation. Changes in the IRIs have been measured yearly and, therefore, did not influence the end line value in 2019.

30. The project has submitted quarterly and annual progress reports, including results and indicators, to the MOH and the Ministry of Planning and Investment. The government agencies have accepted these reports.

IV. Achieved Results by Phases Including Financial Disbursement

31. **The components' activities have not changed.** The project has removed only one sub activity b, point 104, under Subcomponent 1-C in the PAD "to develop internet-based software to regular update information relating to healthcare waste management."

32. **Three components have been successfully implemented, through the achievement of component indicators (after two years of restructuring and extension).** Many achieved PDIs and IRIs have exceeded the planned targets. This is the result of the strong commitment of the GOV, effective coordination between the MOH and related ministries, the MOH/CPMU and the World Bank, the MOH and the People's Committees of provinces and central hospitals, and provincial People's Committees and provincial hospitals as well as related departments in the province. The implementation of the components has also been because of effective coordination between the borrower (MOH) and lender (World Bank). By the time of the project evaluation, all three components (also the three specific objectives) of the project were achieved with the outputs as detailed in the following paragraphs.

Component 1: Policy and Institutional Environment Strengthening

33. **The policy gaps have been filled with five policy documents, three technical regulations, and seven technical manuals.** Previously difficult problems in HCWM were solved, for example, the establishment of the National Executive Board responsible for health environmental protection with the participation of relevant ministries and agencies; approval of regulations on the responsibility and



mechanism of intersectoral coordination at all levels in the management of HCW; development of detailed regulations on HCWM at health facilities; development of cost norms and financial mechanisms for managing HCW at health facilities; development of regulations on means of collection, transportation, and storage of hazardous HCW; development of regulations on use of non-burning technology for hazardous waste treatment in health facilities; and development of standards for healthcare wastewater treatment.

34. **Staff capacity for HCWM at all levels has been improved.** The project has developed a set of teaching materials and trainings on HCWM and established a system of national training programs on HCWM with certification authority. The team of 310 standardized trainers can meet the teaching requirements of HCWM at all levels. The capacity of health staff in charge for HCWM in the DOH, hospitals, and units of the preventive medicine system has also been strengthened with 2,761 staff being trained and certified. In addition, 1,227 staff operating the HCW treatment system at health facilities have been trained and certified to show a comprehensive change in the awareness and skills of human resources who are managing HCW treatment system in Vietnam.

35. **Institutional capacity in HCWM has also been strengthened.** A total of 2,422 leaders and managers at all levels of health, environmental resources, and Environment Police were trained and certified by the project. This ensures commitment, consensus, and close coordination among departments in the management of HCW.

Component 2: Hospital Waste Management Improvement Facility

36. To support investment and equip healthcare solid management and wastewater for 150–200 hospitals in Vietnam priority has been given to public hospitals with an urgent need for waste treatment in central, provincial, and inter-district areas and some large-scale hospitals in disadvantaged provinces in the northern mountainous region and Mekong delta river and some other localities.

37. In fact, the project supported 217 hospitals and 1 centralized treatment system (CTS) for healthcare solid waste, widely across 52 provinces/cities, of which 123 hospitals were supported with healthcare wastewater treatment systems and 142 hospitals were supported with hazardous solid waste treatment systems, of which, there are 20 central hospitals and 198 provincial/district hospitals. For central hospitals, the investment of the project mainly supported wastewater treatment systems, internal management practices, logistics, and capacity building. Particularly, for the central 74 hospitals, the project also invested in a hazardous solid waste treatment system. For provincial and district hospitals, the criteria for investment selection were those hospitals that were at risk, where the HCW treatment system was not invested or did not meet standards, and that needed to increase capacity or replace outdated technology.

38. A total of 40 hospitals were on the blacklist of seriously polluting environment facilities under the Prime Minister's Decision No. 1788/QĐ-TTg issued in 2013. Up to now, all intermediate indicators for this objective have reached the final targets. Out of 218 hospitals, 216 have completed the output verification, including the hospitals in the blacklist supported by the project.



39. For hazardous solid waste treatment system, the investment of a modern non-burning technology by the project, mainly wet steamers or microwave combined with cutting and grinding, replaces the technology of burning or burial of hospital solid waste at the hospitals. This has contributed to solving the environmental problems due to dust and exhaust gas pollution caused by incinerators or polluted soil and water environment due to burial of hospital solid waste at hospitals earlier. Of the 142 hospitals that had invested in hazardous solid waste treatment systems, 103 hospitals were developed into cluster treatment for healthcare solid waste models, expanding the range of benefits to many other satellite health facilities. This support is particularly significant for the northern mountainous provinces and the central highlands, where there is a lack of hazardous solid waste treatment services and most hospitals are still self-treating waste by burial or burning. The analysis of 34 hospitals which had invested in hazardous solid waste treatment systems shows that 100 percent hospitals manage HCW according to regulations and 79.1 percent of hazardous solid waste in northern mountainous and central highlands hospitals was treated by the project's technology. Meanwhile, this rate was only 55.8 percent at hospitals in the remaining regions.

40. In Quang Ngai, the project also invested in the construction of a concentrated hazardous solid waste treatment area, with a huge capacity to serve hospitals in the region. The construction and installation of equipment for CTS Quang Ngai was completed and the independent inspection was conducted in July 2019. At present, the PPMU has signed a principal contract to operate and test the system for three months, after which it will be handed over to the Urban Environment Company in the province to operate.

41. In terms of healthcare wastewater treatment system in 123 hospitals, the project has invested in modern AAO technology. This is a modern wastewater treatment technology that applies biotechnology, which is appreciated by the beneficiary hospitals for its efficiency and environmental friendliness. Out of 123 hospitals, 122 have been certified by the IVAs as meeting the environmental standards for healthcare wastewater indicators.

Component 3. Project Implementation Support and Coordination

42. The capacity of monitoring healthcare environment and supervision of HCWM activities at all levels has also been strengthened for four centers for healthcare environmental monitoring and surveillance at regional institutes. The main activities included upgrading and additional purchasing of environmental monitoring equipment, providing standardized training for environmental monitoring staff, and developing a set of report forms of environmental monitoring data and environmental management.

43. The centers for environmental monitoring within the four regional institutes have been provided with healthcare environmental monitoring equipment. Most equipment has been used frequently by institutes and evaluated as appropriate with the equipment needs of the institutes. The project has also trained 26 national trainers of the National Institute of Occupational and Environmental Health, Nha Trang Pasteur Institute, Ho Chi Minh City Institute of Hygiene and Public Health, and 15 staff who are in charge of healthcare environmental monitoring for the Nha Trang Pasteur Institute and Ho Chi Minh City Institute of Hygiene and Public Health.



44. After being supported by the project, all four Institutes have significantly enhanced their capacity. The National Institute of Occupational and Environmental Health and Ho Chi Minh City Institute of Hygiene and Public Health have been able to undertake eight new techniques, while the Nha Trang Pasteur Institute and Institute of Hygiene and Epidemiology of Tay Nguyen have been able to undertake three new techniques.

45. The project has been implemented with the total capital investment under the ceiling of the Loan Agreement between the GOV and the World Bank. Actually, the loan's value is currently only US\$134 million, compared to the amount of US\$150 million as defined in the Loan Agreement, due to changes in the exchange rates between the U.S. dollar and Special Drawing Rights. However, results of the investment at the end of project, accounted by number of invested hospitals, are 218 hospitals, while the number of hospitals in the original project plan was 150–200 hospitals. The Government's contribution was originally estimated at US\$5 million, but in fact, the actual disbursement is US\$8million, mostly for Subcomponent 2B. This is strong evidence to show the appropriateness of the project investment with the need of hospitals in Vietnam and commitment from provinces' authorities. The table on estimated disbursements by components by August 30, 2019, is detailed in annex 1.

46. The project has submitted the Government's periodic project progress reports, including results and disbursement. The Government has accepted and provided no comments. During project implementation, the project's changes have been consulted with and appraised by the Government's aid management agencies, such as the Ministry of Planning and Investment, Ministry of Finance, Government Office, and MOH.

V. Project Restructuring

47. The project has been implemented since August 2011. However, during the first three years, the project was implemented slowly due to a number of reasons: (a) with the open and result-based project design, the project could not identify beneficiary hospitals for investment, so it took a long time to assess investment needs from provinces and central hospitals; (b) during implementation of the project, there were a number of changes in laws and sub-laws relating to HCWM, including changes relating to construction, licensing processes, environmental assessment, and so on.; these changes caused beneficiary hospitals to revise their processes and documents, which took a lot of time; and (c) the project implementation modality and management mechanism in the first stage were inappropriate through the application of a centralized project management and implementation model at the central level, without full-time staff in the CPMU, no separate project management unit at the provincial level, limited coordination between CPMU and relevant sectors, unclear responsibilities within the CPMU, delay in establishment of a technical advisory group, and so on.

48. The project temporarily postponed implementation, during January to August 2014, to restructure the project. With the agreement with the World Bank, the project has overcome the situation by implementing a number of solutions for project restructuring, including the following:

- (a) Reviewing the management and implementation modality of the project, selecting investment addresses according to the approved criteria, proposing restructuring of the



- CPMU and project activities, and creating learning experiences for capital allocation for the next round.
- (b) Rearranging the CPMU with clear tasks assignment and coordination mechanisms, recruiting full-time staff, and establishing specialized teams to assist the Central Project Management Board.
 - (c) Establishing a PPMU.
 - (d) Adjusting some activities and some intermediate indicators
 - (e) Adjusting selection criteria and approval process of beneficiary hospitals. According to the original design, the project will invest in hospitals with over 200 beds, by round and by region. However, in response to the actual needs, the project has adjusted to expand the investment coverage nationwide and has changed criteria for selection. The project will invest in a beneficiary hospital if the hospital has a need for investment, number of beds ranged from 150 to 200, and the hospital has enough documents required by the project. Priority has been given to high-risk hospitals, where waste treatment systems have not been financed or have not met standards, or hospitals in the blacklist. The project will invest in concentrated hazardous solid HCW treatment systems in Quang Ngai.
 - (f) Removing the separate budget ceilings for Subcomponents 2-A and 2-B and keeping the whole budget ceiling for Component 2.

49. The project restructuring has contributed to accelerating the implementation of components and subcomponents to achieve defined indicators, supporting the appraisal and approval of investment proposals from beneficiary hospitals more effectively. In particular, the change in the number of hospital beds has opened up the opportunity for access to capital for smaller district hospitals with fewer than 200 beds, especially hospitals in the mountainous provinces. The establishment of a PPMU has contributed to speeding up project implementation and making coordination at the provincial level more efficient. The actual implementation of the project and the achieved results have shown the positive impact of the project restructuring. The project has achieved all project results over the extension time.

50. The project was extended for two years and ended on August 30, 2019. It has contributed to successful implementation of the project activities and has helped the project have enough time for implementation and evaluation of results of the first phase to draw best practices and lessons for the next round of investment and increase project coverage and the number of beneficiary hospitals. Having more time for implementation, utilization of the loan will be more efficient with the higher number of hospitals. The health system's capacity in management of healthcare hazardous waste has been improved so that it can contribute to reduced risks for environment pollution and national burden in this area.

51. **RBF mechanism.** This new mechanism has been applied to the MOH for the first time ever so that beneficiary hospitals have opportunities for doing and learning from experience. Advantages of this mechanism are to increase responsibility and accountability, ensure quality, and invest in results of local authorities and beneficiary hospitals.



VI. Beneficiaries of the Project

52. **Direct beneficiaries of the project** are 218 central, provincial, and district hospitals; hundreds of thousands of patients and their families; thousands of health workers; garbage collectors; hundreds of thousands of people living around the hospitals; and people in general. The capacity of hospitals, in terms of governance related to the environment, has been strengthened, and there is better management of the health environment, prevention of hospital cross-contamination, and improvement of occupational safety practices in hospitals. Relevant departments of the MOH, scientific research and training organizations, the MONRE, and the Environment Police have been better coordinated in strengthening the management of HCW.

53. **Indirect project beneficiaries.** The capacity of VIHEMA and other partners, including private providers to provide HCW treatment services, has been strengthened.

54. **Hospitals.** HCW treatment has become a part of routine activities by having clear regulations on waste treatment and waste classification at source of emission; safe and green hospital environment, because of the advanced waste treatment system; trained staff who practice and apply their training in their daily work; and policies and mechanisms related to the healthcare environment and waste treatment broadly disseminated to staff and patients and their families

55. **Patients and their families.** Patients have been receiving medical services in safer, greener, cleaner, and more beautiful hospitals with less risks of contracting cross-infections. Patients and their families have better awareness of environment protection, maintain better hygiene, and directly participate in HCWM by implementation of waste classification at the source of emission.

56. **Healthcare workers.** They are knowledgeable about environmental health protection, apply daily practices of effective HCWM, and follow routine occupational safety practices to minimize occupational accidents for themselves and avoid hospital infections.

57. **VIHEMA, four regional institutes, departments within the MOH, MONRE, and the Environmental Police** have capacity to better coordinate the protection and handling of environmental health issues and support environmental appraisal for health facilities. Policy documents, training programs, and core trainers, approved and applied nationwide, will contribute to strengthening the general waste management system of the health sector.

58. The CPMU has been strengthened in project management capacity.

59. Results of the independent verification test are used for 39 hospitals to request for removal from the blacklist of facilities that seriously pollute the environment.

60. The project data were used by some officials to develop doctoral and master's theses, contributing to improving human resources for hospital waste management in the future.

61. The voice of beneficiary hospitals has been implemented through the developed plans (provincial HCWM plan, plans of beneficiary hospitals under the project guidelines), which are the basis for the



project to sign a financing agreement between the MOH with the provincial People's Committee/central hospital. The beneficiary hospitals are members of the PPMU in the province. If the beneficiary hospitals do not meet the selection criteria, they will be removed from the investment list.

62. **Government contribution increased**, demonstrating the strong commitment of Government authorities to the project, satisfaction, project suitability with actual needs, exchange rate fluctuations, and increasing the number of beneficiary hospitals. Results of the end-of-project evaluation have showed that beneficiary hospitals, leaders and health workers, and related stakeholders have highly appreciated the project's support, which has proved the appropriateness with the hospitals and patient needs.

VII. EVALUATION OF OTHER ASPECTS OF THE PROJECT

63. The risks identified in the project document include changes in the policy environment, coordination among agencies, risks related to project design, operational design, project management mechanism, selection of waste treatment technologies, complicated implementation procedures in procurement, construction, licensing, and so on.

64. The CPMU has played a very important role in reducing risks through advising the MOH to suspend project activities for eight months in 2014 and extend the project for another two years, conducting the review of processes, procedures, and activities; strengthening staff capacity; putting in place an expert team, and establishing professional support groups within the project management unit.

65. The project's safeguard issues (social, environmental, and cultural) were followed and well implemented during project implementation as these are the factors that determine the investment. The project has developed a PDI on the satisfaction of people living around the hospital, if the project did not perform well on the issues. The result of the project evaluation of this indicator is over 90 percent.

66. The project experienced some difficulties from delayed budget allocation along its implementation, but did not face problems with counterpart funds. During project implementation, there were no problems related to bidding and procurement and financial management at Project Management Units, especially related to construction and procurement of equipment for the treatment system of HCW. Capacity on procurement and financial management of the PPMUs was improved during project implementation.

VIII. Capacity for Project Implementation of the Borrower and World Bank

67. **Borrower.** The MOH is competent to carry out the project. Although there were a number of issues in the early stages that led to the project's suspension in 2014 and a two-year extension, in general, the borrower's capacity to implement the project was effective and efficient. The overall performance of the borrower in all aspects of project management was good (including timely implementation of all components, parts of components that could be implemented due to lack of funds, solved risks and issues). After the restructuring, the borrower implemented and exceeded the identified PDO, PDIs, and IRIs.



68. **World Bank's implementation capacity.** The World Bank's capacity has been clearly shown during project implementation in supervising and supporting the borrower's financial management issues, reviewing and issuing 'no objection' letters for bidding results, joining technical missions, and solving technical problems.

69. This is the first project that the World Bank has supported the MOH, in which the RBF approach is applied. The World Bank and its expert team in Hanoi provided timely and adequate support for project implementation, especially in the most complex activities.

70. **Selection of beneficiary hospitals.** The World Bank has worked closely with the CPMU/MOH in the selection, appraisal, and initial evaluation of beneficiary hospitals for investment approval, based on the application of clear and transparent criteria.

71. **Process of project restructuring.** By working closely with the CPMU, with the aim of speeding up the project activities, the World Bank has worked closely with the CPMU/MOH on issues and appropriate solutions to solve the problems.

72. **Process of extending the project.** After the restructuring was implemented, the project has effectively operated and reached better progress. However, the remaining project duration from mid-2016 to August 2017 was not enough to carry out the remaining activities, appraise the outputs of treated waste, test the built systems, prepare disbursement reports, and so on. By working closely with the CPMU, with the aim of fully implementing all project activities, the World Bank agreed with the CPMU/MOH to extend the project for two more years, until August 30, 2019.

73. **Financial management.** The World Bank has supported in reviewing investment implementation, reviewing other support, and providing guidelines on selection of appropriate technologies as basis for next round reviewing and grant allocation.

74. **Procurement activities.** After bidding assessment, the CPMU submitted the bidding results to the World Bank. The World Bank has maximized support by issuing the 'no objection' letter within one week, so that the procurement activities of the project could be quickly and efficiently undertaken.

75. **M&E activities.** By June 2019, World Bank experts conducted a total of 22 supervision visits at the CPMU and 107 supervision in the project's provinces. After each supervision, the World Bank provided recommendations for the project. The World Bank experts' recommendations have been seriously and fully implemented by the CPMU and PPMUs, which contributed to the achievement of the project's objectives.

76. After project implementation, some issues of the borrower and the World Bank can be better undertaken in the abovementioned areas. In the project design and project implementation modalities, if from the beginning the posts of full-time staff and the PPMU were included, project implementation progress might not have been delayed in the first few years.

IX. Solutions to Ensure Sustainability of the Project Results



77. Legal framework related to environmental protection, health environment, management and treatment of HCW, including the Law on Environmental Protection, sub-laws documents, strategies, master plans, the health sector's work plan, and technical guidelines related to the health environment and the management and treatment of HCW are the basis for ensuring sustainability of the project results. In the Decree on Hospital Autonomy signed by the Prime Minister, there is a section on environmental protection and management of HCW, which must be implemented by public health facilities.

78. Decision No. 2038 / QD-TTG dated November 15, 2011, of the Prime Minister approved the Master Plan for Management of Healthcare Waste for 2011–2015 and orientation to 2020. The master plan defined targets for management and treatment of solid waste and wastewater for hospitals by 2015 for each level of health facilities and orientation to 2020 to ensure that all health facilities meet national environment standards and technical regulations. The Joint Circular No. 58/2015/TTLT-BYT-BTNMT, dated December 31, 2015, on management of medical waste is the basis for implementation of environmental protection in health activities, including medical examination and treatment facilities, medical and pharmaceutical research, and training establishments and production establishments.

79. Most public health hospitals have been newly built, or the infrastructure upgraded, including healthcare sanitation and environment protection of the hospital and HCW treatment. Infection control, waste classification at the emission source, and universal prevention are part of routine hospital operations.

80. In 2015, the MOH issued a set of criteria for evaluating hospitals' quality. Among 83 evaluation criteria, there are many criteria to evaluate the management of HCW and hospital sanitation. Awareness of environmental protection in medical examination and treatment activities of leaders and health workers at hospitals has significantly improved. Results of this change in awareness are that most of the hospitals are currently green, clean, beautiful, and environment-friendly and better manage waste emission at source.

81. Interdisciplinary cooperation between the MOH and MONRE on inspection, appraisal, and licensing activities also helps comprehensively improve the management of HCW.

82. Resources to be used to maintain the invested infrastructures and repair systems and equipment will be mobilized from different sources. The HCW treatment system is part of the hospital's overall infection control operation and will be the responsibility of the Infection Control Departments. Hospitals implementing Decree 43 of the Prime Minister on Hospital Autonomy, will be required to allocate separate budget lines for HCW treatment. With a liquid waste treatment system, hospitals are required to perform the treatment at the hospital before dumping treated wastewater into the local general sewage system. With solid HCW treatment, the pricing mechanism should be accurate and sufficient to ensure budget estimation for this activity. Therefore, the role of hospital leadership has been extremely important in allocating the budget to ensure the disposal of HCW. For hospitals that have not yet implemented hospital autonomy, the budget for HCW management is part of the hospital operating costs. The results of the annual hospital quality assessment relating to waste management and treatment, if not satisfactory, are important evidence/basis for hospital leaders to develop a proposal to request budget from local government to ensure operation, replacement of spare parts, and maintenance.



83. The project organized seminars to discuss solutions to maintain the project results after project termination for leaders of the DOH and beneficiary hospitals. The outcome of the workshops is the hospitals' plans to sustain project results. Under the hospital financial autonomy mechanism in Decree 43, the beneficiary hospitals must ensure budget for HCW treatment; thus, the ability to maintain the waste treatment system after the project's termination will be high. The local government can support from the Government budget based on hospital requirements.

84. Can the private sector contribute to the project sustainability in the future? The results from the project evaluation show the clear role of private services in HCWM. Private services will therefore contribute to the sustainability of hospital waste treatment activities in the future. The project has supported the construction of infrastructure for solid and liquid waste treatment systems. With a liquid waste system, which must be implemented at a health facility, solid waste can be initially treated at the health facility to reduce the risk of infection and toxins in the environment. The remaining treatment stages after solid waste, treated by non-burning technology, still need to be moved to cluster treatment areas (for satellite hospitals) or hire public or private environment treatment companies to handle the remaining treatment stages.

X. Lessons Learned

85. **Comprehensiveness and appropriateness of the project design.** The project design has covered comprehensive interventions, including strengthening the policy framework, through development new or updating/editing existing documents, and technical guidance; supporting capacity building by development of training programs and implementation of training programs on the treatment of infectious solid wastes for hospital facility; supporting the construction of HCW treatment systems; and supporting operational and logistics expenditure to ensure that post-treated waste will meet Vietnamese and international standards.

86. **Effective and accountable financial mechanism.** The RBF disbursement mechanism applied in the project shows effectiveness in increasing responsibility and accountability of local authorities and beneficiary hospitals in the development of HCW treatment systems.

87. **Encourage ownership and initiative of beneficiary hospitals.** According to the project regulations, beneficiary hospitals are members of the PPMU. Joining the PPMU has helped hospitals clearly understand their responsibilities, so they will be more proactive in participating in implementing their own hospital subproject investments on time and efficiently.

88. Maintain project results at the hospital through the following:

- **HCWM is part of the hospital's routine work.** This mechanism is effective when the hospital appoints a deputy director and a leader of the Infection Control Department to handle HCWM activities.
- **Training of waste treatment system operators.** Employees have been well trained on knowledge and technical skills in system operation, so that the HCW treatment system can



function stably and regularly. The content of the training focused on the technologies being applied in the system, the process of operating the system, and repairing simple failures.

89. **Hospital budget allocation for operation and maintenance.** The most important part is that the hospital has invested in constructing a new project or upgrading a waste treatment system. Therefore, it is necessary to allocate/build the hospital's budget for maintenance, repair, and replacement of parts according to the manufacturer's instructions for the waste treatment system.

90. **Collaboration between agencies/partners.** The close cooperation between the health sector and the environment sector in the province has played an extremely important role in project implementation. DONRE has advised the health sector in the process of constructing and operating healthcare solid and liquid waste treatment systems and issued the necessary environmental license. The department has advised the provincial People's Committee in appraising and approving plans for collection, transportation, and disposal of hazardous HCW in the province. DONRE also has implemented the approved operational plan together with the DOH.

91. **Legalization of project results.** The integration of project experiences and good practices into strengthening the health environment protection and the health sector will depend on the advocacy efforts after the end of the project by the CPMU, the MOH, and the World Bank. The experiences, project results, and good practices should be considered during the advocacy process.

92. **Legal framework.** The project has supported the completion of a comprehensive legal framework for environmental health protection and effective HCWM. Approved policy documents, technical guidelines, healthcare environmental procedures, and waste management have been applied nationwide and will continue to play a critical role to improve quality and safety in hospitals. Hospital and local budgets need to be proactively allocated to build, upgrade, maintain, maintain, and replace spare parts.

93. **Assessment and monitoring following the project's model.** Evaluation and supervision play a very important role to ensure policies; technical guidelines; and processes related to the health environment, and disposal of HCW, construction quality, and so on are being carried out in health facilities. In particular, when the set of 83 criteria for annual hospital quality assessment is applied, there should be special attention to criteria related to hospital waste treatment. Sharing the learning experiences from hospitals that have done well in the project (such as Bach Mai hospital) will help hospitals that have not yet implemented HCW treatment.

94. **Improve the quality of human resources for health environment and medical waste management.** A total of 7 approved training programs; 310 core trainers; and trained human resources of the health sector (at the MOH, 52 provincial health departments, 218 hospitals from the central to district levels, capacity of 4 regional epidemiological/preventive institutions, more than 90,000 managers and service providers trained, and staff operating the waste treatment system) are valuable resources for implementing HCWM. The MOH should consider the nationwide application of training materials and core trainers when expanding the training program from all different budget sources for this field of activity.



95. HCWM should be legalized to become a regular activity of the hospital in which the hospital director/deputy directors and the leaders of the Infection Control Department play a very important ownership role.

Which Project Areas Will Be Cancelled and Not Continued

96. The designed components and activities of the project after restructuring have all been implemented. However, in the future, it is necessary to consider the following factors: (a) application of policies on hospital financial autonomy; (b) limitations of the current incineration treatment technologies, that the project is supporting, which are not able to handle solid waste to the final stage of treatment; (c) unclear and unstable price mechanisms for transporting and treating solid waste from satellite health facilities to hospitals; and (d) the rapid development and in-depth involvement of public and private services in healthcare solid waste treatment until the final stage. The cluster treatment model for solid waste should be more carefully considered and applied where the clear financial and operational mechanisms are clear to all main and satellite hospitals and where the centralized treatment by public or private entities is not possible. Instead, given the evidence that it is very effective and that every hospital had to have its own facility for liquid waste treatment, to ensure high sustainability, the cluster treatment model should consider only supporting the healthcare wastewater system.

Solutions Have Been Implemented by the Project to Strengthen Transparency and Accountability of Monitoring and Evaluation Data

97. To enhance the transparency and accountability of monitoring and evaluation data, the project has applied some of the following solutions:

- **Monitoring and evaluation of the performance of PDOs, PDIs, and IRIs.** Based on the project's Result Framework, the project's M&E unit has updated the annual information with the indicators, based on reports, from the CPMUs and provinces, beneficiary hospitals, research, and monitoring and activity reports. Based on the results table, the project has undertaken annual adjustments to ensure that the implementation schedule was followed. In addition, the World Bank and the CPMU have conducted regular M&E activities at beneficiary hospitals to monitor progress and quality of activities.
- **Supervising the quality of construction works of the waste treatment system.** According to the Construction Law and signed agreements, the quality of construction works is strictly monitored and supervised by the CPMU and PPMU.
- **Monitoring the output quality of healthcare waste/wastewater from treatment systems financed by the project.** Four Institutes of Hygiene and Epidemiology and Occupational Labor in four areas have validated the output of healthcare wastewater treatment systems after treatment. The evaluation results showed that the system-treated wastewater in 116 out of 118 hospitals met Vietnam standards, especially the 39 hospitals that were eligible to be removed from the blacklist of establishments causing serious environmental pollution.



- **RBF mechanism.** The project will only disburse to beneficiary hospitals to ensure the construction quality and the output quality of the waste after treatment by the project-supported system.
- **Supervision of financial liquidation.** The project has clear cost norms, a project implementation manual, recording and supporting tables, and supporting receipts and documents, thus ensuring transparency in financial liquidation.



ANNEX 6. SUPPORTING DOCUMENTS (IF ANY)

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ANNEX 7. MAP

IBRD 38157

