**Republic of Kosovo Ministry of Environment, Spatial Planning and Infrastructure** 

# Republic of Kosovo Capacity Development Project for Air Pollution Control Project Completion Report Annex-1 Appendix-1, 2, 3

August 2021

Japan International Cooperation Agency (JICA)

**SUURI-KEIKAKU CO., LTD. JFE Techno-Research Corporation** 

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**Republic of Kosovo Ministry of Environment, Spatial Planning and Infrastructure** 

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# Annex -1 List

# Joint Coordinating Committee (JCC) Meeting relevant documents

ANNEX 1-1 Project Design Matrix (PDM) (including editing history)ANNEX 1-2 Plan of Operation (including editing history)ANNEX 1-3List of relevant documents regarding Joint Coordinating Committee (JCC)

ANNEX 1-1 Project Design Matrix (PDM) (including editing history)

1.0
(Ver.
2017
November,
2nd,
Date:

Project Title: Capacity Development Project for Air Pollution Control Duration of the Project: 3 years (October 2017 to September 2020) Project Target Group: Ministry of Environment and Spatial Planning (MESP) and Counterpart Working Group (C/P-WG) Implementing Organizations: MESP and C/P-WG Project Target Area: the Pristina Area, Drenas and Mitrovica

	rs Means of Verificat
a, שופוומא מווע ואוווטעוטמ מין שופוומא מווע אווו	Objectively Verifiable Indicato
וטקכנו ומוטפו אופמ. ווופ רוואווומ אופ	Narrative Summary

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Important Assumptions			Kosovo side	commitment for NERP in the context	of Energy Community	/ EU Directives is	sustained.		Supports by Energy	Community / EU and	relevant donors for	NERP are sustained.		Relevant policies of	MESP on air quality	management in	accordance with EU	Directives are	sustained.	Regulatory function of MESP in air
Means of Verification	<ol> <li>State of the environment in Kosovo</li> </ol>	2. Strategy on air quality / Action plan	1. State of the environment in	K080V0	2. Strategy on air quality / Action	plan		3. Progress Report												
Objectively Verifiable Indicators	<ol> <li>MESP issues periodic/annual report on air quality including emission inventory, air quality assessment and</li> </ol>	emission measurement results. 2. Kosovo side's strategy on air quality and action plan is periodically revised based on technical evidences.	1. Concrete emission reduction	measures are initiated at the Large Combustion Plants (LCPs).	2. Air pollution control measures for	other emission sources are elaborated.	3. Priority pollutants and emission	sources including LCPs, other	stationary sources and other emission	sources are identified based on air	quality monitoring, emission	inventory and simulation modeling	and revised twice during the Project	for decision making.						
Narrative Summary	Overall Goal: Kosovo side develops capacities for sound air pollution control and air quality	management based on technical evidence.	Project Purpose:	kosovo side tecnnical capabilities are developed to control emission sources in	the Project target area.															

pollution control is maintained. Cooperation between MESP and relevant agencies (MED, MTI, MIA, MI, KAS, KEK etc.) is maintained. MESP and related agencies are properly budgeted and staffed.	Important Assumptions	More than 70% of C/P (Counterpart) and C/P-WG members assigned at the Project start will be maintained until the end of the Project
	Means of Verification	<ul> <li>1.1 Emission Inventory report for the base year</li> <li>1.2. Progress Report</li> <li>2.1 Progress Report</li> <li>2.1 Progress Report</li> <li>2.2 SOPs for on-site stack measurement (LCPs, other stationary sources)</li> <li>3.1 Air quality monitoring annual report</li> <li>3.2 Progress Report</li> </ul>
	Objectively Verifiable Indicators	<ol> <li>1.1 Emission inventory on LCPs and other sources for the base year is revised at least twice.</li> <li>2.1 On-site stack gas measurements are conducted at least 26 times for NOx, SO2 and Dust (Kosovo A: 3 boilers×3 ducts, Kosovo B: 2 boilers ×2 ducts).</li> <li>2.2 Standard Operating Procedures (SOPs) for on-site stack gas measurements for LCPs and other stationary sources are elaborated.</li> <li>3.1 Xx air quality monitoring stations rehabilitated by the Project comply with 6,000 hours effective measurements a year (8,760 hours) in second and third year in the Project implementation.</li> <li>3.2 Emergency air pollution monitoring drills are implemented at least three times utilizing portable samplers for SO2, NO2, PM2.5 and</li> </ol>
	Outputs	Output 1 : Capabilities to elaborate emission inventory for LCPs and other sources are developed at Kosovo side. Output 2 : Capabilities for emission measurements are developed for LCPs and for other sources. Output 3 : Air quality monitoring activities are sustained

	PM10 measurements.		
	3.3 Air quality monitoring reports are		
	elaborated at least twice.	4	
put 4 : Capabilities for relevant	4.1 Measurements for NOX, SO2 and	4.1 Progress Report	
ironmental laboratory analyses are	Hg tor LCPs as required by the EU		
eloped for emission measurements	Directive based on reference methods	4.2 SOPs for reference method of	
air quality monitoring.	are conducted at least twice during the	LCPs (NOx, SO2, Hg)	
	Project implementation.		
	4.2 The three SOPs for NOx, SO2 and		
	Hg in stack gas for LCPs based on		
	reference methods are elaborated.		
	4.3 Assessment of importance of		
	heavy metal contents in ambient PM is		
	conducted.		
put 5 : Capabilities for air quality	5.1 Dispersion simulation model for	5.1 Simulation result reports for the	
ulation modeling are developed.	the base year is elaborated.	base year	
	5.2 Based on the current emission	5.2 Progress Report	
	inventory, simulation model is		
	implemented at least twice.		
put 6: Decision making by Kosovo	6.1 Recommendations for air pollution	6.1 Recommendations for air pollution	
is improved based on technical	control are made two times toward	control	
lence for air pollution control.	Kosovo side's relevant policy making	6.2 Progress Report	
	processes.	6.3 Newsletter etc.	
	6.2 Publication and newsletter on air		
	pollution control are disseminated at		
	least four times.		
put 7: Emission control measures are	7.1 Diagnosis on NOx, SO2 and Dust	7.1 Diagnosis study report on NOx,	
eloped at LCPs.	emissions for LCPs are conducted.	SO2 and Dust emission of LCPs	
	Pollution control measures for each	7.2 Progress Report	
	pollutant are elaborated at two power		
	plants for three pollutants, six		
	measures in total.		
put 8: Capabilities for evaluating air	8.1 Pollution control measures	8.1 Progress Report	
ution control measures of Kosovo	discussed in Kosovo sides strategy on		
are developed.	air quality and action plan are		
	evaluated at least twice.		

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<ul> <li>antion, Kaswo side with JICA (2) Project Sub-Leader/Stationary G) Forject Minanger</li> <li>antion, Kaswo side with JICA (2) Project Sub-Leader/Stationary G) Forject Director</li> <li>bekground is everyers drift publication of information and (3) Froject Minanger</li> <li>(2) Afr quality monitoring 1</li> <li>and conduct a survey for publication control measures for and conduct a survey for pollution control measures for and conduct a survey for pollution control measures for abortancyy and tax and conduct a survey for pollution control measures for and conduct a survey for pollution control measures for and conduct a survey for pollution control measures for the provision of laboratory and give with JICA Experts makes a such as (3) Onsite stack gas measurement 2 microbalance, draft chamber, privileges and tax and conduct a survey for pollution control measures for the provision of laboratory and tax and conduct a survey for pollution control measures for the pollution control measures for the provision of secret storage space for and small combile and small combile and small combine and faborates prefinimary (1) Mohle financion control measures 2 microbalance, darit chamber, pollution control measures 2 microbalance, darit (1) Project microbalance (1) Project measures 2 microbalance (1) Project measures 2 microbalance (1) Provision of precisary supports for provision of forecastry measures and and conduct as unventory and tax and small combile and small combine and tax and small combile and small combile and small combine and tax and small combile and small compares and small compares and small composition of permissions and once tax and small combile and small composition of permissions and once tax and small composition of the project diministrative expenses of the proster diministration of the proster diministratin the stack gas measurement in the proster dimin</li></ul>	h relevant agencies.	measurement 1/Air pollution control	(1) Assignment of C/P and C/P-WG	C/P and C/P-WG
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the-job-training of on-site stack activities	A experts execute		Kosovo side outside of the Project	
	the-job-training of on-site stack		activities	

	gas measurement by introducing
	necessary instruments including
	standard gases.
2-3	MESP and relevant agencies with
	JICA experts develop experts of
	on-site stack gas measurement in
	Kosovo.
2-4	MESP and relevant agencies with
	JICA experts establish an
	institutional framework for
	implementation of on-site stack gas
	measurement in Kosovo.
2-5	MESP with JICA experts conducts
	on-site stack gas measurement for
	LCP and other stationary emission
	sources, and confirms compliance
	with ELVs (Emission Limit Values)
3-1	MESP with JICA Experts assesses air
	quality monitoring stations (AQMS)
	in Kosovo and summarizes status of
	analyzers and equipment.
3-2	MESP with JICA Experts prepares a
	plan of operation and maintenance,
	and a renewal plan for AQMS in
	Kosovo.
3-3	MESP with JICA Experts rehabilitate
	AQMS in the Pristina Area based on
	the plans (3-2).
3-4	MESP with JICA Experts prepares
	manuals for operation and
	maintenance for AQMS in the
	Pristina Area.
3-5	MESP with JICA Experts calibrates
	analyzers in AQMS in the Pristina
	Area based on the
	operation/maintenance manuals.
3-6	MESP with JICA Experts prepares a
	guideline for network design of
	AQMS in Kosovo.

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MESP with JICA Experts establishes Networking among AQMS in the Pristina Area. MESP with JICA Experts prepares SOP for ambient NO2, SO2, PM10, and PM2.5 measurement by a portable sampler for emergency needs. MESP with JICA Experts implements measurements of ambient NO2, SO2, PM10, and PM2.5 based on SOP (1 hour average). for emergency needs.	MESP with JICA Experts utilizes results of AQMS for an annual air quality report as well as for public awareness.	MESP with JICA experts studies sampling and measurement methodologies for the LCPs. MESP with JICA experts makes Ion Chromatograph available for analysis.	MESP with JICA experts conducts analyses by reference methods for LCPs by using Ion Chromatograph method for SO2 and NOX and atomic absorption method for Hg. MESP with JICA experts elaborates	MESP with JICA experts studies sampling and malyses for tCPs' stack gas. MESP with JICA experts studies sampling and measurement methods for other stationary emission sources. MESP with JICA experts elaborates	SOPs for sampling and measurement methods for other stationary emission sources. MESP with JICA Experts conducts Particulate Matter (PM) sampling by
3-7 3-8 3-9	3-10	4-1 4-2	4-3	4-5 4-6	4-7

Republic of Kosovo	Capacity Development	Project fo	or Air	Pollution	Control
<b>Project Completion</b>	Report Annex-1				

Hi-volume air samplers at least for 2 sampling points. JICA Experts analyze heavy metal contents (Mn. Ni. As. Cd. Ph and Zn)	in PM in laboratory in Japan MESP with JICA Experts assesses	importance and urgency of heavy metal pollution in air. 9 JICA experts make diagnosis on	OPERATION.	MESP and relevant agencies with JICA Experts designate responsible	establish necessary coordination with	relevant agencies. MESP and relevant agencies with	JICA Experts collect existing data	such as air quality monitoring data, meteorological data geographical	information etc.	MESP with JICA Experts analyzes	applying a dispersion simulation	model.	MEST WITH JICA EXPERTS analyzes and validates air quality monitoring	data.	MESP with JICA Experts elaborates disnersion simulation model for the	target year. MFSP with IICA Fynerts analyzes	structure of air pollution	MESP with JICA experts acquire	theoretical knowledge of simulation	model and practice simulation	modeling through seminars and
4-8	4-9	4-10		5-1		5-2				5-3			- 4-		5-5	9-5	2	5-7			

A experts	n measures	ith NERP	ction Plan)	w.	A experts	emission	or other	e technical		A experts	policy	tivities 6-1		A experts	wledge and	ion control	the public	b site etc.	A experts	of exhaust	ding SO2.	ninar and a	emission	LCPs and	including	emission		A experts	of LCPs'	operational	emission	
Kosovo side with JIC	reviews emission reductio	for LCPs relating wi	(National Emission Redu-	from technical point of vie	Kosovo side with JIC	reviews and evaluates	reduction measures 1	stationary sources from th	point of view.	Kosovo side with JIC	discusses relevant	improvements based on ac	and 6-2.	Kosovo side with JIC	disseminates relevant kno-	information on air polluti	generated by the Project to	through newsletter and we	Kosovo side with JIC	analyzes the behavior o	stack gas from LCPs inclu	JICA experts provide a sei	workshop to discuss	reduction measures for	other stationary sources	fundamental theories of	control.	Kosovo side with JIC	implements diagnosis	operations and elaborates	improvements for	reduction.
6-1					6-2					6-3	-			6-4	-		-		7-1			7-2	-		-		-	7-3		-		

Kosovo side with JICA experts evaluates technical, economic and social viability of pollution control	MESP and relevant agencies with JICA experts evaluates emission reduction effects of pollution control	measures for important emission sources. MESP with JICA Experts evaluates effects on air quality improvements	by pollution control measures with dispersion simulation model.

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Note: "XX with JICA experts" means "XX with the assistance of JICA experts"

		Date: 5 <sup>th</sup> Februar Date: 4 <sup>th</sup> Augu Date: 16 <sup>th</sup> Jui	y, 2019 (Ver. 2.1) ist, 2020 (Ver. 3.0) ne, 2021 (Ver. 4.0)
Project Title: Capacity Development Duration of the Project: 3 years and Project Target Group: Ministry of En	t Project for Air Pollution Control 1 9 months (October 2017 to June 2 hvironment, Spatial Planning and In	(021) frastructure (MESPI) and Counterp	art Working Group
ເບໄກ-ໜອງ Implementing Organization: MESPI Project Target Area: the Pristina Are	and C/P-WG ea, Drenas and Mitrovica		
Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal: Kosovo side develops capacities for sound air pollution control and air quality management based on technical evidence.	<ol> <li>MESPI issues periodic/annual report on air quality including emission inventory, air quality assessment and emission measurement results.</li> <li>Kosovo side's action plan is revised based on technical evidence.</li> </ol>	<ol> <li>"State of the Air" and "State of the Environment in Kosovo" reports</li> <li>Kosovo side, after adoption of Action Plan for Air Quality, prepares report on "Implementation of the Action Plan for Air Quality".</li> </ol>	
Project Purpose: Kosovo side technical capabilities are developed to control emission sources in the Project target area.	<ol> <li>Concrete emission reduction measures are initiated at the Large Combustion Plants (LCPs).</li> <li>Air pollution control measures for other emission sources are elaborated.</li> <li>Priority pollutants and emission sources including LCPs, other stationary sources and other emission sources are identified based on air quality monitoring, emission inventory and simulation modeling and revised twice during the Project for decision making.</li> </ol>	<ol> <li>"State of the Air" and "State of the Environment in Kosovo" reports</li> <li>Action Plan for Air Quality</li> <li>Progress Report</li> </ol>	Kosovo side commitment for NERP in the context of Energy Community / EU Directives is sustained. Supports by Energy Community / EU and relevant donors for NERP are sustained. Relevant policies of
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Date: 2nd, November, 2017 (Ver. 1.0) Date: 12th, July, 2018 (Ver. 2.0)

Project Design Matrix

			MESPI on air quality management in accordance with EU Directives are sustained.
			Regulatory function of MESPI in air pollution control is maintained.
			Cooperation between MESPI and relevant agencies (MITE, MIAPA, KAS, KEK etc.) is maintained.
			MESPI and related agencies are properly budgeted and staffed.
Outputs	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Output 1 : Capabilities to elaborate emission inventory for LCPs and other sources are developed at Kosovo side.	1.1 Emission inventory on LCPs and other sources for the current year <sup>1</sup> is revised at least twice.	1.1"State of the Air" and "State of the Environment in Kosovo" reports 1.2. Progress Report	More than 70% of C/P (Counterpart) and C/P-WG members
Output 2 : Capabilities for emission measurements are developed for LCPs	2.1 On-site stack gas measurements are conducted at least 26 times for	2.1 Progress Report	assigned at the Project start will be
and for other sources.	NOx, SO2 and Dust (Kosovo A: 3 boilers×3 ducts, Kosovo B: 2 boilers ×2 ducts).	2.2 SOPs for on-site stack measurement (LCPs, other stationary sources)	maintained until the end of the Project
	2.2 Standard Operating Procedures (SOPs) for on-site stack gas		
	measurements for LCPs and other stationary sources are elaborated.		
Output 3 : Air quality monitoring	3.1 Five air quality monitoring	3.1"State of the Environment in	

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comply with 6,000 hours effective measurements a year (360 hours) in second and third year in the Project       3.2 Progress Report         amplementation       3.2 Finegress Report         3.3 Emergency air pollution       3.3 Finegress report         amplementation       3.3 Air quality monitoring reports are elaborated at least twice.       4.1 Progress Report         3.3 Air quality monitoring reports are elaborated at least twice.       4.1 Progress Report         4.1 Measurements.       3.3 Air quality monitoring reports are elaborated at least twice.       4.2 SOPs for reference method of the ormission measurements.         0.0ptut 4:       Capabilities for relevant       4.1 Measurements for NOx, SO2 and the ormission measurements.       4.1 Progress Report         0.0ptut 4:       Capabilities for relevant       4.1 Measurements for NOx, SO2 and the ormission measurements.       4.1 Progress Report         0.0ptut 5:       Capabilities for relevant       4.1 Progress Report       4.2 SOPs for reference methods for the ormitoring.         0.0ptut 5:       Capabilities for air quality       5.1 Siste of the Air''         0.0ptut 5:       Capabilities for air quality       5.1 "Siste of the Air''         0.0ptut 5:       Capabilities for air quality       5.1 "Siste of the Air''         0.0ptut 5:       Capabilities for air quality       5.1 "Siste of the Air''         0.0ptut 5:       5.1 Siste of the control <th>activities are sustained sta</th> <th>tions rehabilitated by the Project</th> <th>Kosovo" and "State of the Air"</th>	activities are sustained sta	tions rehabilitated by the Project	Kosovo" and "State of the Air"
measurements a year (8,760 hours) in second and third year in the Project implemented at mediating dills are indimension     3.2 Progress Report implementation.       3.2 Emergency air pollution     3.2 Progress Report implementation.       3.3 Ari quality monitoring reports are portion that a least three times utilizing portable samplers for SO, NO2, NO2, NO2, NO2, NO2, NO2, NO3, 3.3 Ari quality monitoring reports are caleborated at least twice.     4.1 Progress Report       3 Ari quality monitoring reports are caleborated at least twice.     3.3 Ari quality monitoring reports are caleborated at least twice.     4.1 Progress Report       0 upput 4 : Capabilities for relevant enveloped for emission measurements.     3.3 Ari quality monitoring reports are caleborated at least twice.     4.1 Progress Report       0 upput 5 : Capabilities for relevant enveloped for emission measurements.     4.1 Progress Report     4.2 SOPS for relevant and air quality monitoring.       0 upput 5 : Capabilities for relevant enveloped for emission measurements.     4.3 Assessment of importance of the struct of the Environment in treference methods are caleborated.     5.1 "State of the Environment in treference methods in treference methods in the current set is alborated.       0 upput 5 : Capabilities for air quality     5.1 Dispersion simulation model is inventory, simulation model is     5.1 "State of the Environment in treference methods in treference methods       0 upput 5 : Capabilities for air quality     5.1 Dispersion and new of the Atim treference methods     5.1 "State of the Environment in treference methods       0 upuput 5 : Capabilities for air quality     5.1 Di	C01	mply with 6,000 hours effective	reports
Second and third year in the Project     3.2 Progress Report       implementation.     3.2 Fingress Report       implementation.     3.2 Fingress Report       implementation.     3.2 Fingress Report       3.3 Air quality monitoring reports are claborated at least twice.     4.1 Progress Report       3.4 Air quality monitoring reports are claborated at least twice.     4.1 Progress Report       3.4 Air quality monitoring reports are claborated at least twice.     4.1 Progress Report       0 upput 4 : Capabilities for relevant     4.1 Measurements.       3.4 Air quality monitoring.     4.1 Progress Report       1 ar quality monitoring.     4.1 Progress Report       1 ar quality monitoring.     1.2 Stops for reference methods for distributed frast twice during the LCPs as required by the EU       1 ar quality monitoring.     4.2 Stops for reference methods for distributed frast twice during the LCPs (NOX, SO2, Hg)       1 ar quality monitoring.     4.3 Assessment of implementation.       1 are conducted at least twice.     4.3 Stops for reference methods for distributed for a state of the fast twice during the LCPs (NOX, SO2, Hg)       1 are conducted at least twice.     4.3 Stops for reference methods for distributed for the fast twice.       1 are conducted at least twice.     5.3 The three SOPs for NOX, SO2, Hg)       1 are clared and for the trast twice.     4.3 Stops for the fast twice.       2 are conducted at least twice.     5.3 Assessment of importance of heart t	me	sasurements a year (8,760 hours) in	
implementation.     implementation.       implementation.     3.3 Energency air pollution       monitoring drifts are implemented at least three times uitizing portable samplers for SO.2, NO2, PM2.5 and PMD measurements.     4.1 Progress Report       3.3 Air quality monitoring.     3.3 Air quality monitoring reports are developed for emission measurements.     4.1 Progress Report       0.uput 4 : Capabilities for relevant evolopmental laborated at least twice.     4.1 Progress Report       0.uput 4 : Capabilities for relevant evolopmental laborated at least twice during the Dripect implementation.     4.2 SOPs for reference method of the CPS as required by the EU       0.uput 4 : Capabilities for relevant evoloped for emission measurements     4.1 Progress Report       1.3 Air quality monitoring.     4.2 SOPs for reference method of the evoloped at least twice during the Project implementation.     4.2 SOPs for reference method of the evoloped at least twice during the the evolution are collopered.       0.uput 5 : Capabilities for air quality mulation modeling are developed.     5.1 Progress Report for air pollution for all obstration intertory simulation model is     5.1 Progress Report for air pollution for all obstration for a for air pollution for all obstration intertory simulation model is       0.uput 6 : Decision making by Kosovo side is improved based on technical for air pollution control.     5.1 Progress Report       0.uput 7 : Emission control measures are for vidence for air pollution control.     6.1 Recommendations for air pollution for origin are disseminated at least twice insions for air pollution control.       0	sec	cond and third year in the Project	3.2 Progress Report
3.2 Emergenoy air pollution       3.3 Emergenoy air pollution       amplers for SO2, NO2, PM2.5 and samplers for SO2, NO2, PM2.5 and M10 measurements.       Duput 4: Capabilities for relevant ervironmental laboratory analyses are elaborated at least twice.       Ouput 4: Capabilities for relevant developed for emission measurements for NOx, SO2 and 4.1 Measurements are conducted at least twice.       Duput 5: Capabilities for relevant and air quality monitoring.       Project implementation.       Project implementati	ii	plementation.	
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Three Pollution control measures for	Th	ree Pollution control measures for	

	8.1" State of the Environment in	Kosovo" and "State of the Air"	reports	8.2 Progress Report
each pollutant are elaborated for Kosovo A TPP.	8.1 Pollution control measures	discussed in Kosovo sides strategy on	air quality and action plan are	evaluated at least once.
	Output 8 : Capabilities for evaluating air	pollution control measures of Kosovo	side are developed.	

	Activities	Input of th	e Project	Important Assumptions
1-1	Kosovo side with JICA Experts	Japanese Side	Kosovo Side	During the Project
	designates a responsible section and	1. Dispatched Japanese Experts	1. Counterpart and Counterpart	implementation,
	establishes necessary coordination	(1) Project Leader/ On-site stack gas	Working Group Member	adequate number of
	with relevant agencies.	measurement 1/Air pollution control	(1) Assignment of C/P and C/P-WG	C/P and C/P-WG
1-12	? Based on analyzing existing	measures 1	staff	members with
	information, Kosovo side with JICA	(2) Project Sub-Leader/Stationary	(2) JCC Chairman	appropriate technical
	Experts decides framework for	Emission Inventory/ Disclosure and	(3) Project Director	background is
	emission source inventory in the	Publication of information and	(4) Project Manager	appointed.
	Pristina Area.	public awareness	2. Provision of necessary office space	
1.0	3 MESPI with JICA Experts makes a	(3) Air quality monitoring 1	and a project office at MESPI /DEPW	Kosovo side will take
	plan and conduct a survey for	(4) Pollution control measures for	and KHMI	necessary measures
	emission inventory on LCPs.	power plants (boiler)	3. Provision of laboratory and	including both
1-4	1 MESPI with JICA Experts makes a	(5) On-site stack gas measurement 2/	laboratory instruments such as	privileges and tax
	plan and conduct a survey for	Air quality monitoring 3	microbalance, draft chamber,	exemptions in the
	emission inventory on other	(6) On-site stack gas measurement 3	desiccator, oven, atomic absorption	Project
	stationary sources.	(7) Pollution control measures for	spectrophotometer, Ion	implementation.
1-5	Kosovo side with JICA Experts	power plants (ESP-1)	Chromatography etc.	
	develops a methodology for emission	(8) Pollution control measures for	4. Provision of secured storage space	Kosovo side will take
	inventory on other sources such as	power plants (ESP-2)	for procured equipment	necessary measures to
	automobile and small combustion	(9) Air quality monitoring 2	5. Provision of place for display on	obtain relevant
	facilities, and elaborates preliminary	(10) Mobile Emission Inventory/ Air	air quality monitoring	permissions and
	emission inventory.	pollution control measures 2	6. Provision of necessary supports for	authorizations in the
1-6	5 Based on activities (1-1 to 1-5) on	(11) Simulation model	on-stack measurement for LCPs and	Project
	emission sources, MESPI with JICA	(12) Air quality protection policy	other stationary sources	implementation.
	Experts elaborates an integrated	2. Provision of necessary equipment	7. Acquisition of permissions needed	
	emission inventory.	3. Holding of local seminars and	and authorization	Kosovo side will take
1-	7 MESPI with JICA Experts	provision of seminar documents	8. Local costs	necessary safety
	independently prepares the emission	4. Training course implementation in	(1) Counterpart and counterpart	measures to conduct
	inventory, implements the quality	Japan	working group members for salaries	on-site stack gas
	control and quality assurance of the	5. Car rental costs of Japanese experts	and transportation expenses	measurements and
	emission inventory and prepares the		(2) Project administrative expenses	field works.
	improvement plan.		(3) Seminar participants expenses for	

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2-1	MESPI and relevant agencies with	personnel travel	
	JICA experts acquire theoretical	9. Transportation for on-site stack gas	
	knowledge of on-site stack gas	measurements equipment by	
	measurement for LCP through	Kosovo side outside of the Project	
	seminars and workshops in Kosovo	activities	
	and Japan.		
2-2	MESPI and relevant agencies with		<b>Pre-conditions</b>
	JICA experts execute		
	on-the-job-training of on-site stack		
	gas measurement by introducing		
	necessary instruments including		
	standard gases.		
2-3	MESPI and relevant agencies with		
	JICA experts develop experts of		
	on-site stack gas measurement in		
	Kosovo.		
2-4	MESPI and relevant agencies with		
	JICA experts establish an		
	institutional framework for		
	implementation of on-site stack gas		
	measurement in Kosovo.		
2-5	MESPI with JICA experts conducts		
	on-site stack gas measurement for		
	LCP and other stationary emission		
	sources, and confirms compliance		
	with ELVs (Emission Limit Values)		
3-1	MESPI with JICA Experts assesses		
	air quality monitoring stations		
	(AQMS) in Kosovo and summarizes		
	status of analyzers and equipment.		
3-2	MESPI with JICA Experts prepares a		
	plan of operation and maintenance,		
	and a renewal plan for AQMS in		
	Kosovo.		
3-3	MESPI with JICA Experts		
	rehabilitate AQMS in the Pristina		
	Area based on the plans (3-2).		
3-4	MESPI with JICA Experts prepares		
	manuals for operation and		
	9		

maintenance for AQMS in the Pristina Area. MESPI with JICA Experts calibrates analyzers in AQMS in the Pristina Area based on the operation/maintenance manuals. MESPI with JICA Experts prepares a guideline for network design of	AQMS in Kosovo. MESPI with JICA Experts confirms Networking among AQMS in the Pristina Area.	MESPI with JICA Experts prepares SOP for ambient NO2, SO2, PM10, and PM2.5 measurement by a portable sampler for emergency needs.	MESPI with JICA Experts implements measurements of ambient NO2, SO2, PM10, and PM2.5 based on SOP (1 hour	average), for emergency needs. MESP1 with JICA Experts utilizes results of AQMS for an annual air quality report as well as for public awareness.	JICA Experts give lectures on data management system for air quality data.	MESPI with JICA experts studies sampling and measurement methodologies for the LCPs.	MESPI with JICA experts makes lon Chromatograph available for analysis. MESPI with JICA experts conducts analyses by reference methods for LCPs by using Ion Chromatograph
3-5	3-7	3-8	3-9	3-1(	3-1 ]	4-1	4-2 4-3

	method for SO2 and NOx and atomic	
	absorption method for Hg.	
4-4	MESPI with JICA experts elaborates	
	SOPs for sampling and analyses for	
	LCPs' stack gas.	
4-5	MESPI with JICA experts studies	
	sampling and measurement methods	
	for other stationary emission sources.	
4-6	MESPI with JICA experts elaborates	
	SOPs for sampling and measurement	
	methods for other stationary	
	emission sources.	
4-7	MESPI with JICA Experts conducts	
	Particulate Matter (PM) sampling by	
	Hi-volume air samplers at least for 2	
	sampling points.	
4-8	JICA Experts analyze heavy metal	
	contents (Mn, Ni, As, Cd, Pb and Zn)	
	in PM in laboratory in Japan	
4-9	MESPI with JICA Experts assesses	
	importance and urgency of heavy	
	metal pollution in air.	
4-10	JICA experts make diagnosis on	
	ICP-MS in KHMI laboratory for	
	operation.	
5-1	MESPI and relevant agencies with	
	JICA Experts designate responsible	
	section for simulation model and	
	establish necessary coordination with	
	relevant agencies.	
5-2	MESPI and relevant agencies with	
	JICA Experts collect existing data	
	such as air quality monitoring data,	
	meteorological data, geographical	
	information etc.	
5-3	MESPI with JICA Experts analyzes	
	and validates meteorological data for	
	applying a dispersion simulation	
	model.	

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MESPI with JICA Experts analyzes and validates air quality monitoring	data. MESPI with JICA Experts elaborates	dispersion simulation model for the	target year. MFSDI with IICA Exnerts analyzes	structure of air pollution.	MESPI with JICA experts acquire	theoretical knowledge of simulation	model and practice simulation	modeling through seminars and	workshops.	MESPI with JICA experts prepares	Tor the establishment of simulation	Implementation system.	MESPI with JICA experts analyzes	the air quality condition in the	Pristina area.	Kosovo side with JICA experts	reviews emission reduction measures	for LCPs relating with NERP	(National Emission Reduction Plan)	from technical point of view.	Kosovo side with JICA experts	reviews and evaluates emission	reduction measures for other	stationary sources from the technical	point of view.	Kosovo side with JICA experts	discusses relevant policy	improvements based on activities 6-1	and 6-2.	Kosovo side with JICA experts	disseminates relevant knowledge and	information on air pollution control	generated by the Project to the public	through newsletter and web site etc.
5-4	5-5		5-6	2	5-7					5-8		1	5-9			6-1					6-2					6-3				6-4				

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ANNEX 1-2 Plan of Operation (including editing history)



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#### ŝ × 12 l 10 6 Ť 12 1 1 9 12 -Ī Ī 1 10 Ì Ť 1 Plan Actual Plan Actual Plan Plan Plan Plan Actual Plan Actual Plan Actual Actual Plan Actual Plan Actual Plan vctual Plan vctual Plan Actual Actual Plan Actual Plan Actual Plan Actual Plan Actual Plan Actual Actual Plan Actual Plan Plan Actual Plan Plan Plan Actual Plan Vctual Plan Plan Actual Plan Actua Plan **Vctua** MESP and the relevant agencies with the assistance of JICA Experts establish an institutional framework for implementation of on-site stack gas measurement in Kosovo. MESP and the relevant agencies with the assistance of JICA Experts develop experts for MESP with the assistance of JJCA Experts rehabilitates the AQMSs in the Pristina Area MESP with the assistance of JICA Experts conducts on-site stack gas measurement for LCP and other stationary emission sources, and confirms the compliance with ELVs. MESP with the assistance of JICA Experts assesses the air quality monitoring stations (hereinafter referred to as "AQMS") in Kosovo and summarizes the status of analyzers 2.3.1 develops experts through OJT training for on-site gas stack measurement for LCPs Chooses 4 other stationary sources as targets for the on-site stack gas measurement develops experts through OJT training for on-site gas stack measurement for other Visits and studies processes of 4 targeted stationary sources and decides how to Conducts by themselves on-site gas stack measurement for 4 targeted stationary 2.5.6 Confirms the compliance with ELVs for LCPs and 4 targeted stationary sources Requests platforms and measurement holes for 4 targeted stationary sources to Conducts on-site gas stack measurement with Accrediting Agency (hereinafter Wraps up the results of surveys and evaluations, and summarizes the status of Proposes and discusses a plan to build mechanism to establish an institutional MESP with the assistance of JICA Experts prepares a plan of operation and Conducts surveys and evaluates the condition of all AQMSs in Kosovo Prepares a plan of operation and maintenance for all AQMS in Kosovo Conducts by themselves on-site gas stack measurement for LCPs maintenance, and a plan for revitalization of AQMS in Kosovo. 3.3.3 Conducts the rehabilitation of the AOMS in the Drictina Area Makes a mechanism to establish an institutional framework Conducts OJT training for on-site gas stack measurement 3.1.1 Arranges necessary instruments including standard gases 3.2.2 Makes a plan for revitalization of all AQMS in Kosovo Plans rehabilitations of the AQMSs in the Pristina Area Prepares SOPs for on-site gas stack measurement Trains persons in charge at an instructor's level analyzers and equipment Reports and discusses the summarized results Air quality monitoring activities are sustained on-site stack gas measurement in Kosovo. conduct on-site stack gas measurement conduct on-site stack gas measurement 3.3.2 Arranges necessary instruments referred to as "AA") amework with AA ased on plans (3.2). (meennii eniidhi stationary sources and equipment. sources 2.4.2 2.4.1 2.5.1 2.5.2 3.1.2 3.2.1 3.3.1 2.2.3 2.5.4 2.5.5 3.1.4 Activities 2.3.2 2.4.3 2.4.4 2.4.5 2.5.3 3.1.3 L . Output 3 2.5 3.2 ...





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#### ------12 10 6 -----1 12 Ĩ Ì 0 Ĩ Actual Plan Plan Actual Actual Plan Actual Plan Actual Actual Actual Plan Plan Actual Actual Plan Plan Plan Actual Plan Actual Plan Plan Plan Actual Plan Plan Plan Plan Vctual Plan Plan Actual Actual Actua Actual Assesses each emission reduction measure from the technical and economical point of Discusses emission reduction measures for other stationary sources based on the acquired data and theories, in order to select appropriate emission reduction measures Apply proposed solutions such as improvement of operation or simple modification to boiler operation and assesses these measures Kosovo side with the assistance of JICA Experts discusses relevant policy improvement Kosovo side with the assistance of JICA Experts analyzes the behavior of exhaust stack gas from LCPs including the SO2. ssesses emission reduction measures, and if necessary, proposes suitable measures Studies dust, SO<sub>2</sub>, NO<sub>X</sub> behavior together with the lignite properties, boiler operation JICA Experts provide a seminar and a workshop to discuss emission reduction measure for LCPs and other stationary sources including fundamental theories of emission Discusses and assess the measures for LCPs based on the acquired data and theories, and decides whether they are applied to boilers or not. MEE with JICA experts carry out additional exhaust gas measuremtn at TPP Kosovo A. ber Finds out relations between emissions and other factors, and proposes some feasible Reviews and evaluates emission reduction measures for targeted stationary sources and information on air pollution control generated by the Project to the public through Selects appropriate emission reduction measures, and proposes suitable equipment, osovo side with the assistance of JICA Experts disseminates the relevant knowledge and applicable solutions such as improvement of operation or simple modification. Prepares EI reflecting emission reduction measures for targeted stationary sources. Kosovo side with the assistance of JICA Experts establishes the diagnosis for LCPs' JICA Experts provide a seminar and a workshop, and introduce typical emission reduction measures including fundamental theories of emission control Discusses emission reduction measures for LCPs based on the aquired data and Discusses relevant policy improvements for other stationary sources including Disseminates the relevant knowledge and information on air pollution control generated by the Project to the public through newsletters, web site, etc. operations and elaborates the operational improvements for emission reduction. Conducts Simulation using EI of 6.2.4 and assesses results in air quality. cide : Prepares the project public relations during seminars, workshops, etc theories, in order to select appropriate emission reduction measures ree hv Koenvo 6.3.1 Discusses relevant policy improvements for LCPs based on 6.1. carry out additional exhaust gas measuremtn at TPP Kosovo A for 3 targeted stationary sources using the decision from 6.1.2. data, fly ash analysis results, etc. and studies the collected data nission control measures are developed at LCPs. information from EI surveys based on 6.2. Makes a leaflet for public relations based on the measurement results. newsletter, web site, etc. based on activities 6-1 and 6-2. Publishes newsletters specifications etc. truit & Canabilities for control. view 6.2.5 6.2.6 6.3.2 6.4.1 6.4.2 6.4.3 7.1.1 7.1.2 7.1.3 7.1.4 7.2.1 7.2.2 7.2.3 7.3.2 7.4.1 Activities 6.2.4 6.2.7 6.4.4 7.3.1 Output 7 5 7.2
ANNEX 1-3 List of relevant documents regarding Joint Coordinating Committee (JCC)

- Minutes of the first JCC Meeting (November 2, 2017)
- Minutes of the second JCC Meeting (July 3, 2018)
- Minutes of the Work Plan (Second Period) Meeting (October 24, 2018)
- Minutes of the third JCC Meeting (January 25, 2019)
- Minutes of the fourth JCC Meeting (June 21, 2019)
- Minutes of the fifth JCC Meeting (October 25, 2019)
- Minutes of the revision of R/D and PDM Meeting (July 30, 2020)
- Minutes of the sixth (Final) JCC Meeting (June 16, 2021) and reply letter of the Kosovo side to questions of JICA

**Republic of Kosovo Ministry of Environment, Spatial Planning and Infrastructure** 

> Republic of Kosovo Capacity Development Project for Air Pollution Control Project Completion Report Appendix-1

> > August 2021

Japan International Cooperation Agency (JICA)

**SUURI-KEIKAKU CO., LTD. JFE Techno-Research Corporation**  -

## Appendix-1

Output materials of the Project

1. First Period: October 6, 2017 ~ September 28, 2018

Output 1: Capabilities to elaborate emission inventory for LCPs and other sources are developed at Kosovo side.

1) Pr	Presentation, etc. for Emission Inventory		
	No.	Date	Title
	1	Dec. 1, 2017	2017 EI Seminar 00: Outline of Activity
	2	Dec. 4, 2017	2017 EI Seminar 01: What is Emission Inventory
	2	D. 4 2017	2017 EI Seminar 02: Introduction of Emission Inventory
	3 Dec. 4, 2017		(Sector, Scope, Concept, etc.)
	4	D 4 2017	2017 EI Seminar 03: Introduction of Emission Inventory (Key
	4	Dec. 4, 2017	category analysis and Data collection)
	5	D., 5 2017	2017 EI Seminar 04: Introduction of Emission Inventory
	2	Dec. 5, 2017	(Time Series Consistency and Uncertainties)
	(	Dec ( 2017	2017 EI Seminar 05: Introduction of Emission Inventory
	0	Dec. 6, 2017	(Spatial Mapping of Emissions and Projections)
	7	D., 7 2017	2017 EI Seminar 06: Introduction of Emission Inventory
	/	Dec. 7, 2017	(Inventory Management, Improvement, and QA/QC)
	8	Dec. 12, 2017	2017 EI Seminar 07: Energy Industries Category
	0	Dec. 13, 2017	2017 EI Seminar 08: Manufacturing Industries and
	9		Construction Category
	10 Dec. 14, 2017		2017 EI Seminar 09: Small Combustion Category
	11	E.1. 7 2019	2018 EI Seminar 13: IPPU (Industrial Process and Product
	11	Feb. 7, 2018	Use) Sector
	10	F. 1. 7. 2010	2018 EI Seminar 14: AFLOU (Agriculture, Forestry, and
	12	Feb. 7, 2018	Other Land Use) Sector
	13	Feb. 8, 2018	2018 EI Seminar 15: Waste Sector
	14	Feb. 9, 2018	2018 EI Seminar 16: Road transport Category
	1.5	4 11 2010	2018 EI Seminar 10: Non-Road Mobile and Machinery
	15	Apr. 11, 2018	Category
	16	A	2018 EI Seminar 11: Aviation Category and Railway
	16	Apr. 11, 2018	Category
	17	Amm 11 2018	2018 EI Seminar 12: Fugitive Emissions from Solid Fuels
	1/	Apr. 11, 2018	Category
	18	Apr. 11, 2018	2018 EI Seminar 16: Other
2) Le	) Lecture materials for the University of Prishtina		

		1 1	1 20 2010	Outline of Air Quality Assessment & Air Pollutant Emission
		1	Jan. 29, 2018	Inventory
	3) l	Instruc	tion materials for	the Emission Inventory research by the students of the
		Univer	rsity of Prishtina	
		1	Feb. 16, 2018	Instruction Documents on Household Survey
		2	Feb. 16, 2018	Instruction Documents on Public/Private Service Survey
		3	Feb. 16, 2018	Instruction Documents on Small Facility Survey
	4) I	nstruct	tion material for th	e Traffic counting research by the students of the University of
		Prishti	na	
		1	Apr. 13, 2018	Instruction on Traffic Volume Survey
	5) E	Emissio	on Inventory data	for LCP
		1	July, 2018	Measurement Record in TPP Kosovo A and TPP Kosovo B
				for EI
		2	July, 2018	Lignite Analysis Kosovo A & B TPP
Out	tput 2	: Capa	bilities for emission	on measurements are developed for LCPs and for other sources.
	1) F	Present	ation, etc. for Exh	aust gas measurement
		1	Apr. 11, 2018	On-site Stack Gas Measurement
		0	Apr. 26, 2018	Dust Isokinetic sampling calculation (For 1 point)
		2	May 4, 2018	
	2) E	Exhaus	t gas measuremen	t results
		1	May 9,2018	TPP Kosovo A Emission measurement results
	3) S	Standaı	d Operating Proce	edure (SOP) for Exhaust gas measurement
		1	N. 4 2010	Standard Operating Procedure (SOP) for Dust content
		1	May 4, 2018	Measurement
				Standard Operating Procedure (SOP) for Exhaust Gas
		2	August, 2019	Measurement by PG-350
Out	tput 3	: Air q	uality monitoring	activities are sustained
	No	materi	als	
Out	tput 4	: Ca	pabilities for relev	vant environmental laboratory analyses are developed for
emi	ission	meas	urements and air q	uality monitoring.
	No	materi	als	
Out	tput 5 : Capabilities for air quality simulation modeling are developed.			
	1)	Semir	har materials for S	imulation
		1	Dec.11, 2017	Simulation Model: Introduction
		2	Dec. 20, 2017	Simulation Model: Necessary Data
	2) V	Vorksh	op materials for s	imulation
		1	May 14, 2018	Input Data: Elevation
		2	May 17, 2018	Input Data: Land Use
		3	May 18, 2018	Input Data: MAKEGEO program
	I	l	-	• T

		4	May 21, 2018	Supplement: Overall Procedure	
		5	May 21, 2018	Supplement: How to Display CTGPROC Output Grid Map	
Out	Putput 6 : Decision making by Kosovo side is improved based on technical evidence for air				
poll	utior	n contr	ol.		
	No	materi	als		
Out	put 7	': En	nission control me	easures are developed at LCPs.	
	1)	Semir	nar and presentation	n materials	
		1	Dec. 1, 2017	Outline of Emission Reduction Plan for LCPs	
		2	Dec. 1, 2017	Introduction of Boiler Group activities	
		3	Dec. 4, 2017	Schedule of Boiler Group	
		4	Dec. 4, 2017	Explanation of ESP Investigation	
		5	Dec. 4, 2017	ESP Appendix (No SQ version)	
		6	Dec. 13, 2017	SO2 Reduction of LCP	
		7	Dec. 15, 2017	Explanation of ESP Principle	
		8	Dec. 15, 2017	Additional Description	
		9	Apr. 6, 2018	Study of velocity measurement in ESP	
		10	Apr. 6, 2018	SO <sub>2</sub> and Dust reduction of LCP	
		11	Apr. 6, 2018	Inside inspection of Kosovo A ESP	
		12	Apr. 12, 2018	Introduction of ESP Performance Improvement	
		13	Apr. 12, 2018	Safety of ESP Internal Work	
		14	May 8, 2018	Investigation Report of Kosovo-A ESP	
		15	May 25, 2018	Report on SO <sub>2</sub> Behavior	
		16	May 29, 2018	Environmental measures for LCP	
	2)	Mater	ial on TPP Kosovo	ρA	
		1	Dec. 13, 2017	Operation Record and Measurement Results in TPP Kosovo	
				А	
		2	Dec. 18, 2017	Specification of Kosovo A ESP	
		3	May 19, 2018	Lignite Analysis Kosovo A	
		4	May 19, 2018	Lignite Analysis Kosovo B	
Out	put 8	S: Ca	pabilities for eval	uating air pollution control measures of Kosovo side are	
dev	eveloped.				
	1)	Semir	nar		
		1	Apr. 20, 2018	Seminar: History of air pollution measures in Japan	
Oth	er m	aterials	s (9)		
	1)	Preser	ntation material fo	r the minister of MEE/MESP	
		1	Nov. 1, 2017	Capacity Development Project for Air Pollution control in the	
				Republic of Kosovo: Outline	
		2	Feb. 12, 2018	Capacity Development Project for Air Pollution control in the	

			Republic of Kosovo: Outline
	3	July 11, 2018	Capacity Development Project for Air Pollution control in the
			Republic of Kosovo: Progress in the first period
			(Oct.2017~June 2018)

2. Second Period: Oct-12, 2018 ~ Sep-30, 2019

Output 1: Capabilities to elaborate emission inventory for LCPs and other sources are developed at Kosovo side.

	1)	Preser	ntation	
		No.	Date	Title
		1	Oct. 19, 2018	2nd Period Work Plan EI & Sim
	2) 8	Semina	r and lecture mate	rials
		1	Oct. 24, 2018	Progress of EI Overview
		2	Oct. 24, 2018	Progress of EI Overview (detailed)
		3	Oct. 24, 2018	Progress of EI (IPPU AFOLU Waste)
		4	Jun. 5, 2019	Progress of EI (Small Combustion Sub-Sector Service & Business)
		5	Jun. 5, 2019	Progress of EI (Small Combustion Sub-Sector Household)
	3) (	On the	Job Training (OJT	) Materials
		1	Oct. 29, 2018	Emission Inventory Calculation File Structure
		2	Oct. 29 and 30, 2018	OJT on Emission from Small Combustion Household
		3	Jan. 30, 2019	OJT on Emissions from KEK
		4	Feb. 4, 5, and 6, 2019	OJT on Emissions from KEK
Output 2: Capabilities for emission measurements are developed for LCPs and for other sources			on measurements are developed for LCPs and for other sources.	
	1) E	Exhaus	t gas measuremen	t results
		1	Jan. 21, 2019	Ferronickel Measurement Report_1
		2	May 22,2019	Ferro-nickel Measurement Report_2
		3	May 22,2019	Brick Factory Measurement Report_1
Out	put 3	: Air q	uality monitoring	activities are sustained
	1) F	Present	ation, etc. for Emi	ssion Inventory for air quality monitoring
		1	Oct. 26, 2018	Introduction of AQM
		2	Oct. 26, 2018	Topics: Air Quality Monitoring
		3	Jun. 21, 2019	Request on AQMS configuration
		4	Jun. 13, 2019	Request on AQMS configuration for Display
		5	Jun. 17, 2019	AQMS Analyzers Data Management
		6	Jun. 13, 2019	Suggestion for Air Quality Monitoring Maintenance
	2)	Repor	ts, etc.	
		1	October, 2018	Summary of Air Quality Monitoring Station Inspection all over Kosovo

## Republic of Kosovo Capacity Development Project for Air Pollution Control Project Completion Report Appendix-1

		2	August 7, 2018	FINAL REPORT from AGS	
		3	May 27, 2019	Housing renewal of 3 (three) AQMSs in the Pristina Area	
		4	May 27, 2019	Rehabilitation of AQMS in the Pristina Area	
	3)	SOPs	and manuals		
		1	Feb. 2019	SG741 Introduction to KHMI	
Out	put 4	: Ca	pabilities for relev	vant environmental laboratory analyses are developed for emission	
mea	measurements and air quality monitoring.				
	1)	Preser	ntations, etc. for la	boratory analysis	
		1	Apr. 26, 2019	Presentation of Standard Reference method	
	2)	Repor	ts, etc.		
		1	August, 2018	Service report (ICP-MS)	
		2	Oct. 12, 2018	Report on ICP-MS	
		3	Jan. 27, 2019	Result of Heavy Metal analysis from TSP and PM10	
		4	April, 2019	Report on Ion Chromatograph	
		5	April, 2019	Detailed version of Report on Ion Chromatograph	
		6	July, 2019	Draft Result of Heavy Metal Analysis at Drenas	
	3)	SOP			
		1	Apr. 15, 2019	SOP for gas sampling for SO <sub>X</sub>	
		2	Apr. 15, 2019	SOP for gas sampling for NO <sub>X</sub>	
		3	Apr. 15, 2019	SOP for gas sampling for Hg	
Out	put 5	5: Ca	pabilities for air q	uality simulation modeling are developed.	
	1)	Preser	ntations, etc. for si	mulation	
		1	June, 2019	Preliminary Result of Simulation Model	
	2)	Works	shop and seminar	materials, etc. for simulation	
		1	Nov. 12 and	Simulation Model 06 Input Data - READ62 (Upper air data	
		1	13, 2018	preprocessor)	
		2	Nov. 15 and	Simulation Model 07 Input Data – SMERGE (Surface meteorology	
			16, 2018	data preprocessor)	
		3	Nov. 21,23 and	Simulation Model 08 CALMET (Meteorology model)	
		5	30, 2018		
		4	Feb. 15 and	Simulation Model 09 Input Data - Emission Data	
			20, 2019		
		5	Feb. 20, 21, 22	Simulation Model 10 Input Data – MAIN program	
			and 25, 2019		
			May 24 and		
		6	29, 2019,	Simulation Model 11 Input Data - Emission Data	
			Jun. 6 and 7,		
			2019		

con	control.						
	No materials						
Out	put 7	': Er	: Emission control measures are developed at LCPs.				
	1)	) Presentation materials					
		1	Oct. 23, 2018	Explanation of ESP Performance Improvement			
		2	Oct. 23, 2018	Prezanimi KEK - SH. Lajqi (UP)			
		3	Oct. 25, 2018	Explanation of ESP Performance Improvement			
		4	Oct. 30, 2018	ESP Energization Control			
		5	Oct. 30, 2018	Smoke Reduction of Oil Firing			
		6	Oct. 31, 2018	NO <sub>X</sub> Reduction Test Procedure			
		7	Mar. 22,2019	Air flow Distribution Measurement of TPP Kosovo A ESP			
		8	Mar. 27,2019	ESP-Internal Inspection			
		9	Apr. 8,2019	SO <sub>2</sub> Reduction Measure Plan			
		10	May 1,2019	In-furnace De-Sulfurization			
	2)	Works	shop and seminar	materials			
		1	Oct. 26, 2018	Environmental measures for LCP(1)			
		2	Oct. 31, 2018	NOx Reduction of Existing Boiler			
		3	Nov. 1, 2018	ESP presentation			
		4	Nov. 9, 2018	Environmental measures for LCP(2)			
		5	Mar. 28,2019	Study on SO <sub>2</sub> Reduction			
		6	Mar. 29,2019	ESP Energization Control			
		7	Apr. 12,2019	Performance Improvement of Kosovo-A ESP			
		8	Apr. 24,2019	Environmental measures for LCP			
	3)	Reports, etc.					
		1	Nov. 5,2018	Inquiry for Energization (draft)			
		2	Nov. 5,2018	Attached sheet for inquiry			
		3	Nov. 8,2018	Guide Vane remodeling Plan			
		4	Dec. 3, 2018	Simulation results of ESP by UP			
		5	May 8,2019	SO <sub>2</sub> vs. Not Operating Mill Location			
		6	May 9,2019	Data Comparison of April 26 and 30			
		7	May 19,2019	Consideration on SO <sub>2</sub> vs Boiler Operation Change			
		8	July 9,2019	Emission Control measures of LCPs			
Out	put 8	3 : Ca	apabilities for eval	uating air pollution control measures of Kosovo side are developed.			
	1)	Presei	ntations, etc.				
		1	January, 2019	2030 Agenda for Sustainable Development			
		2	Jan. 28, 2019	Review of Measures using 17 Goals of Sustainable Development Goals			
		2	Jan. 29, 2019	(herein after referred to as "SDGs")			

Output 6 : Decision making by Kosovo side is improved based on technical evidence for air pollution

		3	Apr. 19, 2019	Evaluation of air pollution control measures		
Oth	ther materials (9)					
	1)	1) Presentation material for the minister of MEE/MESP				
		1	Oct. 29, 20178	Capacity Development Project for Air Pollution control in the Republic		
		1		of Kosovo: Outline of Emission Inventory		
		2	June. 21, 2019	Capacity Development Project for Air Pollution control in the Republic		
		Z		of Kosovo: Preliminary Result of Simulation Model		
2) Materials for the first training in Japan		aining in Japan				
		1	Feb. 28, 2019	Kosovo side Assignment during the Training in Japan		
		2	Mar. 1, 2019	Training document of MOEJ		
		3	Mar. 1, 2019	Environmental measures for LCP(2)		
		4	Mar. 4, 2019	Air Quality Monitoring in Yokohama		
		5	Mar. 5, 2019	Yokohama_History_Agreement		
		6	Mar. 5, 2019	Yokohama_Regulations		
		7	Mar. 6, 2019	Procedure for Traffic Pollution Management		
		8	Mar. 8, 2019	Environmental measurement/analysis		
		9	Mar. 11, 2019	Experience of Nihei-san in TMG		
		10	Mar. 12, 2019	Final Presentation by Kosovo		

## 3. Third Period: Sep-27, 2019 ~ June-30, 2021

Output 1: Capabilities to elaborate emission inventory for LCPs and other sources are developed at Kosovo side. 1) Presentations, etc. for emission inventory Title No. Date Nov. 5, 2019 Institutional Framework for Emission Inventory Preparation 1 Progress of Emission Inventory on Small Combustion 2 Nov. 6, 2019 (Commercial/Institutional Stationary) Category 3 Nov. 19, 2019 Vehicle Emission Calculation Method 4 Nov. 28, 2019 Structure for Emission Inventory Preparation 5 Jan.27. 2020 Remaining Tasks for Emission Inventory Preparation 6 Mar. 3, 2020 Final Lecture for Emission Inventory Preparation 2) Lecture materials for the University of Prishtina 1 Feb.27, 2020 Lecture for Vehicle Emission Calculation Method 3) Discussion materials for MCC/MFK Oct. 31, 2019 Structure for Emission Inventory Preparation by the Project 1 JICA Activity on Emission Inventory Preparation (Skype 2 Apr. 6, 2020 meeting)

4) Questionnaires of the research interview for Municipalities

		1	Nov. 26, 2019	Data Request for the Municipality of Obiliq	
		2	Nov. 29, 2019	Data Request for the Municipality of Fushe Kosovo	
	5) I	Data set	for OJT on emiss	sion inventory preparation	
		1	Dec. 2, 2019	Set of Emission Inventory Calculation Files for OJT	
	6) N	Aanual	on emission inve	ntory preparation	
		1	May 29, 2020	Air Pollutant Emission Inventory Preparation Manual	
Out	put 2	: Capal	bilities for emission	on measurements are developed for LCPs and for other sources.	
	1) Presentation for exhaust gas measurement				
		1	Feb. 2020	Lecture for exhaust gas measurement	
	2) E	Exhaust	gas measuremen	t results	
		1	Nov.2019	Asphalt Company Measurement Report	
		2	Nov.2019	Oil Recycle Company Measurement Report	
		3	Dec. 2019	Brick Company Measurement Report_2	
		4	Mar, 2020	LCP measurement data sheet	
Out	Output 3: Air quality monitoring activities are sustained				
	1)	Presen	tations, etc. for ai	r quality monitoring	
		1	Nov. 14, 2019	AQMS Seminar: Japanese Manual	
		2	Nov. 14, 2019	Reducing invalid data in AQMS	
	2)	Report	ts, etc.		
		1	Aug. 26, 2019	Air Quality Information Display in Prishtina	
		2	Nov.2019	AQMS Proper Distribution Guideline	
		3	May, 2020	Air Quality Data Display in Obiliq	
	3) S	SOP and	d/or manuals		
				AQMS Maintenance Manual	
		1	Mar.2020	Attachment-1 SOP for SG-741	
				Attachment-2 Analyzer Check Sheet (Only English)	
		2	Jan. 2020	SOP Emergency $NO_2$ , $SO_2$ , $PM_{10}$ and $PM_{2.5}$	
Out	put 4	: Caj	pabilities for relev	vant environmental laboratory analyses are developed for	
emi	ssion	measu	rements and air q	uality monitoring.	
	1)	Report	s, etc.		
		1	Jan. 2020	Standard Reference Method for gas measurement	
	2)	SOP at	nd/or manuals		
		1	Nov. 2019	SOP (IC-Reagents, standard and sample solution)	
		2	Nov. 2019	SOP (IC-Operating)	
		3	Nov. 2019	SOP (Hg for AAS, Reagents)	
Out	put 5	: Caj	pabilities for air q	uality simulation modeling are developed.	
	1) F	resenta	ation materials for	simulation	
		1	Mar. 3, 2020	Wrap up for Simulation Modeling	
	2) V	Vorksh	op materials for s	imulation	

		1	Nov. 7, 2019	Simulation Model: Air Quality Monitoring Data
		2	Nov. 19, 21,	Simulation Model: Input Data – Emission (3) Area source -
			2019	Waste
		ſ	Feb. 12, 19,	Simulation Model: Input Data – Emission (5) Line source -
		3	21, 2020	Vehicle
		4	Apr. 8, 2021	Simulation Model: Brick Factory Emission
3) Manual				
		1	June 28, 2021	Simulation Manual

Output 6 : Decision making by Kosovo side is improved based on technical evidence for air pollution control.

	1)	Semin	Seminar materials		
		1	Jan. 2020	Emission from industry-1	
		2	Jan. 2020	Emission from industry-1_Calculation	
		3	Jan. 2020	Emission from industry-2-0	
		4	Feb. 2020	Emission from industry-2-1	
		5	Feb. 2020	Emission from industry-2_Calculation-1	
		6	Feb. 2020	Emission from industry-2_Calculation-2	
		7	Feb. 2020	Emission from industry-3	
		8	Feb. 2020	Emission from industry-3_Calculation	
		9	Feb. 2020	Emission from industry-4	
Out	Output 7 : Emission control measures are developed at LCPs.				
	1)	Preser	tation materials		
		1	Mar. 19 2021	Additional Info for Boiler	
		2	Mar. 19 2021	Troubleshooting of TPP Kosovo A ESP	
	2)	Repor	ts, etc.		
		1	Nov. 28, 2019	Study on Kosovo A Operation Data	
		2	Feb. 8, 2020	SO <sub>2</sub> & NO <sub>X</sub> Data Analysis	
		3	Mar.1, 2020	Environment Measures of Kosovo A	
		4	Nov. 19,2020	Kosovo A-5 Boiler Load Change	
		5	Nov. 20,2020	Fuel Flow Control of Drum Type Boiler	
		6	Dec. 01,2020	Impact of Boiler Load down on NOx	
	3)	Mater	ials on TPP Kosov	vo A	
		1	Nov. 28, 2019	Operation data during measurement, November 2019	
Out	put 8	3 : Ca	pabilities for eval	uating air pollution control measures of Kosovo side are	
dev	developed.				

1)	Seminar materials				
	1	Nov. 5, 2019	Policy Measures for Discussion Materials		
	2	Nov. 20, 2019	Policy Measures for Household Content		

		3	Nov. 22, 2019	Policy Measures for Vehicle Content	
		4	Nov. 25, 2019	Policy Measures Seminar	
		5	Dec.3, 2019	Policy Measures Household Scenario	
		6	Dec.5, 2019	Policy Measures Vehicle Scenario	
		7	Jan. 22, 2020	Policy Measures Draft Evaluation Sheet	
		8	Feb. 11, 2020	Policy Measures Progress Lecture	
		9	Mar. 4, 2020	Policy Measures Final Lecture	
Others materials (9)					
	1)	Presen	tation material fo	r the minister of MEE/MESP	
	1Feb 19, 2020Presentation to the minister				
		2	July 30, 2020	Presentation to the Secretary General of MEE	
2) Materials for the second training in Japan				l training in Japan	
1 Sep. 2, 2019				Assignment-2nd Japanese Training	
2 Sep. 3, 2019 Air Quality Management Policy in Japan				Air Quality Management Policy in Japan	
3 Sep. 3, 2019 Air Pollution Control in Kawasaki A				Air Pollution Control in Kawasaki A	
4 Sep. 3, 2019 AQMS in Kawasaki				AQMS in Kawasaki	
5 Sep. 4, 2019 Air Quality Monitoring in Yokohama				Air Quality Monitoring in Yokohama	
6 Sep. 6, 2019 MOEJ_CO2Statis			Sep. 6, 2019	MOEJ_CO2Statistics_Household	
		7	Sep. 9, 2019	JARI-Emission Inventory	
		8	Sep. 9, 2019	NIES EI and Simulation	
		9	Sep. 10, 2019	Joint research in Japan-Air	
				Joint research in Japan-Water	
		10	Sep. 10, 2019	Procedure for Traffic Pollution Management	
		11	Sep. 10, 2019	Air Quality Control in Tokyo	
		12	Sep. 10, 2019	Introduction of Policy in Tokyo (English version only and	
				no word file)	
		13	Sep. 11, 2019	Nihei Presentation	
		14	Sep. 12, 2019	Final Presentation by Kosovo	
	3)	Additi	onal activities		
		1	Nov. 27, 2020	Discussion on Draft completion report	
		2	Nov. 24, 2020	Establishment of Institutional framework for simulation	
		3	Nov. 30, 2020	Analysis of Air Quality during the Lockdown	
		4	Dec. 7, 2020	Seminar on Air quality Data management	
5 Jan. 7, 2021 Discussion on Kosovo air pollution law				Discussion on Kosovo air pollution law	
		6	Jan.29, 2021	Discussion on ISO17025	
7 Mar. 24, 2021 Wrap Up of Remote Activities of the Simulation M   Group					

	1					
		8	Apr. 2, 2021	Wrap Up of Remote Activities of the Emission Inventory Group		
		9	Apr. 6, 2021	Wrap Up of Remote Activities of the Policy Making Group		
		10	Lune 21, 2021	Support for analysis and evaluation of air quality data during		
		10	June 21, 2021	one year		
	4)	Materi	als for the Final S	or the Final Seminar		
		1	Introduction of the Project "Capacity development for air			
		1	June 9, 2021	pollution control"		
2 June 9, 2021 Improvement of Air quality monitoring activitie		Improvement of Air quality monitoring activities				
		2	June 0, 2021	National Emission Reduction Plan in Kosovo and current		
		3	June 9, 2021	situation		
		4	June 0, 2021	Emission measurement and Emission reduction measure for		
		4	June 9, 2021	TPP Kosovo A		
		5	June 9, 2021	Preparation of Emission Inventory in the Pristina Area		
		6	June 9, 2021	Simulation of the air quality condition in the Pristina Area		
7		7	June 9, 2021	The evaluation of possible air pollution control measures		
		8	June 9, 2021	Results of Capacity Assessment		
		9	June 9, 2021	Issues remained and Future direction for air pollution control		
	5)	Materi	als for the Region	nal Conference		
				Issues on air quality management in Kosovo and Introduction		
		1 June 23, 2021	of the Project "Capacity development for air pollution			
				control"		
		2	June 23, 2021	Improvement of Air quality monitoring activities		
		2	June 23, 2021	National Emission Reduction Plan in Kosovo and the current		
		5		situation		
		4	June 23, 2021	Emission measurement and Emission reduction measure for		
4 TPP Kosovo A   5 June 23, 2021   Preparation of Emission Inventory for the			TPP Kosovo A			
		Preparation of Emission Inventory for the Pristina Area				
		6	June 23, 2021	Simulation of the air quality condition in the Pristina Area		
		7	June 23, 2021	The evaluation of possible air pollution control measures		
		8	June 23, 2021	Air Quality Management and Monitoring in Croatia		
		9	June 23, 2021	Current Air Pollution situation in North Macedonia		

**Republic of Kosovo Ministry of Environment, Spatial Planning and Infrastructure** 

> Republic of Kosovo Capacity Development Project for Air Pollution Control Project Completion Report Appendix-2

> > August 2021

Japan International Cooperation Agency (JICA)

SUURI-KEIKAKU CO., LTD. JFE Techno-Research Corporation

## **Appendix-2** Capacity Assessment

The Project conducted Capacity assessment from the first period to third period in order to study the change of capacity of the Kosovo side (C/P and C/P-WG).

Capacity assessment is aiming at providing indicators for as follows. The indicators must be the ones which can assess the capacity of individual level, organization level, and social level systematically regarding the overall goal and the project purpose through the implementation of the Project. In addition, the indicators are the ones through which one can understand the conditions of capacity development of the Kosovo side from the point of view of formation of self-sustained and constructive air quality management system.

The capacity assessment was carried out through the self-assessment test form by getting together all C/P and C/P-WG members on February 6, 2018 in the first period, on January 31, 2019 in the second period and February 25, 2020 in the third period. The tests had several questions to be answered by YES or NO, and then, the current capacity on the individual level, organization level, and institutions/society of each activity in the Project was assessed by themselves. The perfect score of each question item in the test was five points, and the scoring system was set so that the score is higher as the capacity is higher.

Comments on these evaluated results from the JET point of view are given as an attachment.

(1) Output 1: Capabilities to elaborate emission inventory for LCPs and other sources are developed at Kosovo side.

Results of the capacity assessment on Output 1 are shown in Table 1. Then, the average score of each questionnaire answered by C/P and C/P-WG is shown and comments by JET is also described next to the graph of questionnaires.

Since the general understanding of C/Ps on emission inventory preparation progressed through activities from the first period, the scores at Individual level and Organizational level are high and have increased. On the other hand, since the development of collaboration with relevant organizations through actual data collection activities has not progressed sufficiently, the evaluation on the Social level is rather low. In the 3rd period, since there were many specific activities to prepare the emission inventory, such as carrying out OJT for calculating the emissions from each sector and conducting the calculation of emission reductions as part of the supporting activities for Output 8, C/Ps were able to objectively evaluate their capacities. Therefore, the scores of the self-evaluation in the third period did not raise so much. JET thinks that this is a good trend.

Comments on these evaluated results by JET are as follows.

Starting point		Final point		
Individual	Although C/P knew the air	C/Ps deepened the understanding of the		
level (A)	pollutant emission inventory	whole activities for emission inventory		

	itself, they did not have	preparation. In addition, since they carried out		
	sufficient knowledge on the	the series of calculation of emissions in each		
	concreate calculation method	sector through OJT by themselves, their		
	and did not have experience	capacity was developing. However, in order to		
	on preparing it.	carry out the independent activities by C/Ps in		
		the future, such as adding the target air		
		pollutants, preparing national emission		
		inventory and making improvement plan of the		
		emission inventory, further capacity		
		development is necessary.		
Organizational	MEE/MESP did not have	Many C/Ps belong to KEPA (MEE/MESP),		
level (B)	experience of preparing the	and KEPA is preparing the emission inventory		
	air pollutant emission	as an organization, and the capacity at		
	inventory.	organizational level is increasing. In addition,		
		roles and responsibilities within KEPA became		
		clear. However, there is a difference in		
		individual abilities, and the actual situation is		
		that the load on the competent people is		
		increasing. In addition, the capacity of the		
		organization to deepen collaboration with		
		relevant organizations is still insufficient.		
Social level	There was little	Since regarding the data collection activity of		
(C)	understanding of air	emission inventory, the data is not sufficiently		
	pollutant emission inventory.	provided from the relevant organizations, the		
		situation is not such that emission inventory is		
		sufficiently prevailed at the social level.		
		However, in the Project, C/Ps were able to		
		prepare the emission inventory based on the		
		data from the activities such as research		
		interviews on actual fuel consumption		
		conditions in households and services, traffic		
		counting, etc. in collaboration with targeted		
		municipalities, the University of Prishtina, etc.		
		These are the data obtained for the first time in		
		Kosovo, and they become valuable data from		
		the administrative point of view. In the future, it		
		is necessary to carry out activities such as the		
		development of national emission inventory, the		
		preparation of emission inventory by expanding		

	target air pollutants, and utilization of the				
		emission inventory by planning, studying, and			
		evaluating the Measures in the Action Plan			
		under the Strategy of Air Quality in Kosovo. It			
		is expected that the understanding of emission			
		inventory preparation will be further promoted			
		through widespread public awareness and			
		consultation with more relevant organizations.			
Outcome	It is a great achievement that C	/Ps has been able to carry out a series of			
	calculation procedures on the e	mission inventory through OJT, such as			
	collecting multiyear data, enter	ing these data, calculating and coordinating			
	emissions for each year, etc.				
	It is a great progress that after t	understanding the concept of emission inventory			
	C/Ps understood the significant	ce of data collection and collected the data from			
	the relevant organizations by th	nemselves. In addition, in the C/P-WG, C/Ps			
	informed on the situation where	e C/Ps were struggling in establishing the data			
	providing system in collaboration with relevant organizations. Since C/Ps				
	recognized the issues and tried to solve them, and it was clearly observed that				
	they are independently tackling	the issues.			
	The emission inventory prep	aration manual prepared by JET includes not only			
	emission calculation procedure but also the recommendation on the institutional				
	framework including roles and	responsibilities. These activities created a path			
	for future work on emission inv	on inventory preparation.			
Issues /	The current challenges are the	nat it is not easy to collect the data required for			
Proposals	national emission inventories, i	t is not easy to prepare emission inventories for			
	many target air pollutants requi	ired by EU, and the it is not easy for C/Ps			
	themselves to calculate many e	mission sources. Therefore, the roles and			
	responsibilities for not only KE	EPA but also the relevant organizations such as			
	data providing organizations sh	ould be defined, and it is assumed that measures			
	need to be taken to ensure that	the preparation of the emission inventory is			
	legally set as the MEE/MESP a	ctivity As an activity with legal basis, it is			
	assumed that the emission inve	ntory preparation will be set as an annual routine			
	work and will be set as an essen	ntial activity when drafting the Action Plan under			
	the Strategy of Air Quality in K	Cosovo. These are recommended in the Project.			

Individual level	Organizational level	Social level			
1-1 Assessment of understanding by C/P on development of Institutional Framework of EI					



	Assessment Item			
	Kosovo side with JICA Experts designates a	First	Second	Third
<u>1-1</u>	responsible section and establishes necessary	Average	Average	Average
	coordination with relevant agencies.	(6/2/2018)	(31/1/2019)	(25/2/2020)
А	We can identify and determine necessary relevant organization and agencies on the Emission Inventory.	4.1	<b>4</b> .3	→ 4.4
В	I am a person in charge of preparing the Emission Inventory, or we have already designated persons in charge of preparing the Emission Inventory.	3.7	→ 3.8	→ 3.7
С	We have already designated a responsible section and established necessary coordination with relevant agencies.	3.4	→ 3.5	<b>→</b> 3.7

Since the understanding by C/Ps on the institutional framework for emission inventory preparation is progressing, the score of the Individual level (A) is considered to be estimated high as 4.4 out of 5. Regarding the Organizational level (B), it is supposed that the establishment of institutional framework is evaluated as progressing to some extent as MEE/MESP. In addition, since through activities of Output 1 in the third period, the understanding of the institutional framework progressed, the score of the Social level (C) also increased steadily.

On the other hand, it is considered that the score of (B) and (C) are estimated not high as 3.7 out of 5, because of following situation: 1) the situation in which collaboration with related organizations on data provision is not established sufficiently, 2) the situation in which it is necessary to create a institutional framework for preparing national emission inventory in Kosovo by increasing more targets of air pollutants, 3) the situation in which the support for establishment of the EU reporting system is necessary, etc.

<u>1-2</u>	<b>Based on the analysis of existing information,</b> Kosovo side with the assistance of JICA Experts decides on the framework for emission sources inventory in the Pristina Area.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We can analyze existing information.	3.6	4.0	→ 4.0
А	We have already reviewed EMEP/EEA emission inventory guidebook.	3.6	4.1	3.9
В	We can make the framework for the Air Pollutant Emission Inventory in Pristina Area.	3.8	4.3	→ 4.4
С	We can decide the framework for the Air Pollutant Emission Inventory in the Pristina Area.	3.4	3.6	4.0

Through data collection activitites and study on establishment of institutional framework for emission inventory, C/Ps deeply understood the framework for emission sources. Looking ahead to the future of preparing national emission inventories, etc., it became clear that the parts that Kosovo side is able to carry out activities independently and the parts that need support from donors were clear and C/Ps also understand the necessary of support for the establishment of a further cooperation system with related organizations. As a result, it is considered that the scores at the Individual level (A) and the Social level (C) were close to around 4 out of 5 points. At the Organizational level (B), through the JICA Project, C/Ps have been able to carry out activities smoothly as the emission inventory team, and it is considered that C/P estimated a high score as 4.4

out o	out of 5.				
	MESP with the assistance of JICA Experts drafts	First	Second	Third	
<u>1-3</u>	a plan and conducts a survey for emission	Average	Average	Average	
	inventory of LCPs	(6/2/2018)	(31/1/2019)	(25/2/2020)	
Α	We can understand the emissions estimation method from LCPs using the monitoring data of field surveys.	3.6		4.0	
В	We can make a draft plan of estimating emissions from LCPs.	3.2	1 3.9	→ 3.8	
С	We can conduct the activity of estimating emissions from LCPs in line with plan.	3.3	3.9	→ 3.9	

Since C/Ps deeply understand the emission inventory through OJT of emissions from TPPs carried out in the second period, it is thought that the score became much high in the second period. By confirming that the source of the activity data is the annual report by KEK and the source of the emission factors is the result of the exhaust gas measurement by the JICA Project, it is possible to clearly understand the roles and responsilibities of the related organizations on the calculation of the emissions from LCPs. Therefore, it is thought that such a good score of 4 out of 5 is obtained. On the other hand, since the TPP Kosovo B is currently planned to be rehabilitated, a new TPP will be constructed in the future and TPP Kosovo A is schedulted to be shut down, it is necessary to revise the future emission factors for TPPs. It seems that the score is around 4 points because future support is necessary for C/Ps on updating the emission inventories.

<u>1-4</u>	<b>MESP with the assistance of JICA Experts drafts</b> <u>a plan and conducts a survey for emission</u> <u>inventory of other stationary sources.</u>	First Average (6/2/2018)	Second Average (31/1/2019 )	Third Average (25/2/2020 )
А	We can make a draft plan of estimating emissions from other emission sources.	3.1	<b>3</b> .9	→ 4.0
В	We can make a draft plan for estimating emissions from other stationary sources.	3.2	4.2	4.0
С	We can conduct the activity of estimating emissions from other stationary sources in line with plan.	3.1	3.8	4.1

It is considered that C/Ps obtained a better understanding of the planning and implementation of the emission inventory preparation of the other stationary sources from the experience of '1-3', because the score increased sharply in the second period. On the other hand, considering the preparation of the national emission inventories, it is highly likely that it will be important to calculate the amount of emissions from manufacturing industy, which has few targets in the Prishtina area. C/Ps feels that the needs for future additional support for such emission sources, so it is seemed to have been evaluated as 4 out of 5.

<u>1-5</u>	Kosovo side with the assistance of JICA Experts develops a methodology for emission inventory of other sources such as vehicle and small combustion facilities, and elaborates the preliminary emission inventory	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We can develop a methodology for estimating emissions from other sources.	3.1	4.0	<b>→</b> 4.0

Α	We can prepare and/or compile the preliminary Air Pollutant Emission Inventory using the results of estimated emissions.	3.5	1	4.0		4.0
В	We can make a draft plan for estimating emissions from other sources.	3.3	1	3.9		4.0
В	We can prepare the preliminary Air Pollutant Emission Inventory by using the results of emissions estimated.	3.7	~	3.9	↗	4.1
С	We can establish the preparation procedure for the preliminary Air Pollutant Emission Inventory in Kosovo government.	3.6		3.4	1	3.8

C/Ps deepened their understanding of the calculation of emissions from other sources through data collection activities, research interviews by students, and data collection request activities to the relevant organizations. In addition, through the lectures and OJT, the understanding by C/Ps of the procedures for emission inventory preparation has progressed, and the scores at the indivicual level (A) and organizational level (B) have been high since the second period. On the other hand, it is considered that the scores of the social level (C) have decreased because C/Ps have begun to understand the difficulty of the data collection activities and the cooperation with related organizations has not been established yet enough.

Since the self evaluation test for the capacity assessment in the first period was conducted after sufficient lectures on emission inventory preparation were carried out, C/Ps fuly understood the emission calculation methodology. As a result, it is judged that the score has been higher since the first period.

<u>1-6</u>	<b>Based on activities (1-1 to 1-5) on emission</b> sources, MESP with the assistance of JICA Experts elaborates an integrated emission inventory.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We can continuously prepare the Air Pollutant Emission Inventory in the future by using the preparation procedure established.	3.6	<b>1</b> 4.2	→ 4.1
В	We can continuously prepare the Air Pollutant Emission Inventory in the future by using the established preparation procedure.	3.6	1 4.2	4.0
С	We have already established the preparation procedure for the Air Pollutant Emission Inventory in Kosovo government.	3.4	→ 3.6	→ 3.7

Since C/Ps has improved understanding of the compiliation of emission inventory through the activites from 1-1 to 1-5, the scores of individual level (A) and the organizational level (B) are increasing. On the other hand, since through these activities it has become clear that they are struggling to establish the collaboration with the data collection from the relevant organizations, it is considered that the score of the social level (C) is somewhat lower. Through OJT conducted in the 3rd period, C/Ps were able to understand the overall practice of activities for emission inventory preparation. As a result, the future issues of their activities became clearer, and it is judged that the score of the 3rd period became slightly lower than that of the 2nd period.

(2) Output 2: Capabilities for emission measurements are developed for LCPs and for other sources.

Results of the capacity assessment on Output 2 are shown in Table 2.Then, the average score of each questionnaire answered by C/P and C/P-WG is shown and comments by JET is also described next to the graph of questionnaires.

In the aspect of exhaust gas measurement technology, the members of the measurement group have fully acquired measurement technology. They understood not only the principles of measurement but also the difficulties of measurement, and they reached the where they are able to conduct measurement by themselves.

Total two sets of measurement equipment (one set from the Precedent Activity and another from the Project) were handed over to the Kosovo side, and KHMI and KEK received each one set as both parties became able to conduct exhaust gas measurement. However, both KHMI and KEK are in the situation where the reinforcement of the staff is required in order to conduct measurement independently. Originally the Project planned to donate one more set of equipment to the Kosovo side in order to bring up private measurement agencies. However, since it is difficult for the government to support a specific private agency and there is no proper private agency in Kosovo, this was cancelled.

At present, there is no private agency which can conduct measurement properly. The establishment of the institutional framework where private facilities conduct measurement and report the results is far from being realized. The proper instructions by the officials in MEE/MESP are desirable in order to enforce the law properly, and therefore, it is indispensable to enhance the knowledge on the exhaust gas measurement and emission reduction measures. Since KHMI acquired the exhaust gas measurement technology, the environment where MEE/MESP can fully utilize this capacity and instruct private facilities properly is prepared. It is important for MEE/MESP to develop the capacity and utilize the exhaust gas measurement technology.

	Starting point	Final point
Individual	Technology transfer has	During the Project period, C/Ps repeated
level (A)	started from the Precedent	measurement for LCPs through OJT and also
	Activity. C/P had knowledge	conducted measurement for other stationary
	of measurement to some	sources. Through these experiences, C/Ps have
	extent at the starting point.	acquired sufficient ability.
Organizational	One person from	One from DPEW/DIPM, two from KHMI and
level (B)	DPEW/DIPM, one from	two from KEK acquired the technology.
	KHMI, and one from KEK	Munuals for the works were organized and
	have learned the technology.	become available. If these people cooperate,
	However, they have not	proper measurement can be conducted. Both
	reached the level to conduct	KHMI and KEK possess the measurement
	measurement by themselves.	equipment and they can conduct measurement

Comments on these evaluated results by JET are as follows.

	independently. However, especially for the dust				
		measurement at least three persons are needed			
		and neither party can secure the necessary			
		number of persons.			
Social level	Neither MEE/MESP nor	The law clearly obliges private facilities to			
(C)	private facilities fully	conduct measurement and report the results, but			
	understand the significance	in reality, the law is not enforced sufficiently.			
	of exhaust gas measurement.	Members from DPEW/DIPM, KHMI and			
		KEK understood the importance of the			
		measurement. However, except the			
		measurement group members, neither officials			
		in MEE/MESP nor private facilities understand			
		the importance. The exhaust gas measurement,			
		which is the base for the environmental			
		administration has not been disseminated, and			
		the institutional framework is not at the stage			
		where it can be established.			
Outcome	MEE/MESP has organized the system where as a government can conduct				
	measurement and confirm the	results, and both KHMI and KEK possess a set of			
	measurement equipment and o	peration manuals are organized and provided,			
	which can help them conduct r	neasurement independently.			
	Measurement group member	s can conduct a series of works from preparation			
	for measurement, measurement	t, tidying up equipment, organization of data, to			
	drafting reports, and consequer	tly, acquired the ability to conduct measurement			
	properly. Especially members f	rom KHMI can lead the measurement activity.			
	However, especially for dust	measurement, at least three persons are required,			
	but both KHMI and KEK have	two members for measurement, and both parties			
	must reinforce their staff.				
	MEE/MESP has acquired the	e measurement technology through KHMI, but it			
	is an issue for MEE/MESP how	v to utilize this capacity.			
	The Project could not reach	the stage to foster private measurement agencies.			
	Therefore, the framework for c	lissemination of exhaust gas measurement was			
	not prepared, and as a result, the	ne institutional framework has not been			
	established.				
Tanana a d		1.1			
Issues /	The law of Kosovo clearly obliges facilities to conduct exhaust gas				
Proposals	measurement and report the res	suits, but in a reality the law is not enforced			
	sufficiently, and this is a big is				
	The cause is presumed to be that neither official in MEE/MESP nor business				

operators (other stationary sources) understand the importance of exhaust gas
measurement and even the exhaust gas measurement itself is not properly
acknowledged in general. The exhaust gas measurement results are and effective
tool used not only to manage emissions but also to confirm the functioning of
the exhaust gas treatment equipment in case such equipment is installed.
In order to expand the acknowledgement of the exhaust gas measurement,
officials in charge in MEDSPE/MESP need to instruct private facilities the
implementation of exhaust gas measurement. This requires for officials to
enhance the knowledge and accumulate the experience on exhaust gas
measurement and emission reduction measures. For this purpose, the OJT is
thought to be the most appropriate way, in which trainees inspect each facility
and conduct measurement by themselves, since each private facility usually have
its own process and process flow, and may use different type of fuel.
When MEE/MESP acquires the ability to instruct private facilities through
these activities, the implementation of exhaust gas measurement is disseminated
and the base for fostering private measurement agencies is expected to be
established.



Table 2 Results of Capacity Assessment on Output 2



	Assessment Items			
<u>2-1</u>	MESP and relevant agencies with JICA experts acquire theoretical knowledge of on-site stack gas measurement for LCP through seminars and workshops in Kosovo and Japan.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We know the dust measurement which includes velocity measurement and its calculation method, dust sampling and its calculation method (isokinetic sampling), and a calculation method converting to the values at reference $O_2$ concentration.	3.50	<b>4</b> .50	3.88
A	We know $SO_2$ and $NO_X$ measurement which include calibration using standard gases and data logging, and calculation method converting to the values at reference O2 concentration.	3.50	<b>1</b> 4.50	→ 4.38
В	Our organization has opportunities to learn how to conduct on-site stack gas measurement theoretically and knows the necessary equipment and consumables.	3.75	4.20	→ 4.11
С	Kosovo has effective SOPs or theoretical documents and provides opportunities to learn how to conduct on-site stack gas measurement theoretically.	3.00	<b>1</b> 4.00	→ 4.11

This is the item to evaluate understandings of C/P on the principle of exhaust gas measurement. Compared with the scores at the starting point, every score increases and every item is evaluated high, and it is evaluated for C/P to understand the principles of exhaust gas measurement. However, only in the individual level, the score decreases from the second to the third period. It is because C/Ps again recognizes the complexity of the calculation on the dust isokinetic sampling which C/Ps are hard to understand. As for the calculation, there is practically no problem, since the excel form was provided for its calculation when C/Ps input data.

In organizational level and social level, C/Ps who are DPEW/DIPM, KHMI and KEK marked high scores, since they learned the measurement principles and acquired the technologies, and

furth	furthermore, SOPs were prepared.							
<u>2-2</u>	MESP and relevant agencies with JICA experts execute on-the-job-training of on-site stack gas measurement by introducing necessary instruments including standard gases.	First Average (6/2/2018)	Seco Aver (31/1/2	ond age 019)	Thi Aver (25/2/2	rd age 2020)		
А	We can prepare and conduct on-site stack gas measurement for LCPs and other stationary sources by ourselves.	2.75	Ť	4.00		4.00		
В	Our organization knows how to conduct on-site stack gas measurement, and has necessary equipment and consumables for dust, $SO_2$ and $NO_X$ measurement.	2.76	>	3.30	t	4.22		
В	Our organization has enough members who understand how to conduct on-site stack gas measurement of dust, $SO_2$ and $NO_X$ , and has equipment and consumables in order to conduct measurement.	2.50	1	3.20	1	3.56		
С	Kosovo provides opportunities to learn how to conduct on-site stack gas measurement through on-the-job-training.	2.75	1	3.30	1	3.78		

This is the item to evaluate the capability of conducting exhaust gas measurement.

The scores continue to rise from the starting point to the final point. From the first period to the second period, the score in the individual level increased because of the improvement of exhaust gas technology. From the second period to third period, through the measurement for other stationary sources (although KEK could not participate), members from DPEW/DIPM and KHMI built their confidence, and the scores in the organizational level also rose. In the social level, the score also increased since they evaluated that sufficient opportunities are prepared for learning measurement.

At this moment, when members from DPEW/DIPM, KHMI and KEK cooperate, the measurement is conducted properly, but both MEE/MESP (DPEW/DIPM and KHMI) and KEK do not have sufficient number of the measurement staff and both parties must reinforce at least one more person.

MEE/MESP and KEK acquired the technology as an organization, but there is no private measurement agency in Kosovo, and this is the future issue from the view point of the dissemination of exhaust gas measurement to private sectors. Especially in social level, there is little incentive to the exhaust gas measurement for private sectors. In the present situation, it is very hard to think that the institutional framework will be established in Kosovo.

2_3	MESP and relevant agencies with JICA experts develop experts of on-site stack gas	First Average	Second	Third Average
1	measurement in Kosovo.	(6/2/2018)	(31/1/2019)	(25/2/2020)
A	We can plan the on-site stack gas measurement including investigation for targeted facilities beforehand, and we can manage them.	2.88	<b>1</b> 4.00	3.62
A	We can manage on-site stack gas measurement, and can judge whether on-site stack gas measurement is properly conducted.	3.00	<b>1</b> 3.90	3.66
В	Our organization makes effort for on-site stack gas measurement to prevail in Kosovo and it has ability to instruct on-site stack gas measurement to	2.50	3.90	3.66

	other persons.					
В	Our organization can judge the validness and/or adequacy of measurement results.	3.00	↑	3.90	-	3.88
С	Kosovo has law or regulations to promote measurement and provides opportunities for other persons to learn them.	3.00	٦	3.40	1	4.00

This is the item to evaluate the possibility to train experts for exhaust gas measurement in Kosovo.

Through the Project activity, measurement members willingly acquired the measurement technology. At the same time, through the measurement for four other stationary sources conducted in the second and third period, they started to learn it is necessary to understand processes, process flows, consumed fuels, etc. of each factory, in order to conduct proper measurement. Since they understood the difficulties on exhaust gas measurement, the score in the individual level decreased from the second to the third period a little bit. In the organizational level, from the first to the second period, the scores increased a lot, but from the second to the third period, the scores stagnated because of the understanding on the difficulties of measurement. However, what they start to understand the difficulties of the measurement means that the technology and knowledge on the measurement is deepened. The level of understandings was steadily improved, and it was highly evaluated. In social level, they recognized that the laws and regulations were well prepared, and learned that the laws and regulations could be applied to private facilities through the exhaust gas measurement. Therefore, the scores rose from the second to the third period.

Measurement members acquired the measurement technology and even reached the level to teach other personnel. However, from now, it is necessary to plan the measurement for private facilities, etc. based on the understandings on processes, process flows, consumed fuels, etc. In order to realize this, it is necessary to accumulate experience to conduct measurement for more sources.

<u>2-4</u>	<u>MESP and relevant agencies with JICA experts</u> <u>establish an institutional framework for</u> <u>implementation of on-site stack gas</u> <u>measurement in Kosovo.</u>	First Average (6/2/2018)	Seco Avera (31/1/20	ond age 019)	Thi Aver (25/2/2	rd age 2020)
А	We have agencies/organization or private company which can conduct on-site stack gas measurement.	3.00	Å	2.40	~	2.56
В	Our organization has enough ability to bring up persons in charge of on-site stack gas measurement and has its system.	3.00		2.90	۶	3.44
С	Kosovo has laws or regulations to make on-site stack gas measurement mandatory in Kosovo and has enough budget and system to form them.	3.00	~	3.30	<b>_</b>	3.56

This is the item to evaluate whether the institutional framework can be established in Kosovo or not. The scores are low for all items overall.

The scores are unchanged during whole Project period. In social level, they recognize the exhaust gas measurement must be conducted, but they also know that it is not socially disseminated. The law regulates it but the enforcement of the law in not sufficient, and private facilities do not have

incentives to conduct measurement. At the same time, they judged that there is no private measurement agency in Kosovo, and no budget for it is secured.

This situation is presumed to be caused by the fact that private facilities do not acknowledge the importance, and it is mainly caused by the fact that MEE/MESP does not fulfill its duties for instructing private facilities. Since the measurement members acquired the exhaust gas measurement technology, it is desirable to utilize this capability and fulfill instruction duties.

<u>2-5</u>	MESP with JICA experts conducts on-site stack gas measurement for LCP and other stationary emission sources, and confirms compliance with ELVs (Emission Limit Values)	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We know the ELVs for LCP and other stationary sources.	4.00	4.50	4.13
В	Our organization has enough ability to judge the validity and adequacy of the measurement results.	4.34	4.10	3.76
В	Our organization has enough ability to assess countermeasures for targeted facilities if they exceed the ELVs.	4.00	<b>→</b> 4.10	3.76
С	Kosovo has system to monitor emissions and has enough ability to assess or impose countermeasures for targeted facilities if they exceed the ELVs.	4.00	3.80	3.50

This is the item to evaluate the capacity of C/Ps to conduct exhaust gas measurement and evaluate the compliance of emissions with ELVs. During the Project period, every item has the tendency to lose the scores.

In individual level, C/Ps recognize the existence of the ELVs, and their awareness is high. However, through the Project activity, they recognized that many facilities do not comply with ELVs, and do not apply appropriate emission reduction measures, and because of these reason, the scores are becoming low not only in organizational level but also in social level.

This issue is a big future issue for the dissemination of exhaust gas measurement and the application of emission reduction measure for each facility.

(3) Output 3: Air quality monitoring activities are sustained

Results of the capacity assessment on Output 3 are shown in Table 3. Then, the average score of each questionnaire answered by C/P and C/P-WG is shown and comments by JET is also described next to the graph of questionnaires.

Output 3 includes activities related to air quality monitoring, that is air quality monitoring by AQMSs, air quality measurement with the portable device for emergency, the publishing of the monitoring results and the use of them for environmental awareness.

In general, levels were improved very much at individual level, organizational level and social level. The answers to the questionnaire from the first to the second question were significantly improved at the individual level, the organizational level, and the social level but from the 2nd to the 3rd question the level has decreased, except for the ambient air quality measurement by the portable equipment for emergency. During this period, AQMSs inspection, analyzer calibration

training, AQMSs analyzer rehabilitation, AQMS maintenance manual preparation and training on the manual, and guideline for AQMSs placement were conducted. In particular, during the 3rd period, MCC/MFK replaced the analyzers in 7 AQMSs outside the Pristina area, installed meteorological equipment in all 12 AQMSs, conducted training, and received the acceptance inspection. SO, their schedule overlapped with the activity schedule of the Project. As result, the participation of C/Ps became quite limited. In addition, the donors prepared the TOR, for the rehabilitation of 5 AQMS in the Pristina area by JICA and for the replacement of equipment for 7 other AQMSs by MCC/MFK. This is considered to be the reason for the low evaluation at the organizational level and the social level, especially from the second to third period, except for the environmental air quality measurement by the portable equipment for emergency.

Accurate and reliable monitoring began in June 2019 with 5 AQMSs in the Pristina area and in November 2019 with 7 AQMSs in other areas. Finally all 12 AQMSs were rehabilitated with the assistance of donors. However, this time the abnormal values of the measurement data of the analyzer have not been detected and evaluated at a sufficient level. Therefore, it cannot be considered that the capacity to find out the analyzer failure from the data has been established.

Regarding the data displays, the Project installed them in four locations in the city of Pristina and in one location in the city of Obiliq. The number of citizens showing interest and stopping in front of the display is increasing, and the installation of displays has been reported in newspapers and television. It is necessary to increase the number of staff in charge of air quality monitoring and secure a stable budget for O&M.

	Starting point	Final point
Individual	The staff of KHMI	C/P understood the principle of calibration of
level (A)	performed only very simple	NOx, SO <sub>2</sub> , CO and O <sub>3</sub> analyzers, and became
	tasks such as replacing the	able to calibrate these analyzers. But OJT is still
	dust removal filter, etc. other	necessary. Furthermore, it is necessary to have
	than managing the contractor	training on distinguishing the normal data from
	in charge of maintenance.	the abnormal data, and to find the failure of the
	KHMI had neither the	analyzers.
	equipment nor the knowledge	On the other hand, it has become possible to
	regarding the environmental	measure the ambient air pollution by portable
	air quality measurement for	equipment for emergencies.
	emergency.	
Organizational	The twelve AQMSs were	The budget for O&M in 2017 has been
level (B)	installed from 2009 to 2012.	increased to about 150,000 Euros, and analyzers
	Before the Project started,	in more than half of AQMS have retrieved their
	MEE/MESP's budget for	functions.
	AQMS maintenance was	Furthermore, rehabilitation by the Project has

Comments on these evaluated results by JET are as follows

	approximately 60,000 Euro	been implemented, and it can be considered that	
	for eight years in the row.	reliable air quality data can be provided from	
	As of October 2017, at the	five AQMSs in the Pristina areas. Following	
	start of the Project, only 4	JICA, MCC/MFK replaced analyzers of the	
	AQMSs out of 12 AQMS in	remaining 7 AQMSs in November 2019, and as	
	Kosovo were in operation.	result the air quality monitoring system for all	
	Moreover, the calibration	12 stations in Kosovo was reestablished.	
	of the analyzers had not been	At this moment, two KHMI staff must	
	performed for many years.	maintain and manage all twelve AQMSs. Two	
		persons are insufficient to conduct all O&M	
		works. These two people are also in charge of	
		laboratory works, so it is necessary to employ at	
		least one more person.	
Social level	The staff of KHMI	On the other hand, in the end of January	
(C)	performed only very simple	2018, highly polluted air condition occured	
	tasks such as replacing the	around the Pristina Area for approximately one	
	dust removal filter, etc. other	week. It became a major social issue and	
	than managing the contractor	concern of citizens. This became one of the	
	in charge of maintenance.	reasons that budget was allocated to AQMS	
	KHMI had neither the	maintenance. The Project installed data displays	
	equipment nor the knowledge	that show real-time air pollution information at	
	regarding the environmental	four locations in Pristina city and one location	
	air quality measurement for	in Obiliq. On the other hand, the MCC/MFK	
	emergency.	integrated air quality data network from all	
		twelve AQMSs and these data became available	
		to the public through the internet that followed	
		the EC network. The social-level impact for air	
		quality monitoring is now increasing.	
Outcome	Outcomes are: The following works necessary for O&M of AQMS were		
	conducted, 1) Rehabilitation/overhaul of analyzers in 5 AQMS in Pristina area,		
	2) Preparation of standard gases and calibrator required for analyzer calibration,		
	3) C/P have learned how to cali	ibrate analyzers, 4) Replacement of 3 housings	
	that were inappropriate for mai	ntenance, 5) OJT on repair of analyzers, 6)	
	Preparation of maintenance ma	nual, 7) Guideline for AQMS proper placement,	
	8) Drill and SOP for using portable devices for emergency. It is considered that the air quality monitoring can be finally conducted with a certain degree of		
	reliability, and the needs for repairs can be met. Furthermore, the Project		
	installed displays in four locations in the city of Pristina and in one location in		
	the city of Obiliq. The number	of citizens showing interest and stopping in front	

	of the displays is increasing, and the installation of displays has been report		
	newspapers and television. In addition, as a result of the EC data network and		
	the MCC/MFK data network that succeeded the EC one, the general public can		
	now check the level of air pollution in real time through the smartphone app.		
	On the other hand, there have been very few opportunities to scrutinize the air		
	quality data, and thus, it is very difficult for C/P to judge whether it is normal		
	data or abnormal data, and to judge the failure of the analyzer. These are the		
	future issues. Furthermore, systematic maintenance and budget management,		
	such as creating the device management ledger and keeping calibration records		
	for each device, will be a major issue from now on.		
Issues /	From February to April 2019, one person with the experience on AQMS O&M		
Proposals	joined as a member, however at the same time one person in charge was relieved		
	of this work. As a result the number of the persons in charge remained the same.		
	Two C/Ps in charge of AQMS at KHMI are not dedicated only to O&M of		
	AQMSs, but also perform soil monitoring, IC analysis, attend the workshops		
	organized overseas, attend meetings, etc. At present, maintenance companies in		
	Kosovo do not have the ability to properly calibrate NOx analyzers, SO <sub>2</sub>		
	analyzers, O <sub>3</sub> analyzers and CO analyzers. It is necessary to transfer technology		
	of calibration. Sustainable maintenance is difficult without at least one more		
	person. Regarding the air quality data displays, it is necessary to secure the		
	budget for continuous stable operation.		



Table 3 Results of Capacity Assessment on Output 3




	Assessment Items			
	MESP with JICA Experts assesses air quality	First	Second	Third
<u>3-1</u>	monitoring stations (AQMS) in Kosovo and	Average	Average	Average
	summarizes status of analyzers and equipment.	(6/2/2018)	(31/1/2019)	(25/2/2020)
А	We know the present condition of SO <sub>2</sub> , NO <sub>X</sub> , O <sub>3</sub> , CO, PM10 and PM2.5 analyzers in KHMI, Rilindja, Obiliq, Palaj and Dardhisht.	3.75	<b>4</b> .25	5.00
A	We know the present condition of SO <sub>2</sub> , NO <sub>x</sub> , O <sub>3</sub> , CO, PM10 and PM2.5 analyzers in Drenas, Mitrovica, Peja, Prizren, Hani i Elezit, Gjilan and Brezovice.	3.75	4.25	5.00
В	Our organization provides opportunities to learn how to check the condition/status of SO <sub>2</sub> , NO <sub>x</sub> , O <sub>3</sub> , CO, PM10 and PM2.5 analyzers.	3.00	<b>1</b> 4.50	4.00
С	Kosovo provides enough training persons in charge on how to check the condition of $SO_2$ , $NO_x$ , $O_3$ , $CO$ , PM10 and PM2.5 analyzers.	2.00	4.25	➡ 3.00

It is an item to evaluate the condition (normal, abnormal, what is bad) of analyzers installed in AQMS.

At the individual level, after the first questionnaire, C/Ps who participated in the AQMS inspection in all over Kosovo contributed to the improvement of the evaluation because they understood the current situation of AQMSs. C/Ps once gave a high evaluation because it provided various experiences and learning opportunities through the Project. It is estimated that the evaluation was lowered because it was carried out by donors rather than MEE/MESP and Kosovo.

However, at present the ability to find abnormalities in the analyzer is insufficient.

Unfortunately, the evaluation from the expert's point of view, evaluation is lower than those in the questionnaire.

	MESP with JICA Experts prepares a plan of	First	Second	Third
<u>3-2</u>	operation and maintenance, and a renewal	Average	Average	Average
	plan for AQMS in Kosovo.	(6/2/2018)	(31/1/2019)	(25/2/2020)
А	We can prepare by ourselves a plan of operation and maintenance, and a renewal plan for AQMS in Kosovo and their SO <sub>2</sub> , NO <sub>x</sub> , O <sub>3</sub> , CO, PM10 and	3.75	<b>1</b> 4.75	↓ 4.00

	PM2.5 analyzers?			
В	Our organization knows how to prepare a plan of operation and maintenance and a renewal plan for AQMS in KOSOVO, and their SO <sub>2</sub> , NO <sub>x</sub> , O <sub>3</sub> , CO, PM10 and PM2.5 analyzers.	3.25	<b>4</b> .25	4.00
В	Our organization has enough members who understand how to prepare a plan of operation and maintenance of AQMS in KOSOVO and their renewal plan.	1.75	<b>1</b> 4.00	→ 4.00
С	Kosovo provides opportunities to learn through training how to prepare a plan of operation and maintenance of AQMS in KOSOVO and their renewal plan.	1.5	<b>1</b> 3.75	₿ 3.00

It is an item to evaluate the understanding of the operation and maintenance plan and the renewal plan of AQMS. At the individual level, the evaluation increased once C/Ps were trained mainly on calibration, but it is considered that the evaluation declined because it relied on donors for both planning and funding. At the organizational level and at the social level, since the donors (JICA and MCC/MFK) decided to conduct rehabilitation and renewal, the high evaluation was obtained, but at the social level, after recognizing Kosovo's contribution was small and it is considered that the low evaluation was obtained. However, the number of staff for continuous high quality O&M is not sufficient, and the problems as an organization have not been solved.

<u>3-3</u>	MESP with JICA Experts rehabilitate AQMS in the Pristina Area based on the plans (3-2).	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We can plan by ourselves the rehabilitation of AQMS and their SO <sub>2</sub> , NOx, O3, CO, $PM_{10}$ and $PM_{2.5}$ analyzers.	3.25	<b>1</b> 4.25	4.00
В	Our organization has enough members who understand how to conduct rehabilitation of AQMS and their SO <sub>2</sub> , NO <sub>x</sub> , O <sub>3</sub> , CO, PM <sub>10</sub> and PM <sub>2.5</sub> analyzers.	1.75	<b>1</b> 3.75	4.00
В	Our organization has enough budgets to conduct rehabilitation of AQMS and their SO <sub>2</sub> , NO <sub>x</sub> , O <sub>3</sub> , CO, PM <sub>10</sub> and PM <sub>2.5</sub> analyzers periodically, e.g. every 5 years.	1.50	<b>1</b> 2.50	2.00
С	Kosovo provides opportunities for persons in charge to learn how to conduct the rehabilitation of AQMS and their SO <sub>2</sub> , NO <sub>x</sub> , O <sub>3</sub> , CO, PM <sub>10</sub> and PM <sub>2.5</sub> analyzers.	2.00	<b>4</b> .25	4.00

It is an item to evaluate the implementation of AQMS rehabilitation and renewal. At the individual level, it is considered that the donors (JICA and MCC/MFK) conducted rehabilitation and renewal, which contributed to the high evaluation. At the organizational level, insufficient MEE/MESP budgets lead to a rather low evaluation. At the social level as well, it is considered that the plans for rehabilitation and renewal were decided through the Project and MCC/MFK activities, which contributed to the high evaluation in the second period. However, it is an issue from now that MEE/MESP cannot prepare the budget for rehabilitation and renewal by itself and it is

considered that this is the reason why the evaluation at the organizational level in terms of budget						
is rela	is relatively low.					
	MESP with JICA Experts prepares manuals	First	Second	Third		
<u>3-4</u>	for operation and maintenance for AQMS in	Average	Average	Average		
	<u>the Pristina Area.</u>	(6/2/2018)	(31/1/2019)	(25/2/2020)		
	We know how to conduct operation and					
^	maintenance of AQMS and their SO <sub>2</sub> , NO <sub>x</sub> , O <sub>3</sub> ,	2	<b>4</b> 4 25	<b>\</b> 4.00		
A	CO, $PM_{10}$ and $PM_{2.5}$ analyzers in a routine bases,	3	<b>∎ ∓</b> .23	<b>`</b>		
	based on written manuals.					
	Our organization has enough ability to instruct					
в	persons in charge of operation and maintenance of	2.25	<b>4</b> 3 75	<b>7</b> 1 00		
ы	AQMS and their $SO_2$ , $NO_X$ , $O_3$ , $CO$ , $PM_{10}$ and	2.23	I 3.75	/ 4.00		
	PM <sub>2.5</sub> analyzers.					
	Kosovo has effective SOPs for operation and			<b>3</b> 00		
C	maintenance of AQMS and their SO <sub>2</sub> , NO <sub>X</sub> , O3,	2.00	<b>T</b> 4.00	↓ 5.00		
	CO, $PM_{10}$ and $PM_{2.5}$ analyzers.			▼		
	Kosovo has enough budgets to keep proper			■ 2 00		
С	operation and maintenance for AQMS and their	1.75	<b>T</b> 2.75	↓ 2.00		
	analyzers.			•		

It is an item to evaluate the operation and maintenance manual of AQMS in Pristina area. The individual level and the organizational level are almost the same evaluation as before, but the evaluation at the social level became low. At the individual level, various experience and learning opportunities were obtained through the Project, but it is considered that C/Ps did not give a higher evaluation due to the delay in finalizing and sharing the maintenance manual.

The last question on the social level seems to be influenced by the contribution of donors that solved the problems that had occurred in maintenance, because the donor implemented rehabilitation of 5 stations in Pristina area and renewal of 7 other stations.

	MESP with JICA Experts calibrates analyzers	First	Second	Third
<u>3-5</u>	in AQMS in the Pristina Area based on the	Average	Average	Average
	operation/maintenance manuals.	(6/2/2018)	(31/1/2019)	(25/2/2020)
Δ	We know how to calibrate SO <sub>2</sub> , NO <sub>X</sub> , O <sub>3</sub> , CO	1.50	▲ 3.50	▲ 5.00
Λ	analyzers by ourselves.	1.50		
	Our organization provides opportunities for		<b>A</b>	
В	persons in charge to learn how to calibrate SO <sub>2</sub> ,	1.75	<b>T</b> 3.75	4.00
	$NO_X$ , $O_3$ , CO analyzers.		-	
	Our organization knows what kind of equipment			
В	and consumables are necessary in order to	3.25	<b>T</b> 4.25	4.00
	calibrate $SO_2$ , $NO_X$ , $O_3$ , CO analyzers.		-	
	Kosovo provides opportunities to learn how to		<b></b>	
С	calibrate $SO_2$ , $NO_X$ , $O_3$ , CO analyzers	2.00	4.00	→ 4.00
	on-the-job-training.		-	

It is an item to evaluate the calibration of SO<sub>2</sub>, NOx, O<sub>3</sub>, and CO analyzers based on the maintenance manual. The experience before conducting the third period questionnaire has led to improved evaluation at the individual and organizational levels. The experience is to confidently calibrate SO<sub>2</sub>, NOx, O<sub>3</sub> and CO analyzers at the time of rehabilitation and OJT at 5 AQMS in Pristina area using JICA provided calibrator (SG-741). However, in order to continue from now on, reinforcement of human resources is essential.

<u>3-6</u>	MESP with JICA Experts prepares a guideline for network design of AQMS in Kosovo.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We have the basic knowledge of networking system of AQMS.	3.75	4.50	5.00
В	Our organization provides opportunities for persons in charge to learn the basic knowledge of networking system for AQMS.	3.00	<b>4</b> .50	4.00
С	Kosovo provides opportunities for persons in charge to learn the basic knowledge of networking system for AQMS.	2.75	4.25	4.00

It is an item to evaluate the AQMS distribution plan of the whole country. The individual level evaluation is improving, but the organizational and social level evaluation is getting worse. The project prepared the draft guidelines for AQMS placement plan and held a workshop, but C/Ps could not participate, because C/P had to participate in renewal of the 7 AQMS which MCC/MFK were conducting in parallel. Although individual explanations were made for C/P's opinions before and after the workshop, it is thought that this led to a decline in the evaluation at the organizational and social levels.

<u>3-7</u>	<u>MESP with JICA Experts confirms Networking</u> <u>among AQMS in the Pristina Area.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We have experience in making a plan and establish a networking system among AQMS in KOSOVO	2.00	4.25	4.00
В	Our organization knows what kind of content is necessary in TOR for the contractor in charge in establishing a networking system among AQMS.	3.00	<b>4</b> .50	4.00
С	Kosovo provides opportunities for persons in charge in MESP to teach and instruct what kind of content is necessary in TOR for the contractor in establishing a networking system among AQMS.	2.00	<b>1</b> 4.25	4.00

It is the item on the data network from analyzers in AQMSs in Pristina Area.

From the first to the second period, the scores in the individual level, the organizational level and social level increase. Eventually, MCC/MFK took charge all of this work, and established the air quality data network for all AQMSs in Kosovo including the ones in the Pristina Area. Japanese side utilized this network, installed the displays and started to show air quality data.

It is hard to say that C/Ps contribute to this establishment. MCC/MFK drew up the TOR for it, and established the work. Since C/Ps could finally possess the data network, it will be the reason why the scores in the third period did not change much.

Future issue is whether C/Ps can manage and maintain data network and displays appropriately, and keep showing the data sustainably.

<u>3-8</u>	<u>MESP with JICA Experts prepares SOP for</u> <u>ambient NO<sub>2</sub>, SO<sub>2</sub>, PM10, and PM2.5</u> <u>measurement by a portable sampler for</u> <u>emergency needs.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We have portable samplers for ambient $NO_2$ , $SO_2$ , $PM_{10}$ and $PM_{2.5}$ measurement for emergency.	1.75	<b>1</b> 3.75	1 4.50

А	We have the written manuals for ambient $NO_2$ , $SO_2$ , $PM_{10}$ and $PM_{2.5}$ measurement by portable sampler for emergency.	1.05	<b>1</b> 3.50	<b>†</b> 5.00
В	Our organization has opportunities to learn how to conduct emergency sampling using a portable sampler for NO <sub>2</sub> , SO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub> based on SOP.	2.00	<b>1</b> 3.50	<b>†</b> 5.00
С	Kosovo has effective SOPs to conduct emergency sampling using a portable sampler for NO <sub>2</sub> , SO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub>	1.75	<b>1</b> 3.00	<b>4</b> .00
It is	an item to evaluate the ability related SOP on enviro	onmental air q	uality measure	ement by
portab	le equipment for emergency case. The evaluation is i	improving at t	he individual l	evel, the
organi	zational level and the social level. It is considered th	at sharing the	SOP just befo	re the
evalua	tion of the 3rd term led to improvement of the evaluation	ation, it is con	sidered.	
	MESP with JICA Experts implements measurements of ambient NO <sub>2</sub> SO <sub>2</sub> PM10	First	Second	Third
<u>3-9</u>	and PM2.5 based on SOP (1 hour average), for emergency needs.	Average (6/2/2018)	Average (31/1/2019)	Average (25/2/2020)
<u>3-9</u> A	Inclusion 1002, 502, 11110,and PM2.5 based on SOP (1 hour average), foremergency needs.We have the basic knowledge for measurement ofambient NO2, SO2, PM10 and PM2.5 for emergencyneeds.	Average (6/2/2018) 2.75	Average (31/1/2019) <b>3</b> .50	Average (25/2/2020) 4.00
<u>3-9</u> A A	Inclusion interferenceand PM2.5 based on SOP (1 hour average), foremergency needs.We have the basic knowledge for measurement ofambient NO2, SO2, PM10 and PM2.5 for emergencyneeds.We have portable samplers for ambient NO2, SO2,PM10 and PM2.5 measurement for emergency.	Average (6/2/2018) 2.75 1.50	Average (31/1/2019) <b>1</b> 3.50 <b>1</b> 3.50	Average (25/2/2020) 4.00 4.00
<u>3-9</u> A A B	Inclusion interaction inte	Average (6/2/2018) 2.75 1.50 2.00	Average (31/1/2019) <b>1</b> 3.50 <b>1</b> 3.50 <b>1</b> 4.00	Average         (25/2/2020)         ✓       4.00         ✓       4.00
<u>3-9</u> А А В С	<ul> <li>and PM2.5 based on SOP (1 hour average), for emergency needs.</li> <li>We have the basic knowledge for measurement of ambient NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> for emergency needs.</li> <li>We have portable samplers for ambient NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> measurement for emergency.</li> <li>Our organization provides on-the-job-training for persons in charge on emergency ambient air sampling for NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> using portable sampler.</li> <li>Kosovo provides opportunities to teach and instruct persons in charge on how to conduct emergency ambient air sampling for NO<sub>2</sub>, SO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>.</li> </ul>	Average (6/2/2018) 2.75 1.50 2.00 2.00	Average (31/1/2019) <b>1</b> 3.50 <b>1</b> 3.50 <b>1</b> 4.00 <b>1</b> 3.75	Average (25/2/2020) 4.00 4.00 4.00 4.00

equipment for emergency case.

The evaluation is improving at the individual level, the organizational level and the social level. Although it was a very busy time for C/P due to the renewal of 7 AQMSs by MCC/MFK, C/P get out during the training course by MCC/MFK and participated in the third training at TPP Kosovo A. It is considered that the C/P conducted all the procedures by themselves, which led to their confidence and improved evaluation.

	<b>MESP with JICA Experts utilizes results of</b>	First	Second	Third
<u>3-10</u>	AQMS for an annual air quality report as well	Average	Average	Average
	as for public awareness.	(6/2/2018)	(31/1/2019)	(25/2/2020)
	We can prepare by ourselves an annual air quality		<b>-</b> 4 7 7	
A	report based on AQMS result and use the result of	4.25	4.75	
	AQMS for public awareness.			
	Our organization knows how to prepare an annual		4 15	
В	air quality report based on the results of AQMS	3.75	4.5	→ 4.5
	and use it for public awareness.			
В	Our organization has enough members who	1 75	4.25	→ 4.25
В	prepare an annual air quality report based on	1.75		1.23

	AQMS results and use it for public awareness.				
С	Kosovo through training provides opportunities to learn how to prepare the annual air quality report.	2	4.5		4.5
It is an item to evaluate the disclosure of air quality monitoring results and the use for					
enviro	environmental public awareness. The evaluation is improving at the individual level, the				
organi	organizational level and the social level. Although it is simply a formality, the annual and monthly				
reports have already been published on the MEE/MESP's web site and the C/Ps is in charge, so it					
was hi	ghly evaluated from the first period at individual leve	el. At the end	of the 2nd per	riod and t	he

3rd period, the Project installed an air quality information displays in the Pristina area, so it is considered that the project has maintained a high evaluation from an environmental awareness point of view.

(4) Output 4: Capabilities for relevant environmental laboratory analyses are developed for emission measurements and air quality monitoring.

Results of the capacity assessment on Output 4 are shown in Table 4. Then, the average score of each questionnaire answered by C/P and C/P-WG is shown and comments by JET is also described next to the graph of questionnaires.

Output 4 consists of the acquisition of laboratory analysis technology  $(4-1 \sim 4-6)$  through exhaust gas measurement by Standard Reference Method and evaluation  $(4-7 \sim 4-10)$  for heavy metal analysis in PM in the air.

As for laboratory analysis, in the first period, C/P did not have any knowledge on Standard Reference Method and therefore, the scores were low. In the second period, although the capacity assessment was carried out before the activities, but since C/Ps thought that they can acquire the technology soon, the evaluations seemed to have high scores.

In the last half of the second period, the Project supported the re-functionalization and adjustment of the IC and the adjustment of the AAS. Furthermore, the Project carried out the exhaust gas analysis by Standard Reference Method. In the third period, C/P themselves requested additional training, and deepened the knowledge on handling not only the IC but also the ICP-MS. At the same time, they acquired the technology to properly conduct exhaust gas analysis by Standard Reference Method.

However, the application of Standard Reference Method is limited since only EU directive demands this method for LCPs in Kosovo, and the IC is possessed only by KHMI. On the other hand, this analysis technology can be applicable to analysis for water quality, and the analysis technology in KHMI, including the re-functionalization of ICP-MS, has been improved. Future needs for these analyses should be clarified, and it is desirable to expand the application of these technologies.

However the problem is the number of staff in charge. Only one person can carry out these analyses, and at least one more person is needed. It is also very important to secure the budget.

These analyses require not only for the maintenance of analyzers but also the procurement of standard solutions and many consumables such as reagents, and auxiliary equipment.

At the same time, KHMI as an institution aims at acquiring the EN17025, but it is very far from the establishment of the system, and there remain many issues to be solved. In order to solve the issues, KHMI must start to take the basic measures such as the reinforcement of staff, strengthening the management system for analysis room and analyzers, etc.

As for evaluation of heavy metal analysis in PM in the air, the Project sampled PM in the air, brought them back to Japan and analyzed them in the first period. As a result, Kosovo side decided to monitor heavy metals in PM in the air. In addition, because the factory that could be a pollution source was not operating during the 1st sampling, additional sampling was conducted in the 2nd period and samples were analyzed again in Japan. As a result, Kosovo side decided to monitor heavy metals in PM in the air in Drenas and Mitrovica. Thus, C/P acquired the technology of sampling. On the other hand, heavy metal analysis required the functionalization of the ICP-MS which C/P possesses in KHMI. KHMI has never operated the ICP-MS since it was brought to KHMI, therefore the level of evaluation was low at the first period. As a result of the subsequent project adjustments, during the 2nd and 3rd period, repairs of ICP-MS, adjustments for heavy metal analysis, and troubleshooting of the Project. It is the reason why the evaluation has risen in the second period. MCC/MFK is scheduled to train the staff in KHMI through its project. But training is delayed due to Covid-19. Comments on these evaluated results by JET are as follows.

	Standard Reference Metho	d and Laboratory analyzers	
	Starting point	Final point	
Individual	C/P did not understand	C/P experienced Standard Reference Method,	
level (A)	what Standard Reference	understood the principles and acquired the	
	Method is. The IC (same as	operation techniques. In parallel, the IC was	
	the ICP-MS) had not been	re-functionalized and C/P learned its operation.	
	operated for six to seven	At the same time, the ICP-MS was	
	years since it was brought in	re-functionalized too.	
	KHMI around 2012.		
Organizational	C/P could not analyze	C/Ps learned analysis of exhaust gas by	
level (B)	exhaust gas by Standard	Standard Reference Method.	
	Reference Method. C/P could	Two persons in KHMI can use the IC for	
	not operate the IC (same as	analysis. However, in the process from gas	
	the ICP-MS) either.	sampling to analysis, only one staff can conduct	
		gas sampling, and only one can use the IC for	
		analysis. Therefore, it is very hard to carry out	
		these analyses sustainably. As for ICP-MS, only	

	the same staff who can operate the IC can also					
		operate the ICP-MS.				
Social level	So far, only the AAS had	The starting of the operation of IC made it				
(C)	been operated, and its	possible to conduct exhaust gas analysis by				
	application range for analysis	Standard Reference Method for LCPs required				
	is very small. Besides, this	by EU Directive, which is the base for the				
	output is almost completely	NERP. The IC and ICP-MS were				
	occupied by technical	re-functionalized and the analysis capability of				
	elements. Therefore,	KHMI has improved a lot. However, KHMI				
	recognition at the social level	does not have any other application plan except				
	is very low.	the duties carried out in the Project (IC: exhaust				
		gas analysis by Standard Reference Method,				
		ICP-MS: heavy metal analysis in PM in the air).				
		It cannot be said that these analyzers are				
		sufficiently utilized. It is necessary to expand				
		the application range of analyzers.				
Outcome	KHMI as a laboratory has ac	equired the basic technologies for analysis, and				
	these activities produced good	results.				
	The Project re-functionalized	the IC and ICP-MS, and provided a set of				
	necessary standard solutions, and	uxiliary equipment, etc. therefore, the analysis				
	can be continued for a while. T	he application of these analyzes are broad and				
	they are applicable for various	analyses.				
	It was necessary to conduct a	analyses for the works conducted in the Project,				
	since Standard Reference Meth	od is required by the EU directive for exhaust gas				
	measurement for LCPs, and it i	s also needed for the monitoring of heavy metals				
	in PM in the air.					
Issues /	KHMI acquired the IC and I	CP-MS operation techniques. However, there is				
Proposals	only one staff who can do anal	ysis, and at least one more staff is needed. It is				
	also very important to secure the	ne budget for regular maintenance of analyzers,				
	consumables, auxiliary equipm	ent, etc. Analyzes for the sustainable				
	implementation of Project activ	vities are certainly necessary, but it is difficult to				
	say that KHMI has mastered th	e technology for analysis only by performing				
	these analyzes.					
	KHMI so far has hoped that	the various analyzers will be re-functionalized,				
	but only has hoped for the re-fu	inctionalization, while there is no other				
	application plan for analyzers e	except the duties carried out in the Project. It is				
	hard to say that KHMI utilizes	the analyzers well. It is necessary to expand their				
	application.					

In order to establish the analysis system, the following activities are required.
1) In order to use the newly acquired analysis technology, it is necessary to
expand the application of analysis and continue with them. At the same
time, it is indispensable to reinforce the staff and establish the system for
analysis.
2) Existing condition in laboratory shows that it is not well managed, for
example the equipment for analysis is not well prepared, analysis room is
not kept clean sufficiently (high risk of contamination), analyzers, analyses,
reagents, etc. are not well managed.
The availability of the analyzers is very low in the present condition, and
there is no improvement of the analysis technology any more, and at the same
time, the analyzers may become not-operational because of the features of
analyzers which are kept in normal condition by continuous use.
In order to solve these issues, KHMI must start from the basic measures such
as the reinforcement of the staff, strengthening of the management system for
cleanliness of the analysis room, well maintained analyzers, etc.

	Monitoring of heavy	metals in PM in the air	
	Starting point	Final point	
Individual	Sampling device (low	The Project handed over high volume	
level (A)	volume sampler) was	sampler and C/P became able to conduct PM	
	donated by EC in 2011 $\sim$	(TSP) sampling. However, analysis of heavy	
	2012, but C/P had no	metals in PM is conducted in Japan. It was	
	experience to sample PM by	confirmed that the low volume sampler	
	themselves.	introduced in the past was not working properly.	
		At the individual level, C/Ps have not yet	
		acquired the whole technology including the	
		heavy metal analysis. The training by	
		MCC/MFK for ICP-MS operation is expected.	
Organizational	C/P did not have capacity	C/P became able to conduct sampling, and	
level (B)	to conduct sampling of PM	the sampling was conducted by the high volume	
	and analysis of heavy metals	sampler by the Japanese method. The Kosovo	
	in PM by themselves.	side hopes to use the low volume sampler for	
		sampling of $PM_{10}$ in accordance with EU	
		standard, but since the low volume sampler is	
		not available, until the procurement of the low	
		volume sampler, the Kosovo side is going to use	
		high volume sampler.	
		As for heavy metal analysis, through the	

		activities of the Project, one C/P became able to			
		repair the ICP-MS, make adjustments for heavy			
		metal analysis, and deal with troubles related to			
		the plasma shut down. KHMI is waiting for			
		ICP-MS training by MCC/MFK.			
Social level	Kosovo has abundant	Concerns are high, and analysis results of			
(C)	resources of heavy metals,	daily average showed the existence of heavy			
	and there is a concern on	metals higher than Japanese guideline values			
	heavy metal contamination	(annual average) in PM in the air. C/P decided			
	by industries.	to continue heavy metal monitoring.			
		MEE/MESP has not disclosed the existence			
		of heavy metals in PM in the air yet.			
Outcome	C/P became able to conduct	sampling of PM in the air, but still could not			
	analyze heavy metals in the air.	. Moreover, KHMI possesses the low volume			
	sampler, which is EU standard	method, but it was confirmed that it does not to			
	work properly. Therefore, the F	Project recommended using the high volume			
	sampler tentatively. The projec	t functionalized ICP-MS and the training for			
	ICP-MS by MCC/MFK is sche	duled.			
	However, same as mentioned above, the number of personnel in charge is				
	insufficient and at the same time more experience is required for analysis.				
	Furthermore, there is an issue t	hat the conditions in laboratory are not well			
	organized for conducting analysis.				
	In addition, the operation of ICP-MS requires budgetary support such as				
	continuous purchase of argon g	se of argon gas and the purchase of additional consumables by			
	MEE/MESP.				
Issues /	The heavy metal level in PM	in the air should to be evaluated on annual			
Proposals	average basis, so it is desirable	to perform sampling and analysis once a month.			
	It is necessary to conduct samp	ling and analysis at least four times a year and			
	calculate the annual average. T	herefore, at least one more staff is required.			
	In order to conduct heavy me	etal analysis in line with the EU standard, the			
	sampling of PM <sub>10</sub> is required, a	nd for this reason the acquisition of low volume			
	sampler is necessary. However,	, the sampling method by the low volume sampler			
	is the same as the one by the hi	gh volume sampler, and therefore, there is no			
	problem with sampling.				
	Although, it is currently dela	yed due to Covid-19, but ICP-MS will be put into			
	operation after training by MC	C/MFK.			
	The Kosovo side has not yet	published the analysis results regarding heavy			
	metals in the air. MEE/MESP is	s planning to make it public after the discussion			
	with the municipality of Drenas	s and Mitrovica. It is desirable to handle this issue			
	The Kosovo side has not yet published the analysis results regarding heavy metals in the air. MEE/MESP is planning to make it public after the discussion with the municipality of Drenas and Mitrovica. It is desirable to handle this issu				



as earliest possible.

4-6 Assessment of whether C/P can draft SOPs for exhaust gas measurement by Standard Reference



	Assessment Items			
	<b>MESP</b> with the assistance of JICA Experts	First	Second	Third
<u>4-1</u>	studies sampling and measurement	Average	Average	Average
	methodologies for the LCPs.	(6/2/2018)	(31/1/2019)	(25/2/2020)
А	We have instruments for analysis of $SO_X$ , $NO_X$ , and Hg by reference method, and own them.	2.78	3.33	<b>4</b> .34
А	We know how to sample and analyze $SO_X$ , $NO_X$ , and Hg by reference method, and a calculation	3.33	3.50	1 4.20

	method converting to the values at reference $O_2$ concentration.			
В	Our organization has opportunities to learn how to apply reference method theoretically and owns the necessary equipment, consumables and instruments.	2.56	<b>1</b> 3.50	<b>1</b> 4.30
С	Kosovo has effective theoretical documents and provides opportunities to learn how to apply the reference method by IC.	2.78	1 3.42	4.30
It is	the item to evaluate the knowledge on the sampling as	nd analysis f	or exhaust gas	
measu	rement by Standard Reference Method.			
In tl	ne first period, C/P did not have sufficient knowledge	on Standard	Reference Me	thod, and
therefo	are scores were low However from the second to the	third period	the scores in	reased
drastic	solves solve to whether the weight $C/P_{c}$ and $V_{c}$ and $V_{$	underd Defer	once Method I	w their own
and de	epen the understandings. In the third period, the traini	ng was cond	ucted addition	ally
accord	ing to the request by C/Ps, and C/Ps understood the ex	khaust gas an	alysis by Stan	dard
Refere	nce Method very well.		-	
	MESP with the assistance of JICA Experts	First	Second	Third
<u>4-2</u>	makes lon Chromatograph (hereinafter referred	Average $(6/2/2018)$	Average $(31/1/2010)$	Average $(25/2/2020)$
	We can use IC for analyzing $SO_{y}$ and $NO_{y}$ by	(0/2/2018)		(23/2/2020)
A	ourselves.	2.56	3.33	<b>T</b> 4.30
В	Our organization knows how to make sampling for IC and can operate IC for analyzing $SO_X$ and $NO_X$ .	2.44	<b>1</b> 3.50	4.10
С	Kosovo has effective theoretical documents and provides opportunities to learn how to apply reference method.	2.56	<b>1</b> 3.67	3.90
This	s is the item to evaluate whether C/P can operate the IC	C for Standar	d Reference N	Aethod.
In tl	ne first period, the IC could not be operated, but in the	second perio	od, the Project	
re-fact	ionalized the IC and conducted the analysis Furthern	nore in the f	hird period C	/Ps
condu	the avaluation of an avaluation of the analysis. I define the	lethod throw	the training	requested
	A standard Kelerence M			requested
by C/F	's themselves, and the understandings were deepened a	and the score	s increased. If	n the
individ	dual level, C/Ps became able to use the IC, and in the c	organization	and social lev	el, the scores
rose si	nce KHMI acquired the analysis technology through the	he Project.		
<u>4-3</u>	MESP with the assistance of JICA Experts <u>conducts analysis by reference methods for</u> <u>LCPs, by using Ion Chromatograph method for</u> <u>SO<sub>2</sub> and NO<sub>X</sub> and atomic absorption method</u> (hereinafter referred to as "AAS") for Hg.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We can prepare necessary equipment and consumables for conducting a sampling for reference method and operate IC and AAS.	3.00	3.25	<b>4</b> .20
В	Our organization understands the meaning of reference methods for LCPs, and has enough members for applying reference methods	3.11	3.25	3.90
С	Kosovo has law or regulations to conduct reference methods for LCPs and allocates enough budget to	2.33	<b>1</b> 3.17	3.40

		conduct them			
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This is the item to evaluate whether C/P can conduct exhaust gas analysis by Standard Reference Method by using the IC and mercury analysis by the AAS.

C/Ps with the assistance of JET conducted exhaust gas analysis by using the re-functionalized IC, and the AAS already operated by KHMI in the second and the third period. The actual activities started after the capacity assessment in the second period. Since the preparation started from the early second period, the score in the second period increased. From the last half of the second period, C/Ps experienced exhaust gas analysis, and furthermore, in the third period they continued the exhaust gas analysis through additional training requested by their own. They deepened the understanding of the exhaust gas analysis by Standard Reference Method, and therefore, the score in the individual level further increased.

In KHMI, the analyzer started operation, and the analysis had one step forward. However, since in organizational level, only one person can operate the analyzers, and in social level, there is a concern to the budget, and the scores did not rise.

It is indispensable to reinforce the number of the staff and secure the proper budget in order to keep analyses.

			1	1
	MESP with the assistance of JICA Experts	First	Second	Third
<u>4-4</u>	elaborates SOPs for sampling and analysis for	Average	Average	Average
	LCP stack gas.	(6/2/2018)	(31/1/2019)	(25/2/2020)
А	We know how to apply reference methods for LCPs.	2.33	<b>1</b> 3.33	4.00
В	Our organization understands how to apply reference methods for LCPs and enough ability to draft SOPs.	2.44	<b>1</b> 3.25	<b>†</b> 4.00
С	Kosovo has laws or regulations to make reference method for LCPs mandatory in Kosovo and has SOPs for them.	3.33	3.58	→ 3.70

This is the item to evaluate whether C/P understand exhaust gas measurement by Standard Reference Method to be able to draft a SOP for LCPs.

In the first period, C/P did not have any knowledge on Standard Reference Method, and the score was low. In the second period, since C/P started to gain the knowledge, the scores increased. In the third period, C/P deepened the understandings by the additional training for the Standard Reference Method requested by their own, and the scores further rose.

As for SOPs, C/Ps and JET collaborated together to draft SOPs, and C/P understood more on the Standard Reference Method.

<u>4-5</u>	MESP with the assistance of JICA Experts studies sampling and measurement methods for other stationary emission sources.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We know the ELVs for other stationary sources, and in which cases the reference methods must be applied to other stationary sources.	4.11	→ 4.00	3.80
В	Our organization has enough ability to judge and apply reference methods to other stationary sources.	2.67	<b>1</b> 3.83	4.00

C	Kosovo nas laws or regulations which stipulate to	2.22	<b>X</b> 2 75			
C	which kind of facilities reference methods must be	3.22	5.75	<b>3.60</b>		
	applied.					
This	This is the item to evaluate the possibility for C/P to be able to apply exhaust gas measurement					
by Sta	ndard Reference Method to other stationary sources.					
Met	hods have no difference from the one for LCPs, and the	erefore, the	scores are alm	nost same as		
the on	e for item 4-3.					
The	refore, in the case that the exhaust gas analysis by Star	ndard Refere	nce Method is	applied to		
other s	stationary sources in addition to LCPs, reinforcement of	of the staff a	nd securement	of the		
budget is indispensable as same as item 4-3.						
buuge	is maispensaere as sume as rem 1.5.					
ouuge	<b>MESP with the assistance of JICA Experts</b>	First	Second	Third		
<u>4-6</u>	<b>MESP with the assistance of JICA Experts</b> elaborates SOPs for sampling and measurement	First Average	Second Average	Third Average		
<u>4-6</u>	MESP with the assistance of JICA Experts           elaborates SOPs for sampling and measurement           methods for other stationary emission sources.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)		
<u>4-6</u>	MESP with the assistance of JICA Expertselaborates SOPs for sampling and measurementmethods for other stationary emission sources.We know how to conduct reference methods for	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)		
<u><b>4-6</b></u> A	MESP with the assistance of JICA Experts elaborates SOPs for sampling and measurement methods for other stationary emission sources.We know how to conduct reference methods for other stationary sources.	First Average (6/2/2018) 2.11	Second Average (31/1/2019) 3.50	Third Average (25/2/2020) 4.20		
<u>4-6</u> A	MESP with the assistance of JICA Experts elaborates SOPs for sampling and measurement methods for other stationary emission sources.We know how to conduct reference methods for other stationary sources.Our organization understands how to apply	First Average (6/2/2018) 2.11	Second Average (31/1/2019) 3.50	Third Average (25/2/2020) 4.20		
<u>4-6</u> А В	MESP with the assistance of JICA Expertselaborates SOPs for sampling and measurementmethods for other stationary emission sources.We know how to conduct reference methods forother stationary sources.Our organization understands how to applyreference methods for other stationary sources and	First Average (6/2/2018) 2.11 2.11	Second Average (31/1/2019) 3.50 3.42	Third Average (25/2/2020) 4.20 3.80		
4-6 A B	MESP with the assistance of JICA Experts elaborates SOPs for sampling and measurement methods for other stationary emission sources.We know how to conduct reference methods for other stationary sources.Our organization understands how to apply reference methods for other stationary sources and has enough ability to draft SOPs.	First Average (6/2/2018) 2.11 2.11	Second Average (31/1/2019) <b>1</b> 3.50 <b>1</b> 3.42	Third Average (25/2/2020) 4.20 3.80		
<u>4-6</u> А В	MESP with the assistance of JICA Experts elaborates SOPs for sampling and measurement methods for other stationary emission sources.We know how to conduct reference methods for other stationary sources.Our organization understands how to apply reference methods for other stationary sources and has enough ability to draft SOPs.Kosovo has laws or regulations to make reference	First Average (6/2/2018) 2.11 2.11	Second Average (31/1/2019) <b>1</b> 3.50 <b>1</b> 3.42	Third Average (25/2/2020) <b>1</b> 4.20 <b>3</b> .80		
<u>4-6</u> А В С	MESP with the assistance of JICA Experts elaborates SOPs for sampling and measurement methods for other stationary emission sources.We know how to conduct reference methods for other stationary sources.Our organization understands how to apply reference methods for other stationary sources and has enough ability to draft SOPs.Kosovo has laws or regulations to make reference method for other stationary sources mandatory in	First Average (6/2/2018) 2.11 2.11 2.89	Second Average (31/1/2019) <b>1</b> 3.50 <b>1</b> 3.42 <b>3</b> .58	Third Average (25/2/2020) 4.20 3.80 3.90		
<u>4-6</u> А В С	MESP with the assistance of JICA Experts elaborates SOPs for sampling and measurement methods for other stationary emission sources.We know how to conduct reference methods for other stationary sources.Our organization understands how to apply reference methods for other stationary sources and has enough ability to draft SOPs.Kosovo has laws or regulations to make reference method for other stationary sources mandatory in Kosovo and has SOPs for them.	First Average (6/2/2018) 2.11 2.11 2.89	Second Average (31/1/2019) <b>1</b> 3.50 <b>1</b> 3.42 <b>3</b> .58	Third Average (25/2/2020) 4.20 3.80 3.90		

Reference Method for other stationary sources.

SOPs have no difference from the one for LCPs, and therefore every score is almost same as the one for item 4-4. Since the implementation method is the same, the Project did not draw up the SOPs.

<u>4-7</u>	MESP with the assistance of JICA Experts conducts Particulate Matter (PM) sampling by Hi-volume air samplers at least for 2 sampling points.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We have experience in conducting PM (Particulate Matter) sampling by Hi-Volume Air Sampler for heavy metal analysis.	2.56	<b>1</b> 3.58	→ 3.60
В	Our organization provides on-the-job-training to persons in charge for PM (Particulate Matter) sampling by Hi-Volume Air Sampler for heavy metal analysis.	1.78	<b>1</b> 3.42	3.60
С	Kosovo provides opportunities for persons in charge to learn how to conduct PM sampling for heavy metal analysis.	2.22	<b>1</b> 3.75	3.40

This is the item to evaluate whether C/P can conduct sampling of PM in the air.

At the time of the capacity assessment in the first period, the C/Ps put a low evaluation because they had no knowledge of the PM sampling method for heavy metal analysis. Since the sampling was conducted in the first and second periods, the evaluation became high in the second period. The project conducted PM sampling in total 8 points in 2 areas in Kosovo. Now, C/Ps became capable of conducting PM sampling.

	JICA Experts analyze heavy metal contents	First	Second	Third
<u>4-8</u>	(Mn, Ni, As, Cd, Pb and Zn) in PM in laboratory	Average	Average	Average
	<u>in Japan.</u>	(6/2/2018)	(31/1/2019)	(25/2/2020)
А	We have available equipment in MESP to analyze heavy metal contents (Mn, Ni, As, Cd, Pb and Zn) in PM.	2.56	<b>1</b> 3.67	4.00
В	Our organization has enough ability to analyze heavy metal contents (Mn, Ni, As, Cd, Pb and Zn) in PM.	3.67	3.42	→ 3.50
С	Kosovo provides opportunities for persons in charge to learn how to analyze heavy metal contents (Mn, Ni, As, Cd, Pb and Zn) in PM.	2.78	3.33	→ 3.40

This is the item to evaluate the possibility that C/P become to be able to conduct heavy metal analysis in PM in the air.

In Kosovo KHMI has ICP-MS, and although it was not within the original scope of the work, the Project conducted repairs, adjustments for heavy metal analysis, and troubleshooting for the plasma shutdown together with C/P. Therefore, it is considered that the evaluation at the individual level has greatly improved. In addition, MCC/MFK planned to provide ICP-MS training to KHMI staffs at the beginning of 2020, but due to the influence of Covod-19, the training has not been provided as of the end of May 2020. At the organizational level, it seems that C/Ps are worried about whether they have sufficient abilities.

In particular, when ICP-MS operates in addition to IC, the number of analyzers operating increases in KHMI, so it is essential to secure human resources and O&M budget.

	<b>MESP</b> with the assistance of JICA Experts	First	Second	Third
<u>4-9</u>	assesses the importance and urgency of heavy	Average	Average	Average
	metal pollution in the air.	(6/2/2018)	(31/1/2019)	(25/2/2020)
	We assess the importance and urgency of heavy			
Α	metal pollution such as Mn, Ni, As, Cd, Pb and Zn	4.11	3.83	→ 3.70
	in the air.			
	Our organization has enough members to assess the			
В	level of heavy metal air pollution such as Mn, Ni,	2.33	<b>T</b> 3.42	→ 3.40
	As, Cd, Pb and Zn.			
	Kosovo provides opportunities to learn how to			
С	assess the level of heavy metal air pollution such as	3.00	<b>7</b> 3.42	3.60
	Mn, Ni, As, Cd, Pb and Zn.			

This is the item to evaluate the capacity for C/P to evaluate the significance of heavy metalmonitoring in PM in the air. Issues related to heavy metals were assessed based on the PM analysis conducted in the first period. In addition, the analysis result of the PM sampling at Drenas, which was additionally conducted in the 2nd period in response to the request from MEE/MESP, also was assessed, and thus the evaluation is relatively high. In addition, two C/Ps in charge of PM sampling at KHMI are not dedicated to PM sampling, but also perform O&M of AQMSs, soil monitoring, IC analysis, attend the workshops conducted overseas, attend meetings, etc. It is desirable to conduct the PM sampling every month, but at least four times a year sampling should be conducted, and the annual value should be evaluated because the heavy metal concentration is evaluated as annual average. It is necessary to reinforce the staff, at least one more staff.

<u>4-10</u>	JICA experts make operation diagnosis on	First	Second	Third

	ICP-MS in KHMI laboratory.	Average (6/2/2018)	Average (31/1/2019)	Average (25/2/2020)
А	We arrange an operation diagnosis on ICP-MS in KHMI laboratory by outsourcing to manufacturer, including preparation of TOR on diagnosis.	2.38	<b>1</b> 3.45	→ 3.38
В	Our organization has had enough ability to bring up (instruct) persons in charge of preparation of TOR for an operation diagnosis on ICP-MS in KHMI laboratory by outsourcing to manufacturer.	2.13	<b>1</b> 3.18	→ 3.13
С	Kosovo provides opportunities to teach what kind of contents are necessary in TOR for an operation diagnosis on ICP-MS in KHMI laboratory by outsourcing to manufacturer to persons in charge. And Kosovo will allocate enough budgets to conduct rehabilitation of ICP-MS in the future.	2.13	<b>1</b> 3.18	<b>3.13</b>

This is the item to evaluate whether C/P can re-functionalize the ICP-MS.

As a result, almost all works were carried out by the Project, and finally the ICP-MS reached the condition to be able to operate. However, KHMI only express their hopes and it relied on the activities to the Project and MCC/MFK. From now, MCC/MFK is going to give training for operation, and the ICP-MS will start its operation. Therefore, every score is kept low.

After its operation, it is important to continue analyses, but there is only one staff that can operate the ICP-MS including the IC and the AAs, it is very hard to continue analyses. It is indispensable to reinforce at least one more staff. At the same time, it is indispensable to secure the budget for the continuing analyses such as maintenance of analyzers, consumables, etc.

(5) Output 5: Capabilities for air quality simulation modeling are developed.

Results of the capacity assessment on Output 5 are shown in Table 5. Then, the average score of each questionnaire answered by C/P and C/P-WG is shown and comments by JET is also described next to the graph of questionnaires.

Output 5 was aimed at developing technical capacity for air pollution simulation modeling. The C/P has learnt the purpose of the simulation model, how to operate the program, and how to analyze air pollution conditions by creating concentration distribution maps using GIS. Some C/Ps were able to operate and execute the program on their own under the guidance of JET, but they have not yet reached the level where they can calculate the simulation model independently, including finding and dealing with errors. In order to gain further experience and maintain/improve the technical skills, it is very important to stipulate the tasks to establish and utilizing the simulation model in the job description of MEE/MESP as well as individual efforts.

Starting pointFinal pointIndividualC/Ps had almost noSome of the C/P became to be able to operatelevel (A)knowledge/ experience with<br/>the simulation model, just athe meaning of each manipulation is not fully

The following is a summary of the current situation from the point of view of JET.

	few C/Ps knew the result of	understood.	
	simulation model		
	implemented by other		
	donors. The capacity of		
	handling PC and excel		
	calculation was not sufficient		
	either.		
Organizational	Both MEE/MESP and	C/P from both MEE/MESP and KHMI have	
level (B)	KHMI are interested in the	joined the trainings well, and both organizations	
	simulation model. At the	are cooperative to this activity so far. On the	
	starting point, KHMI was to	other hand, in order to keep the capacity after	
	be the primary organization	the project, it is recommended that the job	
	to do this activity	description of MEE/MESP should stipulate the	
		simulation model task.	
Social level	Although citizens are	No change from the starting point	
(C)	highly interested in the	The simulation modeling is not used for the	
	causes of the air pollution,	evaluation of air pollution control measures,	
	simulation model is not	information disclosure to the public, etc. Since	
	familiar as a tool to analyze	yze concentration map is a useful tool for	
	that.	dissemination of information to the public, it is	
		recommended that the simulation modeling is	
		utilized for drafting the MEE/MESP Action	
		Plan for air pollution control, and for	
		information disclosure and communication with	
		the public.	
Outcome	The C/P has learnt the purpo	ose of the simulation model, how to operate the	
	program, and how to analyze a	ir pollution conditions by creating concentration	
	distribution maps using GIS. S	ome of the C/P came to be able to execute the	
	programs using simulation mod	deling manual under JET's guidance, through a	
	series of practical exercises.		
	At the organizational level, t	he simulation working group, organized mainly	
	from KHMI members and in co	ooperation with KEPA staff, was organized and	
	ready to operate simulation mo	deling including collecting data and GIS	
	manipulation. On the other han	d, in order to keep and maintain the capacity after	
	the project, it is recommended	that the job description of MEE/MESP should	
	stipulate the simulation model	task.	
Issues /	Only the basic items in the C	CALPUFF program have been trained in this	
Proposals	project, and this does not addre	ess the applied content. Individuals within C/P	
	vary in their achievement of tec	chnical competence, and only a few C/Ps have the	

ability to execute the simulation model on their own by using the manual. A deeper understanding of the content of the calculations and the interpretation of the results still remains as an issue. At the organizational level, the C/P's job description does not include the implementation of the simulation model as part of their duties. To maintain the system and capability to conduct simulations after the completion of the project, the task should be specified in the job regulations of the ministry in order to clarify the roles and responsibilities of each related organization. It is necessary to clarify the purposes and situations in which the simulation model can be utilized and to reach consensus among related organizations. When issues related to the capacity and systems to implement the simulation modeling are resolved, it will be possible to use the simulation model for evaluation of air pollution control measures and information disclosure to the public.



Results of Capacity Assessment on Output 5



Table 5Results of Capacity Assessment on Output 5

	Assessment Items			
<u>5-1</u>	<u>MESP and relevant agencies with JICA Experts</u> <u>designate responsible section for simulation</u> <u>model and establish necessary coordination with</u> <u>relevant agencies.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	The responsible section for simulation model is designated and necessary coordination with other relevant agencies is established.	4.0	3.8	3.4
В	Regarding air pollutant emission inventory, our organization has the ability to handle, resolve, and adjust conflicts of interest.	3.0	2.8	<b>1</b> 3.6
В	Regarding air pollutant emission inventory, our organization has the ability to build a collaborative relationship with other relevant parties.	4.0	<b>4</b> .5	4.2
С	There is a basic infrastructure for preparing air pollutant emission inventory in the Republic of Kosovo.	4.4	↓ 4.0	↓ 4.0

This item is related to the establishment of institutional framework on simulation modeling between MEE/MESP and related organizations.

The participants from MEE/MESP and KHMI continued to participate in the Simulation WG established in the 1<sup>st</sup> period of the project. The scores for capacity at the organizational level have increased. On the other hand, scores at individual and social level are declined. It may come from the difficulty to obtain data on weather and other matters from external organizations.

<u>5-2</u>	<u>MESP and relevant agencies with JICA Experts</u> <u>collect existing data such as air quality</u> <u>monitoring data, meteorological data,</u> <u>geographical information etc.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	Our organization can collect necessary data, such as air quality monitoring data, meteorological data, geographical information etc.	4.4	4.2	<b>≁</b> 4.4
В	Regarding air pollutant emission inventory, our organization has the ability to monitor the progress, obtain the feedback, and to flexibly change the activities to achieve the purpose.	3.6	3.8	<b>4</b> .0
С	Kosovo has effective law, regulations, or institutional arrangements for preparing air pollutant emission inventory.	4.2	4.0	<b>→</b> 4.0

This item relates to the collection of information needed for the simulation modeling.

The scores have improved because the air quality monitoring data has obtained from KHMI's

staff in charge in the third period, and the necessary data is now accessible. However, there are still issues such as the low reliability of air quality monitoring data.

	<b>MESP with JICA Experts analyzes and validates</b>	First	Second	Third		
5-3	meteorological data for applying a dispersion	Average	Average	Average		
	simulation model.	(6/2/2018)	(31/1/2019)	(25/2/2020)		
٨	We can analyze and validate the meteorological	2.0	. 35	<b>7</b> 10		
А	data for applying a dispersion simulation model.	5.8	<b>\</b> 3.5	4.0		
	Regarding air pollutant emission inventory, our					
В	organization is willing to acquire the ability to take	3.8	4.2	3.8		
	initiative and act in solving the challenges.					
	In the Republic of Kosovo, there is an					
С	administration system for securing and	2.6	→ <u>25</u>	1 32		
	implementing the budget for preparing air pollutant	2.0	2.5	<b>J</b> 3.2		
	emission inventory.					

This is an item for the evaluation of the capacity to analyze and validate the meteorological data. Although capacity at the individual level has improved, available meteorological data is still

## limited, and this is probably the reason of the low scores at the organizational and social levels.

	<b>MESP</b> with JICA Experts analyzes and validates	First	Second	Third
<u>5-4</u>	air quality monitoring data.	Average	Average	Average
		(6/2/2018)	(31/1/2019)	(25/2/2020)
٨	We can analyze and validate the air quality	2 /	2.8	12
А	monitoring data.	5.4	5.0	4.2
	Regarding air pollutant emission inventory, Our			
D	organization has the ability to use resources in an	3.0	→ 30	▲ 4.0
D	effective and efficient manner in accordance with	5.0	F 3.0	L
	the strategy, and has the ability to implement the			

	activity, and the ability to get things done.				
С	In the Republic of Kosovo, there is an administration system for securing and implementing the budget on preparing air pollutant emission inventory.	2.6	2.3	t	3.2

This is an item for the evaluation of the capacity to analyze and validate the air quality monitoring data.

Capacity at the individual level has advanced through the seminars on air quality measurement data verification in the second and third periods of the project, as well as the rehabilitation of AQMS equipment and the installation of public displays for air quality information, Therefore, the self-assessment scores have increased at all levels. However, it should be noted that in practice, there are still challenges in the quality control of air quality monitoring data. It will be necessary to pay attention to whether air quality monitoring are well-maintained and data verification is sufficiently carried out hereafter.

	MESP with JICA Experts elaborates dispersion	First	Second	Third
<u>5-5</u>	simulation model for the target year.	Average	Average	Average
		(6/2/2018)	(31/1/2019)	(25/2/2020)
А	We can elaborate the dispersion simulation model for the target year.	2.8		3.4
В	Regarding air pollutant emission inventory, our organization has the ability to define and analyze the institution, policy making environment, and social system where we are located.	2.6	1 3.2	<b>†</b> 4.2
С	Regarding air pollutant emission inventory, the Republic of Kosovo has a political decision-making function based on democracy.	2.8	<b>1</b> 3.8	<b>4</b> .2

This item is related to the implementation of the simulation model.

There has been continuous improvement in evaluation at all levels throughout the second and third period of the project. In fact, the C/Ps are deepening their understanding of the simulation model and getting used to the operation of the program, and the work is becoming smoother. Although the evaluation scores at the organizational and social levels are high, the utilization of the simulation modeling is currently not included as a part of the MEE/MESP duties, and it will be an issue in order to keep current systems and capabilities after the project.

	MESP with JICA Experts analyzes structure of	First	Second	Third
<u>5-6</u>	air pollution.	Average	Average	Average
		(6/2/2018)	(31/1/2019)	(25/2/2020)
А	We can analyze the structure of air pollution.	3.4	4.0	3.8
В	Regarding air pollutant emission inventory, our organization has the ability and judgment capacity to develop a strategy that meets the needs of relevant organizations.	2.4	<b>1</b> 3.8	<b>→</b> 4.0
С	The Republic of Kosovo has a behavior pattern and concept of values supported and recognized culturally regarding air pollutant emission inventory.	2.6	→ 2.7	3.4

С	In the Republic of Kosovo, citizens generally have ethic and social obligations for preparing air	2.8	1	3.2	3.0
	pollutant emission inventory.				

This item is related to the analysis of the air pollution structure.

C/P has trained to make a concentration distribution map based on the results of the simulation modeling, and discussed the validity of the results in the second period. That led to the increase of the scores at all levels in the second period. C/Ps showed high interest at the analysis of the results, and their ratings at the individual level are high. On the other hand, the evaluation at the social level is low, since the utilization of these results is not widespread at the organizational or social levels. The calculation and utilization of simulation modeling are not specified in the current MEE/MESP job description. It is desirable that the utilization of the simulation model will be specified in the job description and can be regularly implemented as part of their duties.

<u>5-7</u>	MESP with JICA experts acquire theoretical knowledge of simulation model and practice simulation modeling through seminars and workshops.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We routinely study and practice simulation modeling through seminars and workshops.	3	1 3.6	1 4.2
В	Regarding air pollutant emission inventory, our organization has the ability to continuously acquire skills and knowledge to meet new challenges.	3.6	4.0	4.2
С	Kosovo has laws or regulations to make emission inventory preparation in Kosovo and have enough budget and system to form them.	2.4	2.2	<b>1</b> 3.6
Th	is section is related to the theoretical learning and pra	ctice of simula	ation	

theoretical learning and p

The simulation WG participants from MEE/MESP and KHMI have been continuously joined in simulation practice since the 1<sup>st</sup> period of the project, and the self-assessment scores has constantly increased throughout the second and third periods of the project.

(6) Output 6: Decision making by Kosovo side is improved based on technical evidence for air pollution control.

Results of the capacity assessment on Output 6 are shown in Table 6. Then, the average score of each questionnaire answered by C/P and C/P-WG is shown and comments by JET is also described next to the graph of questionnaires.

Output 6 was aiming for C/P to understand emission reduction measures for LCPs and other stationary sources and to study and instruct measures by themselves. KEK staff deepened their understanding on the study of the emission reduction measures for LCPs through the process implemented in TPP Kosovo A where the Project studied, proposed and implemented emission reduction measures. As for the Dust, the reduction measures were proposed and accepted. The proposal resulted in the implementation of the modification. However, the reduction measures for  $SO_2$  and  $NO_X$  need not a little investment, and it is hard to realize them. At this moment, the investment in TPP Kosovo A is limited and difficult because of the scheduled shutdown in 2023 in line with commencement of TPP Kosova e Re.

On the other hand, as for other stationary sources, the reality of the situation has become obvious through the exhaust gas measurement and the study on emission reduction measures by the Project, where the implementation of the exhaust gas measurement and reporting is not fully carried out, or the measurement results are not accurate even though measurement is conducted. This is presumed to be caused by the fact that MEE/MESP as the competent authority cannot probe the measurement reporting results, judge the adequacy of the results, etc. The enhancement of the capacity of the officials in charge in MEE/MESP is the future issue, where officials in charge improve the knowledge and experience on measurement and emission reduction measures, and at the same time inspect the measurement results by utilizing the exhaust gas measurement capability acquired by KHMI, etc.

	Starting point	Final point		
Individual	Persons in charge had little	Seminars, etc. on emission reduction measures		
level (A)	knowledge on emission	were repeated many times during the Project		
	reduction measures for LCPs	period. Staff in charge in KEK have improved		
	and other stationary sources.	their knowledge and deepened the		
		understanding. However, the officials in charge		
		in MEE/MESP do not understand well and they		
		have just started to realize the lack of		
		knowledge.		
Organizational	Laws regarding emission	At TPP Kosovo A, because of the scheduled		
level (B)	regulation and obligation of	shutdown in line with commencement of TPP		
	reporting emissions are well	Kosova e Re in the future, it is hard to invest,		
	organized, but these laws are	and therefore, the plants cannot comply with		
	not well enforced.	ELVs and no measures can be taken.		
		As for other stationary sources, officials in		
		MEE/MESP did not reach the level to instruct		
		private facilities on improvements from the		
		technical point of view, and at the same time,		
		operators of private facilities do not recognize		
		the importance of the exhaust gas measurement,		
		etc. Now it is not a situation where the law is		
		enforced well.		
Social level	As for stationary sources,	MEE/MESP is lacking the capacity to		
(C)	the concern especially for	instruct LCPs and other stationary sources.		
	dust is very high because of	There are many complains from the citizens		
	the complaints by population.	about LCPs, but the emission reduction		
	Bur they do not have	measures are going to be implemented with the		

Comments on these evaluated results by JET are as follows.

	sufficient knowledge on SO <sub>2</sub>	support of EU.			
	and NO <sub>X</sub> .	On the other hand, officials in MEE/MESP do			
	The concern for $PM_{2.5}$ is	not instruct properly private facilities (other			
	very high.	stationary sources). Currently in Kosovo			
		industries are not very developed, and therefore,			
		the concern by both MEE/MESP and citizens is			
		not high for other stationary sources.			
Outcome	As for TPP Kosovo A, the Pr	roject proposed dust reduction measures with the			
	smallest possible investments.	The proposals are in the way to be implemented,			
	and part of the modification ha	s been applied. These measures were studied in			
	collaboration with the UP, and	the study results were applied, and it became one			
	of the large outcomes. Reduction	omes. Reduction measures for $SO_2$ and $NO_X$ are also proposed,			
	but it is very hard to apply ther	n because of the amount of investment needed.			
	On the other hand, as for other stationary sources, from the results of the				
	exhaust gas measurement conducted by the Project for other stationary sources,				
	it became obvious that most facilities do not comply with their ELVs. The actual				
	situation also became clear that both MEE/MESP as the competent authority and				
	operators of private facilities do not acknowledge the importance of the				
	measurement and do not control the emissions. It is found that officials in				
	MEE/MESP should enhance the	e knowledge on exhaust gas measurement and			
	emission reduction measures. w	which will lead to the acquisition of the capacity			
	to instruct private facilities.	······			
	1				
Issues /	Dust reduction measures for	TPP Kosovo A are now being applied, but the			
Proposals	application of reduction measu	res for $SO_2$ and $NO_X$ is very difficult to			
	implement because of the plan	for construction of TPP Kosova e Re. The			
	rehabilitation of TPP Kosovo E	B is now on-going, and it is necessary to follow			
	the progress. On the other hand	l, at present the plan for construction of TPP			
	Kosova e Re is pending, and it	is necessary to keep a close eye on the response			
	of the government, including th	ne review of the NERP.			
	As for other stationary sourc	es, it is necessary for MEE/MESP to instruct			
	other stationary sources to cond	luct exhaust gas measurement, so first of all			
	understand the emission condit	ion from each private facility and instruct them.			
	In order to realize this, it is ind	ispensable for officials in MEE/MESP to gain			
	knowledge on exhaust gas mea	surement and emission reduction measures. The			
	instructions through OJT, such	as when inspecting the facilities and conducting			
	the measurement, since each pr	ivate facility has its own process, process flow,			
	consumed fuel, etc. must be the most appropriate for the enhancement of the				

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capability.



	Assessment Items			
<u>6-1</u>	Kosovo side with the assistance of JICA Experts reviews emission reduction measures for LCPs related to NERP (National Emission Reduction Plan) from technical point of view.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We can review emission reduction measures for LCPs related to NERP (National Emission Reduction Plan) from technical point of view.	4.4		3.7
В	Our organization has enough information and can plan and implement emission reduction measures for LCPs.	2.8	<b>1</b> 4.0	3.3

С	Kosovo can collect enough information about technologies for emission reduction measures for LCPs and coordinate framework with relevant agencies to plan and implement emission reduction measures for LCPs.	3.6	1	4.0	~	3.7

This is the item to evaluate the capacity to study emission reduction measures for TPP Kosovo A by themselves.

The study on TPP Kosovo A was conducted mainly by the engineers in KEK. Since engineers in TPP Kosovo A with the assistance of JET studied emission reduction measures through measurement and analysis, they surely improved their knowledge and capability, and the scores rose from the first to the second period. The Project proposed Dust emission reduction measures and the measures are now being applied. Reduction measures for  $SO_2$  and  $NO_X$  are proposed too, but they need not a little investment. However, the investment for TPP Kosovo A is limited at this moment because of scheduled shutdown in 2023, and more improvement is not expected.

<u>6-2</u>	Kosovo side with the assistance of JICA Experts reviews and evaluates emission reduction measures for other stationary sources from the technical point of view.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We can review emission reduction measures for other stationary sources from technical point of view.	3.2	<b>1</b> 4.0	1 4.3
В	Our organization has enough information and can plan and implement emission reduction measures for other stationary sources.	3.4	4.0	3.3
С	Kosovo can collect enough information about technologies for emission reduction measures for other stationary sources and coordinate framework with relevant agencies to plan and implement emission reduction measures for other stationary sources.	3.4	<b>1</b> 4.0	3.7

This is the item to evaluate the capacity to study emission reduction measures for other stationary sources by themselves.

The Project started the study of emission reduction measures for other stationary sources from the last half of the second period, and the emission reduction measures were studied in parallel. The capacity assessment in the second period was conducted before the activities, and therefore, C/P was presumed to think that it was easy to study emission reduction measures for other stationary sourced when JET assisted. However, after the study of emission reduction measures, C/P recognized that they are lacking of knowledge and experience, and in organizational level and in social level, the scores decreased. However, in the individual level, the score rose, and it is presumed that C/P gained the knowledge on measures studied by the Project.

In any case, lack of knowledge of officials in MEE//MESP cannot be denied, and it is necessary for them to deepen the knowledge.

	Kosovo side with the assistance of JICA Experts	First	Second	Third
<u>6-3</u>	discusses relevant policy improvements based on	Average	Average	Average
	activities 6-1 and 6-2.	(6/2/2018)	(31/1/2019)	(25/2/2020)
		(0.2.2010)	(01,1,2,01))	()

А	We can discuss relevant policy improvements and make policies related to activities 6-1 and 6-2.	3.8	4.0		4.0
В	Our organization can make relevant policy and discuss policy improvement related to activities 6-1 and 6-2.	3.8	3.5	1	4.0
С	Kosovo has a framework to apply policies and enough abilities to handle the application of policies	3.0	→ 3.0	1	3.7

This is the item to evaluate the capacity of the Kosovo side to study policies for other stationary sources. During the Project period, the score in the social level increased, but other scores were unchanged.

As for the study on the emission reduction measures for TPP Kosovo A, the Project proposed Dust reduction measures and is being applied. However, reduction measures for  $SO_2$  and  $NO_X$  need not a little investment and it is hard to realize them. Same as the evaluation in 6-1, the scores did not rise because of the limited investment and the scheduled shutdown in 2023.

As for the activities on other stationary sources, the situations became clear such that there are cases that are not in compliance with the ELVs stipulated in the law and the exhaust gas measurement results are not reported or not accurate even though they are reported.

<u>6-4</u>	Kosovo side with the assistance of JICA Experts disseminates the relevant knowledge and information on air pollution control generated by the Project to the public through newsletter, web site, etc.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)	
А	We have measures to disseminate the relevant knowledge and information on air pollution control, and have measures to make information to the public.	4	3.5	→ 3.5	
В	Our organization can collect and have knowledge and information on air pollution control, and measures to make information available to the public such as newsletter, web site.	3.8	3.5	→ 3.5	
С	Kosovo has budget and system to disseminate relevant knowledge and information on air pollution control, and can disseminate the relevant knowledge and information generated by the Project.	2.8	1 3.5	3.0	

As mentioned above, the largest issue is to be found that the laws are not properly enforced.

This is the item to evaluate the capacity of the Kosovo side to propose emission reduction measures and disclose measures to the public through the Project activities.

Through the Project activity, C/P obtained knowledge and information on air pollution control to some extent, but some important information was not to be disclosed because of the following reasons.

As for air pollution issues in the Pristina Area, there are the following issues. Simulation results are hard to be published because of the difficulty to verify them caused by the lack of reliability of the past air quality data. Estimated cause for air pollution may have an objection from citizens when it is published as it is. As for the emissions from LCPs and other stationary sources, data disclosure is difficult since parts of the components exceed the ELVs. Because of these reasons,

JET left the information disclosure mentioned above to MEE/MESP, and therefore, the Project did not provide the information by the newsletter.

The Project already published the four newsletters. However, the Project activities focused mainly on the establishment of the database for studying air pollution control measures. The newsletters centered on the introduction of these activities.

On the other hand, the Project activities were often picked up by the media. The medias interviewed data collection activity for emission inventory, PM sampling activity at Mitrovica, opening of the air quality data displays, etc. After the opening data on the air quality data displays, the concern to the air quality is increased and the contribution is large as a role of information disclosure.

(7) Output 7: Emission control measures are developed at LCPs.

Results of the capacity assessment on Output 7 are shown in Table 7. Then, the average score of each questionnaire answered by C/P and C/P-WG is shown and comments by JET is also described next to the graph of questionnaires.

In output 7, since the exhaust gas property frequently varies by the property of Lignite which is the fuel of LCP, the aim is to clarify the behavior of exhaust gas and understand the basic theory about emission reduction measures so that they can develop the measures which can be achieved by the operation method of the boiler and the small-scale investment by themselves

As for Dust reduction measures, it is expected that Dust could be in compliance with ELVs if the ESP performance improvement measures based on the results of various tests conducted in this Project are implemented.

Items that should be implemented on the ESP side are already proceeding through actual modification, but the measures to reduce the amount of the exhaust gas that should be implemented on the boiler side (such as reducing the amount of leaked air in the air preheater) have not been implemented because investment is required. On the other hand, at present the plan for construction of TPP Kosova e Re is pending, and it is necessary to keep a close eye on the response of the government, including the review of the NERP.

Regarding the measures to reduce  $SO_2$  and NOx, it is difficult to reach the level of compliance with ELVs only by improving the operation method of the boiler. The measures have been proposed based on the test results, but they are quite difficult to implement because they require investments. The reason is that the investments in TPP Kosovo A are currently limited as it is scheduled to be stopped in 2023.

Through the process of the examination, proposals for the improvement and the implementation of the emission reduction measures in TPP Kosovo A, C/P understand the actual conditions of the exhaust gas properties in LCP and the way how to proceed with the measures for emission control.

Regarding the emission reduction measures for LCPs, in addition to knowledge on the exhaust gas measurement, a broad knowledge on the boiler and auxiliary equipment is required. Although the number of C/P that can understand all of it is limited, it is considered that the key

person has reached the level in which the study on the emission reduction measures implemented in this project can be executed even if the JET is not present.

In the 3rd period, JET provided support from Japan so that the C/P could continue with their activities. As a result, the overall score of the assessment in comparison to the second period result is higher, and it is thought that this is due to the enthusiasm of C/P for preventing air pollution.

Starting point Final point Individual Education through seminars etc. was The person in charge has level (A) little technical knowledge repeated. The personnel in TPP Kosovo A had a about LCP emission better understanding. However, the persons in reduction. charge of MEE/MESP have not deepened their understanding and are at the stage of recognizing the lack of knowledge. Emission reduction measures by the boiler operation are basic measures that do not require investment, but only few of C/Ps have knowledge on boiler operation, and personnel other than TPP Kosovo A are less interested. Organizational Although there are laws MEE/MESP is not at the level where it can level (B) provide the guidance for facilities, etc. from a and regulations relating to emission regulation, there technical point of view, whereas on the other hand, KEK is deepening its technical are some aspects that cannot be actually enforced. knowledge. The TPP Kosovo A is unable to comply with ELVs due to investment restrictions, the plans to be stopped in the future, etc. Social level MEE/MESP lacks the ability to provide the Regarding LCPs, there is a (C) great interest for Dust, technical guidance to LCPs, and is not able to because it is visible and there respond sufficiently. are complaints from the In particular, complaints from residents to residents, but there is a little KEK are quite great in number, and although interest for SO<sub>2</sub> and NOx. the Dust emission reduction by the rehabilitation of TPP Kosovo B is planned, the ability to evaluate the equipment that will be installed is insufficient. Investing in environmental measures affects the electricity tariffs, but it seems that

Comments on these evaluated results by JET are as follows.

-					
		consumers do not have enough understanding			
		on the issue.			
		As for the improvement of ESPs, study			
		results through collaboration between industry,			
		academy and government have been applied,			
		and this has become one of the big outcomes of			
		the Project.			
Outcome	The emission reduction meas	sures for LCP differ for each plant. Therefore, the			
	judgment on emission values a	nd the technical knowledge are required, but there			
	is a shortage of human resource	es with that knowledge.			
	As for the emission reduction n	neasures by improving the boiler operation			
	method, C/P in charge of TPP k	Kosovo A has almost reached the level where he			
	can carry out the examined by	himself, and they will be able to find ways to			
	manage emissions and operate	the boiler in order to reduce emissions possibly			
	with the current equipment.				
	As for TPP Kosovo A, SO <sub>2</sub> and NOx reduction methods by improving the				
	boiler operation method and Dust reduction measures that can be implemented				
	with a small investment are pro	posed and are being implemented.			
	Some improvements have all	ready been applied to ESPs based on the results of			
	the study conducted in this Pro-	ject through industry-academy collaboration with			
	the University of Pristina, and	this was a big result of the Project.			
	Proposals have been made re	garding SO <sub>2</sub> and NOx reduction measures, but			
	these require considerable inve	stments and are difficult to apply, as they involve			
	the modification of the boiler.				
Issues /	Regarding the emission redu	ction for LCPs, the rehabilitation of TPP Kosovo			
Proposals	B, the construction of the new	Power Plant (TPP Kosova e Re), the stopping of			
	TPP Kosovo A due to operation	n of the new Power Plant are scheduled to be			
	completed around 2023.				
	Therefore, the measures for em	ission reductions in TPP Kosovo A have the			
	problems of financial nature (fi	nancing and impact on electricity tariff), and it is			
	a major problem as their imple	mentation is not easy.			
	Emission reduction measures	s by improving the boiler operation method are			
	basic measures that do not requ	ire investment, and they can also be applied to			
	TPP Kosovo B, which will con	TPP Kosovo B, which will continue to operate.			
	When introducing the enviro	nmental equipment in the future, it is important			
	to reduce the emissions from th	e boiler as much as possible in order to minimize			
	the cost of the emission reduction equipment.				

Table 7 Capacity Assessment Results for Output 7

## Republic of Kosovo Capacity Development Project for Air Pollution Control Project Completion Report Appendix-2



	Assessment Items			
	Kosovo side with the assistance of JICA Experts	First	Second	Third
<u>7-1</u>	analyzes the behavior of exhaust stack gas from	Average	Average	Average
	LCPs including the SO <sub>2</sub> .	(6/2/2018)	(31/1/2019)	(25/2/2020)
Α	We have already confirmed existing information	2.1	2.3	→ 2.2
А	We already know the generation mechanisms of pollutant	1.8	→ 1.9	- 2.2
В	Our organization has already designated persons in charge of emission reduction of LCP who have enough knowledge about air pollutants.	3.6	→ 3.6	1 4.3
С	Kosovo can establish the framework for necessary coordination between the relevant agencies regarding the emission reduction measures for LCP.	3.0	<b>1</b> 3.9	4.2

This is an evaluation of the ability to clarify the behavior of exhaust gas properties including SO2 of TPP Kosovo A.

The actual condition of the exhaust gas properties was clarified through the investigation and the analysis of ESP on Dust, and the measurement and the analysis on  $SO_2$  and NOx, and the awareness of C/P increased.

Regarding  $SO_2$ , as it became clear that the phenomenon is extremely complex, they recognized that they have not enough knowledge at the individual level.

However, in the second period, it became clear that  $SO_2$  could be changed by the boiler operation method, and in the third period, JET provided support from Japan and C/P continued the activities,

as a result the motivation of C/P for reducing emissions increased and the score of assessment increased.

On the other hand, at the organizational level, they recognized the need to cooperate and promote the study. At the social level, the importance of LCP emission control measures has been increasing.

6					
<u>7-2</u>	JICA Experts provide a seminar and a workshop to discuss emission reduction measures for LCPs and other stationary sources including fundamental theories of emission control.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)	
А	We already have information regarding the reduction of emission from LCP	3.9	→ 4.0	<b>→</b> 4.3	
В	Our organization can propose the method for the Emission reduction measures for LCP.	4.3	3.9	<b>→</b> 4.2	
С	Kosovo has administration system for proposing the emission reduction measures.	3.7	3.5	<b>4</b> .0	

C/P learned about the emission control measures for LCP and other stationary sources through workshops and seminars.

When planning the introduction of new equipment, it is necessary to consider the future environmental regulations, and in operating equipment, it is necessary to understand the basic theory of the equipment. However, regarding these, it seems to be scarce, probably because of Kosovo's national character.

It is difficult to change soon, but since the rehabilitation of TPP Kosovo B has begun, it is hoped that these technical capabilities will be improved by experiencing the new environmental facilities.

<u>7-3</u>	Kosovo side with the assistance of JICA Experts establishes the diagnosis for LCPs' operations and elaborates the operational improvements for emission reduction.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We can evaluate emission reduction method for LCPs by analyzing the behavior of exhaust stack gas from LCP	4.0	→ 4.0	4.4
В	Our organization can decide the specification of suitable emission reduction system/equipment to satisfy regulations.	3.3	4.0	3.8
С	Kosovo can establish the preparation procedure for emission reduction measures for LCP through necessary coordination between relevant agencies.	3.0	<b>1</b> 3.8	1 4.4

It is intended to be able to conduct LCP operation diagnosis and to propose the improvement measures by the boiler operation method improvement to reduce emissions by their own.

The awareness of C/P increased through the examination of the gas flow distribution improvement in ESP, the lecture on the electricity charge system improvement,  $SO_2$  behavior investigation by the improvement of the boiler operation method, etc.

Regarding the behavior of  $SO_2$ , it seems that the phenomenon is so complicated that it requires advanced knowledge and C/P seems to have reached a limit at the individual level. However, as a result of JET's support from Japan and the continuation of project activities in the third period, it seems that motivation of C/P for reducing emissions increased.

(8) Output 8: Capabilities for evaluating air pollution control measures of Kosovo side are developed.

Results of the capacity assessment on Output 8 are shown in Table 8. Then, the average score of each questionnaire answered by C/P and C/P-WG is shown and comments by JET is also described next to the graph of questionnaires.

The activities of Output 8 started in earnest in the middle of the second period, and fairly concentrated activities were carried out in the third period. In the second period, the reviews of the Measures prepared already in Kosovo and other JICA project were mainly focused, but in the third period, planning the Measures, calculation of emission reductions and cost-effectiveness for the Measures by using the emission inventory, study of implementation method and issues for the Measures, were considered more broadly, and the results were summarized as the evaluation sheet for the Measures. Since through these activities the capacity was developed and the challenges for implementing the Measures were clarified, the capacity development was enhanced at the individual level, organizational level, and social level, and the lacking fields were clarified. This was reflected in the score of the self-evaluation test.

	Starting point	Final point
Individual	C/Ps were able to draft the	Through the preparation of the evaluation
level (A)	Measures, but they were not	sheet for the Measures, the understanding of the
	able to fully evaluate	need for scientific and technical evidence in the
	technical, economic and	planning, studying and evaluating the Measures
	social viability of the	was deepened. At the same time, C/Ps deepened
	Measures.	understanding of socio-economic
		considerations. Through the Project, C/Ps were
		able to deepen their understanding of the roles
		for the government on the Measures. On the
		other hand, there is not enough experience of
		C/Ps for planning, studying, evaluating and
		implementing the Measures independently in
		the future.
Organizational	It was a situation where	Since activities such as quantification of
level (B)	measures were considered not	emission reductions using emission inventory
	as MEE/MESP but as	and study of results of simulation modeling
	individuals.	were shared through the preparation of the
	In addition, it was not a	evaluation sheet for Measures, the capacity
	situation where measures	development at the organizational level was
	were drafted by considering	enhanced.

The evaluation of the capacity development of C/Ps judged by JET is summarized as follows.

	technical, economic and	However, MEDSPE/MESP is still in the stage	
	social viability.	of trying to establish the institutional	
		framework for the Measures, and it is not able	
		to systematically and independently plan, study,	
		evaluate, and implement the Measures in the	
		future.	
Social level	Although the needs for the	Since through the Project, which included the	
(C)	Measures were understood,	preparation activities on the Evaluation Sheet	
	there was little	for Measures the activities for planning,	
	understanding of concreate	studying, evaluating and implementing the	
	measures.	Measure were carried out through discussions	
		and consultations with the relevant	
		organizations, the capacity at the social level	
		was enhanced.	
		In addition, through the Project activities	
		covered by mass media, such as large scale field	
		research by many students under the Project,	
		etc., the understanding at the social level is	
		gradually advancing.	
Outcome	Since through the preparation of	of the evaluation sheet for the Measures,	
	quantification of emission reductions and cost-effectiveness, the consideration of		
	implementation method and issue, the evaluation on technical and social aspect,		
	etc. are carried out, the capacity for each process of the Measures such as		
	planning, studying, evaluating and implementing the Measures was enhanced.		
	By utilizing the 17 Goals of SE	OGs as indicators of evaluation on social level for	
	the Measures, C/Ps was able to evaluate the social effects of the Measures		
	objectively not arbitrarily.		
	Since the quantification of the emission reductions was calculated by utilizing		
	the emission inventory, C/Ps with support of JET were able to set the calculation		
	condition and calculate the emission reductions by themselves in collaboration		
	with the group of Output 1. At the same time, C/Ps with support of JET were		
	able to calculate and evaluate the cost-effectiveness according to the emission		
	reduction scenario by discussing the cost of calculation conditions.		
	Regarding the implementation method for the Measures, deeper discussions		
	related to the measures were able to be carried out by consulting not only C/P		
	members but also the traffic police (MIA) and the district heating company		
	(Termokos).		
Issues /	Since the outputs of the Project will be shared with society in the future and		
Proposals	activities of oversea donors such as MCC/MFK are also advancing, it is		
Τ

expected that the future understanding of the Measures at the social level will
advance.
Since the C/P leader, who has been proactively implementing the plan of the
Measures in MEE/MESP, retired from MEE/MESP before the start of the third
period, the new person in charge of the Measures lacked experience. However,
since the Project hired this previous leader as a local consultant and provided the
fields of deepened discussions, the work for the Measures was able to be taken
over. In the future, it will be necessary to enhance the capacity mainly focusing
on this new person.
In the future, it will be necessary to carry out planning, studying, evaluating,
and implementing the nationwide Measures. In order to do so, it is necessary to
consider the Measures for many fields such as manufacturing industry category,
agriculture sector and waste sector, which have not been fully considered in the
Project. In addition, regarding the Measures considered by the Project, support
for planning, studying, evaluating, and implementing the further Measures, by
using more detailed evidence such as consideration of the Measures according to
the actual emission performance in Kosovo and according to the region, is
necessary.







	Assessment Item			
<u>8-1</u>	Kosovo side with the assistance of JICA Experts evaluates the technical, economic and social viability of pollution control measures for important emission sources.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We have enough quantitative data and information, and provide decision makers with enough information to study the technical, economic and social viability of pollution control measures for important emission sources.	3.00	<b>1</b> 3.67	3.33
В	Our organization can evaluate air pollution in a quantitative way for important emission sources, and has relevant agencies which are be able to evaluate the technical, economic and social viability of pollution control measures.	3.00	<b>1</b> 3.67	→ 3.67
С	Kosovo can evaluate the technical, economic and social viability of pollution control measures for important emission sources.	2.50	<b>1</b> 3.67	3.33

Through the review by JET on the action plan of Kosovo for air pollution issues and the sharing of activities to prepare emission inventories, C/Ps have deepened their understanding of the technical and socioeconomic validity of the measures for the important emission sources. On the other hand, in the 3rd period, regarding more concreate measures, the quantification of emission reductions, evaluation of cost effectiveness, studyt of implementation method for measures, issues for measures, etc were considered and the evaluation sheets for measures were prepared. As a result, since C/Ps once again understood the difficulty of examining the technical and social-economic validity of the measures, the score by C/Ps has not increased so much. It shows the needs for continous support of this field.

<u>8-2</u>	<b>MESP and relevant agencies with the assistance of</b> <b>JICA Experts evaluate emission reduction effects</b> <b>of pollution control measures for important</b> <b>emission sources.</b>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
Α	We can know (measure or estimate) emissions from important emission sources.	3.50	3.67	→ 3.67
В	Our organization has enough information and can plan and implement emission reduction measures for other stationary sources.	3.25	3.67	→ 3.67
С	Kosovo can collect enough information about technologies for emission reduction measures for other stationary sources and coordinate a framework with relevant agencies to plan and implement emission reduction measures for other stationary sources.	3.00	<b>1</b> 4.00	→ 4.00

Since C/Ps shared the activities of calculating the emission reductions using the emission inventory, it is considered that the understanding by C/Ps for air pollutant emission reduction effects of the measures on important sources was deepened. In the JICA Project, since the measures of emission reductions from TPPs, residential house and vehicles were considered, it was clarified that the effectiveness of emission reduction calculation as well as future issues such as improvement of implementation of measures. As the same time, there are high needs for study and evaluation of other emission sources. Due to these factors, it is thought that the score for the 3rd period is sluggish.

<u>8-3</u>	MESP with the assistance of JICA Experts evaluates effects on air quality improvements by pollution control measures by using the dispersion simulation model.	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
А	We can use the dispersion simulation model for evaluation of the effects of pollution control measures on air quality improvement.	2.75	3.33	<b>1</b> 4.33
В	Our organization knows how to use simulation model for evaluation of the effects of pollution control measures on air quality improvement.	2.75	3.33	3.00
С	Kosovo has a framework to prepare and implement simulation model for evaluation of pollution control measures.	2.00	<b>1</b> 3.00	✓ 3.33
Since the evaluation of the effects of air quality improvements by pollution control measures by				
using the dispersion simualtion model has not been carried out sufficiently by 25th Feburary 2020				
of the 3rd period, it is though that the score by C/Ps is somewhat low. On the other hand, since				
C/Ps understand how to proceed with the evaluation of measures through the lecture on the				
preparation of the evalualtion sheets for measures conducted in the 3rd period, it is assumed that				

the scor at the individual level (A) is increasing.

**Republic of Kosovo Ministry of Environment, Spatial Planning and Infrastructure** 

> Republic of Kosovo Capacity Development Project for Air Pollution Control Project Completion Report Appendix-3

> > August 2021

Japan International Cooperation Agency (JICA)

SUURI-KEIKAKU CO., LTD. JFE Techno-Research Corporation

Newsletter No.1 (2018 January)

Republic of Kosovo (hereinafter referred to as "Kosovo") is highly depending on low quality lignite produced indigenously as a major energy source for power generation, heating, etc. Because of this, air pollution in urban areas has become a serious environmental problem, and its effect on human health is a major concern.

The air pollutant control generally consists of 1) measurement of air pollutant emission sources, 2) air quality monitoring, and 3) air quality assessment by considering the scientific and technical evidence. The figure of these government activities are following.



These activities are included in the JICA Project, and the JICA project is conducted in Pristina area.

The objective of the JICA Project is to improve capacities of Ministry of Spatial Environmental and Planning (hereinafter referred to as "MESP") and its relevant organizations and agencies for harmful air pollutants management, thereby contributing to planning and implementing of more efficient air emission reduction measures for Public health protection and environmental management-related policy development in Kosovo.

The JICA Project started in October 2017.

The activities in December 2017 are the consideration of control of emissions in the thermal power plants (hereinafter referred to as "TTP") and the information collection on Air Quality Assessment through conducting the seminar.



Site Visiting Survey in TTPs







Consultation Meeting in University

In 2018, the activity on the Air Quality Monitoring will be started.

In addition, the JICA Experts and the C/P (mainly MESP) will conduct the emission sources surveys using the students of University of Pristina.

The activity in TPPs will be also continuously conducted by measuring the stack gas emissions in order to study the emission reduction measures.

Newsletter No.2 (2018 February)

At the end of January of this year, the air in the Prishtina region became much polluted. The public concern in this regard arose very quickly in the Republic of Kosovo.

As a result of this situation, the Minister of Environment and Spatial Planning held a meeting with the JICA Expert Team on February 12, 2018.

In this meeting the JICA Expert Team explained and discussed the air quality issues with the Minister of MESP. In addition, the JICA experts explained that atmospheric conditions had an immense effect on the air quality in the Prishtina region.





During the same day, this meeting was also

reported on the web page of a newspaper. Please follow the link:

URL:http://www.gazetaexpress.com/lajme/ja ponezet-do-te-nisin-nj-hulumtim-per-identifi kimin-e-ndotesve-te-ajrit-ne-prishtine-4987 31/

On February 14, 2018, Mr. Shimizu (the chief adviser of the JICA Project) and Ms. Nezakete Hakaj (Project Manager) participated in the recording of a TV program. This TV program was broadcasted at 20:00 on 15 March, 2018 on the Radio Television of Kosovo.

The evaluation and decision making regarding the air pollutant control generally needs three kinds of scientific and technical evidences: 1) measurement of air pollutant emission sources, 2) air quality monitoring, and 3) air quality assessment by modeling (calculating) the simulation using the emission inventory, meteorological data, and geographical data.

In 2018, the inspection of Air Quality Monitoring Stations (AQMSs) will begin. The AQMSs have automatic measurement equipment for the ambient air quality. Kosovo has 11 AQMSs. However, the quality of the data obtained from AQMSs is not satisfactory and is not disposed/displayed to the public yet.

Newsletter No.2 (2018 February)



The JICA Project supports the establishing of the sustainability of AQMSs.

In addition, the JICA Experts and the C/P (namely the Ministry of Environment and Spatial Planning) will conduct the research of emission sources with the assistance of students from the University of Prishtina. On January 29, 2018, the JICA Expert held a lecture for students at the University of Prishtina in order to introduce the JICA Project and for students to understand the air pollution issues.

The research on air pollutants will begin toward the end of February. The results of this research will become foundation data for air pollution issues.





Republic of Kosovo Capacity Development Project for Air Pollution Control Project Completion Report Appendix-3

# Japan International Cooperation Agency Ministry of Environmental and Spatial Planning Capacity Development Project for Air Pollution Control in the Republic of Kosovo

Newsletter No.3 (2018 August)

Research on Actual Fuel Consumption and Traffic Volume Counting with the cooperation of the University of Prishtina Students

During Capacity Development Project for Air Pollution Control in the Republic of Kosovo (JICA Project), the field research in the Pristina area such as the research interviews and traffic volume counting was carried out by the University of Prishtina (UP) students. The information collected from these researches is the fundamental and basic data for the emission inventory.



These researches were carried out with the purpose of preparing the air pollutant emission inventory, which is the comprehensive list of emission sources including the amounts of air pollutant emissions. Through preparing emission inventory, the quantitative emissions for each emission sources are assessed. However, since it is impossible to carry out the complete enumeration of emission sources, the sampling researches were carried out, and the emissions are estimated using the results of these researches.

Before conducting the field research, the lectures of introduction for the JICA Project, namely emission inventory, were carried out for UP students.

The research interview for the households, public and private services, and small business facilities were carried out from February to March, with the main purpose to collect the information on the actual fuel consumption for heating.

#### 1. Research Interviews for Households

20 Students from the Faculty of Mathematics and Natural Sciences of the University of Prishtina "Hasan Prishtina" carried out the research interviews on the fuel consumption for households. The outline of the interviews for households is as follows.

Method	Visiting Interview by 20 students		
Items	Location information, Type of building, Area of dwelling, Number of residents,		
	Construction year, Daily living pattern on heating, Annual usage pattern on		
	heating, Type of fuel, Amount of annual fuel consumption, Height of stack		
Schedule	From February 20 to March 31, 2018, each student conducted interviews for		
	ten days.		
Area	Municipality of Pristina, Municipality of Fushe Kosova, Municipality of Obiliq		

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The targets of research interviews for households are individual houses, attached houses, blocks of flats, apartments, and others. The total number of the sample is around two thousand.



#### 2. Research Interviews for Public and Private Services

16 Students from the Faculty of Mechanical Engineering of the UP "Hasan Prishtina" carried out the research interviews on the fuel consumption for public and private services. The outline of research interviews for public and private services is as follows.

Method	Research Interview by 16 students		
Items	Location information, Area of building, Number of employees, students, et		
	Construction year, Purpose of usage (type of service), Fuel consumption		
	equipment, Daily usage pattern of heating or operating, Annual usage pattern		
	of heating or operating, Type of fuel, Amount of annual fuel consumption,		
	Height of stack		

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Schedule	From February 22 to March 31, 2018, each student conducted interviews for
	ten days.
Area	Municipality of Pristina, Municipality of Fushe Kosova, Municipality of Obiliq





The targets of research interviews for public and private services are offices, schools, restaurants, shops, medical institutions, etc. The total number of the sample is around 1250.



#### 3. Research Interviews for Small Business Facilities

Two students from the Faculty of Mechanical Engineering of the UP "Hasan Prishtina"

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carried out the research interviews on the fuel consumption for 17 small business facilities. The main economic activity of these small business facilities are manufacturing, repairing and waste treatment.





#### 4. Traffic Volume Counting

Although small-scale traffic volume countings have been conducted in the past, the JICA Project conducted the first full-scale traffic volume counting in Kosovo, which can be utilized for the Emission inventory. In total, 160 Students from the Faculty of Mechanical Engineering, and the Faculty of Mathematics and Natural Sciences of the University of Prishtina "Hasan Prishtina" carried out the traffic volume counting at 24 points of the research area.



Vehicle Traffic Volume Counting Points

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Target vehicles are categorized into five types: passenger car, mini-van, bus, light duty vehicle, middle and heavy duty vehicle. At eight points the UP Students counted the traffic volume for 24 hours on weekday and holiday, including the nighttime. The traffic volume of remaining 16 points was counted for 14 hours during the daytime in a weekday.

#### 5. Near Future

The data obtained from these field researches will be analyzed, and the Emission Inventory for the Prishtina area will be prepared through utilization of the estimation method on the emissions of air pollutant..



Newsletter No.4 (2018 December)

### Strengthening of the exhaust gas measurement from Large Combustion Plants

The study of air pollution control measures requires understanding of existing emissions from different sources. Among many emission sources, it is essential to measure pollutants such as dust, sulfur dioxide  $(SO_2)$ , Nitrogen Oxide  $(NO_X)$ , etc. from Large Combustion Plants (LCPs) such as coal firing plants.

The Republic of Kosovo (Kosovo) is one of the contracting parties of Energy Treaty, and must implement National Emission Reduction Plan (NERP). In Kosovo, TPP Kosovo A and TPP Kosovo B are LCPs that are target of the NERP, and the NERP requires for dust,  $SO_2$  and  $NO_X$  from these plants to satisfy Emission Limit Values (ELVs) in accordance with the EU Directive on LCPs.

The Capacity Development Project for Air Pollution Control (the Project) is supporting Kosovo in acquiring the capability for exhaust gas measurement,

This technology transfer started around two years ago through previous work by Japanese International Cooperation Agency (JICA), and is still going on. The Project carried out the technology transfer for the exhaust gas measurement as a final stage, from early April to middle of May this year at TPP Kosovo A and TPP Kosovo B.



Pictures of the exhaust gas measurement at TPP Kosovo A



Pictures of the exhaust gas measurement at TPP Kosovo B

Up to now, pollutants have been measured with dust meter (dust measurement) and automated gas

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analyzer. However, dust meter requires the calibration by the technology which the Project has tried to transfer and the values from dust meters cannot be sufficiently reliable as they have not been calibrated by this method. At the same time, the Project has prepared a portable automated gas analyzer which enables measurement at any time and as necessary.

The following is the explanation about the dust measurement technology.

Generally the dust measurement is conducted by the instrument called dust meter. An example of the dust meter process is shown below.



This dust meter emits the light from one side, and a percentage of the light reaches the other side. Based on transmitted light intensity to the other side, the meter calculates the dust content. When the dust content is high, the light is reflected a lot and light intensity that reaches the other side decreases. On the other hand, when the dust content is low, the transmitted light intensity is high. The dust content is calculated through this principle. However, it is essential for this method to be calibrated by the actual dust content, because the reflection of the light is affected by the dust property such as diameter, shape, etc. which are different from facility to facility.

On the other hand, the Project has tried to transfer the technology, so called iso-kinetic sampling. This technology samples the dust directly from the exhaust gas, weighs the collected dust, and calculates the dust content. In this technology the cylindrical filter called "Thimble" is inserted into the exhaust gas duct, and the dust is sampled in the exhaust gas flow by adjusting the sucking velocity of the dust with the exhaust gas flow. The difference of the weight of the Thimble before and after the sampling shows the dust content in the exhaust gas. This technology can provide accurate dust content because it directly measures the dust content in the exhaust gas. Collected Dust





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Generally speaking, the dust meter can measure an accurate dust content if calibrated by using this technology.

The acquisition of measurement technology for  $SO_2$ ,  $NO_X$ , and dust not only does support the evaluation of accurate emission values, but also supports the evaluation of the effects by operation conditions. Emission values may change depending on the operation condition such as the property of fuel, fuel consumption rate, temperature, air/fuel ratio, etc. The measurement technology also assists the study of emission reduction measures through improvement of operation condition.

The aforementioned activities assist the Kosovo side to conduct measurement at TPP Kosovo A and TPP Kosovo B, starting from the preparation to the equipment clean up. From now on, the Project plans to measure other stationary sources, and will still support the Kosovo side in learning the measurement procedure, such as planning of the measurement, preparation of equipment and consumables required for measurement, the measurement, equipment clean up after the measurement, as well as data organization and reporting. The Project will draft these procedures as a standard operating procedure.

From now on, the Project will conduct measurement of the exhaust gas from other stationary sources. Based on the measurement results, the Project will evaluate emissions, propose emission reduction measures, and provide emission data for preparation of the emission inventory. Utilization of these data for the emission inventory will contribute to evaluate the effect of each emission source in the ambient air.