

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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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 1-3 List of relevant documents regarding Joint Coordinating Committee (JCC)

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

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

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

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Overall Goal: Kosovo side develops capacities for sound air pollution control and air quality management based on technical evidence.</p>	<ol style="list-style-type: none"> MESP issues periodic/annual report on air quality including emission inventory, air quality assessment and emission measurement results. Kosovo side's strategy on air quality and action plan is periodically revised based on technical evidences. 	<ol style="list-style-type: none"> State of the environment in Kosovo Strategy on air quality / Action plan 	
<p>Project Purpose: Kosovo side technical capabilities are developed to control emission sources in the Project target area.</p>	<ol style="list-style-type: none"> Concrete emission reduction measures are initiated at the Large Combustion Plants (LCPs). Air pollution control measures for other emission sources are elaborated. 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. 	<ol style="list-style-type: none"> State of the environment in Kosovo Strategy on air quality / Action plan Progress Report 	<p>Kosovo side commitment for NERP in the context of Energy Community / EU Directives is sustained.</p> <p>Supports by Energy Community / EU and relevant donors for NERP are sustained.</p> <p>Relevant policies of MESP on air quality management in accordance with EU Directives are sustained.</p> <p>Regulatory function of MESP in air</p>

			<p>pollution control is maintained.</p> <p>Cooperation between MESP and relevant agencies (MED, MTI, MIA, MI, KAS, KEK etc.) is maintained.</p> <p>MESP and related agencies are properly budgeted and staffed.</p>
Outputs		Objectively Verifiable Indicators	Means of Verification
<p>Output 1 : Capabilities to elaborate emission inventory for LCPs and other sources are developed at Kosovo side.</p>	<p>1.1 Emission inventory on LCPs and other sources for the base year is revised at least twice.</p>	<p>1.1 Emission Inventory report for the base year 1.2. Progress Report</p>	<p>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</p>
<p>Output 2 : Capabilities for emission measurements are developed for LCPs and for other sources.</p>	<p>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). 2.2 Standard Operating Procedures (SOPs) for on-site stack gas measurements for LCPs and other stationary sources are elaborated.</p>	<p>2.1 Progress Report 2.2 SOPs for on-site stack measurement (LCPs, other stationary sources)</p>	
<p>Output 3 : Air quality monitoring activities are sustained</p>	<p>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. 3.2 Emergency air pollution monitoring drills are implemented at least three times utilizing portable samplers for SO2, NO2, PM2.5 and</p>	<p>3.1 Air quality monitoring annual report 3.2 Progress Report</p>	

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

Activities	Input of the Project		Important Assumptions
<p>1-1 Kosovo side with JICA Experts designates a responsible section and establishes necessary coordination with relevant agencies.</p> <p>1-2 Based on analyzing existing information, Kosovo side with JICA Experts decides framework for emission source inventory in the Pristina Area.</p> <p>1-3 MESP with JICA Experts makes a plan and conduct a survey for emission inventory on LCPs.</p> <p>1-4 MESP with JICA Experts makes a plan and conduct a survey for emission inventory on other stationary sources.</p> <p>1-5 Kosovo side with JICA Experts develops a methodology for emission inventory on other sources such as automobile and small combustion facilities, and elaborates preliminary emission inventory.</p> <p>1-6 Based on activities (1-1 to 1-5) on emission sources, MESP with JICA Experts elaborates an integrated emission inventory.</p>	<p>Japanese Side</p> <ol style="list-style-type: none"> 1. Dispatched Japanese Experts (1) Project Leader/ On-site stack gas measurement 1/Air pollution control measures 1 (2) Project Sub-Leader/Stationary Emission Inventory/ Disclosure and Publication of information and public awareness (3) Air quality monitoring 1 (4) Pollution control measures for power plants (boiler) (5) On-site stack gas measurement 2/ Air quality monitoring 3 (6) On-site stack gas measurement 3 (7) Pollution control measures for power plants (ESP-1) (8) Pollution control measures for power plants (ESP-2) (9) Air quality monitoring 2 (10) Mobile Emission Inventory/ Air pollution control measures 2 (11) Simulation model (12) Air quality protection policy <ol style="list-style-type: none"> 2. Provision of necessary equipment 3. Holding of local seminars and provision of seminar documents 4. Training course implementation in Japan 5. Car rental costs of Japanese experts 	<p>Kosovo Side</p> <ol style="list-style-type: none"> 1. Counterpart and Counterpart Working Group Member (1) Assignment of C/P and C/P-WG staff (2) JCC Chairman (3) Project Director (4) Project Manager <ol style="list-style-type: none"> 2. Provision of necessary office space and a project office at DEP/KHMI 3. Provision of laboratory and laboratory instruments such as microbalance, draft chamber, desiccator, oven, atomic absorption spectrophotometer, Ion Chromatography etc. 4. Provision of secured storage space for procured equipment 5. Provision of place for display on air quality monitoring 6. Provision of necessary supports for on-stack measurement for LCPs and other stationary sources 7. Acquisition of permissions needed and authorization 8. Local costs (1) Counterpart and counterpart working group members for salaries and transportation expenses (2) Project administrative expenses (3) Seminar participants expenses for personnel travel 9. Transportation for on-site stack gas measurements equipment by Kosovo side outside of the Project activities 	<p>During the Project implementation, adequate number of C/P and C/P-WG members with appropriate technical background is appointed.</p> <p>Kosovo side will take necessary measures including both privileges and tax exemptions in the Project implementation.</p> <p>Kosovo side will take necessary measures to obtain relevant permissions and authorizations in the Project implementation.</p> <p>Kosovo side will take necessary safety measures to conduct on-site stack gas measurements and field works.</p>
<p>2-1 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.</p> <p>2-2 MESP and relevant agencies with JICA experts execute on-the-job-training of on-site stack</p>			<p>Pre-conditions</p>

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

<p>3-7 MESP with JICA Experts establishes Networking among AQMS in the Pristina Area.</p> <p>3-8 MESP with JICA Experts prepares SOP for ambient NO₂, SO₂, PM₁₀, and PM_{2.5} measurement by a portable sampler for emergency needs.</p> <p>3-9 MESP with JICA Experts implements measurements of ambient NO₂, SO₂, PM₁₀, and PM_{2.5} based on SOP (1 hour average), for emergency needs.</p> <p>3-10 MESP with JICA Experts utilizes results of AQMS for an annual air quality report as well as for public awareness.</p>		
<p>4-1 MESP with JICA experts studies sampling and measurement methodologies for the LCPs.</p> <p>4-2 MESP with JICA experts makes Ion Chromatograph available for analysis.</p> <p>4-3 MESP with JICA experts conducts analyses by reference methods for LCPs by using Ion Chromatograph method for SO₂ and NO_x and atomic absorption method for Hg.</p> <p>4-4 MESP with JICA experts elaborates SOPs for sampling and analyses for LCPs' stack gas.</p> <p>4-5 MESP with JICA experts studies sampling and measurement methods for other stationary emission sources.</p> <p>4-6 MESP with JICA experts elaborates SOPs for sampling and measurement methods for other stationary emission sources.</p> <p>4-7 MESP with JICA Experts conducts Particulate Matter (PM) sampling by</p>		

<p>Hi-volume air samplers at least for 2 sampling points.</p> <p>4-8 JICA Experts analyze heavy metal contents (Mn, Ni, As, Cd, Pb and Zn) in PM in laboratory in Japan</p> <p>4-9 MESP with JICA Experts assesses importance and urgency of heavy metal pollution in air.</p> <p>4-10 JICA experts make diagnosis on ICP-MS in KHMI laboratory for operation.</p>		
<p>5-1 MESP and relevant agencies with JICA Experts designate responsible section for simulation model and establish necessary coordination with relevant agencies.</p> <p>5-2 MESP and relevant agencies with JICA Experts collect existing data such as air quality monitoring data, meteorological data, geographical information etc.</p> <p>5-3 MESP with JICA Experts analyzes and validates meteorological data for applying a dispersion simulation model.</p> <p>5-4 MESP with JICA Experts analyzes and validates air quality monitoring data.</p> <p>5-5 MESP with JICA Experts elaborates dispersion simulation model for the target year.</p> <p>5-6 MESP with JICA Experts analyzes structure of air pollution.</p> <p>5-7 MESP with JICA experts acquire theoretical knowledge of simulation model and practice simulation modeling through seminars and workshops.</p>		

<p>6-1 Kosovo side with JICA experts reviews emission reduction measures for LCPs relating with NERP (National Emission Reduction Plan) from technical point of view.</p> <p>6-2 Kosovo side with JICA experts reviews and evaluates emission reduction measures for other stationary sources from the technical point of view.</p> <p>6-3 Kosovo side with JICA experts discusses relevant policy improvements based on activities 6-1 and 6-2.</p> <p>6-4 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.</p>		
<p>7-1 Kosovo side with JICA experts analyzes the behavior of exhaust stack gas from LCPs including SO₂.</p> <p>7-2 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.</p> <p>7-3 Kosovo side with JICA experts implements diagnosis of LCPs' operations and elaborates operational improvements for emission reduction.</p>		

<p>8-1 Kosovo side with JICA experts evaluates technical, economic and social viability of pollution control measures for important emission sources.</p> <p>8-2 MESP and relevant agencies with JICA experts evaluates emission reduction effects of pollution control measures for important emission sources.</p> <p>8-3 MESP with JICA Experts evaluates effects on air quality improvements by pollution control measures with dispersion simulation model.</p>			
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Note: “XX with JICA experts” means “XX with the assistance of JICA experts”

Project Design Matrix

Date: 2nd, November, 2017 (Ver. 1.0)
 Date: 12th, July, 2018 (Ver. 2.0)
 Date: 5th February, 2019 (Ver. 2.1)
 Date: 4th August, 2020 (Ver. 3.0)
 Date: 16th June, 2021 (Ver. 4.0)

Project Title: Capacity Development Project for Air Pollution Control
 Duration of the Project: 3 years and 9 months (October 2017 to June 2021)
 Project Target Group: Ministry of Environment, Spatial Planning and Infrastructure (MESPI) and Counterpart Working Group (C/P-WG)
 Implementing Organization: MESPI and C/P-WG
 Project Target Area: the Pristina Area, Drenas and Mitrovica

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Overall Goal: Kosovo side develops capacities for sound air pollution control and air quality management based on technical evidence.</p>	<p>1. MESPI issues periodic/annual report on air quality including emission inventory, air quality assessment and emission measurement results. 2. Kosovo side's action plan is revised based on technical evidence.</p>	<p>1. "State of the Air" and "State of the Environment in Kosovo" reports 2. Kosovo side, after adoption of Action Plan for Air Quality, prepares report on "Implementation of the Action Plan for Air Quality".</p>	
<p>Project Purpose: Kosovo side technical capabilities are developed to control emission sources in the Project target area.</p>	<p>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.</p>	<p>1. "State of the Air" and "State of the Environment in Kosovo" reports 2. Action Plan for Air Quality 3. Progress Report</p>	<p>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</p>

Outputs	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>Output 1 : Capabilities to elaborate emission inventory for LCPs and other sources are developed at Kosovo side.</p> <p>Output 2 : Capabilities for emission measurements are developed for LCPs and for other sources.</p> <p>Output 3 : Air quality monitoring</p>	<p>1.1 Emission inventory on LCPs and other sources for the current year¹ is revised at least twice.</p> <p>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).</p> <p>2.2 Standard Operating Procedures (SOPs) for on-site stack gas measurements for LCPs and other stationary sources are elaborated.</p> <p>3.1 Five air quality monitoring</p>	<p>1.1 “State of the Air” and “State of the Environment in Kosovo” reports</p> <p>1.2. Progress Report</p> <p>2.1 Progress Report</p> <p>2.2 SOPs for on-site stack measurement (LCPs, other stationary sources)</p> <p>3.1 “State of the Environment in</p>	<p>MESPI on air quality management in accordance with EU Directives are sustained.</p> <p>Regulatory function of MESPI in air pollution control is maintained.</p> <p>Cooperation between MESPI and relevant agencies (MITE, MIAPA, KAS, KEK etc.) is maintained.</p> <p>MESPI and related agencies are properly budgeted and staffed.</p> <p>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</p>

¹ The latest year for EI data

<p>activities are sustained</p>	<p>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. 3.2 Emergency air pollution monitoring drills are implemented at least three times utilizing portable samplers for SO₂, NO₂, PM_{2.5} and PM₁₀ measurements. 3.3 Air quality monitoring reports are elaborated at least twice.</p>	<p>Kosovo” and “State of the Air” reports 3.2 Progress Report</p>	
<p>Output 4 : Capabilities for relevant environmental laboratory analyses are developed for emission measurements and air quality monitoring.</p>	<p>4.1 Measurements for NO_x, SO₂ and Hg for LCPs as required by the EU Directive based on reference methods are conducted at least twice during the Project implementation. 4.2 The three SOPs for NO_x, 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.</p>	<p>4.1 Progress Report 4.2 SOPs for reference method of LCPs (NO_x, SO₂, Hg)</p>	
<p>Output 5 : Capabilities for air quality simulation modeling are developed.</p>	<p>5.1 Dispersion simulation model for the current year is elaborated. 5.2 Based on the current emission inventory, simulation model is implemented at least twice.</p>	<p>5.1 “State of the Environment in Kosovo” and “State of the Air” reports 5.2 Progress Report</p>	
<p>Output 6 : Decision making by Kosovo side is improved based on technical evidence for air pollution control.</p>	<p>6.1 Recommendations for air pollution control are made at least once toward Kosovo side’s relevant policy making processes. 6.2 Publication and newsletter on air pollution control are disseminated at least four times.</p>	<p>6.1 Decision on review of the Action Plan for Air Quality (Analysis of implementation of the Action plan based on the recommendation) 6.2 Progress Report 6.3 Newsletter etc.</p>	
<p>Output 7 : Emission control measures are developed at LCPs.</p>	<p>7.1 Diagnosis on NO_x, SO₂ and Dust emissions for LCPs are conducted. Three Pollution control measures for</p>	<p>7.1 Progress Report</p>	

<p>Output 8 : Capabilities for evaluating air pollution control measures of Kosovo side are developed.</p>	<p>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.</p>	<p>8.1 "State of the Environment in Kosovo" and "State of the Air" reports 8.2 Progress Report</p>	
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Activities	Input of the Project		Important Assumptions
<p>1-1 Kosovo side with JICA Experts designates a responsible section and establishes necessary coordination with relevant agencies.</p> <p>1-2 Based on analyzing existing information, Kosovo side with JICA Experts decides framework for emission source inventory in the Pristina Area.</p> <p>1-3 MESPI with JICA Experts makes a plan and conduct a survey for emission inventory on LCPs.</p> <p>1-4 MESPI with JICA Experts makes a plan and conduct a survey for emission inventory on other stationary sources.</p> <p>1-5 Kosovo side with JICA Experts develops a methodology for emission inventory on other sources such as automobile and small combustion facilities, and elaborates preliminary emission inventory.</p> <p>1-6 Based on activities (1-1 to 1-5) on emission sources, MESPI with JICA Experts elaborates an integrated emission inventory.</p> <p>1-7 MESPI with JICA Experts independently prepares the emission inventory, implements the quality control and quality assurance of the emission inventory and prepares the improvement plan.</p>	<p>Japanese Side</p> <ol style="list-style-type: none"> 1. Dispatched Japanese Experts (1) Project Leader/ On-site stack gas measurement 1/Air pollution control measures 1 (2) Project Sub-Leader/Stationary Emission Inventory/ Disclosure and Publication of information and public awareness (3) Air quality monitoring 1 (4) Pollution control measures for power plants (boiler) (5) On-site stack gas measurement 2/ Air quality monitoring 3 (6) On-site stack gas measurement 3 (7) Pollution control measures for power plants (ESP-1) (8) Pollution control measures for power plants (ESP-2) (9) Air quality monitoring 2 (10) Mobile Emission Inventory/ Air pollution control measures 2 (11) Simulation model (12) Air quality protection policy <ol style="list-style-type: none"> 2. Provision of necessary equipment 3. Holding of local seminars and provision of seminar documents 4. Training course implementation in Japan 5. Car rental costs of Japanese experts 	<p>Kosovo Side</p> <ol style="list-style-type: none"> 1. Counterpart and Counterpart Working Group Member (1) Assignment of C/P and C/P-WG staff (2) JCC Chairman (3) Project Director (4) Project Manager <ol style="list-style-type: none"> 2. Provision of necessary office space and a project office at MESPI /DEPW and KHMI 3. Provision of laboratory and laboratory instruments such as microbalance, draft chamber, desiccator, oven, atomic absorption spectrophotometer, Ion Chromatography etc. 4. Provision of secured storage space for procured equipment 5. Provision of place for display on air quality monitoring 6. Provision of necessary supports for on-stack measurement for LCPs and other stationary sources 7. Acquisition of permissions needed and authorization 8. Local costs (1) Counterpart and counterpart working group members for salaries and transportation expenses (2) Project administrative expenses (3) Seminar participants expenses for 	<p>During the Project implementation, adequate number of C/P and C/P-WG members with appropriate technical background is appointed.</p> <p>Kosovo side will take necessary measures including both privileges and tax exemptions in the Project implementation.</p> <p>Kosovo side will take necessary measures to obtain relevant permissions and authorizations in the Project implementation.</p> <p>Kosovo side will take necessary safety measures to conduct on-site stack gas measurements and field works.</p>

<p>2-1 MESPI 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.</p>		<p>personnel travel 9. Transportation for on-site stack gas measurements equipment by Kosovo side outside of the Project activities</p>	
<p>2-2 MESPI and relevant agencies with JICA experts execute on-the-job-training of on-site stack gas measurement by introducing necessary instruments including standard gases.</p>			<p>Pre-conditions</p>
<p>2-3 MESPI and relevant agencies with JICA experts develop experts of on-site stack gas measurement in Kosovo.</p>		<p>Pre-conditions</p>	
<p>2-4 MESPI and relevant agencies with JICA experts establish an institutional framework for implementation of on-site stack gas measurement in Kosovo.</p>			<p>Pre-conditions</p>
<p>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)</p>		<p>Pre-conditions</p>	
<p>3-1 MESPI with JICA Experts assesses air quality monitoring stations (AQMS) in Kosovo and summarizes status of analyzers and equipment.</p>			<p>Pre-conditions</p>
<p>3-2 MESPI with JICA Experts prepares a plan of operation and maintenance, and a renewal plan for AQMS in Kosovo.</p>		<p>Pre-conditions</p>	
<p>3-3 MESPI with JICA Experts rehabilitate AQMS in the Pristina Area based on the plans (3-2).</p>			<p>Pre-conditions</p>
<p>3-4 MESPI with JICA Experts prepares manuals for operation and</p>		<p>Pre-conditions</p>	

<p>maintenance for AQMS in the Pristina Area.</p> <p>3-5 MESPI with JICA Experts calibrates analyzers in AQMS in the Pristina Area based on the operation/maintenance manuals.</p> <p>3-6 MESPI with JICA Experts prepares a guideline for network design of AQMS in Kosovo.</p> <p>3-7 MESPI with JICA Experts confirms Networking among AQMS in the Pristina Area.</p> <p>3-8 MESPI with JICA Experts prepares SOP for ambient NO₂, SO₂, PM₁₀, and PM_{2.5} measurement by a portable sampler for emergency needs.</p> <p>3-9 MESPI with JICA Experts implements measurements of ambient NO₂, SO₂, PM₁₀, and PM_{2.5} based on SOP (1 hour average), for emergency needs.</p> <p>3-10 MESPI with JICA Experts utilizes results of AQMS for an annual air quality report as well as for public awareness.</p> <p>3-11 JICA Experts give lectures on data management system for air quality data.</p>		
<p>4-1 MESPI with JICA experts studies sampling and measurement methodologies for the LCPS.</p> <p>4-2 MESPI with JICA experts makes Ion Chromatograph available for analysis.</p> <p>4-3 MESPI with JICA experts conducts analyses by reference methods for LCPS by using Ion Chromatograph</p>		

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

<p>5-4 MESPI with JICA Experts analyzes and validates air quality monitoring data.</p> <p>5-5 MESPI with JICA Experts elaborates dispersion simulation model for the target year.</p> <p>5-6 MESPI with JICA Experts analyzes structure of air pollution.</p> <p>5-7 MESPI with JICA experts acquire theoretical knowledge of simulation model and practice simulation modeling through seminars and workshops.</p> <p>5-8 MESPI with JICA experts prepares for the establishment of simulation implementation system.</p> <p>5-9 MESPI with JICA experts analyzes the air quality condition in the Pristina area.</p>		
<p>6-1 Kosovo side with JICA experts reviews emission reduction measures for LCPs relating with NERP (National Emission Reduction Plan) from technical point of view.</p> <p>6-2 Kosovo side with JICA experts reviews and evaluates emission reduction measures for other stationary sources from the technical point of view.</p> <p>6-3 Kosovo side with JICA experts discusses relevant policy improvements based on activities 6-1 and 6-2.</p> <p>6-4 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.</p>		

<p>7-1 Kosovo side with JICA experts analyzes the behavior of exhaust stack gas from LCPs including SO₂.</p> <p>7-2 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.</p> <p>7-3 Kosovo side with JICA experts implements diagnosis of LCPs' operations and elaborates operational improvements for emission reduction.</p> <p>7-4 MESPI with JICA experts carry out additional exhaust gas measurement at TPP Kosovo A.</p>		
<p>8-1 Kosovo side with JICA experts evaluates technical, economic and social viability of pollution control measures for important emission sources.</p> <p>8-2 MESPI and relevant agencies with JICA experts evaluates emission reduction effects of pollution control measures for important emission sources.</p> <p>8-3 MESPI with JICA Experts evaluates effects on air quality improvements by pollution control measures with dispersion simulation model.</p> <p>8-4 MESPI with JICA experts summarizes the future administrative issues taking into consideration the new draft air pollution law in Kosovo, and confirms administrative procedures and issues for revision of the Action Plan.</p>		

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

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

Plan of Operation
Project Title: Capacity Development Project for Air Pollution Control in the Republic of Kosovo

Activities	2018												2019												2020											
	The 1st Period			The 2nd period			The 3rd period			The 1st Period			The 2nd period			The 3rd period			The 1st Period			The 2nd period			The 3rd period											
	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	
Output 1	Capabilities to elaborate emission inventory for LCPs and other sources are developed at Kosovo side.																																			
1.1	Kosovo side with the assistance of JICA Experts designates a responsible section and establishes necessary coordination with relevant agencies.																																			
1.1.1	Designates a responsible section																																			
1.1.2	Designates persons in charge to prepare Emission Inventory (hereinafter referred to as "EI") system.																																			
1.1.3	Identifies and determines necessary relevant organizations and agencies on EI																																			
1.1.4	Establishes necessary coordination with relevant agencies including other cities and agencies according to 1.1.1																																			
1.2	Based on the analysis of existing information, Kosovo side with the assistance of JICA Experts decides on the framework for emission source inventory in the Pristina Area.																																			
1.2.1	Analyzes existing information																																			
1.2.2	Review of EU guidebook for EI																																			
1.2.3	Decides framework of EI in Kosovo																																			
1.3	MESP with the assistance of JICA Experts drafts a plan and conducts a survey for EI of LCPs.																																			
1.3.1	Plans the survey for EI on LCPs																																			
1.3.2	Acquires data from LCP measurement																																			
1.3.3	Analyzes measurement data of LCPs																																			
1.3.4	Establishes calculation method on LCPs																																			
1.3.5	Preparing the preliminary EI																																			
1.4	MESP with the assistance of JICA Experts drafts a plan and conducts a survey for emission inventory of other stationary sources.																																			
1.4.1	Lists up and determines other stationary sources																																			
1.4.2	Plans Survey Interview II for other stationary sources																																			
1.4.3	Makes TOR for Survey Interview II																																			
1.4.4	Conducts Survey Interview II using questionnaires																																			
1.4.5	Selects 10 target facilities as other stationary sources																																			
1.4.6	Conducts the visiting surveys of 10 targeted other stationary sources, and makes plan for conducting on-site stack gas measurement if necessary																																			
1.4.7	If necessary, conducts on-site stack gas measurement for some of targeted other stationary sources																																			
1.4.8	Analyzes measurement data of other stationary sources																																			
1.4.9	Establishes calculation method for other stationary sources																																			
1.4.10	Prepares the preliminary EI																																			
1.5	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.																																			
1.5.1	Plans Visiting Survey III for small combustion facilities (residential buildings, commercial and institutional buildings and facilities, and etc.)																																			
1.5.2	Makes TOR for Visiting Survey III																																			

Activities		2018												2019												2020													
		The 1st Period						The 2nd period						The 1st Period						The 2nd period						The 3rd period													
		10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8			
6.2.4	Prepares EI reflecting emission reduction measures for targeted stationary sources.	Actual																																					
6.2.5	Conducts Simulation using EI of 6.2.4 and assesses results in air quality.	Actual																																					
6.2.6	Reviews and evaluates emission reduction measures for targeted stationary sources based on the measurement results.	Actual																																					
6.2.7	Assesses emission reduction measures, and if necessary, proposes suitable measures for 3 targeted stationary sources using the decision from 6.1.2.	Actual																																					
6.3	Kosovo side with the assistance of JICA Experts discusses relevant policy improvements based on activities 6-1 and 6-2.	Plan																																					
6.3.1	Discusses relevant policy improvements for LCPs based on 6.1.	Actual																																					
6.3.2	Discusses relevant policy improvements for other stationary sources including information from EI surveys based on 6.2.	Actual																																					
6.4	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 newspaper, web site, etc.	Plan																																					
6.4.1	Publishes newsletters	Actual																																					
6.4.2	Makes a leaflet for public relations.	Actual																																					
6.4.3	Prepares the project public relations during seminars, workshops, etc.	Actual																																					
6.4.4	Disseminates the relevant knowledge and information on air pollution control generated by the Project to the public through newsletters, web site, etc.	Actual																																					
Output 7	Emission control measures are developed at LCPs.	Plan																																					
7.1	Kosovo side with the assistance of JICA Experts analyzes the behavior of exhaust stack gases from LCPs including the SO2.	Actual																																					
7.1.1	Studies dust, SO2, NOx behavior together with the lignite properties, boiler operation data, fly ash analysis results, etc. and studies the collected data	Actual																																					
7.1.2	Finds out relations between emissions and other factors, and proposes some feasible and applicable solutions such as improvement of operation or simple modification.	Actual																																					
7.1.3	Assesses each emission reduction measure from the technical and economical point of view	Actual																																					
7.1.4	Selects appropriate emission reduction measures, and proposes suitable equipment, specifications etc.	Actual																																					
7.2	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.	Plan																																					
7.2.1	JICA Experts provide a seminar and introduce typical emission reduction measures including fundamental theories of emission control	Actual																																					
7.2.2	Discusses emission reduction measures for LCPs based on the acquired data and theories, in order to select appropriate emission reduction measures.	Actual																																					
7.2.3	Discusses emission reduction measures for other stationary sources based on the acquired data and theories, in order to select appropriate emission reduction measures	Actual																																					
7.3	Kosovo side with the assistance of JICA Experts establishes the diagnosis for LCPs' operations and elaborates the operational improvements for emission reduction.	Plan																																					
7.3.1	Apply proposed solutions such as improvement of operation or simple modification to boiler operation and assesses these measures	Actual																																					
7.3.2	Discusses and assess the measures for LCPs based on the acquired data and theories, and decides whether they are applied to boilers or not.	Actual																																					
7.4	KEE with JICA experts carry out additional exhaust gas measurement at TPP Kosovo A.	Plan																																					
7.4.1	carry out additional exhaust gas measurement at TPP Kosovo A.	Actual																																					
7.4.2	carry out additional exhaust gas measurement at TPP Kosovo A.	Actual																																					
7.4.3	carry out additional exhaust gas measurement at TPP Kosovo A.	Actual																																					
Output 8	Consultancies for evaluating air pollution control measures by Kosovo side are developed.	Plan																																					

Annex 8 Consultancies for evaluating air pollution control measures by Kosovo side are developed.

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) 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
3	Dec. 4, 2017	2017 EI Seminar 02: Introduction of Emission Inventory (Sector, Scope, Concept, etc.)
4	Dec. 4, 2017	2017 EI Seminar 03: Introduction of Emission Inventory (Key category analysis and Data collection)
5	Dec. 5, 2017	2017 EI Seminar 04: Introduction of Emission Inventory (Time Series Consistency and Uncertainties)
6	Dec. 6, 2017	2017 EI Seminar 05: Introduction of Emission Inventory (Spatial Mapping of Emissions and Projections)
7	Dec. 7, 2017	2017 EI Seminar 06: Introduction of Emission Inventory (Inventory Management, Improvement, and QA/QC)
8	Dec. 12, 2017	2017 EI Seminar 07: Energy Industries Category
9	Dec. 13, 2017	2017 EI Seminar 08: Manufacturing Industries and Construction Category
10	Dec. 14, 2017	2017 EI Seminar 09: Small Combustion Category
11	Feb. 7, 2018	2018 EI Seminar 13: IPPU (Industrial Process and Product Use) Sector
12	Feb. 7, 2018	2018 EI Seminar 14: AFLOU (Agriculture, Forestry, and 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
15	Apr. 11, 2018	2018 EI Seminar 10: Non-Road Mobile and Machinery Category
16	Apr. 11, 2018	2018 EI Seminar 11: Aviation Category and Railway Category
17	Apr. 11, 2018	2018 EI Seminar 12: Fugitive Emissions from Solid Fuels Category
18	Apr. 11, 2018	2018 EI Seminar 16: Other

2) Lecture materials for the University of Prishtina

	1	Jan. 29, 2018	Outline of Air Quality Assessment & Air Pollutant Emission Inventory
3) Instruction materials for the Emission Inventory research by the students of the University 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) Instruction material for the Traffic counting research by the students of the University of Prishtina			
	1	Apr. 13, 2018	Instruction on Traffic Volume Survey
5) Emission 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
Output 2: Capabilities for emission measurements are developed for LCPs and for other sources.			
1) Presentation, etc. for Exhaust gas measurement			
	1	Apr. 11, 2018	On-site Stack Gas Measurement
	2	Apr. 26, 2018 May 4, 2018	Dust Isokinetic sampling calculation (For 1 point)
2) Exhaust gas measurement results			
	1	May 9, 2018	TPP Kosovo A Emission measurement results
3) Standard Operating Procedure (SOP) for Exhaust gas measurement			
	1	May 4, 2018	Standard Operating Procedure (SOP) for Dust content Measurement
	2	August, 2019	Standard Operating Procedure (SOP) for Exhaust Gas Measurement by PG-350
Output 3: Air quality monitoring activities are sustained			
No materials			
Output 4 : Capabilities for relevant environmental laboratory analyses are developed for emission measurements and air quality monitoring.			
No materials			
Output 5 : Capabilities for air quality simulation modeling are developed.			
1) Seminar materials for Simulation			
	1	Dec. 11, 2017	Simulation Model: Introduction
	2	Dec. 20, 2017	Simulation Model: Necessary Data
2) Workshop materials for simulation			
	1	May 14, 2018	Input Data: Elevation
	2	May 17, 2018	Input Data: Land Use
	3	May 18, 2018	Input Data: MAKEGEO program

	4	May 21, 2018	Supplement: Overall Procedure
	5	May 21, 2018	Supplement: How to Display CTGPROC Output Grid Map
Output 6 : Decision making by Kosovo side is improved based on technical evidence for air pollution control.			
No materials			
Output 7 : Emission control measures are developed at LCPs.			
1) Seminar and presentation 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 (<u>No SQ version</u>)
	6	Dec. 13, 2017	SO ₂ 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 ₂ 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 ₂ Behavior
	16	May 29, 2018	Environmental measures for LCP
2) Material on TPP Kosovo A			
	1	Dec. 13, 2017	Operation Record and Measurement Results in TPP Kosovo A
	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
Output 8 : Capabilities for evaluating air pollution control measures of Kosovo side are developed.			
1) Seminar			
	1	Apr. 20, 2018	Seminar: History of air pollution measures in Japan
Other materials (9)			
1) Presentation material for 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) Presentation		
No.	Date	Title
1	Oct. 19, 2018	2nd Period Work Plan EI & Sim
2) Seminar and lecture materials		
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.		
1) Exhaust gas measurement 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
Output 3: Air quality monitoring activities are sustained		
1) Presentation, etc. for Emission 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) Reports, etc.		
1	October, 2018	Summary of Air Quality Monitoring Station Inspection all over Kosovo

	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
Output 4 : Capabilities for relevant environmental laboratory analyses are developed for emission measurements and air quality monitoring.			
	1) Presentations, etc. for laboratory analysis		
	1	Apr. 26, 2019	Presentation of Standard Reference method
	2) Reports, 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 _x
	2	Apr. 15, 2019	SOP for gas sampling for NO _x
	3	Apr. 15, 2019	SOP for gas sampling for Hg
Output 5 : Capabilities for air quality simulation modeling are developed.			
	1) Presentations, etc. for simulation		
	1	June, 2019	Preliminary Result of Simulation Model
	2) Workshop and seminar materials, etc. for simulation		
	1	Nov. 12 and 13, 2018	Simulation Model 06 Input Data - READ62 (Upper air data preprocessor)
	2	Nov. 15 and 16, 2018	Simulation Model 07 Input Data – SMERGE (Surface meteorology data preprocessor)
	3	Nov. 21,23 and 30, 2018	Simulation Model 08 CALMET (Meteorology model)
	4	Feb. 15 and 20, 2019	Simulation Model 09 Input Data - Emission Data
	5	Feb. 20, 21, 22 and 25, 2019	Simulation Model 10 Input Data – MAIN program
	6	May 24 and 29, 2019, Jun. 6 and 7, 2019	Simulation Model 11 Input Data - Emission Data

Output 6 : Decision making by Kosovo side is improved based on technical evidence for air pollution control.		
No materials		
Output 7 : 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 _x 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 ₂ Reduction Measure Plan
10	May 1,2019	In-furnace De-Sulfurization
2) Workshop and seminar materials		
1	Oct. 26, 2018	Environmental measures for LCP(1)
2	Oct. 31, 2018	NO _x 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 ₂ 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 ₂ vs. Not Operating Mill Location
6	May 9,2019	Data Comparison of April 26 and 30
7	May 19,2019	Consideration on SO ₂ vs Boiler Operation Change
8	July 9,2019	Emission Control measures of LCPs
Output 8 : Capabilities for evaluating air pollution control measures of Kosovo side are developed.		
1) Presentations, etc.		
1	January, 2019	2030 Agenda for Sustainable Development
2	Jan. 28, 2019 Jan. 29, 2019	Review of Measures using 17 Goals of Sustainable Development Goals (herein after referred to as “SDGs”)

	3	Apr. 19, 2019	Evaluation of air pollution control measures
Other materials (9)			
1) Presentation material for the minister of MEE/MESP			
	1	Oct. 29, 2017	Capacity Development Project for Air Pollution control in the Republic of Kosovo: Outline of Emission Inventory
	2	June. 21, 2019	Capacity Development Project for Air Pollution control in the Republic of Kosovo: Preliminary Result of Simulation Model
2) Materials for the first training 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			
No.	Date	Title	
1	Nov. 5, 2019	Institutional Framework for Emission Inventory Preparation	
2	Nov. 6, 2019	Progress of Emission Inventory on Small Combustion (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			
	1	Oct. 31, 2019	Structure for Emission Inventory Preparation by the Project
	2	Apr. 6, 2020	JICA Activity on Emission Inventory Preparation (Skype 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) Data set for OJT on emission inventory preparation			
	1	Dec. 2, 2019	Set of Emission Inventory Calculation Files for OJT
6) Manual on emission inventory preparation			
	1	May 29, 2020	Air Pollutant Emission Inventory Preparation Manual
Output 2: Capabilities for emission measurements are developed for LCPs and for other sources.			
1) Presentation for exhaust gas measurement			
	1	Feb. 2020	Lecture for exhaust gas measurement
2) Exhaust gas measurement 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
Output 3: Air quality monitoring activities are sustained			
1) Presentations, etc. for air quality monitoring			
	1	Nov. 14, 2019	AQMS Seminar: Japanese Manual
	2	Nov. 14, 2019	Reducing invalid data in AQMS
2) Reports, 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) SOP and/or manuals			
	1	Mar.2020	AQMS Maintenance Manual 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}
Output 4 : Capabilities for relevant environmental laboratory analyses are developed for emission measurements and air quality monitoring.			
1) Reports, etc.			
	1	Jan. 2020	Standard Reference Method for gas measurement
2) SOP and/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)
Output 5 : Capabilities for air quality simulation modeling are developed.			
1) Presentation materials for simulation			
	1	Mar. 3, 2020	Wrap up for Simulation Modeling
2) Workshop materials for simulation			

	1	Nov. 7, 2019	Simulation Model: Air Quality Monitoring Data
	2	Nov. 19, 21, 2019	Simulation Model: Input Data –Emission (3) Area source - Waste
	3	Feb. 12, 19, 21, 2020	Simulation Model: Input Data –Emission (5) Line source - 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) 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
Output 7 : Emission control measures are developed at LCPs.			
	1) Presentation materials		
	1	Mar. 19 2021	Additional Info for Boiler
	2	Mar. 19 2021	Troubleshooting of TPP Kosovo A ESP
	2) Reports, etc.		
	1	Nov. 28, 2019	Study on Kosovo A Operation Data
	2	Feb. 8, 2020	SO ₂ & NO _x 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) Materials on TPP Kosovo A		
	1	Nov. 28, 2019	Operation data during measurement, November 2019
Output 8 : Capabilities for evaluating air pollution control measures of Kosovo side are 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) Presentation material for the minister of MEE/MESP			
	1	Feb 19, 2020	Presentation to the minister
	2	July 30, 2020	Presentation to the Secretary General of MEE
	3		
2) Materials for the second training in Japan			
	1	Sep. 2, 2019	Assignment-2nd Japanese Training
	2	Sep. 3, 2019	Air Quality Management Policy in Japan
	3	Sep. 3, 2019	Air Pollution Control in Kawasaki A
	4	Sep. 3, 2019	AQMS in Kawasaki
	5	Sep. 4, 2019	Air Quality Monitoring in Yokohama
	6	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) Additional 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
	6	Jan.29, 2021	Discussion on ISO17025
	7	Mar. 24, 2021	Wrap Up of Remote Activities of the Simulation Modeling Group

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	June 21, 2021	Support for analysis and evaluation of air quality data during one year
4) Materials for the Final Seminar		
1	June 9, 2021	Introduction of the Project “Capacity development for air pollution control”
2	June 9, 2021	Improvement of Air quality monitoring activities
3	June 9, 2021	National Emission Reduction Plan in Kosovo and current situation
4	June 9, 2021	Emission measurement and Emission reduction measure for 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	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) Materials for the Regional Conference		
1	June 23, 2021	Issues on air quality management in Kosovo and Introduction of the Project “Capacity development for air pollution control”
2	June 23, 2021	Improvement of Air quality monitoring activities
3	June 23, 2021	National Emission Reduction Plan in Kosovo and the current situation
4	June 23, 2021	Emission measurement and Emission reduction measure for TPP Kosovo A
5	June 23, 2021	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 level (A)	Although C/P knew the air pollutant emission inventory	C/Ps deepened the understanding of the whole activities for emission inventory

	<p>itself, they did not have sufficient knowledge on the concrete calculation method and did not have experience on preparing it.</p>	<p>preparation. In addition, since they carried out the series of calculation of emissions in each sector through OJT by themselves, their capacity was developing. However, in order to 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.</p>
<p>Organizational level (B)</p>	<p>MEE/MESP did not have experience of preparing the air pollutant emission inventory.</p>	<p>Many C/Ps belong to KEPA (MEE/MESP), and KEPA is preparing the emission inventory as an organization, and the capacity at 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.</p>
<p>Social level (C)</p>	<p>There was little understanding of air pollutant emission inventory.</p>	<p>Since regarding the data collection activity of emission inventory, the data is not sufficiently 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</p>

		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	<p>It is a great achievement that C/Ps has been able to carry out a series of calculation procedures on the emission inventory through OJT, such as collecting multiyear data, entering these data, calculating and coordinating emissions for each year, etc.</p> <p>It is a great progress that after understanding the concept of emission inventory C/Ps understood the significance of data collection and collected the data from the relevant organizations by themselves. In addition, in the C/P-WG, C/Ps informed on the situation where 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.</p> <p>The emission inventory preparation 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 inventory preparation.</p>	
Issues / Proposals	<p>The current challenges are that it is not easy to collect the data required for national emission inventories, it is not easy to prepare emission inventories for many target air pollutants required by EU, and the it is not easy for C/Ps themselves to calculate many emission sources. Therefore, the roles and responsibilities for not only KEPA but also the relevant organizations such as data providing organizations should 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 activity... As an activity with legal basis, it is assumed that the emission inventory preparation will be set as an annual routine work and will be set as an essential activity when drafting the Action Plan under the Strategy of Air Quality in Kosovo. These are recommended in the Project.</p>	

Table 1 Results of Capacity Assessment on Output 1

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

<p>1-2 Assessment of understanding by C/P on framework of EI and existing information</p>		
<p>1-3 Assessment of understanding by C/P on making plan and implementation of research of EI for LCP</p>		
<p>1-4 Assessment of making plan and implementation of research of EI for other stationary sources</p>		
<p>1-5 Assessment of understanding by C/P on emission calculation methods of other sources (Vehicle, small combustion) and on preparation procedure of primary EI</p>		
<p>1-6 Assessment of understanding by C/P on preparation of EI based on results (Activity 1-1 to 1-5) of these researches of emission sources</p>		

	Assessment Item			
1-1	<u>Kosovo side with JICA Experts designates a responsible section and establishes necessary coordination with relevant agencies.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can identify and determine necessary relevant organization and agencies on the Emission Inventory.	4.1	→ 4.3	→ 4.4
B	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
C	We have already designated a responsible section and established necessary coordination with relevant agencies.	3.4	→ 3.5	→ 3.7
<p>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.</p> <p>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.</p>				
1-2	<u>Based on the analysis of existing information, Kosovo side with the assistance of JICA Experts decides on the framework for emission sources inventory in the Pristina Area.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can analyze existing information.	3.6	↗ 4.0	→ 4.0
A	We have already reviewed EMEP/EEA emission inventory guidebook.	3.6	↗ 4.1	↘ 3.9
B	We can make the framework for the Air Pollutant Emission Inventory in Pristina Area.	3.8	↗ 4.3	→ 4.4
C	We can decide the framework for the Air Pollutant Emission Inventory in the Pristina Area.	3.4	→ 3.6	↗ 4.0
<p>Through data collection activities 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</p>				

out of 5.				
1-3	<u>MESP with the assistance of JICA Experts drafts a plan and conducts a survey for emission inventory of LCPs</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can understand the emissions estimation method from LCPs using the monitoring data of field surveys.	3.6	→ 3.8	↗ 4.0
B	We can make a draft plan of estimating emissions from LCPs.	3.2	↗ 3.9	→ 3.8
C	We can conduct the activity of estimating emissions from LCPs in line with plan.	3.3	↗ 3.9	→ 3.9
<p>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 responsibilities 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 scheduled 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.</p>				
1-4	<u>MESP with the assistance of JICA Experts drafts a plan and conducts a survey for emission inventory of other stationary sources.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can make a draft plan of estimating emissions from other emission sources.	3.1	↑ 3.9	→ 4.0
B	We can make a draft plan for estimating emissions from other stationary sources.	3.2	↑ 4.2	↘ 4.0
C	We can conduct the activity of estimating emissions from other stationary sources in line with plan.	3.1	↗ 3.8	↗ 4.1
<p>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 industry, 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.</p>				
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</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can develop a methodology for estimating emissions from other sources.	3.1	↑ 4.0	→ 4.0

A	We can prepare and/or compile the preliminary Air Pollutant Emission Inventory using the results of estimated emissions.	3.5	↗	4.0	→	4.0
B	We can make a draft plan for estimating emissions from other sources.	3.3	↗	3.9	→	4.0
B	We can prepare the preliminary Air Pollutant Emission Inventory by using the results of emissions estimated.	3.7	↗	3.9	↗	4.1
C	We can establish the preparation procedure for the preliminary Air Pollutant Emission Inventory in Kosovo government.	3.6	↘	3.4	↗	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 individual 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 fully 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>	<u>Based on activities (1-1 to 1-5) on emission sources, MESP with the assistance of JICA Experts elaborates an integrated emission inventory.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)		
A	We can continuously prepare the Air Pollutant Emission Inventory in the future by using the preparation procedure established.	3.6	↗	4.2	→	4.1
B	We can continuously prepare the Air Pollutant Emission Inventory in the future by using the established preparation procedure.	3.6	↗	4.2	↘	4.0
C	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 compilation of emission inventory through the activities 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.

Comments on these evaluated results by JET are as follows.

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

		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 (C)	Neither MEE/MESP nor private facilities fully understand the significance of exhaust gas measurement.	<p>The law clearly obliges private facilities to conduct measurement and report the results, but in reality, the law is not enforced sufficiently.</p> <p>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.</p>
Outcome	<p>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 operation manuals are organized and provided, which can help them conduct measurement independently.</p> <p>Measurement group members can conduct a series of works from preparation for measurement, measurement, tidying up equipment, organization of data, to drafting reports, and consequently, acquired the ability to conduct measurement properly. Especially members from KHMI can lead the measurement activity.</p> <p>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.</p> <p>MEE/MESP has acquired the measurement technology through KHMI, but it is an issue for MEE/MESP how to utilize this capacity.</p> <p>The Project could not reach the stage to foster private measurement agencies. Therefore, the framework for dissemination of exhaust gas measurement was not prepared, and as a result, the institutional framework has not been established.</p>	
Issues / Proposals	<p>The law of Kosovo clearly obliges facilities to conduct exhaust gas measurement and report the results, but in a reality the law is not enforced sufficiently, and this is a big issue.</p> <p>The cause is presumed to be that neither official in MEE/MESP nor business</p>	

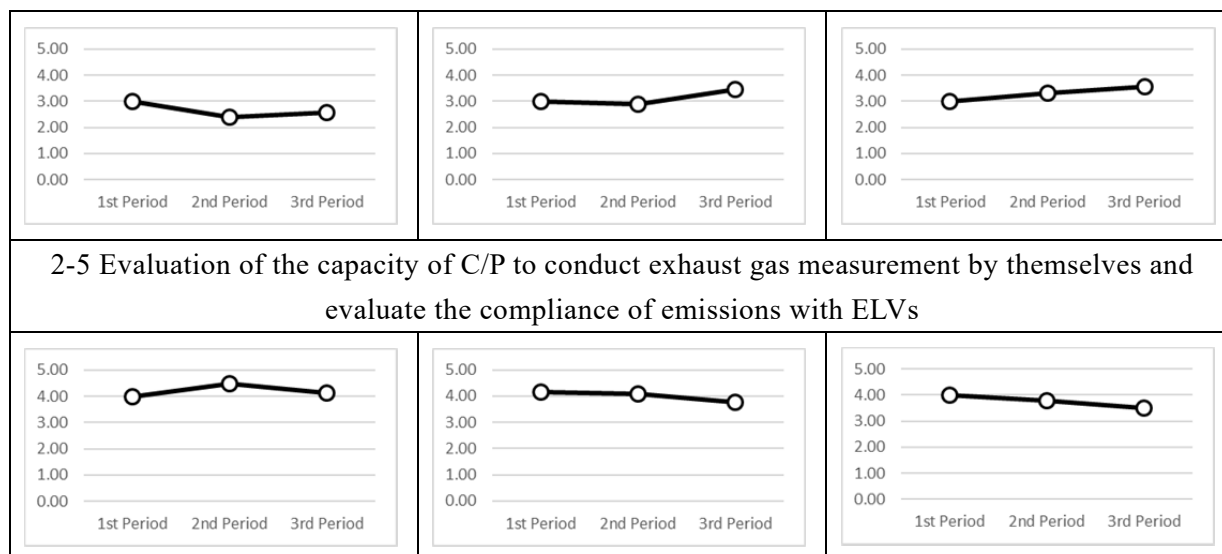
operators (other stationary sources) understand the importance of exhaust gas measurement and even the exhaust gas measurement itself is not properly acknowledged in general. The exhaust gas measurement results are an effective tool used not only to manage emissions but also to confirm the functioning 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 has 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

Individual level	Organizational level	Social level
2-1 Understandings of C/P on the principle of exhaust gas measurement		
2-2 Evaluation of the capability of conducting exhaust gas measurement		
2-3 Evaluation of the capacity to train experts for exhaust gas measurement in Kosovo		
2-4 Evaluation of whether institutional framework can be established in Kosovo or not		



	Assessment Items	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
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.</u>			
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	↑ 4.50	↓ 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 O ₂ concentration.	3.50	↑ 4.50	→ 4.38
B	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
C	Kosovo has effective SOPs or theoretical documents and provides opportunities to learn how to conduct on-site stack gas measurement theoretically.	3.00	↑ 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

furthermore, SOPs were prepared.				
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.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can prepare and conduct on-site stack gas measurement for LCPs and other stationary sources by ourselves.	2.75	↑ 4.00	→ 4.00
B	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	↑ 4.22
B	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	↗ 3.20	↗ 3.56
C	Kosovo provides opportunities to learn how to conduct on-site stack gas measurement through on-the-job-training.	2.75	↗ 3.30	↗ 3.78
<p>This is the item to evaluate the capability of conducting exhaust gas measurement.</p> <p>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.</p> <p>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.</p> <p>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.</p>				
2-3	<u>MESP and relevant agencies with JICA experts develop experts of on-site stack gas measurement in Kosovo.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (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	↑ 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	↑ 3.90	↘ 3.66
B	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.				
B	Our organization can judge the validness and/or adequacy of measurement results.	3.00	↑	3.90	→ 3.88
C	Kosovo has law or regulations to promote measurement and provides opportunities for other persons to learn them.	3.00	↗	3.40	↗ 4.00
<p>This is the item to evaluate the possibility to train experts for exhaust gas measurement in Kosovo.</p> <p>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.</p> <p>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.</p>					
2-4	<u>MESP and relevant agencies with JICA experts establish an institutional framework for implementation of on-site stack gas measurement in Kosovo.</u>	First Average (6/2/2018)		Second Average (31/1/2019)	Third Average (25/2/2020)
A	We have agencies/organization or private company which can conduct on-site stack gas measurement.	3.00	↘	2.40	↗ 2.56
B	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	↗ 3.44
C	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	↗ 3.56
<p>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.</p> <p>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 is not sufficient, and private facilities do not have</p>					

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.

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)</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We know the ELVs for LCP and other stationary sources.	4.00	↗ 4.50	↘ 4.13
B	Our organization has enough ability to judge the validity and adequacy of the measurement results.	4.34	↘ 4.10	↘ 3.76
B	Our organization has enough ability to assess countermeasures for targeted facilities if they exceed the ELVs.	4.00	→ 4.10	↘ 3.76
C	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.

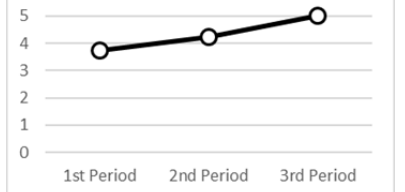
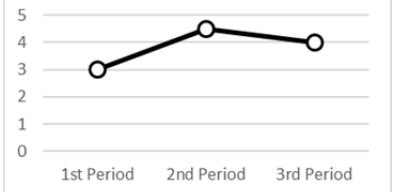
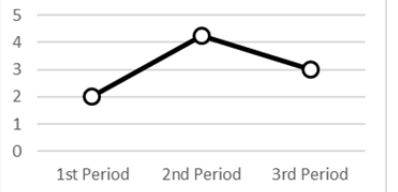
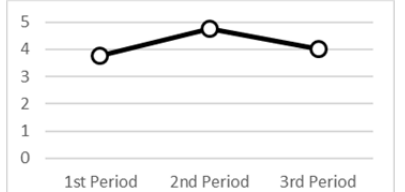
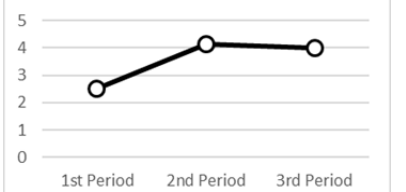
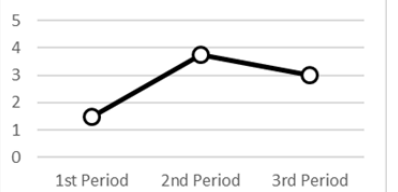
Comments on these evaluated results by JET are as follows

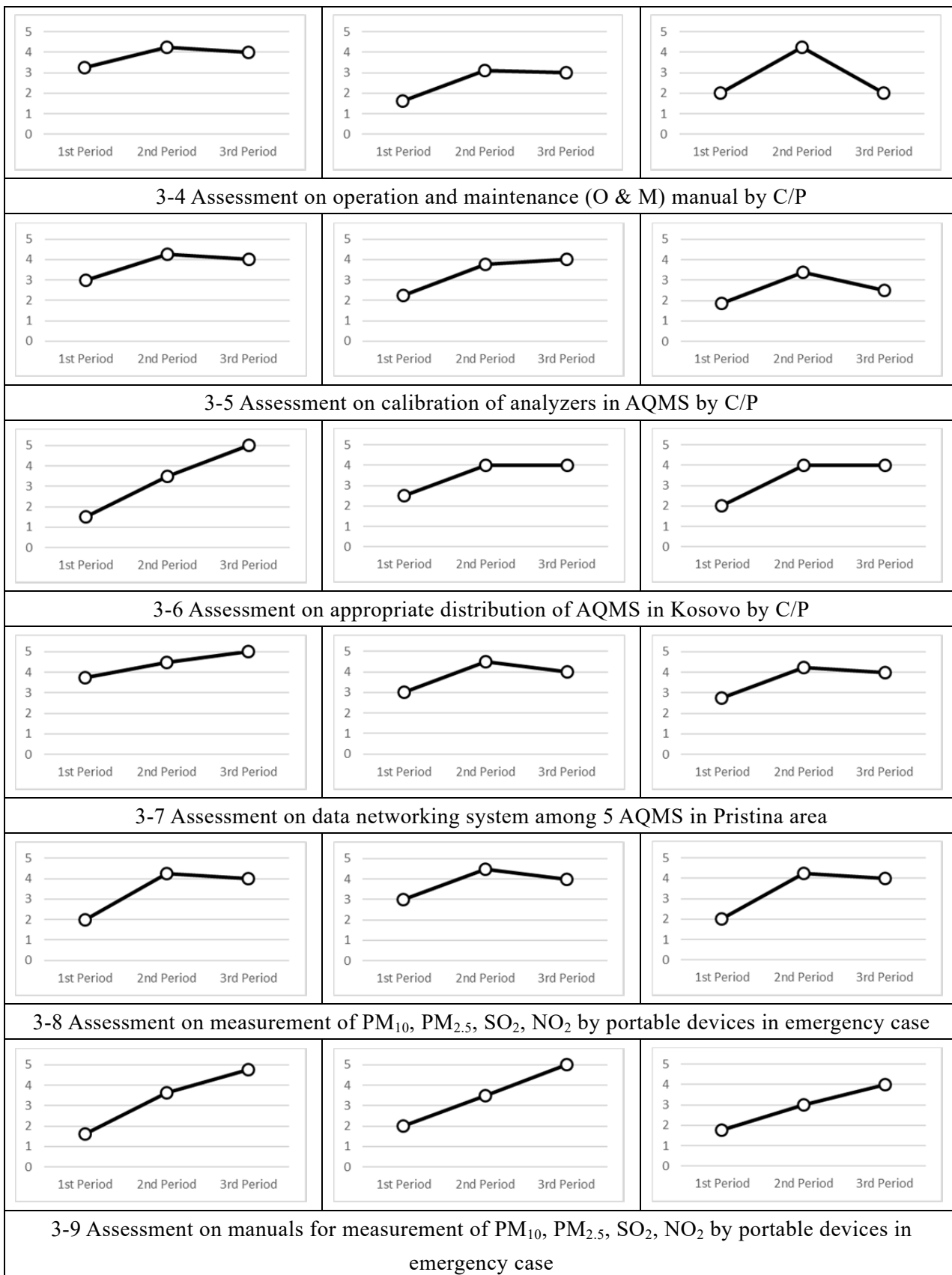
	Starting point	Final point
Individual level (A)	<p>The staff of KHMI performed only very simple tasks such as replacing the dust removal filter, etc. other than managing the contractor in charge of maintenance.</p> <p>KHMI had neither the equipment nor the knowledge regarding the environmental air quality measurement for emergency.</p>	<p>C/P understood the principle of calibration of NOx, SO₂, CO and O₃ analyzers, and became able to calibrate these analyzers. But OJT is still necessary. Furthermore, it is necessary to have training on distinguishing the normal data from the abnormal data, and to find the failure of the analyzers.</p> <p>On the other hand, it has become possible to measure the ambient air pollution by portable equipment for emergencies.</p>
Organizational level (B)	<p>The twelve AQMSs were installed from 2009 to 2012. Before the Project started, MEE/MESP's budget for AQMS maintenance was</p>	<p>The budget for O&M in 2017 has been increased to about 150,000 Euros, and analyzers in more than half of AQMS have retrieved their functions.</p> <p>Furthermore, rehabilitation by the Project has</p>

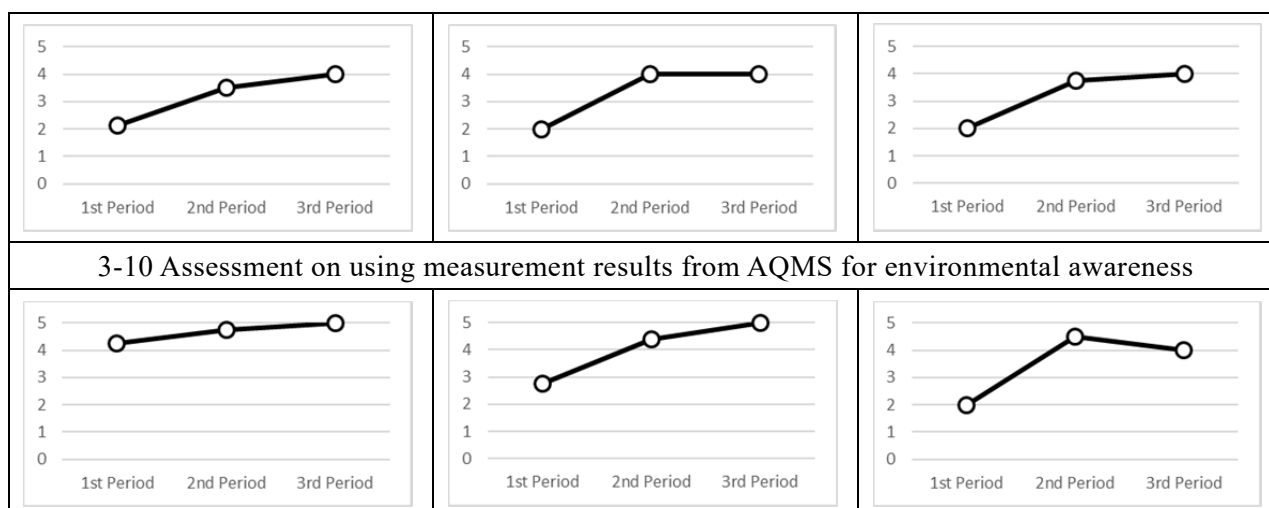
	<p>approximately 60,000 Euro for eight years in the row.</p> <p>As of October 2017, at the start of the Project, only 4 AQMSs out of 12 AQMS in Kosovo were in operation.</p> <p>Moreover, the calibration of the analyzers had not been performed for many years.</p>	<p>been implemented, and it can be considered that reliable air quality data can be provided from five AQMSs in the Pristina areas. Following JICA, MCC/MFK replaced analyzers of the remaining 7 AQMSs in November 2019, and as result the air quality monitoring system for all 12 stations in Kosovo was reestablished.</p> <p>At this moment, two KHMI staff must 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.</p>
Social level (C)	<p>The staff of KHMI performed only very simple tasks such as replacing the dust removal filter, etc. other than managing the contractor in charge of maintenance.</p> <p>KHMI had neither the equipment nor the knowledge regarding the environmental air quality measurement for emergency.</p>	<p>On the other hand, in the end of January 2018, highly polluted air condition occurred around the Pristina Area for approximately one week. It became a major social issue and concern of citizens. This became one of the reasons that budget was allocated to AQMS maintenance. The Project installed data displays that show real-time air pollution information at four locations in Pristina city and one location in Obiliq. On the other hand, the MCC/MFK 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.</p>
Outcome	<p>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 calibrate analyzers, 4) Replacement of 3 housings that were inappropriate for maintenance, 5) OJT on repair of analyzers, 6) Preparation of maintenance manual, 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</p>	

	<p>of the displays is increasing, and the installation of displays has been reported in 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.</p> <p>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.</p>
<p>Issues / Proposals</p>	<p>From February to April 2019, one person with the experience on AQMS O&M 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 NO_x analyzers, SO₂ analyzers, O₃ 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.</p>

Table 3 Results of Capacity Assessment on Output 3

Individual level	Organizational level	Social level
3-1 Level of understanding about analyzer condition/status by C/P		
		
3-2 Assessment on operation and maintenance plan for AQMS by C/P		
		
3-3 Assessment on rehabilitation plan and execution of maintenance by C/P		





	Assessment Items	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
3-1	<u>MESP with JICA Experts assesses air quality monitoring stations (AQMS) in Kosovo and summarizes status of analyzers and equipment.</u>			
A	We know the present condition of SO ₂ , NO _x , O ₃ , CO, PM10 and PM2.5 analyzers in KHMI, Rilindja, Obiliq, Palaj and Dardhisht.	3.75	↗ 4.25	↗ 5.00
A	We know the present condition of SO ₂ , NO _x , O ₃ , CO, PM10 and PM2.5 analyzers in Drenas, Mitrovica, Peja, Prizren, Hani i Elezit, Gjilan and Brezovice.	3.75	↗ 4.25	↗ 5.00
B	Our organization provides opportunities to learn how to check the condition/status of SO ₂ , NO _x , O ₃ , CO, PM10 and PM2.5 analyzers.	3.00	↕ 4.50	↘ 4.00
C	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
<p>It is an item to evaluate the condition (normal, abnormal, what is bad) of analyzers installed in AQMS.</p> <p>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.</p> <p>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.</p>				
3-2	<u>MESP with JICA Experts prepares a plan of operation and maintenance, and a renewal plan for AQMS in Kosovo.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can prepare by ourselves a plan of operation and maintenance, and a renewal plan for AQMS in Kosovo and their SO ₂ , NO _x , O ₃ , CO, PM10 and	3.75	↕ 4.75	↘ 4.00

	PM2.5 analyzers?			
B	Our organization knows how to prepare a plan of operation and maintenance and a renewal plan for AQMS in KOSOVO, and their SO ₂ , NO _x , O ₃ , CO, PM ₁₀ and PM _{2.5} analyzers.	3.25	↑ 4.25	↘ 4.00
B	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	↑ 4.00	→ 4.00
C	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	↑ 3.75	↓ 3.00
<p>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.</p>				
3-3	<u>MESP with JICA Experts rehabilitate AQMS in the Pristina Area based on the plans (3-2).</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can plan by ourselves the rehabilitation of AQMS and their SO ₂ , NO _x , O ₃ , CO, PM ₁₀ and PM _{2.5} analyzers.	3.25	↑ 4.25	↘ 4.00
B	Our organization has enough members who understand how to conduct rehabilitation of AQMS and their SO ₂ , NO _x , O ₃ , CO, PM ₁₀ and PM _{2.5} analyzers.	1.75	↑ 3.75	↗ 4.00
B	Our organization has enough budgets to conduct rehabilitation of AQMS and their SO ₂ , NO _x , O ₃ , CO, PM ₁₀ and PM _{2.5} analyzers periodically, e.g. every 5 years.	1.50	↑ 2.50	↘ 2.00
C	Kosovo provides opportunities for persons in charge to learn how to conduct the rehabilitation of AQMS and their SO ₂ , NO _x , O ₃ , CO, PM ₁₀ and PM _{2.5} analyzers.	2.00	↑ 4.25	↘ 4.00
<p>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</p>				

considered that this is the reason why the evaluation at the organizational level in terms of budget is relatively low.				
3-4	<u>MESP with JICA Experts prepares manuals for operation and maintenance for AQMS in the Pristina Area.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We know how to conduct operation and maintenance of AQMS and their SO ₂ , NO _x , O ₃ , CO, PM ₁₀ and PM _{2.5} analyzers in a routine bases, based on written manuals.	3	↑ 4.25	↘ 4.00
B	Our organization has enough ability to instruct persons in charge of operation and maintenance of AQMS and their SO ₂ , NO _x , O ₃ , CO, PM ₁₀ and PM _{2.5} analyzers.	2.25	↑ 3.75	↗ 4.00
C	Kosovo has effective SOPs for operation and maintenance of AQMS and their SO ₂ , NO _x , O ₃ , CO, PM ₁₀ and PM _{2.5} analyzers.	2.00	↑ 4.00	↓ 3.00
C	Kosovo has enough budgets to keep proper operation and maintenance for AQMS and their analyzers.	1.75	↑ 2.75	↓ 2.00
<p>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.</p> <p>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.</p>				
3-5	<u>MESP with JICA Experts calibrates analyzers in AQMS in the Pristina Area based on the operation/maintenance manuals.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We know how to calibrate SO ₂ , NO _x , O ₃ , CO analyzers by ourselves.	1.50	↑ 3.50	↑ 5.00
B	Our organization provides opportunities for persons in charge to learn how to calibrate SO ₂ , NO _x , O ₃ , CO analyzers.	1.75	↑ 3.75	↗ 4.00
B	Our organization knows what kind of equipment and consumables are necessary in order to calibrate SO ₂ , NO _x , O ₃ , CO analyzers.	3.25	↑ 4.25	↘ 4.00
C	Kosovo provides opportunities to learn how to calibrate SO ₂ , NO _x , O ₃ , CO analyzers on-the-job-training.	2.00	↑ 4.00	→ 4.00
<p>It is an item to evaluate the calibration of SO₂, NO_x, O₃, 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 SO₂, NO_x, O₃ 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.</p>				

3-6	<u>MESP with JICA Experts prepares a guideline for network design of AQMS in Kosovo.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We have the basic knowledge of networking system of AQMS.	3.75	↑ 4.50	↗ 5.00
B	Our organization provides opportunities for persons in charge to learn the basic knowledge of networking system for AQMS.	3.00	↑ 4.50	↘ 4.00
C	Kosovo provides opportunities for persons in charge to learn the basic knowledge of networking system for AQMS.	2.75	↑ 4.25	↘ 4.00
<p>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.</p>				
3-7	<u>MESP with JICA Experts confirms Networking among AQMS in the Pristina Area.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We have experience in making a plan and establish a networking system among AQMS in KOSOVO	2.00	↑ 4.25	↘ 4.00
B	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	↑ 4.50	↘ 4.00
C	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	↑ 4.25	↘ 4.00
<p>It is the item on the data network from analyzers in AQMSs in Pristina Area.</p> <p>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.</p> <p>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.</p> <p>Future issue is whether C/Ps can manage and maintain data network and displays appropriately, and keep showing the data sustainably.</p>				
3-8	<u>MESP with JICA Experts prepares SOP for ambient NO₂, SO₂, PM₁₀, and PM_{2.5} measurement by a portable sampler for emergency needs.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We have portable samplers for ambient NO ₂ , SO ₂ , PM ₁₀ and PM _{2.5} measurement for emergency.	1.75	↑ 3.75	↗ 4.50

A	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	↑ 3.50	↑ 5.00
B	Our organization has opportunities to learn how to conduct emergency sampling using a portable sampler for NO ₂ , SO ₂ , PM ₁₀ and PM _{2.5} based on SOP.	2.00	↑ 3.50	↑ 5.00
C	Kosovo has effective SOPs to conduct emergency sampling using a portable sampler for NO ₂ , SO ₂ , PM ₁₀ and PM _{2.5}	1.75	↑ 3.00	↑ 4.00
<p>It is an item to evaluate the ability related SOP on environmental air quality measurement by portable equipment for emergency case. The evaluation is improving at the individual level, the organizational level and the social level. It is considered that sharing the SOP just before the evaluation of the 3rd term led to improvement of the evaluation, it is considered.</p>				
3-9	<u>MESP with JICA Experts implements measurements of ambient NO₂, SO₂, PM₁₀, and PM_{2.5} based on SOP (1 hour average), for emergency needs.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We have the basic knowledge for measurement of ambient NO ₂ , SO ₂ , PM ₁₀ and PM _{2.5} for emergency needs.	2.75	↗ 3.50	↗ 4.00
A	We have portable samplers for ambient NO ₂ , SO ₂ , PM ₁₀ and PM _{2.5} measurement for emergency.	1.50	↑ 3.50	↗ 4.00
B	Our organization provides on-the-job-training for persons in charge on emergency ambient air sampling for NO ₂ , SO ₂ , PM ₁₀ and PM _{2.5} using portable sampler.	2.00	↑ 4.00	→ 4.00
C	Kosovo provides opportunities to teach and instruct persons in charge on how to conduct emergency ambient air sampling for NO ₂ , SO ₂ , PM ₁₀ and PM _{2.5} .	2.00	↑ 3.75	↗ 4.00
<p>It is an item to evaluate the ability related environmental air quality measurement by portable equipment for emergency case.</p> <p>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.</p>				
3-10	<u>MESP with JICA Experts utilizes results of AQMS for an annual air quality report as well as for public awareness.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can prepare by ourselves an annual air quality report based on AQMS result and use the result of AQMS for public awareness.	4.25	↗ 4.75	→ 4.75
B	Our organization knows how to prepare an annual air quality report based on the results of AQMS and use it for public awareness.	3.75	↗ 4.5	→ 4.5
B	Our organization has enough members who prepare an annual air quality report based on	1.75	↑ 4.25	→ 4.25

	AQMS results and use it for public awareness.				
C	Kosovo through training provides opportunities to learn how to prepare the annual air quality report.	2	↑	4.5	→ 4.5
<p>It is an item to evaluate the disclosure of air quality monitoring results and the use for environmental public awareness. The evaluation is improving at the individual level, the 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 highly evaluated from the first period at individual level. At the end of the 2nd period and the 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.</p>					

(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 (4-1~4-6) through exhaust gas measurement by Standard Reference Method and evaluation (4-7~4-10) 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 phenomenon of plasma shutdown were conducted with one C/P in the activities 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 Method and Laboratory analyzers		
	Starting point	Final point
Individual level (A)	C/P did not understand what Standard Reference Method is. The IC (same as the ICP-MS) had not been operated for six to seven years since it was brought in KHMI around 2012.	C/P experienced Standard Reference Method, understood the principles and acquired the operation techniques. In parallel, the IC was re-functionalized and C/P learned its operation. At the same time, the ICP-MS was re-functionalized too.
Organizational level (B)	C/P could not analyze exhaust gas by Standard Reference Method. C/P could not operate the IC (same as the ICP-MS) either.	C/Ps learned analysis of exhaust gas by Standard Reference Method. Two persons in KHMI can use the IC for analysis. However, in the process from gas 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 (C)	So far, only the AAS had been operated, and its application range for analysis is very small. Besides, this output is almost completely occupied by technical elements. Therefore, recognition at the social level is very low.	The starting of the operation of IC made it possible to conduct exhaust gas analysis by Standard Reference Method for LCPs required by EU Directive, which is the base for the NERP. The IC and ICP-MS were re-functionalized and the analysis capability of KHMI has improved a lot. However, KHMI does not have any other application plan except 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	<p>KHMI as a laboratory has acquired the basic technologies for analysis, and these activities produced good results.</p> <p>The Project re-functionalized the IC and ICP-MS, and provided a set of necessary standard solutions, auxiliary equipment, etc. therefore, the analysis can be continued for a while. The application of these analyzers are broad and they are applicable for various analyses.</p> <p>It was necessary to conduct analyses for the works conducted in the Project, since Standard Reference Method is required by the EU directive for exhaust gas measurement for LCPs, and it is also needed for the monitoring of heavy metals in PM in the air.</p>	
Issues / Proposals	<p>KHMI acquired the IC and ICP-MS operation techniques. However, there is only one staff who can do analysis, and at least one more staff is needed. It is also very important to secure the budget for regular maintenance of analyzers, consumables, auxiliary equipment, etc. Analyzes for the sustainable implementation of Project activities are certainly necessary, but it is difficult to say that KHMI has mastered the technology for analysis only by performing these analyzes.</p> <p>KHMI so far has hoped that the various analyzers will be re-functionalized, but only has hoped for the re-functionalization, while there is no other application plan for analyzers 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.</p>	

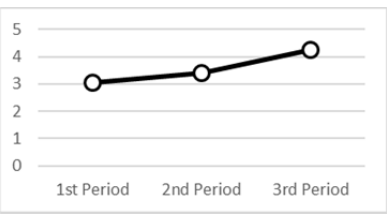
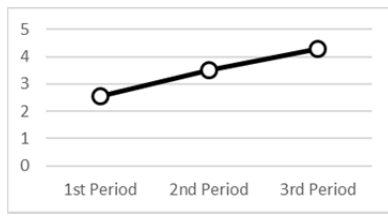
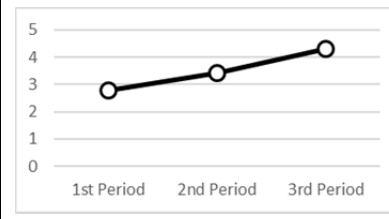
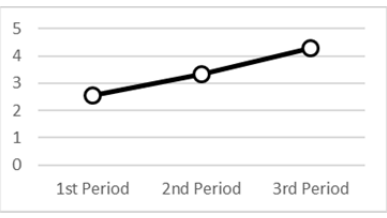
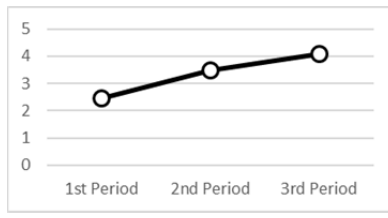
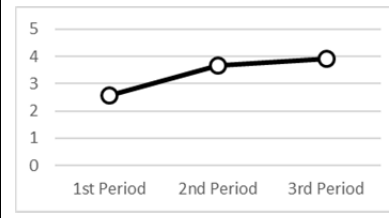
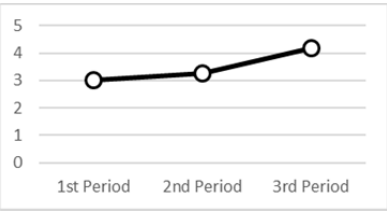
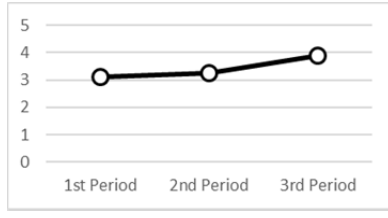
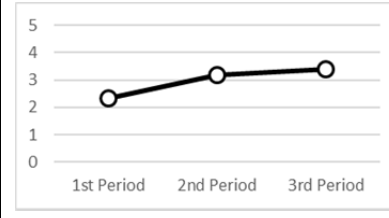
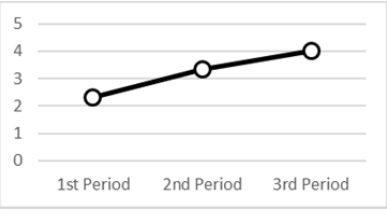
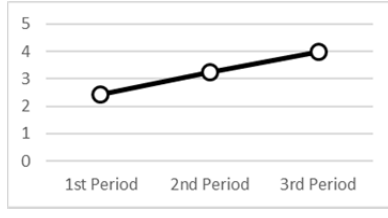
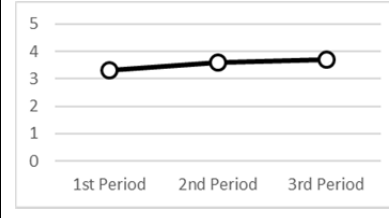
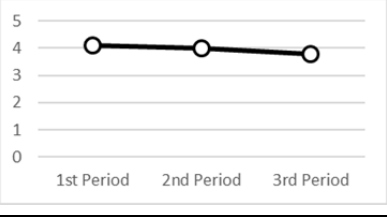
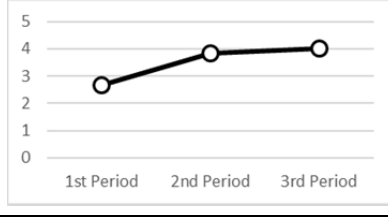
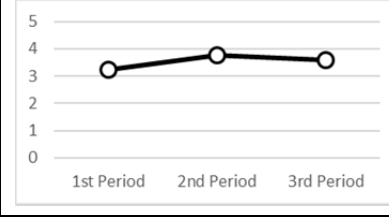
	<p>In order to establish the analysis system, the following activities are required.</p> <ol style="list-style-type: none"> 1) In order to use the newly acquired analysis technology, it is necessary to expand the application of analysis and continue with them. At the same time, it is indispensable to 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. <p>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.</p> <p>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.</p>
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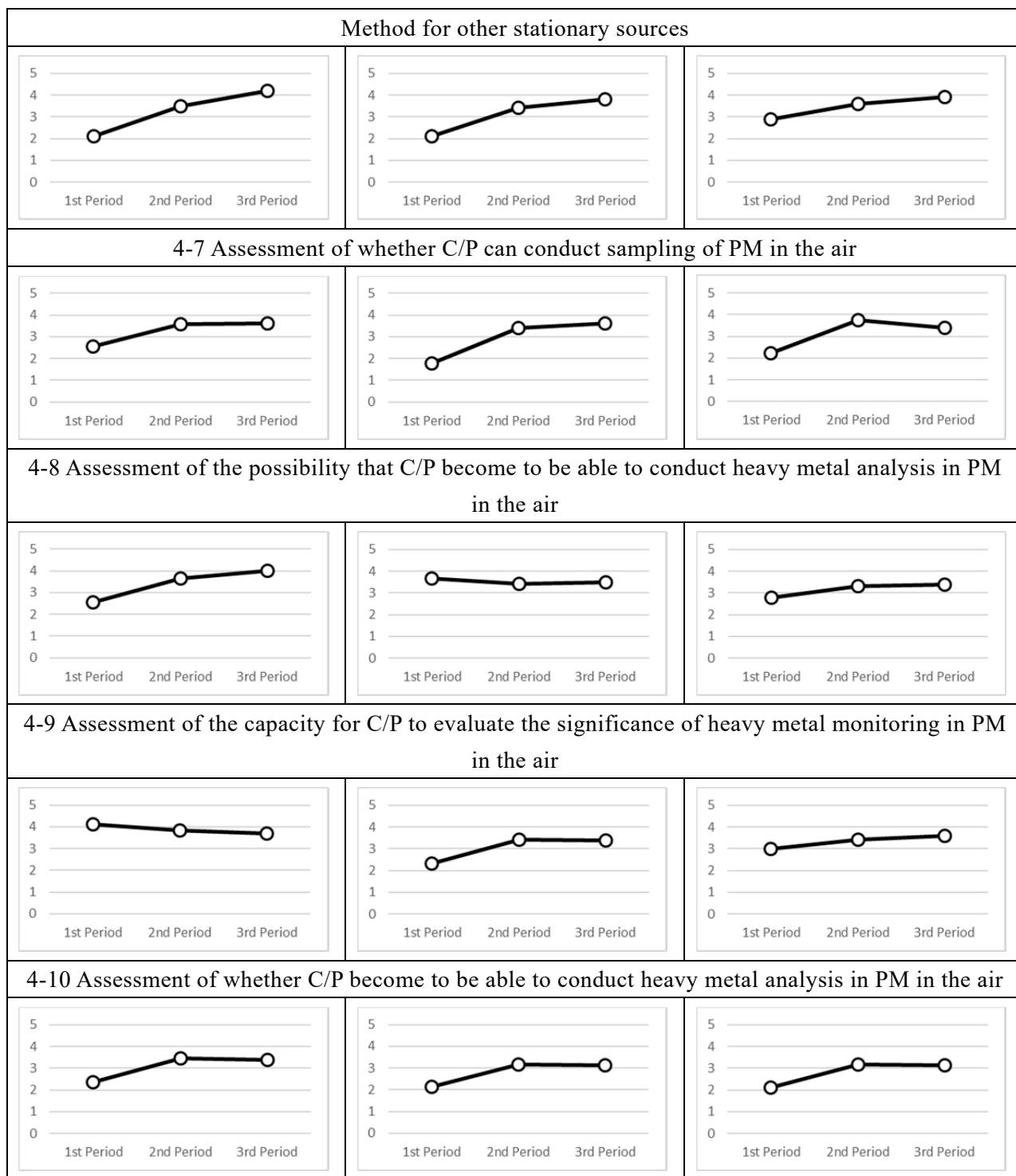
Monitoring of heavy metals in PM in the air		
	Starting point	Final point
Individual level (A)	<p>Sampling device (low volume sampler) was donated by EC in 2011 ~ 2012, but C/P had no experience to sample PM by themselves.</p>	<p>The Project handed over high volume sampler and C/P became able to conduct PM (TSP) sampling. However, analysis of heavy metals in PM is conducted in Japan. It was confirmed that the low volume sampler introduced in the past was not working properly.</p> <p>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.</p>
Organizational level (B)	<p>C/P did not have capacity to conduct sampling of PM and analysis of heavy metals in PM by themselves.</p>	<p>C/P became able to conduct sampling, and the sampling was conducted by the high volume sampler by the Japanese method. The Kosovo side hopes to use the low volume sampler for sampling of PM₁₀ 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.</p> <p>As for heavy metal analysis, through the</p>

		<p>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.</p>
<p>Social level (C)</p>	<p>Kosovo has abundant resources of heavy metals, and there is a concern on heavy metal contamination by industries.</p>	<p>Concerns are high, and analysis results of daily average showed the existence of heavy metals higher than Japanese guideline values (annual average) in PM in the air. C/P decided to continue heavy metal monitoring.</p> <p>MEE/MESP has not disclosed the existence of heavy metals in PM in the air yet.</p>
<p>Outcome</p>	<p>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 Project recommended using the high volume sampler tentatively. The project functionalized ICP-MS and the training for ICP-MS by MCC/MFK is scheduled.</p> <p>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 that the conditions in laboratory are not well organized for conducting analysis.</p> <p>In addition, the operation of ICP-MS requires budgetary support such as continuous purchase of argon gas and the purchase of additional consumables by MEE/MESP.</p>	
<p>Issues / Proposals</p>	<p>The heavy metal level in PM in the air should to be evaluated on annual average basis, so it is desirable to perform sampling and analysis once a month. It is necessary to conduct sampling and analysis at least four times a year and calculate the annual average. Therefore, at least one more staff is required.</p> <p>In order to conduct heavy metal analysis in line with the EU standard, the sampling of PM₁₀ is required, and 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 high volume sampler, and therefore, there is no problem with sampling.</p> <p>Although, it is currently delayed due to Covid-19, but ICP-MS will be put into operation after training by MCC/MFK.</p> <p>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 issue</p>	

as earliest possible.

Table 4 Results of Capacity Assessment on Output 4

Individual level	Organizational level	Social level
4-1 Assessment of the knowledge of C/P on the sampling for exhaust gas measurement by Standard Reference Method		
		
4-2 Assessment of whether C/P can operate the IC for Standard Reference Method		
		
4-3 Assessment of whether C/P can conduct exhaust gas measurement by Standard Reference Method by using the IC and AAS		
		
4-4 Assessment of whether C/P understand exhaust gas measurement by Standard Reference Method to be able to draft a SOP		
		
4-5 Assessment of the possibility for C/P to be able to apply exhaust gas measurement by Standard Reference Method to other stationary sources		
		
4-6 Assessment of whether C/P can draft SOPs for exhaust gas measurement by Standard Reference		



	Assessment Items	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
4-1	<u>MESP with the assistance of JICA Experts studies sampling and measurement methodologies for the LCPs.</u>			
A	We have instruments for analysis of SO _x , NO _x , and Hg by reference method, and own them.	2.78	↗ 3.33	↑ 4.34
A	We know how to sample and analyze SO _x , NO _x , and Hg by reference method, and a calculation	3.33	↗ 3.50	↗ 4.20

	method converting to the values at reference O ₂ concentration.			
B	Our organization has opportunities to learn how to apply reference method theoretically and owns the necessary equipment, consumables and instruments.	2.56	↑ 3.50	↑ 4.30
C	Kosovo has effective theoretical documents and provides opportunities to learn how to apply the reference method by IC.	2.78	↗ 3.42	↑ 4.30
<p>It is the item to evaluate the knowledge on the sampling and analysis for exhaust gas measurement by Standard Reference Method.</p> <p>In the first period, C/P did not have sufficient knowledge on Standard Reference Method, and therefore, scores were low. However, from the second to the third period, the scores increased drastically, since C/Ps conducted exhaust gas analysis by Standard Reference Method by their own, and deepen the understandings. In the third period, the training was conducted additionally according to the request by C/Ps, and C/Ps understood the exhaust gas analysis by Standard Reference Method very well.</p>				
4-2	<u>MESP with the assistance of JICA Experts makes Ion Chromatograph (hereinafter referred to as "IC") available for analysis.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can use IC for analyzing SO _x and NO _x by ourselves.	2.56	↗ 3.33	↑ 4.30
B	Our organization knows how to make sampling for IC and can operate IC for analyzing SO _x and NO _x .	2.44	↑ 3.50	↗ 4.10
C	Kosovo has effective theoretical documents and provides opportunities to learn how to apply reference method.	2.56	↑ 3.67	↗ 3.90
<p>This is the item to evaluate whether C/P can operate the IC for Standard Reference Method.</p> <p>In the first period, the IC could not be operated, but in the second period, the Project re-factionalized the IC, and conducted the analysis. Furthermore, in the third period, C/Ps conducted the exhaust gas analysis by Standard Reference Method through the training requested by C/Ps themselves, and the understandings were deepened and the scores increased. In the individual level, C/Ps became able to use the IC, and in the organization and social level, the scores rose since KHMI acquired the analysis technology through the Project.</p>				
4-3	<u>MESP with the assistance of JICA Experts conducts analysis by reference methods for LCPs, by using Ion Chromatograph method for SO₂ and NO_x and atomic absorption method (hereinafter referred to as "AAS") for Hg.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can prepare necessary equipment and consumables for conducting a sampling for reference method and operate IC and AAS.	3.00	↗ 3.25	↑ 4.20
B	Our organization understands the meaning of reference methods for LCPs, and has enough members for applying reference methods.	3.11	↗ 3.25	↗ 3.90
C	Kosovo has law or regulations to conduct reference methods for LCPs and allocates enough budget to	2.33	↑ 3.17	↗ 3.40

	conduct them			
<p>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.</p> <p>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.</p> <p>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.</p> <p>It is indispensable to reinforce the number of the staff and secure the proper budget in order to keep analyses.</p>				
4-4	<u>MESP with the assistance of JICA Experts elaborates SOPs for sampling and analysis for LCP stack gas.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We know how to apply reference methods for LCPs.	2.33	↑ 3.33	↗ 4.00
B	Our organization understands how to apply reference methods for LCPs and enough ability to draft SOPs.	2.44	↑ 3.25	↑ 4.00
C	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
<p>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.</p> <p>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.</p> <p>As for SOPs, C/Ps and JET collaborated together to draft SOPs, and C/P understood more on the Standard Reference Method.</p>				
4-5	<u>MESP with the assistance of JICA Experts studies sampling and measurement methods for other stationary emission sources.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	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
B	Our organization has enough ability to judge and apply reference methods to other stationary sources.	2.67	↑ 3.83	↗ 4.00

C	Kosovo has laws or regulations which stipulate to which kind of facilities reference methods must be applied.	3.22	↗ 3.75	→ 3.60
<p>This is the item to evaluate the possibility for C/P to be able to apply exhaust gas measurement by Standard Reference Method to other stationary sources.</p> <p>Methods have no difference from the one for LCPs, and therefore, the scores are almost same as the one for item 4-3.</p> <p>Therefore, in the case that the exhaust gas analysis by Standard Reference Method is applied to other stationary sources in addition to LCPs, reinforcement of the staff and securement of the budget is indispensable as same as item 4-3.</p>				
4-6	<u>MESP with the assistance of JICA Experts elaborates SOPs for sampling and measurement methods for other stationary emission sources.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We know how to conduct reference methods for other stationary sources.	2.11	↑ 3.50	↗ 4.20
B	Our organization understands how to apply reference methods for other stationary sources and has enough ability to draft SOPs.	2.11	↑ 3.42	↗ 3.80
C	Kosovo has laws or regulations to make reference method for other stationary sources mandatory in Kosovo and has SOPs for them.	2.89	↗ 3.58	↗ 3.90
<p>This is the item to evaluate whether C/P can draft SOPs for exhaust gas analysis by Standard Reference Method for other stationary sources.</p> <p>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.</p>				
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.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We have experience in conducting PM (Particulate Matter) sampling by Hi-Volume Air Sampler for heavy metal analysis.	2.56	↑ 3.58	→ 3.60
B	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	↑ 3.42	↗ 3.60
C	Kosovo provides opportunities for persons in charge to learn how to conduct PM sampling for heavy metal analysis.	2.22	↑ 3.75	↘ 3.40
<p>This is the item to evaluate whether C/P can conduct sampling of PM in the air.</p> <p>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.</p>				

4-8	<u>JICA Experts analyze heavy metal contents (Mn, Ni, As, Cd, Pb and Zn) in PM in laboratory in Japan.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We have available equipment in MESP to analyze heavy metal contents (Mn, Ni, As, Cd, Pb and Zn) in PM.	2.56	↑ 3.67	↗ 4.00
B	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
C	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
<p>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.</p> <p>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 Covid-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.</p> <p>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.</p>				
4-9	<u>MESP with the assistance of JICA Experts assesses the importance and urgency of heavy metal pollution in the air.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We assess the importance and urgency of heavy metal pollution such as Mn, Ni, As, Cd, Pb and Zn in the air.	4.11	↘ 3.83	→ 3.70
B	Our organization has enough members to assess the level of heavy metal air pollution such as Mn, Ni, As, Cd, Pb and Zn.	2.33	↑ 3.42	→ 3.40
C	Kosovo provides opportunities to learn how to assess the level of heavy metal air pollution such as Mn, Ni, As, Cd, Pb and Zn.	3.00	↗ 3.42	↗ 3.60
<p>This is the item to evaluate the capacity for C/P to evaluate the significance of heavy metal monitoring 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.</p>				
4-10	<u>JICA experts make operation diagnosis on</u>	First	Second	Third

	<u>ICP-MS in KHMI laboratory.</u>	Average (6/2/2018)	Average (31/1/2019)	Average (25/2/2020)
A	We arrange an operation diagnosis on ICP-MS in KHMI laboratory by outsourcing to manufacturer, including preparation of TOR on diagnosis.	2.38	↑ 3.45	→ 3.38
B	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	↑ 3.18	→ 3.13
C	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	↑ 3.18	→ 3.13

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.

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

	Starting point	Final point
Individual level (A)	C/Ps had almost no knowledge/ experience with the simulation model, just a	Some of the C/P became to be able to operate the programs under JET's instruction. However, the meaning of each manipulation is not fully

	<p>few C/Ps knew the result of simulation model implemented by other donors. The capacity of handling PC and excel calculation was not sufficient either.</p>	<p>understood.</p>
Organizational level (B)	<p>Both MEE/MESP and KHMI are interested in the simulation model. At the starting point, KHMI was to be the primary organization to do this activity</p>	<p>C/P from both MEE/MESP and KHMI have joined the trainings well, and both organizations are cooperative to this activity so far. On the other hand, in order to keep the capacity after the project, it is recommended that the job description of MEE/MESP should stipulate the simulation model task.</p>
Social level (C)	<p>Although citizens are highly interested in the causes of the air pollution, simulation model is not familiar as a tool to analyze that.</p>	<p>No change from the starting point The simulation modeling is not used for the evaluation of air pollution control measures, information disclosure to the public, etc. Since concentration map is a useful tool for 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.</p>
Outcome	<p>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 of the C/P came to be able to execute the programs using simulation modeling manual under JET's guidance, through a series of practical exercises.</p> <p>At the organizational level, the simulation working group, organized mainly from KHMI members and in cooperation with KEPA staff, was organized and ready to operate simulation modeling including collecting data and GIS manipulation. On the other hand, 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.</p>	
Issues / Proposals	<p>Only the basic items in the CALPUFF program have been trained in this project, and this does not address the applied content. Individuals within C/P vary in their achievement of technical competence, and only a few C/Ps have the</p>	

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.

Table 5 Results of Capacity Assessment on Output 5

Individual level	Organizational level	Social level
5-1 Assessment of establishment of necessary coordination with relevant agencies regarding simulation model		
5-2 Assessment of collection of necessary data for implementing simulation model		
5-3 Assessment of analysis and validation of meteorological data		
5-4 Assessment of analysis and validation of air quality monitoring data		

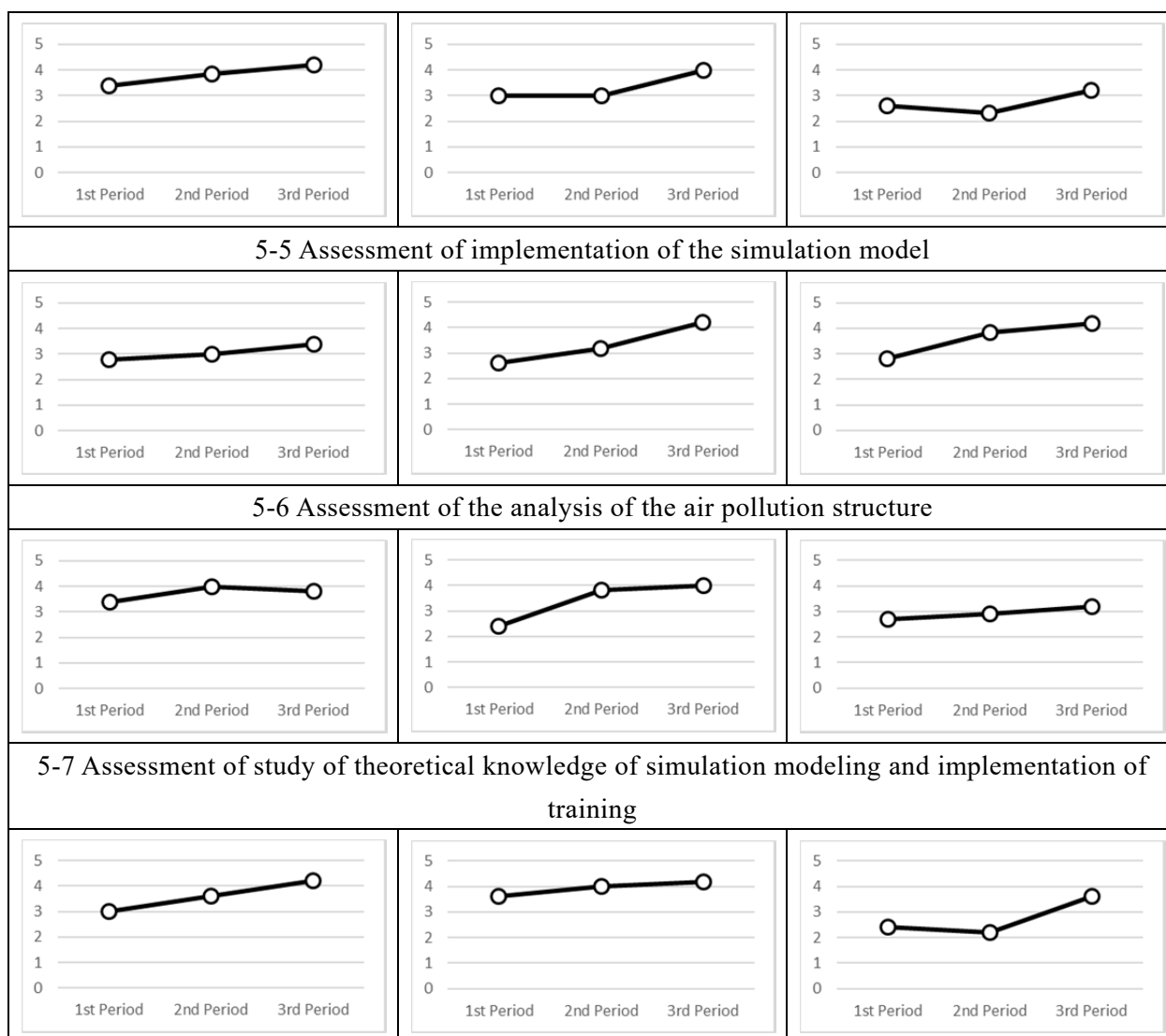


Table 5 Results of Capacity Assessment on Output 5

Assessment Items		First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
5-1	<u>MESP and relevant agencies with JICA Experts designate responsible section for simulation model and establish necessary coordination with relevant agencies.</u>			
A	The responsible section for simulation model is designated and necessary coordination with other relevant agencies is established.	4.0	↘ 3.8	↘ 3.4
B	Regarding air pollutant emission inventory, our organization has the ability to handle, resolve, and adjust conflicts of interest.	3.0	↘ 2.8	↑ 3.6
B	Regarding air pollutant emission inventory, our organization has the ability to build a collaborative relationship with other relevant parties.	4.0	↑ 4.5	↑ 4.2
C	There is a basic infrastructure for preparing air pollutant emission inventory in the Republic of Kosovo.	4.4	↓ 4.0	↓ 4.0

<p>This item is related to the establishment of institutional framework on simulation modeling between MEE/MESP and related organizations.</p> <p>The participants from MEE/MESP and KHMI continued to participate in the Simulation WG established in the 1st 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.</p>				
5-2	<u>MESP and relevant agencies with JICA Experts collect existing data such as air quality monitoring data, meteorological data, geographical information etc.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	Our organization can collect necessary data, such as air quality monitoring data, meteorological data, geographical information etc.	4.4	↘ 4.2	↗ 4.4
B	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	↗ 4.0
C	Kosovo has effective law, regulations, or institutional arrangements for preparing air pollutant emission inventory.	4.2	↘ 4.0	→ 4.0
<p>This item relates to the collection of information needed for the simulation modeling.</p> <p>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.</p>				
5-3	<u>MESP with JICA Experts analyzes and validates meteorological data for applying a dispersion simulation model.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can analyze and validate the meteorological data for applying a dispersion simulation model.	3.8	↘ 3.5	↗ 4.0
B	Regarding air pollutant emission inventory, our organization is willing to acquire the ability to take initiative and act in solving the challenges.	3.8	↗ 4.2	↘ 3.8
C	In the Republic of Kosovo, there is an administration system for securing and implementing the budget for preparing air pollutant emission inventory.	2.6	→ 2.5	↗ 3.2
<p>This is an item for the evaluation of the capacity to analyze and validate the meteorological data.</p> <p>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.</p>				
5-4	<u>MESP with JICA Experts analyzes and validates air quality monitoring data.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can analyze and validate the air quality monitoring data.	3.4	3.8	4.2
B	Regarding air pollutant emission inventory, Our organization has the ability to use resources in an effective and efficient manner in accordance with the strategy, and has the ability to implement the	3.0	→ 3.0	↑ 4.0

	activity, and the ability to get things done.			
C	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	↑ 3.2
<p>This is an item for the evaluation of the capacity to analyze and validate the air quality monitoring data.</p> <p>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.</p>				
5-5	<u>MESP with JICA Experts elaborates dispersion simulation model for the target year.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can elaborate the dispersion simulation model for the target year.	2.8	→ 3.0	↗ 3.4
B	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	↗ 3.2	↑ 4.2
C	Regarding air pollutant emission inventory, the Republic of Kosovo has a political decision-making function based on democracy.	2.8	↑ 3.8	↗ 4.2
<p>This item is related to the implementation of the simulation model.</p> <p>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.</p>				
5-6	<u>MESP with JICA Experts analyzes structure of air pollution.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can analyze the structure of air pollution.	3.4	4.0	3.8
B	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	↑ 3.8	→ 4.0
C	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

C	In the Republic of Kosovo, citizens generally have ethic and social obligations for preparing air pollutant emission inventory.	2.8	↗	3.2	↘	3.0
<p>This item is related to the analysis of the air pollution structure.</p> <p>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.</p>						
5-7	<u>MESP with JICA experts acquire theoretical knowledge of simulation model and practice simulation modeling through seminars and workshops.</u>	First Average (6/2/2018)		Second Average (31/1/2019)		Third Average (25/2/2020)
A	We routinely study and practice simulation modeling through seminars and workshops.	3	↗	3.6	↗	4.2
B	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
C	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	↗	3.6
<p>This section is related to the theoretical learning and practice of simulation.</p> <p>The simulation WG participants from MEE/MESP and KHMI have been continuously joined in simulation practice since the 1st period of the project, and the self-assessment scores has constantly increased throughout the second and third periods of the project.</p>						

(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 SO₂ 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.

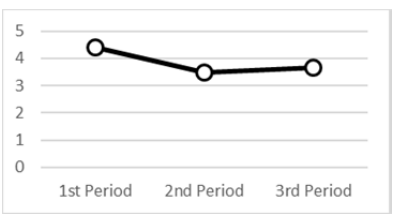

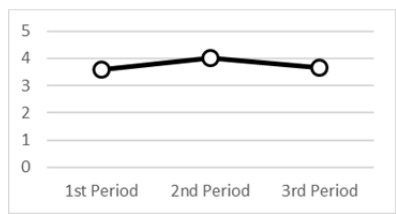
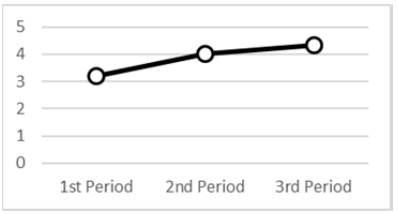
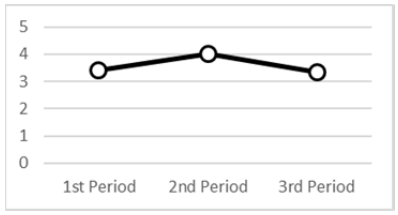
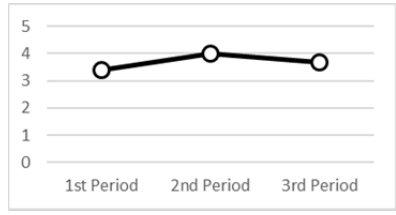
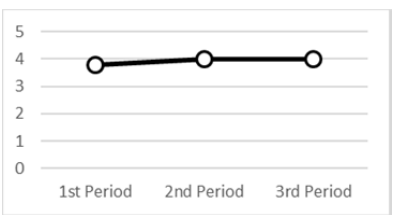
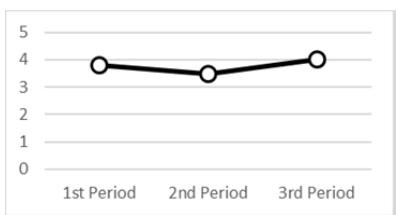
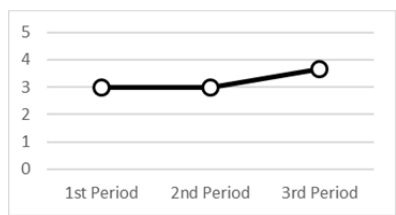
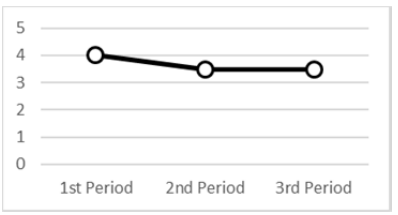
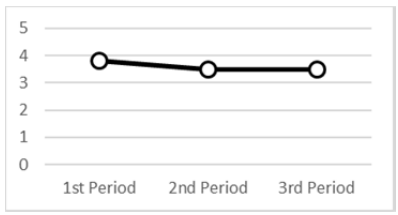
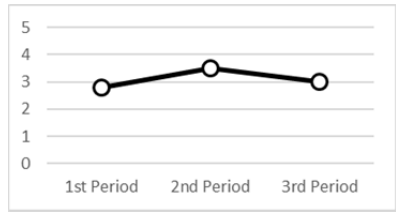
Comments on these evaluated results by JET are as follows.

	Starting point	Final point
Individual level (A)	Persons in charge had little knowledge on emission reduction measures for LCPs and other stationary sources.	Seminars, etc. on emission reduction measures were repeated many times during the Project period. Staff in charge in KEK have improved 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 level (B)	Laws regarding emission regulation and obligation of reporting emissions are well organized, but these laws are not well enforced.	At TPP Kosovo A, because of the scheduled shutdown in line with commencement of TPP Kosova e Re in the future, it is hard to invest, and therefore, the plants cannot comply with 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 (C)	As for stationary sources, the concern especially for dust is very high because of the complaints by population. Bur they do not have	MEE/MESP is lacking the capacity to instruct LCPs and other stationary sources. There are many complains from the citizens about LCPs, but the emission reduction measures are going to be implemented with the

	<p>sufficient knowledge on SO₂ and NO_x.</p> <p>The concern for PM_{2.5} is very high.</p>	<p>support of EU.</p> <p>On the other hand, officials in MEE/MESP do not instruct properly private facilities (other 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.</p>
<p>Outcome</p>	<p>As for TPP Kosovo A, the Project proposed dust reduction measures with the smallest possible investments. The proposals are in the way to be implemented, and part of the modification has 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 measures for SO₂ and NO_x are also proposed, but it is very hard to apply them because of the amount of investment needed.</p> <p>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 knowledge on exhaust gas measurement and emission reduction measures, which will lead to the acquisition of the capacity to instruct private facilities.</p>	
<p>Issues / Proposals</p>	<p>Dust reduction measures for TPP Kosovo A are now being applied, but the application of reduction measures for SO₂ and NO_x is very difficult to implement because of the plan for construction of TPP Kosova e Re. The rehabilitation of TPP Kosovo B is now on-going, and it is necessary to follow the progress. 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.</p> <p>As for other stationary sources, it is necessary for MEE/MESP to instruct other stationary sources to conduct exhaust gas measurement, so first of all understand the emission condition from each private facility and instruct them. In order to realize this, it is indispensable for officials in MEE/MESP to gain knowledge on exhaust gas measurement and emission reduction measures. The instructions through OJT, such as when inspecting the facilities and conducting the measurement, since each private facility has its own process, process flow, consumed fuel, etc. must be the most appropriate for the enhancement of the</p>	

capability.

Table 6 Results of Capacity Assessment on Output 6

Individual level	Organization level	Social level
6-1 Assessment of the capacity of the Kosovo side to study policies for TPP Kosovo A		
		
6-2 Assessment of the capacity to study emission reduction measures for other stationary sources by their own		
		
6-3 Assessment of the capacity of the Kosovo side to study policies for other stationary sources		
		
6-4 Assessment of the capacity of the Kosovo side to propose emission reduction measures and disclose measures to the public through the Project activities		
		

Assessment Items		First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
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.</u>			
A	We can review emission reduction measures for LCPs related to NERP (National Emission Reduction Plan) from technical point of view.	4.4	↓ 3.5	↗ 3.7
B	Our organization has enough information and can plan and implement emission reduction measures for LCPs.	2.8	↑ 4.0	↓ 3.3

C	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	↗ 4.0	↘ 3.7
<p>This is the item to evaluate the capacity to study emission reduction measures for TPP Kosovo A by themselves.</p> <p>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 SO₂ 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.</p>				
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.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can review emission reduction measures for other stationary sources from technical point of view.	3.2	↑ 4.0	↗ 4.3
B	Our organization has enough information and can plan and implement emission reduction measures for other stationary sources.	3.4	↗ 4.0	↘ 3.3
C	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	↗ 4.0	↘ 3.7
<p>This is the item to evaluate the capacity to study emission reduction measures for other stationary sources by themselves.</p> <p>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.</p> <p>In any case, lack of knowledge of officials in MEE//MESP cannot be denied, and it is necessary for them to deepen the knowledge.</p>				
6-3	<u>Kosovo side with the assistance of JICA Experts discusses relevant policy improvements based on activities 6-1 and 6-2.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)

A	We can discuss relevant policy improvements and make policies related to activities 6-1 and 6-2.	3.8	↗ 4.0	→ 4.0
B	Our organization can make relevant policy and discuss policy improvement related to activities 6-1 and 6-2.	3.8	↘ 3.5	↗ 4.0
C	Kosovo has a framework to apply policies and enough abilities to handle the application of policies.	3.0	→ 3.0	↗ 3.7
<p>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.</p> <p>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 SO₂ 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.</p> <p>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.</p> <p>As mentioned above, the largest issue is to be found that the laws are not properly enforced.</p>				
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.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	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
B	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
C	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	↗ 3.5	↘ 3.0
<p>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.</p> <p>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.</p> <p>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,</p>				

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 SO₂ and NO_x, 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.

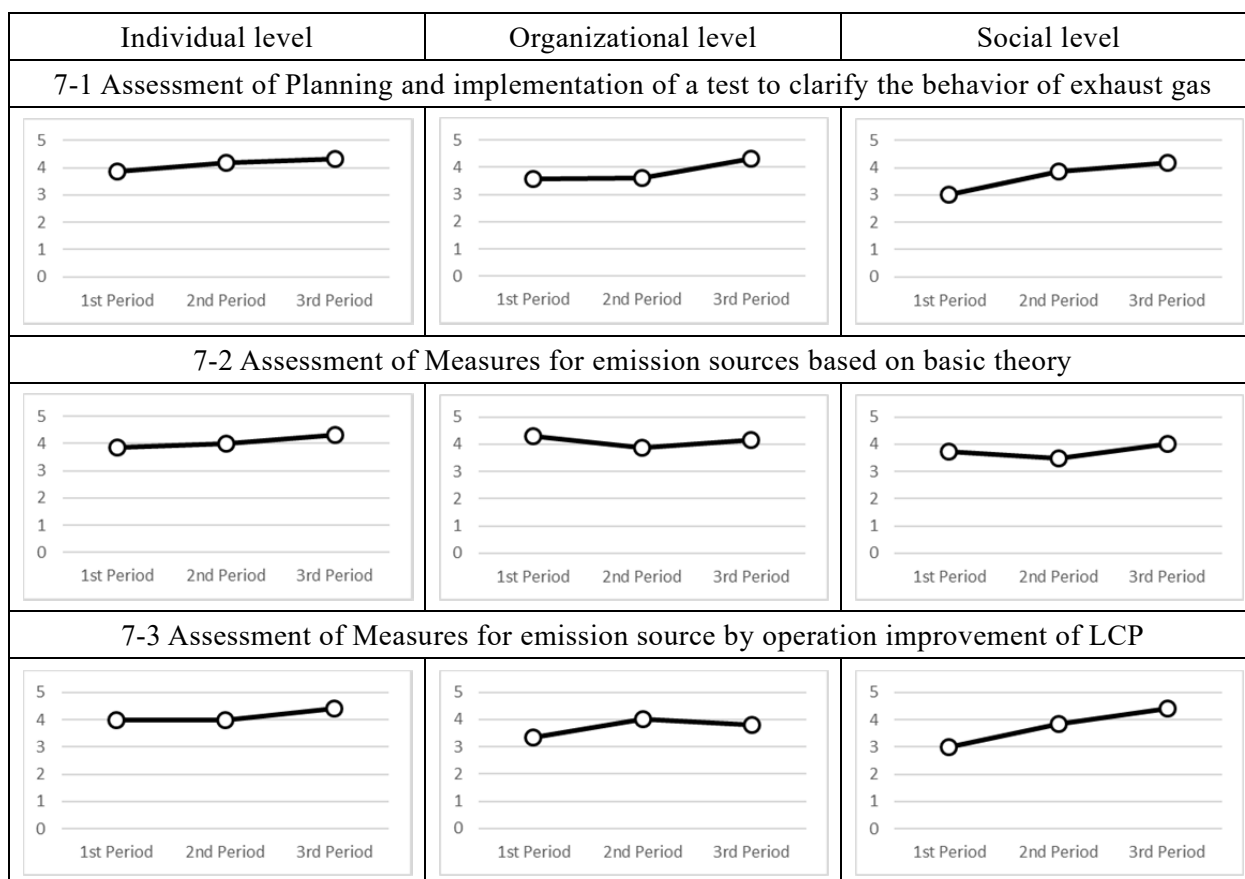
In the 3rd period, JET provided support from Japan so that the C/P could continue with their activities. As a result, the overall score of the assessment in comparison to the second period result is higher, and it is thought that this is due to the enthusiasm of C/P for preventing air pollution.

Comments on these evaluated results by JET are as follows.

	Starting point	Final point
Individual level (A)	The person in charge has little technical knowledge about LCP emission reduction.	<p>Education through seminars etc. was repeated. The personnel in TPP Kosovo A had a better understanding. However, the persons in charge of MEE/MESP have not deepened their understanding and are at the stage of recognizing the lack of knowledge.</p> <p>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.</p>
Organizational level (B)	Although there are laws and regulations relating to emission regulation, there are some aspects that cannot be actually enforced.	<p>MEE/MESP is not at the level where it can provide the guidance for facilities, etc. from a technical point of view, whereas on the other hand, KEK is deepening its technical knowledge.</p> <p>The TPP Kosovo A is unable to comply with ELVs due to investment restrictions, the plans to be stopped in the future, etc.</p>
Social level (C)	Regarding LCPs, there is a great interest for Dust, because it is visible and there are complaints from the residents, but there is a little interest for SO ₂ and NO _x .	<p>MEE/MESP lacks the ability to provide the technical guidance to LCPs, and is not able to respond sufficiently.</p> <p>In particular, complaints from residents to KEK are quite great in number, and although 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.</p> <p>Investing in environmental measures affects the electricity tariffs, but it seems that</p>

	<p>consumers do not have enough understanding on the issue.</p> <p>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.</p>
Outcome	<p>The emission reduction measures for LCP differ for each plant. Therefore, the judgment on emission values and the technical knowledge are required, but there is a shortage of human resources with that knowledge.</p> <p>As for the emission reduction measures by improving the boiler operation method, C/P in charge of TPP 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.</p> <p>As for TPP Kosovo A, SO₂ and NO_x reduction methods by improving the boiler operation method and Dust reduction measures that can be implemented with a small investment are proposed and are being implemented.</p> <p>Some improvements have already been applied to ESPs based on the results of the study conducted in this Project through industry-academy collaboration with the University of Pristina, and this was a big result of the Project.</p> <p>Proposals have been made regarding SO₂ and NO_x reduction measures, but these require considerable investments and are difficult to apply, as they involve the modification of the boiler.</p>
Issues / Proposals	<p>Regarding the emission reduction for LCPs, the rehabilitation of TPP Kosovo B, the construction of the new Power Plant (TPP Kosova e Re), the stopping of TPP Kosovo A due to operation of the new Power Plant are scheduled to be completed around 2023.</p> <p>Therefore, the measures for emission reductions in TPP Kosovo A have the problems of financial nature (financing and impact on electricity tariff), and it is a major problem as their implementation is not easy.</p> <p>Emission reduction measures by improving the boiler operation method are basic measures that do not require investment, and they can also be applied to TPP Kosovo B, which will continue to operate.</p> <p>When introducing the environmental equipment in the future, it is important to reduce the emissions from the boiler as much as possible in order to minimize the cost of the emission reduction equipment.</p>

Table 7 Capacity Assessment Results for Output 7



	Assessment Items			
7-1	<u>Kosovo side with the assistance of JICA Experts analyzes the behavior of exhaust stack gas from LCPs including the SO₂.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We have already confirmed existing information	2.1	→ 2.3	→ 2.2
A	We already know the generation mechanisms of pollutant	1.8	→ 1.9	→ 2.2
B	Our organization has already designated persons in charge of emission reduction of LCP who have enough knowledge about air pollutants.	3.6	→ 3.6	↗ 4.3
C	Kosovo can establish the framework for necessary coordination between the relevant agencies regarding the emission reduction measures for LCP.	3.0	↑ 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 SO₂ and NO_x, and the awareness of C/P increased.

Regarding SO₂, 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 SO₂ 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.

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.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We already have information regarding the reduction of emission from LCP	3.9	→ 4.0	↗ 4.3
B	Our organization can propose the method for the Emission reduction measures for LCP.	4.3	↘ 3.9	↗ 4.2
C	Kosovo has administration system for proposing the emission reduction measures.	3.7	↘ 3.5	↗ 4.0

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.

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.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can evaluate emission reduction method for LCPs by analyzing the behavior of exhaust stack gas from LCP	4.0	→ 4.0	↗ 4.4
B	Our organization can decide the specification of suitable emission reduction system/equipment to satisfy regulations.	3.3	↗ 4.0	↘ 3.8
C	Kosovo can establish the preparation procedure for emission reduction measures for LCP through necessary coordination between relevant agencies.	3.0	↑ 3.8	↗ 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, SO₂ behavior investigation by the improvement of the boiler operation method, etc.

Regarding the behavior of SO₂, 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.

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

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

	<p>technical, economic and social viability.</p>	<p>However, MEDSPE/MESP is still in the stage 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.</p>
<p>Social level (C)</p>	<p>Although the needs for the Measures were understood, there was little understanding of concrete measures.</p>	<p>Since through the Project, which included the preparation activities on the Evaluation Sheet for Measures the activities for planning, studying, evaluating and implementing the Measure were carried out through discussions and consultations with the relevant organizations, the capacity at the social level was enhanced.</p> <p>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.</p>
<p>Outcome</p>	<p>Since through the preparation 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 SDGs 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.</p> <p>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.</p> <p>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).</p>	
<p>Issues / Proposals</p>	<p>Since the outputs of the Project will be shared with society in the future and activities of oversea donors such as MCC/MFK are also advancing, it is</p>	

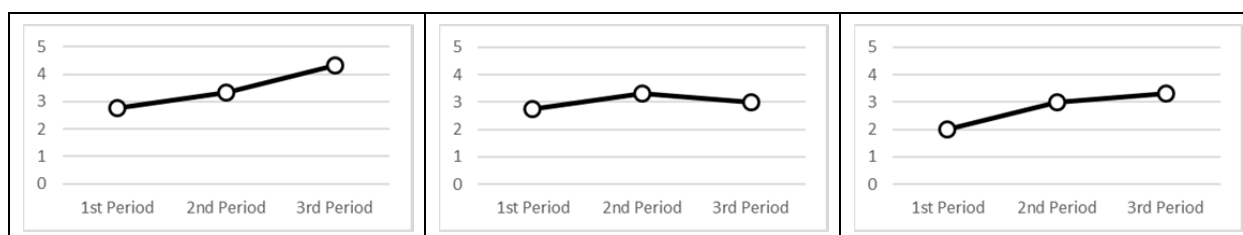
expected that the future understanding of the Measures at the social level will advance.

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.

Table 8 Results of Capacity Assessment on Output 8

Individual level	Organization level	Social level
8-1 Assessment of technical, economic and social viability of pollution control measures for important emission sources		
8-2 Assessment of emission reduction effects of pollution control measures for important emission sources		
8-3 Assessment of effects on air quality improvements by pollution control measures with dispersion simulation model		



Assessment Item		First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
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.</u>			
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	↗ 3.67	↘ 3.33
B	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	↗ 3.67	→ 3.67
C	Kosovo can evaluate the technical, economic and social viability of pollution control measures for important emission sources.	2.50	↑ 3.67	↘ 3.33
<p>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 concrete measures, the quantification of emission reductions, evaluation of cost effectiveness, study 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 continuous support of this field.</p>				
8-2	<u>MESP and relevant agencies with the assistance of JICA Experts evaluate emission reduction effects of pollution control measures for important emission sources.</u>			
A	We can know (measure or estimate) emissions from important emission sources.	3.50	↗ 3.67	→ 3.67
B	Our organization has enough information and can plan and implement emission reduction measures for other stationary sources.	3.25	↗ 3.67	→ 3.67
C	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	↑ 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.

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.</u>	First Average (6/2/2018)	Second Average (31/1/2019)	Third Average (25/2/2020)
A	We can use the dispersion simulation model for evaluation of the effects of pollution control measures on air quality improvement.	2.75	↗ 3.33	↑ 4.33
B	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
C	Kosovo has a framework to prepare and implement simulation model for evaluation of pollution control measures.	2.00	↑ 3.00	↗ 3.33

Since the evaluation of the effects of air quality improvements by pollution control measures by using the dispersion simulation model has not been carried out sufficiently by 25th February 2020 of the 3rd period, it is thought 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 evaluation sheets for measures conducted in the 3rd period, it is assumed that the score 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)

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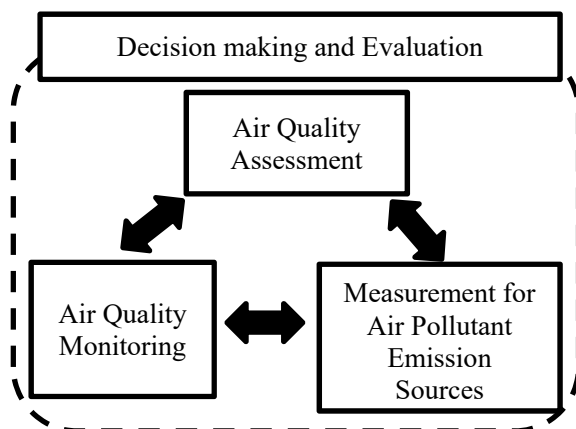


Capacity Development Project for Air Pollution Control in the Republic of Kosovo

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 Environmental and Spatial 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



Seminar in MESP



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.



Japan International Cooperation Agency Ministry of Environmental and Spatial Planning



Capacity Development Project for Air Pollution Control in the Republic of Kosovo

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/japonezet-do-te-nisin-nj-hulumtim-per-identifikimin-e-ndotesve-te-ajrit-ne-prishtine-498731/>

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.



Japan International Cooperation Agency
Ministry of Environmental and Spatial Planning



Capacity Development Project for Air Pollution Control in the
Republic of Kosovo

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.





Japan International Cooperation Agency
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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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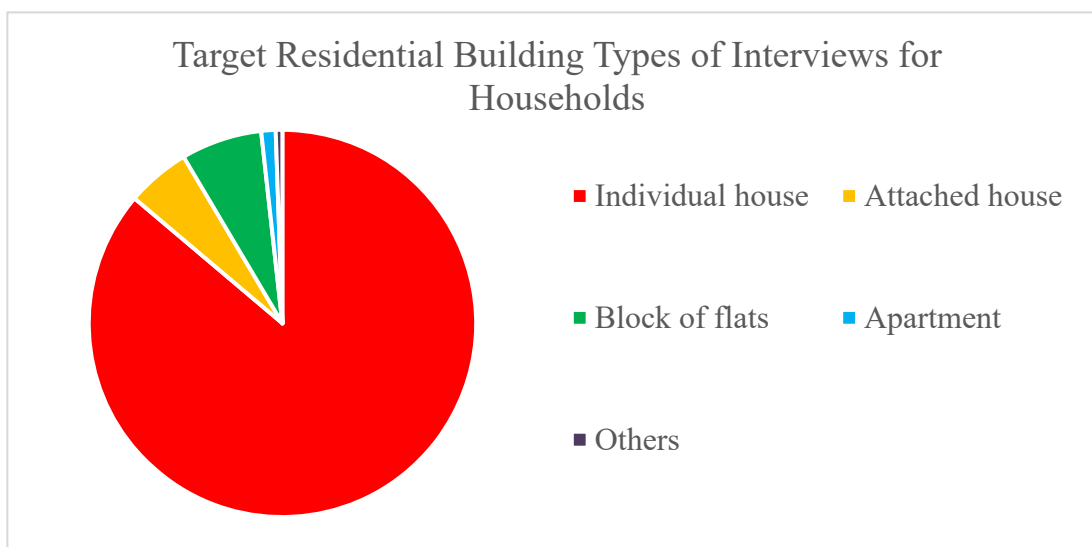


Capacity Development Project for Air Pollution Control in the
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Newsletter No.3 (2018 August)



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, etc., 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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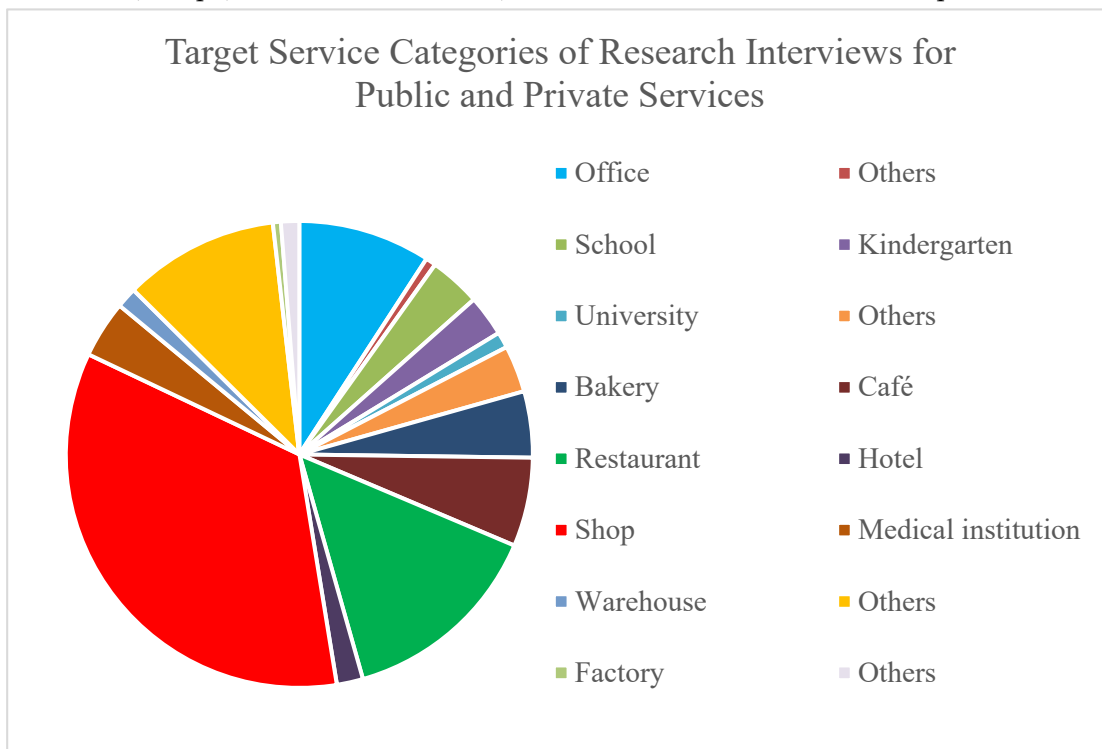
Capacity Development Project for Air Pollution Control in the
 Republic of Kosovo

Newsletter No.3 (2018 August)

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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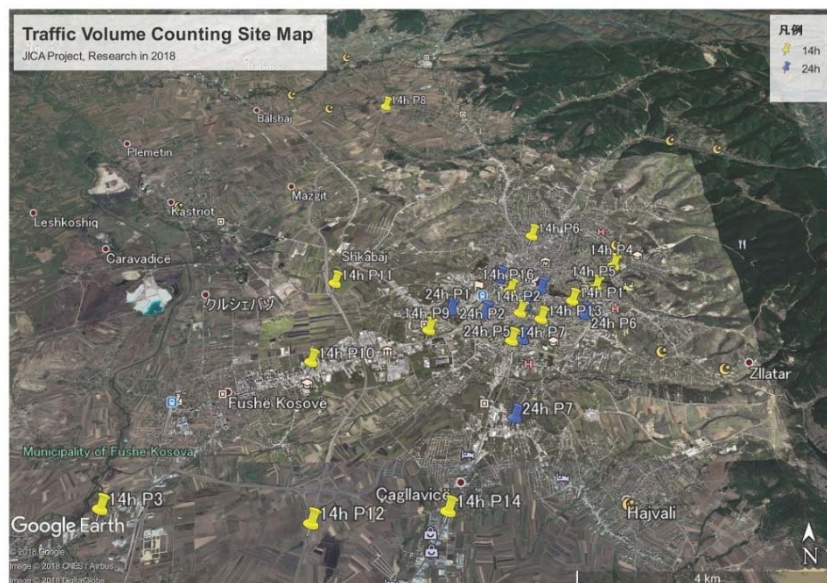
Newsletter No.3 (2018 August)

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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Capacity Development Project for Air Pollution Control in the
 Republic of Kosovo

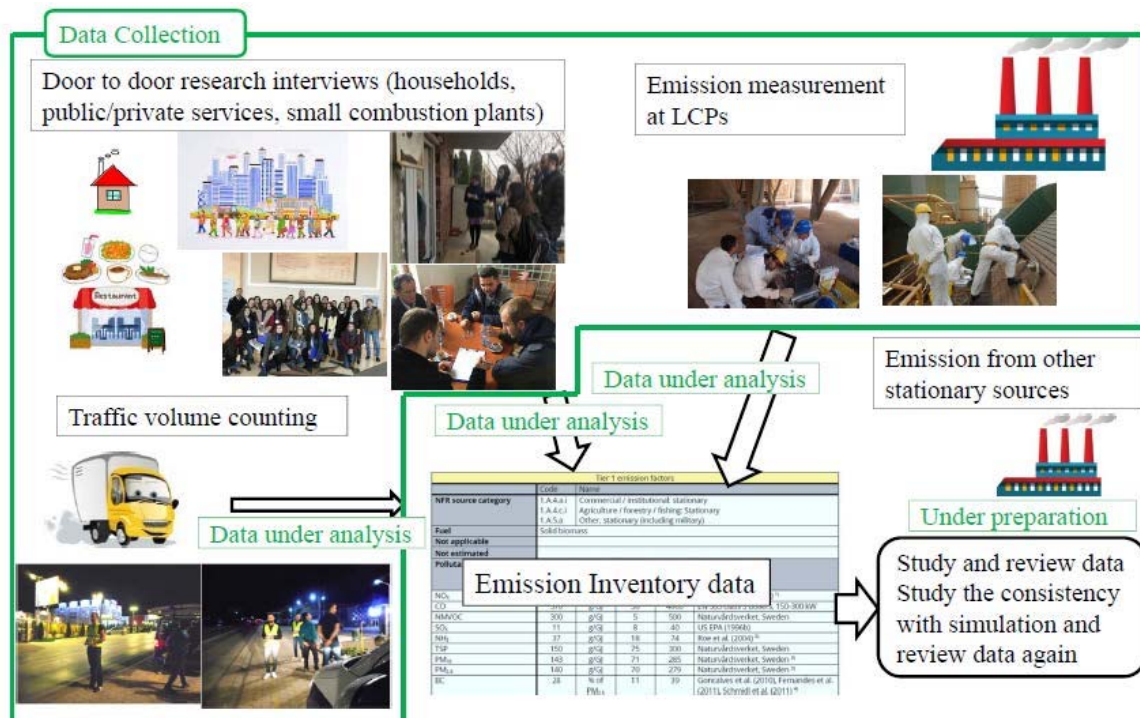
Newsletter No.3 (2018 August)



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..





Japan International Cooperation Agency
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Capacity Development Project for Air Pollution Control in the
Republic of Kosovo

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 (SO₂), 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, SO₂ 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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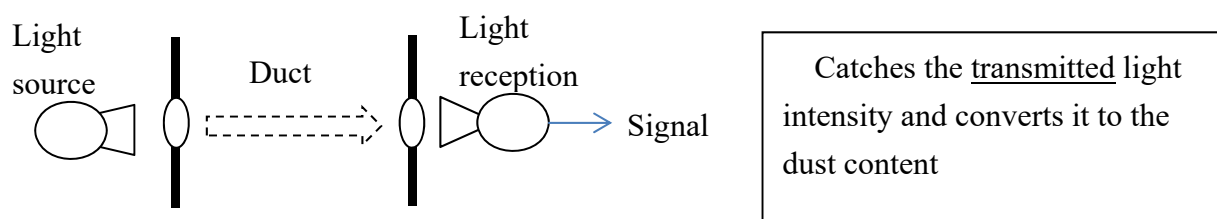
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analyzer. However, dust meter requires the calibration by the technology which the Project has tried to transfer and the values from dust meters cannot be sufficiently reliable as they have not been calibrated by this method. At the same time, the Project has prepared a portable automated gas analyzer which enables measurement at any time and as necessary.

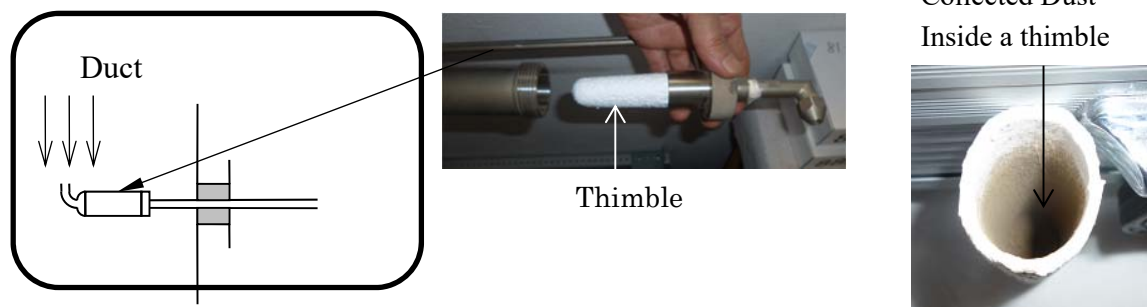
The following is the explanation about the dust measurement technology.

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.





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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 SO₂, 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.