

ASEAN Member States Meeting on Soot-Free Transport

Senior Level Consultation on EURO 4/IV Implementation
and EURO 6/VI Roadmap

11-12 October 2018
Bangkok, Thailand



SUMMARY REPORT

Table of Contents

OPENING	3
OBJECTIVES.....	4
STATUS OF VEHICLE EMISSION STANDARDS IN THE ASEAN REGION	6
ASEAN CONSULTATIVE COMMITTEE ON STANDARDS AND QUALITY (ACCSQ).....	6
CAMBODIA.....	6
INDONESIA	7
LAO PDR.....	7
MALAYSIA.....	8
MYANMAR.....	8
THAILAND	9
VIETNAM	9
ROUNDTABLE DISCUSSIONS.....	10
EURO 4/IV HARMONIZATION	10
EURO 6/VI HARMONIZATION	11
OBSTACLES TOWARDS SOOT-FREE TRANSPORT IN ASEAN.....	11
CLOSING	13
ANNEX 1 SOOT FREE ASEAN JOINT TECHNICAL WORKPLAN.....	14
ANNEX 2 A: AGENDA	16
ANNEX 2B: LIST OF PARTICIPANTS	18

Opening

1. The Climate and Clean Air Coalition (CCAC) Heavy-Duty Vehicles Initiative (HDVI) is supporting the Association of South East Asian Nations (ASEAN) to reduce the air pollution and near-term climate impacts of diesel emissions in the on-road transport sector. The “ASEAN MEMBER STATES MEETING ON SOOT-FREE TRANSPORT: Senior Level Consultation on EURO 4/IV Implementation and EURO 6/VI Roadmap” was convened on 11-12 October 2018 in Bangkok, Thailand.
2. Senior level representatives from the Ministry of Environment and Ministry of Transport in ASEAN countries, which include Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Thailand, and Vietnam, participated in the meeting. Senior representatives of international organizations, co-leads of HDVI, and other local experts also attended the consultation. The list of participants is attached as Annex 2B of the report.
3. The International Council on Clean Transportation (ICCT), on behalf of the CCAC HDVI, has joined with the Asian Institute of Technology (AIT), represented by the Regional Resource Centre for Asia and the Pacific (RRC.AP) to organize this meeting. Both ICCT and RRC.AP organized this meeting in cooperation and coordination with the Pollution Control Department (PCD), Ministry of Natural Resources and Environment, Thailand, and UN Environment, Regional Office for Asia and the Pacific.
4. Mr. Thalearnsak Pethsuwan, Deputy Director General, Pollution Control Department (PCD), Ministry of Natural Resources and Environment, Thailand, delivered opening remarks. He expressed gratitude for representatives from several ASEAN member states and the participants attending the meeting to exchange views and discuss further cooperation across ASEAN to deal with air pollution from vehicles, including greenhouse gases (GHGs). He emphasized that ASEAN countries face air pollution and climate change problems from the use of energy, especially in the transport sector, and that Thailand is no different from other member states. He mentioned that the energy consumption data from last year showed the transport sector consumes 38 (thirty-eight) per cent of national energy. He highlighted some points regarding Thailand which include: a) Thailand invests much in air pollution control in the transport sector, particularly in efforts to improve vehicle emission standards and fuel quality; b) Thailand has adopted emission standards for new vehicles since 1995, following the European emission standards; c) right now, the Euro 4 standard is enforced for light duty and gasoline vehicles, while the EURO III standard is enforced for heavy duty vehicles and motorcycles; d) for fuel quality, Thailand has adopted petroleum fuel specifications since 1989; e) since then, gasoline and diesel fuels used in Thailand have undergone revisions several times, and current fuel quality meets Euro 4 standards.
5. Mr. Ray Minjares, Clean Air Program Lead, International Council on Clean Transportation (ICCT) gave his opening remarks. He expressed thanks to PCD for co-hosting the event and he recognized that Thailand is one of the key leaders on transport sector emission controls. He acknowledged the presence

of other co-leads of the Heavy Duty Vehicle Initiative (HDVI) of the CCAC, e.g. Canada, Switzerland, and UN Environment. He highlighted that HDVI focuses more on diesel emissions because diesel engines produce 99 percent of transport-sector emissions of black carbon. Black carbon is a major component of soot and is produced by incomplete combustion of fossil fuel. It has a warming impact on climate. It is a primary component of particulate matter in air pollution that is the major environmental and global issue causing premature death globally. He stressed that the meeting was organized to identify common obstacles to implement low-sulfur fuel and Euro 4/IV vehicle emission standards and advance to Euro 6/VI among member states. Based on these obstacles, our aim is to develop an ASEAN Soot-Free Technical Workplan to shape future technical assistance offered directly to individual ASEAN members and offered at the regional level in support of a harmonized roadmap.

6. Mr. Naoya Tsukamoto, Director, RRC.AP, delivered welcome remarks on behalf of AIT RRC.AP, the meeting secretariat. He mentioned that scientific evidence shows that human well-being, especially poverty and equity, are affected by all atmospheric environment issues. It is clear that air pollution from human activities constitutes one of the most important environmental issues affecting sustainable development across the world. He stressed that along with air pollution issues, events and activities, including acid deposition, the UN Environment Asia and RRC.AP had convened this week the 18th Session of the Scientific Advisory Committee (SAC18) on Acid Deposition Monitoring Network in East Asia (EANET) in Hanoi, Vietnam. He pointed out the current implementation of activities by the Malé Declaration on Control and Prevention of Air Pollution and its Likely Transboundary Effects for South Asia (Malé Declaration), being coordinated by RRC.AP as the Secretariat of the network. He expressed his gratitude to PCD for co-hosting the meeting, the CCAC, ICCT, UN Environment, co-leads of HDVI and all participants. He also thanked the ASEAN countries for their active involvement and stressed that their contribution in implementing activities at the national level on vehicular emission standards and mitigation of emissions will enable this world to move rapidly toward achieving our goals for better air quality in this region.

Objectives

7. Dr. Supat Wangwongtana, Policy and Technical Advisor, RRC.AP introduced and chaired the meeting. As a background, he stressed that nine out of every ten people breathes unhealthy air. In 2016, an estimated 4.2 million premature deaths resulted from chronic exposure to ambient fine particulate matter and ambient ozone, reducing global average life expectancy at birth by about 1 year. He presented the Global Burden of Disease 2015: ranking of risk factors globally for total deaths from all causes for all ages and sexes in 2015. Exposure to ambient particulate matter pollution is among the top ten global risk factors. He elaborated the meaning and importance of some current terminology, current implementation, including the actions taken on them, which include Short-Lived Climate Pollutants (SLCPs); Climate and Clean Air Coalition (CCAC); Heavy Duty Vehicles Initiative (HDVI), among others. He pointed out that HDVI is an initiative of CCAC with the aim to promote reductions of SLCPs, in particular black carbon (BC) from heavy duty vehicles.

HDVI developed a “Global Strategy to Introduce Low-Sulfur Fuels and Cleaner Diesel Vehicles” which was endorsed by the partners in 2016. The objective of the HDVI is to virtually eliminate fine particle and black carbon emissions from new and existing heavy-duty diesel vehicles and engines through the introduction of low-sulfur fuels, and vehicle emission standards, including measures which address existing vehicles such as through green freight programs.

8. Mr. Ray Minjares, ICCT addressed specifically the objectives of the meeting. He pointed out that the meeting is aimed at harmonization of standards and development of a joint technical workplan towards this end. We care about international harmonization of standards because air pollution is an international issue. He stressed that controlling diesel emissions is an urgent issue. He mentioned that based on World Bank in 2010, half of deaths from motor vehicle air pollution occur in Asia. He called attention to the World Health Organization study on the Health Effects of Black Carbon (2012). According to the International Agency for Research on Cancer, diesel engines are a key target, as the scientific evidence is compelling and the working group’s conclusion is unanimous: diesel engine exhaust causes lung cancer in humans. Black carbon causes strong climate warming. He emphasized that heavy-duty vehicles account for ~80% of black carbon from diesel road transport. The technology pathways for soot-free engines include: Euro VI or US 2010, where diesel engines require 10-15 ppm S diesel; older diesel engines require a ceramic wall-flow diesel particulate filter; gas engines using biogas or fossil gas are soot-free; and zero emission electric drive engines such as battery-electric, fuel cell, trolley-electric, etc. are soot-free. He stressed that Euro VI engines deliver soot-free emissions, so harmonization around Euro 6/VI fuel and vehicle standards in the ASEAN region can deliver soot-free transport. He concluded by sharing information about ICCT resources on Soot-Free Transport, including an ICCT website, Facebook Soot Free Transport page (<https://www.theicct.org/soot-free-transport-resources>), Youtube Soot Free Transport videos posting and related CCAC activities, including the Global Industry Partnership on Soot-Free Clean Bus Fleets a new Soot-Free Technology Advisory Group, among others.
9. The meeting objectives include:
 - To identify common obstacles and challenges to implement low-sulfur fuel and Euro 4/IV vehicle emission standards and advance to Euro 6/VI among ASEAN countries and exchange best practices.
 - To develop a joint technical workplan to address the support needed among ASEAN countries to overcome fuel quality and vehicle emission standard implementation challenges with an aim towards regional harmonization around soot-free Euro 6/VI emission levels.

Status of vehicle emission standards in the ASEAN region

ASEAN Consultative Committee on Standards and Quality (ACCSQ)

10. Asst. Prof. Phulporn Saengbangpla, Chair, ASEAN Consultative Committee for Standards and Quality (ACCSQ) presented on harmonization of vehicle emission standards in ASEAN. The automotive sector has worked to reduce emissions for 20 years and the emission standards have become more stringent over this time: starting from Euro I/1 up to Euro VI/6. The ASEAN members have tried to catch up with the most stringent standards. In order to comply with the objectives of an ASEAN “One Vision, One Identity, One Community”, the ASEAN Automotive Product Working Group (APWG) tries to harmonize standards in ASEAN. The member states have been working together for more than 10 years to harmonize standards across several regulations, including emission standards. Her presentation included:

- Current status of harmonization on 19 UNR – Phase 1
- Current status of harmonization on 10 UNR (AMS input)
- Roadmap towards harmonization on emission regulations (light vehicle - Petrol) – UN R83 applicable to M1 vehicle category;
- Roadmap towards harmonization of emission regulations (light vehicle - diesel) - UN R49 / UN R83 applicable to N1 vehicle Category;
- Roadmap towards harmonization of emission regulations for motorcycles – UNR 40 only applicable to L category vehicles;
- Roadmap towards harmonization of fuel properties (petrol and diesel);
- Update on analysis on suitability of 22 UN Regulations (Phase 1 and 2);
- Roadmap for ASEAN member states to join the 1958 agreement.

11. Following the presentation, there was an exchange of ideas and sharing of experiences among the participants highlighting the issues as follows:

- On current production of cars and motorcycles in Thailand, it was clarified that Euro 4/IV has been applied for new production.
- In Japan, Metropolitan Government of Tokyo has issued Euro 6/VI, almost 10 years ago.
- It was pointed out that car manufacturers could produce Euro 3/III, 4/IV, 5/V, 6/VI to be exported. It is up to the country whether to adopt stricter standards on manufacturers who have the knowledge and capacity to produce e.g. Japanese manufacturers

Cambodia

12. Mr. Pak Sokharavuth, Deputy Director General, General Directorate of Environmental Protection, Ministry of Environment (MoE), Cambodia presented on “Fuel quality and vehicle emission standards in Cambodia, opportunities and challenges”. He started by introducing the organizational structure of MoE, existing legislation and its applications. He highlighted the Gas Emission Standards of Mobile Sources and the Sub-decree on Air Pollution Control and Noise Disturbance. He also presented on the current fuel standards, i.e sulfur, lead, benzene, and aromatic hydrocarbons. Key issues should be addressed to improve current air pollution problems, including: sub-decree in 2000 almost

20 years old needs to be amended; lack of equipment and laboratory to conduct fuel quality control as well as mobile emission inspection; capacity building at local level is required to ensure good performance on air pollution control; no experience with field inspection of mobile sources; lack of cooperation or partnership between public sector, private sector and international organizations; and need to develop regulatory framework at the national and provincial/municipal levels under the consideration of decentralization concept.

Indonesia

13. Ms. Ratna Kartikasari, Sub Directorate of Air Pollution Control from Mobile Sources, Ministry of Environment and Forestry (MOEF), Indonesia presented on the “Implementation of EURO 4 in Indonesia”. She stressed that the automotive industry in Indonesia continues to grow year by year, that many large car manufacturers have built their own factory in Indonesia. The energy crisis and air pollution have become more serious problems. She mentioned that on March 10, 2017 a regulation on EURO 4 was signed by Minister of MOEF: No. P.20/MENLHK/SETJEN/KUM.1/3/2017. Regarding fuel availability, in 2016 Minister of Environment and Forestry (MOEF) issued formal letter to Ministry Energy and Mineral Resources (MOER) to make new specifications for EURO 4 fuel. She also presented the Euro 4 diesel limit. The Ministry of Transportation in 2018 has inaugurated an emission testing laboratory for vehicles (R 40 and R 83) with Euro 4 technology as one of the type approval requirements. The Ministry of Energy and Mineral Resources has issued a fuel specification equivalent to euro 4 (Decree of the Director General of Oil and Gas No. 0177.K / 10 / DJM.T / 2018 concerning Standards and Quality (Specifications) of Fuel Gasoline RON 98 which is marketed domestically). The Ministry of Transportation issues technical guidelines for emission testing for motorized vehicles with EURO 4 technology (Decree of the Director General of Land Transportation Number SK./AJ.402/DRJD/2018 concerning Technical Guidelines Implementation of New Type and Current Production of Vehicles Emissions in the Category M, N and O). On challenges, she stressed that: MoEF has to revise the Ministry Regulation on Emission Standards for In-use Vehicles (Regulation number 5/2006) to accommodate the new regulation (on emission standard vehicle) once its implemented; MoEF has to ask Ministry of Energy and Mineral Resources to issued new specification of Euro 4 for diesel, encouraging Pertamina to provide and distribute fuel equivalent to Euro 4 more widely and campaign to encourage people to use better fuels.

Lao PDR

14. Mr. Intha Kongkhammanivong, Technical Officer, Department of Transport, Ministry of Public Works and Transport, Lao PDR made a presentation on “Overview of Vehicles Standard and Fuel in Lao PDR”. He gave vehicle fleet statistics in Lao PDR: from 2000 to 2018, Lao PDR experienced growth of 2,045,652 units, equal to 13% per year. He presented the pollution control standards for new vehicles in Lao PDR, the air pollution control standards for used vehicles, and standards for fuel (diesel and gasoline). He highlighted the on-going plan in Lao PDR, which includes: 1) creating additional standards for vehicles; 2) accept ASEAN Mutual Recognition Arrangement on Type Approval for Automotive Products; 3) develop Roadmap of Harmonization on Emission

Regulation (Motorcycle) Euro 4, 2016 - 2024, (Heavy Vehicle - Diesel) Euro IV 2016 - 2024 (Light Vehicle - Petrol) Euro 4, 2016 - 2024 and Roadmap of Harmonization on Fuel Properties (Petrol), (Diesel) Euro 4, 2016 - 2024; and 4) exchange experiences with neighboring countries on emission laws. On problems and challenges he highlighted as follows: inspections are not yet complete because of car and fuel consolidation; the inspection center legislation is under consideration/ for approval by the Minister; lack of equipment for measurement and inspection not yet conducting roadside inspection; some provinces are not yet establishing inspection centers; and limitation of government's budget.

Malaysia

15. Ms. Syarina Binti Kassim, Deputy Undersecretary, Environmental Management and Climate Change Division, Ministry of Energy, Science, Technology, Environment and Climate Change, Malaysia presented on current fuel quality and vehicle emission standards in Malaysia, including opportunities and implementation challenges. As a background, she presented on National Environment Policy, the Environment Quality Act 1974, (enacted to prevent abate, control pollution and enhance the quality of environment); Clean Air Action Plan (CAAP), 2010. She explained the Motor Vehicles Emission Reductions Strategy, which includes: to reduce travel demand through integrated land-use planning; to promote the use of public transport; to introduce stricter emission standards by improving engine technology and fuel quality; to increase in-use vehicles inspection and maintenance program through regulatory measures; and to improve traffic management by encouraging mass transit options, effective traffic management that reduces congestion. She presented on the roadmap on diesel quality improvement and emission standards for vehicle type approval. Regarding challenges, she emphasized that: oil companies – constrained in term of refineries and shared facilities; pricing mechanism; and degree of awareness of environmental impact.

Myanmar

16. Dr. Tin Tin Thaw, Deputy Director, Environmental Conservation Department, Ministry of Natural Resources and Environmental Conservation presented on "The Challenges of Fuel Quality and Vehicle Emission Standard in Myanmar". She presented the current situation in Myanmar and highlighted that Myanmar has been facing considerable challenges in environmental management such as pollution of water and air, ever since the country's transition to civilian rule in 2011 fueled investments and industrial growth; environmental considerations are emerging from the economic development of Myanmar since 2012; and the awareness and practices of conservation of environment are still limited. In order to control such problems, the Government of Myanmar enacted Environmental Conservation Law in 2012 and established the Environmental Conservation rule in 2014. The Environmental Impact Assessment procedure was released in 2015. These regulations were the first and only laws existent in the country that served as guidance documents for the government, until other regulations are issued in 2018. She presented the Automotive Policy (Draft) with the Vision to increase the usage of vehicles with affordable prices

in each and every sector. Its objectives include: To develop a sustainable Automotive Policy; to support the nation's transportation and economy through the development of auto-related industries; to develop auto-related industries such as production, distribution, sales and service as well as maintenance-related technologies; to define and promulgate standards for quality assurance and least impact on environment; to earn more job opportunities and attract foreign investments effectively; and to establish auto-related industrial sector by connecting and entering into global market and production network.

Thailand

17. Mr. Thalearnsak Pethsuwan, Deputy Director General, Pollution Control Department (PCD) of Thailand made a presentation on "Thailand's Future Plans for New Vehicle Emission Standards". He highlighted the number of vehicles registered in Thailand and the fuel consumption in Thailand, 1993-2016. He presented a graphical illustration of the air quality in Bangkok compared with number of vehicles. He also presented on particulate matter (PM_{2.5}) 24 hr. avg. in Bangkok from 2011-2017; EURO emission standards for light duty gasoline vehicles; EURO emission standards for light duty diesel vehicles; phasing down sulfur in gasoline fuel in Thailand; phasing down sulfur in diesel fuel in Thailand; and exhaust emission standards enforcement in Thailand (past – 2018). He pointed on needs for 10 ppm S diesel and gasoline fuels; PM (in particular PM_{2.5}) and O₃ still exceed ambient air quality standards; increasing level of O₃ in particular in the inner part of Bangkok; increasing vehicle population especially in Bangkok; extreme traffic congestion in urban areas; dispersion of air pollutants in urban areas become limited due to increasing numbers of high-rise buildings; and it is highly likely that air quality in urban areas in particular Bangkok will become worse again. He highlighted the development of a future roadmap for implementing mitigation measures in the transport sector in Thailand, which includes: Pollution Control Board of Thailand established a Sub-Committee on Emission Standards for Motor Vehicles in Thailand; the sub-committee established 4 task forces (Task Force on Vehicle Emission Standards, Task Force on Fuel Quality Standards, Task Force on Inspection and Maintenance Program, and Task Force on Emission Inventory for Bangkok); the sub-committee plans future fuel quality and vehicle emission standards and their implementation timelines by the first quarter of 2019 for submission to the Pollution Control Board.

Vietnam

18. Mr. Vu Tat Dat, Officer, Waste Management Division, Vietnam Environment Administration (VEA), Ministry of Natural Resources and Environment (MONRE) presented on "Fuel quality and emission standards in Vietnam". He highlighted the urban air quality challenge and stressed that PM is the most serious air pollutant in Vietnam; 70% of air pollution in Hanoi is caused by traffic (Source: CEM, 2017). On fuel quality, he presented the National Technical Regulation on gasoline, diesel fuel oils and biogasoline (QCVN 1:2015/BKHHCN). He highlighted the current situation of vehicle demand, fuel demand, and bio-gasoline demand in Vietnam. Regarding Euro 4/IV implementation, he pointed out as follows: Starting on 01 January, 2017, Ministry of Transportation (MOT) applied testing, license and registry

equal to Euro 4/IV standards for cars, Euro 3/III standards for motorcycles; and starting on 31 March, 2017, vehicles using diesel that do not pass the standard have to move to seaports and to border gates. On opportunities, he stressed as follows: access to clean, environmentally friendly fuel to reduce the risk of pollution; vehicle manufacturers need to innovate to meet standards; develop biofuels to reduce the impact of oil suppliers; reduce costs for fuel, control prices of other goods and stabilize trading. Some challenges posed include: changing habits for biofuel; remove old, unqualified vehicles and pressure domestic manufacturers; investment cost for ethanol industry; and renovation cost for fuel stations and vehicle registry. He concluded that: the Euro 4/IV roadmap is effective for vehicles produced or imported but not yet fully applied to vehicles used; many motorcycle are using Euro 3/III. The road map should have an effective way to handle these vehicles. The Euro 6/VI roadmap application depends on quantity, type, fuel, transportation and characteristics of each country.

Roundtable Discussions

Euro 4/IV harmonization

19. Dr. Supat Wangwongwatana facilitated. The following questions were used as guidance in the discussion:

- What are the common regional challenges for 50ppm S fuel quality standard reform?
- What are the common regional challenges for Euro 4/IV emission standard reform and implementation?
- What other regional challenges exist around Euro 4/IV implementation?
- What specific research and technical support activities can help to overcome these challenges to fully harmonize Euro 4/IV standards in ASEAN?

20. Major discussions and conclusions include:

- Significant challenges regarding political will and need to convince policy makers on the need and benefit of stringent standards.
- Obstacles raised on fuel quality and testing capability;
- Governments focus more on socio-economic development rather than environment;
- Suggestion on staff taking on monitoring capability;
- Lacking in emission testing capability; one recommendation is to use On-Board Diagnostic (OBD) systems (computer-based system originally designed to reduce emissions by monitoring the performance of major engine components);
- Awareness raising for public and policy makers is needed;
- There is lack of data in ASEAN countries;
- There is a need for multi-agency involvement in the countries, e.g. Ministry of Environment, Ministry of Transport, Ministry of Finance, etc.;
- Issues were raised on inspection and maintenance of vehicles;
- Bio-fuel standards are not implemented; and
- Need for cost and capital investment.

Euro 6/VI harmonization

21. Ms. Zifei Yang, Researcher, ICCT presented on “Transitioning from Euro 4/IV to Euro 6/VI”. She informed that more than 60% of new vehicles globally will require soot-free diesel engines equal to Euro VI by 2021. Some countries accept certificate from multiple standards, certified in other countries and sell in their own markets. She further informed that 50% of G-20 Nations require soot-free diesel engines equal to Euro VI. Regarding ASEAN status, she highlighted as follows:

- Indonesia: Euro 4 2018/IV 2021 (Euro IV for gasoline, diesel standards necessary)
- Philippines: Euro 4 2016/IV 2018
- Thailand: Euro 4 since 2012

22. She pointed out that more countries are on the way to EURO 6/VI, which include:

- Singapore: move to Euro 6 in Sep 2017/Euro VI in Jan 2018
- Mexico: Euro VI/US2010 in 2021
- China: move to China 6/VI in 2020
- India: leapfrog from BS IV to BS VI in 2020
- Georgia and Panama Euro 6/VI in 2021
- Thailand: planning roadmap to Euro 6/VI
- Brazil: Euro VI in 2023

23. She stressed that Euro 6/VI is a world class emission standard. She mentioned that small tuning is required to move to Euro 5/6 for gasoline vehicles, that Euro 6/VI implies changes to vehicle technology for diesel vehicles. She presented on key technologies to achieve Euro 6/VI, e.g. diesel particulate filter (DPF) and selective catalytic reduction (SCR), and illustration of Euro VI technology options. She pointed out that real emissions get better for heavy-duty vehicles once reach Euro VI. She also highlighted the comparison between Euro VI and China VI PEMS standard.

24. Mr. Ray Minjares facilitated a second roundtable discussion guided by the following questions:

- What are the common regional challenges for 10ppm S fuel quality standard reform and implementation?
- What are the common regional challenges for Euro 6/VI emission standard reform and implementation?
- What other regional challenges exist around Euro 6/VI implementation?
- What specific research and technical support activities can help to overcome these challenges to fully harmonize Euro 6/VI standards in ASEAN?

Obstacles Towards Soot-Free Transport in ASEAN

25. Mr. Ray Minjares wrapped up the roundtable 2 discussion, and highlighted main obstacles, issues and support needed. He summarized the key elements to be

captured, and the process to go forward. (A detailed workplan on Soot-Free Transport in ASEAN is included in Appendix 1):

I. Process obstacles

- I.1** There is no agenda on ASEAN on Soot-free Transport in the region;
- I.2** Inter-agency coordination and coordination of relevant ministries (Ministry of Environment, Ministry of Finance, Ministry of Transport, Ministry of Commerce, Ministry of Industry; Customs, etc.) at the national level.
- I.3** Public awareness among policy makers and the public. Awareness provides political support. Public awareness within ministries is lacking and becomes a barrier in the process.
- I.4** Process on adopting emission standards and fuel quality standards, including mutual recognition agreements

II. Knowledge Obstacles

- II.1** Fuel quality testing capability and enforcement in the region is lacking; capacity building is needed
- II.2** Status of OBD application and utilization in the region is unknown;
- II.3** Urea infrastructure and utilization in the region is unknown
- II.4** Real-world emissions performance in the region is unknown; validation of existing Euro 4/IV vehicles is needed
- II.5** Cost-benefit analysis needs to be undertaken to support decision making; CBA of soot-free transport needed in ASEAN.
- II.6** Absence of inspection centers;
- II.7** Cost of refinery upgrade and obstacles to investment
- II.8** Cost of vehicle technology and obstacles to investment among manufacturers; change in market price of vehicles with cleaner technology
- II.9** Data, information, and technical capacity, especially among the smallest countries in the region
- II.10** Access to Portable Emissions Measurement System (PEMS) (a vehicle emissions testing device/equipment)
- II.11** Future practice of in-service conformity check of vehicles in the region and mutual recognition of recalls;
- II.12** Effect of bio-fuels blends on Euro 6/VI and older diesel engines

26. The meeting requested potential sponsors including international development agencies, UN, and other donors to provide financial support to the joint workplan on soot-free transport in ASEAN. ICCT is committed to long term support and close communication is necessary for way forward.

Closing

27. Mr. Ray Minjares delivered the closing remarks. He thanked the warm hospitality of the organizers and thanked all the participants for a very active discussion. He thanked the AIT for its strong organization of the meeting, to CCAC for sponsoring the meeting, and to the Swiss Agency for Development and Cooperation and other HDVI partners including Canada and UN Environment for their attendance. He pointed out that we have launched a very important agenda with global impact. He hoped that we will work together to carry the agenda forward. He gave his reflections on the 2-days discussions. In closing, he mentioned that the report of the meeting will be the report of the HDVI and will be posted electronically in the CCAC website. He had noted some processes are identified at the meeting.
28. Dr. Supat also thanked the participants. He hoped that ASEAN participants could make the outcome of the meeting a reality in their respective country.
29. Likewise, Ms. Adelaida B. Roman, on behalf of the meeting secretariat, expressed her deepest gratitude to ICCT and all participants including the co-host country, Thailand and to Dr. Supat for all the great contributions to the meeting. She looked forward to working continuously with the ASEAN countries on soot-free transport and with the partner organizations. She stressed that the report of the Meeting will be developed and be transmitted to all participants.

Annex 1 Soot Free ASEAN Joint Technical Workplan

1. Put Soot-Free Transport on the ASEAN agenda; request the support of the Government of Thailand, who will chair ASEAN in 2019; identify with the support of the ASEAN Secretariat the relevant committees to be assigned a role in carrying forward the agenda; delegate to these committees the responsibility to harmonize fuel quality and vehicle emission standards across the region.
2. Establish Inter-agency Task Force on Soot-Free Transport in each ASEAN country to define a timeline and appropriate regulations to implement fuel quality standards, vehicle emission standards, compliance and enforcement.
3. Undertake a public awareness campaign on soot-free transport in the ASEAN region.
4. Undertake a fuel quality survey of ASEAN member states; undertake a survey of fuel quality testing capability and enforcement in the region; establish a program of capacity building and investment around fuel quality compliance and enforcement in ASEAN member states.
5. Undertake a survey of OBD regulations in effect in ASEAN member states; survey the utilization of OBD in inspection and maintenance programs, including the presence of inspection centers and their utilization; make recommendations for greater utilization of OBD.
6. Undertake a survey of urea availability and utilization in the region; make recommendations for policy design to support urea infrastructure deployment in the region.
7. Assess the real-world emissions performance of light-duty and heavy-duty vehicles in the region with PEMS, remote sensing; and laboratory-based emissions measurement equipment; validate the compliance and enforcement of vehicles required to meet the Euro 4/IV standard for gasoline and diesel fuels.
8. Undertake a cost-benefit analysis of soot-free transport in ASEAN; develop capacity for cost-benefit analysis in ASEAN.
9. Estimate the incremental cost to deliver fuels needed for soot-free transport; identify obstacles to investment; make recommendations for technical and regulatory activities.
10. Estimate the incremental cost of vehicle technology to deliver soot-free transport in ASEAN; identify obstacles to investment within the vehicle manufacturing sector; make recommendations.
11. Identify capacity building needs among the smallest countries in the region and recommend activities to support these countries with compliance and enforcement measures.

12. Identify and make available a Portable Emissions Measurement System (PEMS) to the ASEAN Secretariat or other research partner and establish a round robin training and data collection program to give ASEAN member states familiarity with the equipment.
13. Develop guidelines for in-service conformity check of vehicles designed to Euro 6/VI emission standards in the region; identify activities to be undertaken jointly by ASEAN member states to implement effective compliance and enforcement measures of Euro 6/VI.
14. Evaluate the effect of bio-fuels blends on Euro 6/VI and older diesel engines.

Annex 2 A

Agenda

Day 1: 11 October 2018 (Thursday)

Time	Tentative Agenda	Speaker/Expert Presenter
9:00 – 9:20	Opening Remarks	Mr. Thalearngsak Pethsuwan Deputy Director General, PCD, Thailand -Mr. Ray Minjares, Clean Air Program Lead, ICCT, on behalf of CCAC
9:20- 9:30	Welcome Remarks	Mr. Naoya Tsukamoto Director, RRC.AP/AIT
9:30-9:50	Introduction and objectives of the meeting	Mr. Ray Minjares, ICCT/Dr. Supat Wangwongtana, Policy and Technical Advisor, RRC.AP
9:50-10:00	Group Photo	
10:00 – 10:15	Presentation on harmonization of vehicle emission standards in ASEAN	Asst. Prof. Phulporn Saengbangpla Co-chair, ASEAN Consultative Committee for Standards and Quality (ACCSQ)
10:15 – 10:30	Coffee/Tea Break	
10:30 – 12:30	Presentation on current fuel quality and vehicle emission standards by each country, including opportunities and implementation challenges (20 minutes per country)	Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Facilitator: Ms. Adelaida B. Roman, RRCAP

12:30- 13:30	LUNCH	
13:30-14:50	Presentation on current fuel quality and vehicle emission standards by each country, including opportunities and implementation challenges (continue)	Thailand, Vietnam
14:50-15:00	Q&A/General Discussion	
15:00-15:15	Coffee Break/Tea Break	
15:15-17:00	Roundtable 1 Discussion: Implementation of low sulfur fuel (50 ppm S) and Euro 4/IV vehicle emission standards	Facilitator: Dr. Supat Wangwongwatana
17:00	End of first day	
18:30	Reception Dinner	Bangkok, Thailand

Day 2: 12 October 2018 (Friday)

Time	Tentative Agenda	Speaker/Expert Presenter
9:00 – 9:15	Recap of the first day	Dr. Supat Wangwongwatana
9:15- 10:45	Roundtable 1 Discussion (continue...)	Facilitator: Dr. Supat Wangwongwatana
10:45-11:00	Coffee Break/Tea Break	
11:00-11:30	Presentation on the description of the differences between the Euro 4/IV standard and Euro 6/VI standard for fuels, vehicles, and compliance/enforcement.	Ms. Zifei Yang, ICCT
11:30-12:30	Roundtable 2 Discussion: Roadmap for ultra-low sulfur fuels (10 ppm S) and Euro 5/V and Euro 6/VI vehicle emission standards	Facilitator: Mr. Ray Minjares, ICCT
12:30- 13:30	LUNCH	

13:30– 15:30	Roundtable 2 Discussion (continue)	Facilitator: Mr. Ray Minjares, ICCT
15:30-16:00	Coffee/Tea Break	
16:00-17:00	Summary of the discussion during the 2-day meeting and presentation on elements of the overall work plan.	Mr. Ray Minjares, ICCT
17:00	Closing of the Meeting	

Annex 2B: List of Participants

ASEAN Member States

Cambodia

Mr. Pak Sokharavuth
Deputy Director General
General Directorate of Environmental Protection
Ministry of Environment
Morodok Techo Building (Lot 503), Tonle Bassac, Chamkarmorn, Phnom Penh
Cambodia
Tel:+85512962103
Email: sokharavuth@online.com.kh

Lao PDR

Mr. Intha Kongkhammanivong
Technical Officer
Department of Transport
Ministry of Public Works and Transport
Vientiane, Lao PDR
Tel: 020-22002624
Email: intha1987@outlook.com

Myanmar

Dr. Tin Tin Thaw
Deputy Director

Indonesia

Ms. Ratna Kartikasari
Sub Directorate of Air Pollution Control from Mobile Sources
Ministry of Environment and Forestry
Indonesia
Tel: +62-21-858-11207,
Fax:+62-21-859-11207
Email: emaknyauyi@yahoo.com

Malaysia

Ms. Syarina Binti Kassim
Deputy Undersecretary
Environmental Management and Climate Change Division
Ministry of Energy, Science, Technology, Environment and Climate Change
Wisma Sumber Asli, No.25 Persiaran Perdana Presint 4,62574 Putrajaya
Malaysia
Tel: +603-88861138/ +6013-5126374 10;
Fax: +603-8888 4473
Email: syarina@nre.gov.my

Thailand

Mr. Thalearnsak Pethsuwan
Deputy Director General

Environmental Conservation Department
Ministry of Natural Resources and
Environmental Conservation
Office No. (53), Environmental Quality
Standard Division, Environmental
Conservation Department, Nay Pyi Taw,
Myanmar
Tel: +9595150594: Fax: 067431321
Email: dr.tintinhaww@gmail.com

Pollution Control Department (PCD)
92 Soi Phaholyothin 7, Phaholyothin Road
Sam Sen Nai, Phayathai
Bangkok 10400, Thailand
Email: thalearnsak.p@pcd.go.th

Vietnam

Mr. Vu Tat Dat
Officer, Waste Management Division
Vietnam Environment Administration (VEA),
Vietnam Ministry of Natural Resources and
Environment (MONRE)
No 10 Ton That Thuyet str., Cau Giay, Hanoi
Vietnam
Email: yudatkson@gmail.com

International Organizations

Asian Institute of Technology

Dr. Nguyen Thi Kim Oanh
Professor, Environmental Engineering and
Management
Asian Institute of Technology (AIT)
P.O. Box 4
58 Moo 9, Km. 42, Paholyothin Highway,
Klong Luang, Pathum Thani 12120
Thailand
Email: kimoanh@ait.asia

International Council on Clean Transportation (ICCT)

Ms. Zifei Yang
Researcher
International Council on Clean Transportation
(ICCT)
1225 Eye Street, NW, Suite 900 Washington,
DC 20005

International Council on Clean Transportation (ICCT)

Mr. Ray Minjares
Clean Air Program Lead
International Council on Clean
Transportation
595 Market Street, NW, Suite 1250
San Francisco, CA 94105
+1 (415) 399-9019
skypename ray_icct
@mrminjares

Swiss Agency for Development and Cooperation (SDC)

Mr. Reto Thönen
Global Programme Climate Change
and Environment (GPCCE)
Swiss Agency for Development and
Cooperation (SDC)
Freiburgstrasse 130
3003 Berne
Switzerland

Swiss Agency for Development and Cooperation (SDC)

Mr. Philippe Brunet
Programme Officer
Global Programme Climate Change and Environment (GPCCE)
Swiss Agency for Development and Cooperation (SDC)
Freiburgstrasse 130, 3003 Bern
Switzerland
Email: philippe.brunet@eda.admin.ch

UN Environment

Ms. Maria Katherina Patdu
Consultant/Coordinator
Asia Pacific Clean Air Partnership (APCAP)
UN Environment, Asia and the Pacific Office
UN Building, Rajadamnern Nok Avenue
Bangkok, 10200
Tel: +66 22 28 1443
Skype: kaye.patdu
Email: mariakatherina.patdu@un.org
<https://www.unenvironment.org/regions/asia-and-pacific>

Resource Person

Asst. Prof. Phulporn Saengbangpla
Automotive Engineering Building, 2nd Floor
Faculty of Engineering
Chulalongkorn University
254 Phyathai Road, Wang Mai, Pathumwan,
Bangkok 10330

Local Participants

Mr. Phunsak Theramongkol
Director of Air Quality and Noise Management Bureau
Air Quality and Noise Management Bureau
Pollution Control Department
E-mail: phunsak.t@pcd.go.th

Ms. Manwipa Kuson
Environmentalist, senior professional level
Automotive air pollution section
Air Quality and Noise Management Bureau
Pollution Control Department
E-mail: manwi.k73@gmail.com

UN Environment

Mr. Bert Fabian
Programme Officer
UN Environment, Asia and the Pacific Office
UN Building, Rajadamnern Nok Avenue
Bangkok 10200

Ms. Noochjariya Aransri
Head of Automotive air pollution section
Air Quality and Noise Management Bureau
Pollution Control Department
E-mail: noochjariya.a@pcd.go.th

Mrs. Kanjane Gunvachai
Scientist, Senior Professional Level
Department of Energy Business
E-mail: kanjane@doeb.go.th

Assoc. Prof. Dr.Savitri Garivait
Chairperson of Environmental Division
The Joint Graduate School of Energy and
Environment
King Mongkut's University of Technology
Thonburi, Bangkok
Thailand
E-mail: savitri.jgsee@gmail.com

Dr. Phatchaploy Vongmahadlek
Researcher
The Joint Graduate School of Energy
and Environment
King Mongkut's University of
Technology Thonburi
Bangkok Thailand
E-mail: ptbthao@gmail.com

RRC.AP, Meeting Secretariat

Mr. Naoya Tsukamoto
Director
Regional Resource Centre for Asia and the
Pacific (RRC.AP)
3rd Floor Outreach Building
Asian Institute of Technology
P.O. Box 4, Klong Luang,
Pathumthani 12120, Thailand
Tel. no. +662 524 5384
Fax no. +662 516 2125
Email: Naoya.Tsukamoto@rrcap.ait.ac.th

Ms. Adelaida B. Roman
Senior Programme Specialist
Regional Resource Center for Asia and the
Pacific (RRC.AP)
3rd Floor Outreach Building
Asian Institute of Technology
P.O. Box 4, Klong Luang,
Pathumthani 12120, Thailand
Tel. no. +662 524 5366
Fax no. +662 516 2125
Email: Adelaida.Roman@rrcap.ait.ac.th

Dr. Supat Wangwongwatana
Consultant
Regional Resource Centre for Asia and the
Pacific (RRC.AP)
3rd Floor Outreach Building
Asian Institute of Technology
P.O. Box 4, Klong Luang,
Pathumthani 12120, Thailand

Ms. Bayasgalan Sanduijav
Senior IT Specialist
Regional Resource Centre for Asia and the
Pacific (RRC.AP)
3rd Floor Outreach Building
Asian Institute of Technology
P.O. Box 4, Klong Luang,
Pathumthani 12120, Thailand
Email:
Bayasgalan.Sanduijav@rrcap.ait.ac.th

Ms. Nawaphorn Supakarn
Administrative Officer
Regional Resource Centre for Asia and the
Pacific (RRC.AP)
3rd Floor Outreach Building
Asian Institute of Technology
P.O. Box 4, Klong Luang,
Pathumthani 12120, Thailand

Ms. Thida Tieng
Administrative Officer
Regional Resource Centre for Asia and the
Pacific (RRC.AP)
3rd Floor Outreach Building
Asian Institute of Technology
P.O. Box 4, Klong Luang,
Pathumthani 12120, Thailand