

Minutes of Meeting
Project Steering Committee Meeting No. 1/2563
Application of industry-urban symbiosis and green chemistry for low emission and
persistent organic pollutants free industrial development in Thailand
9 September 2020, 12:00 – 16:30 (BKK Time)
at Lotus Suite 5-7, 23rd Floor, Centara Grand at Central World Hotel

Committee Members

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| 1. Mr. Prakob Vivitjinda
Director General, Department of Industrial Works | Co-chairperson |
| 2. Mr. Pralong Dumrongthai
Director General, Pollution Control Department | Co-chairperson |
| 3. Mr. Nattaphongs Julagatepotichai
Director of Eco Industrial Development Division, Department of Industrial | Member |
| 4. Miss Pornpimon Chareonsong
Director of Waste and Hazardous Substances Management Division, Pollution
Control Department | Member |
| 5. Miss Krissadaporn Boonyoo
Director of Eco Industrial Development Department
Industrial Estate Authority of Thailand | Member |
| 6. Mr. Somchai Wangwattanapanich
Vice Chairman, The Federation of Thai Industries | Member |
| 7. Mr. Peerayuth Charnsethikul
Dean, Faculty of Engineering, Kasetsart University | Member |
| 8. Miss Yaowalak Chuchot
Vice President, Sustainability Strategy, PTT Public Co., Ltd. | Member |
| 9. Mr. Somchai Ramart
Executive Vice President, Engineering and Maintenance,
PTT LNG Co., Ltd | Member |
| 10. Mr. Wirat Boonbumrungchai
Senior Vice President - Quality, Safety, Occupational Health and
Environment, PTT Global Chemical Public Co., Ltd. | Member |
| 11. Mr. Sontaya Tabkhan
Vice President - Industrial Park Development
Saha Pathana Inter-Holding Public Co., Ltd. | Member |
| 12. Miss Sunisa Tamthai
Plan and Policy Analyst, Expert Level, Office of Industrial Economics | Member |
| 13. Mr. Stein Hansen | Member |

Director and UNIDO Representative
UNIDO Regional Office

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| 14. Mr. Smail Alhilali
Project Manager, UNIDO | Member |
| 15. Mrs. Ampaiwan Jairungsee
Director of Eco Industrial Town Development Group
Department of Industrial Works | Member and co-secretary |
| 16. Miss Teeraporn Wiriwutikorn
Director of Hazardous Substance Group, Pollution Control Department | Member and co-secretary |
| 17. Miss Uma Wirutskulshai
National Project Coordinator, UNIDO | Member and assistant secretary |

Absent Committee Members

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| 1. Deputy Governor, Industrial Estate Authority of Thailand | Vice Chairperson |
| 2. Director, Office of International Cooperation | Member |

Observer

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| 1. Mr. Tawee Ampapan | Department of Industrial Works |
| 2. Miss Salakjit Wutanusorn | Department of Industrial Works |
| 3. Miss Nutcharithip Kathongthung | Department of Industrial Works |
| 4. Miss Sasi Worakulpanyalert | Department of Industrial Works |
| 5. Mr. Porawit Chanloi | Department of Industrial Works |
| 6. Miss Waritsara Yoodee | Department of Industrial Works |
| 7. Mr. Thaveesak Sutanant | Department of Industrial Works |
| 8. Mr. Prasom Damrongpong | Department of Industrial Works |
| 9. Mr. Chayanin Jawrungrit | Department of Industrial Works |
| 10. Mrs. Duangporn Khunthong | Industrial Estate Authority of Thailand |
| 11. Miss Sawanya Jareemit | Industrial Estate Authority of Thailand |
| 12. Mr. Kandis Sudsakorn | Engineering Department, Kasetsart University |
| 13. Miss Viganda Varabuntoonvit | Engineering Department, Kasetsart University |
| 14. Mr. Chirattikarn Kittimongkolmar | Engineering Department, Kasetsart University |
| 15. Miss Kanokporn Sinchai | PTT Public Co., Ltd. |
| 16. Mr. Panuphot Praditpheuk | PTT LNG Co., Ltd. |
| 17. Mr. Viroj Sumritpiam | PTT Global Chemical Public Co., Ltd. |
| 18. Miss Khwanrudee Imardoon | PTT Global Chemical Public Co., Ltd. |

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| 19. Mr. Anek Kaewkrajang | Eastern Thai Consulting 1992 Co., Ltd. |
| 20. Miss Panrat Phechpakdee | The Federation of Thai Industries |
| 21. Mr. Pongtheb Jaruampornparn | The Federation of Thai Industries |
| 22. Miss Patrandha Sangmahamad | The Federation of Thai Industries |
| 23. Mr. Anuwat Julintron | Office of Industrial Economics |
| 24. Miss Kitsiri Kaewpipat | Minister Counsellor (UNIDO/Industrial) |
| 25. Miss Sooksiri Chamsuk | UNIDO |
| 26. Miss Teechutha Mahachoklertwattana | UNIDO |
| 27. Mr. Nuttawut Chuenarom | UNIDO |
| 28. Mr. Decha Pimpisut | UNIDO |
| 29. Mrs. Maren Mellendorf | UNIDO |

The meeting started at 1.30 p.m.

Agenda No.1: Remarks and briefing made by the Chairperson

Mr. Prakob Vivitjinda, Director General, the Department of Industrial Works, gave the welcome remarks and then thanked all members joining to work as the Steering Committee of the Project on Application of Industry-Urban Symbiosis and Green Chemistry for Low Emission and Persistent Organic Pollutants Free Industrial Development in Thailand.

Mr. Pralong Dumrongthai, Director General, the Pollution Control Department addressed to the meeting with thank to all members of the Steering Committee for supporting work and project carried-out, then gave highlighting to issues of POPs, harmful chemical substances and electronic wastes which would be mixed and possibly contaminated and accessed to all persons purchasing and segregating wastes or even in some cases with burning and melting of brass in Khong Chai sub-district, Kalasin province or with contamination of agricultural chemical residues where the Pollution Control Department has direct roles and mandates to deal with. Moreover, this would also acknowledge to the development of sustainable city or Green City and the further concrete development with circular economy.

Mr. Stein Hansen, Director, Regional Office of the United Nations Industrial Development Organization (UNIDO) conveyed greetings with pleasure to attend the first meeting of the Steering Committee and then gave thanks to the Department of Industrial Works, the Pollution Control Department, the Industrial Estate Authority of Thailand, the Federation of Thai Industries (FTI) and the Kasetsart University for joining hands to design and prepare the project document. He also thanked all private sectors spending utmost efforts to overcome and mitigate the greenhouse gas emission together with financial supports made by the Global Environment Facility (GEF). Mr. Hansen highlighted by the end with rationale and justification of the Project with the goals to enhance the recognition and acknowledgment with cost-effectiveness to resources spent and to undertake more environmental-friendly approaches with chemical substances. These would link to the utmost objectives with the mitigation of greenhouse gas emission and the safe disposal of POPs.

Mr. Smail Alhilali, the Project Manager, UNIDO congratulated to the 1st meeting of Steering Committee organized and thanked to collaboration of all sectors for propelling the initiative of this Project which for sure would help to develop economy and make more environmental sustainability for Thailand.

Mr. Prakob Vivitjinda additionally opined that for the resources management in Thailand, both in industrial or community sectors, it is still in problem with present, thus there is a need for all sectors' collaboration as mentioned by UNIDO and reiterated that this is not only for Thailand but also worldwide. Therefore, he would like to persuade all members to give opinions and advices with focusing on the accomplishment of the Project's goals, as: to mitigate the greenhouse gas emission and to safe dispose of POPs.

By the end of remarks, Mr. Prakob Vivitjinda informed the meeting for acknowledgement in 2 issues, as: (i) the Cabinet's Resolution with agreement to the Project; and (ii) the Order with appointment of

the Steering Committee with entrustment of the secretariat in charge. There would be detailed information presented by the secretariat.

1.1 The Cabinet's Resolution with approval of the project execution

Mrs. Ampaiwan Jairungsee, Director of Eco Industrial Town Development Group, the Department of Industrial Works, introduced the background and justification of the Project that executed by the Ministry of Industry by the Department of Industrial Works, the Industrial Estates Authority of Thailand, under the collaboration with the Pollution Control Department, the Federation of Thai Industries, the Kasetsart University and the UNIDO. This Project is financially supported for 5 years from the GEF, to implement the project namely “Application of industry-urban symbiosis and green chemistry for low emission and persistent organic pollutants free industrial development in Thailand”, with engagement and support of private sectors, as: the PTT Public Company Limited, the PTT LNG Company Limited, the PTT Global Chemical Public Company Limited and the Saha Pattana Inter-Holding Public Company Limited. The GEF approved the Project's document on 2nd April 2019 with objectives to mitigate the greenhouse gas emission and to reduce the POPs and other harmful chemical substances from industrial and community sectors with applying of industry-urban symbiosis and green chemistry. Thus for the implementation upon the Cabinet's Resolution dated 9th May 2006 with agreement and endorsement towards the project proposal with financial request from the GEF, the Ministry of Industry had informed the Cabinet's meeting on the date of 12th May 2020, which then the Cabinet agreed and approved upon the proposals made by the Ministry of Industry, as follows:

1. To agree and approve for the execution undertaken by the Department of Industrial Works together with the UNIDO, of the project namely “Application of industry-urban symbiosis and green chemistry for low emission and persistent organic pollutants free industrial development in Thailand”.
2. To agree and approve upon the drafted letter of intent and confirmation to accept and execute the Project with the UNIDO.
3. To agree and approve the Permanent Secretary of the Ministry of Industry to give a signature to the letter of intent and confirmation to accept and execute the Project.

The Ministry of Industry had also received opinions and advices made by the Ministry of Transport, Office of the National Economic and Social Development Council, and the Budget Bureau to consider with further actions taken.

Meeting's resolution: The meeting noted.

1.2 The Order with appointment of the Steering Committee

Mrs. Ampaiwan Jairungsee presented the name list upon the Order with appointment of the Steering Committee, under the Ministerial Order No.212/2563, titled “The Appointment of the Project Steering Committee, undersigned by the Permanent Secretary of the Ministry of Industry, dated 30th July 2020, comprising 19 members, in detail as listed below.

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| 1. Director General, Department of Industrial Works | Co-chairperson |
| 2. Director General, Pollution Control Department | Co-chairperson |
| 3. Deputy Governor, Industrial Estate Authority of Thailand | Vice chairperson |
| 4. Director of Eco Industrial Development Division, Department of Industrial | Member |
| 5. Director of Waste and Hazardous Substances Management Division
Pollution Control Department | Member |
| 6. Director of Eco Industrial Development Department
Industrial Estate Authority of Thailand | Member |
| 7. Vice Chairman, The Federation of Thai Industries | Member |
| 8. Dean of Engineering Department, Kasetsart University | Member |
| 9. Representative of PTT Public Co., Ltd. | Member |
| 10. Representative of PTT LNG Co., Ltd | Member |
| 11. Representative of PTT Global Chemical Public Co., Ltd. | Member |
| 12. Vice President - Industrial Park Development
Saha Pathana Inter-Holding Public Co., Ltd. | Member |
| 13. Director of Office of International Cooperation | Member |
| 14. Representative of Office of Industrial Economics | Member |
| 15. Director and UNIDO Representative, UNIDO Regional Office | Member |
| 16. Project Manager, UNIDO | Member |
| 17. Director of Eco Industrial Town Development Group
Department of Industrial Works | Member and co-
secretary |
| 18. Director of Hazardous Substance Unit, Pollution Control Department | Member and co-
secretary |
| 19. National Project Coordinator, UNIDO | Member and
assistant secretary |

The Project Steering Committee is authorized (i) to direct and supervise the Project upon the goals and objectives designed within the documents of Project approved from the GEF; (ii) to follow-up, monitor and evaluate outputs and outcomes with performances of the Project; (iii) to support coordination and liaison among relevant agencies; (iv) to give advices and suggestions to the Project; (v) to appoint and entrust relevant technical working group(s) for support the work followed-up and monitored with progress markers made; and (vi) to work on any other assignments.

Meeting's resolution: The meeting noted.

Agenda No.2: Items for acknowledgement

2.1 The Project's overview and implementation

Miss Uma Wirutskulshai, the National Project Coordinator, UNIDO, presented the Project's overview and implementation including work plan, upon the approval of the GEF towards the GEF-6 Request for project endorsement/approval, on the date of 2nd April 2019 and the Cabinet's Resolution dated 12th May 2020 with details as follows:

The Project aims to mitigate the greenhouse gas emission, in equivalent with amount of 1.3 million tons of carbon dioxide equivalent, and to reduce the industrial POPs, in amount of 620 tons. And again, the main ideas of this Project are (i) to promote resource efficiency; and (ii) to exchange wastes among factories or even in-between the factories and communities.

The administrative and operational structure of the Project could be depicted as: the GEF would provide financial supports and the aforementioned Steering Committee would direct, supervise, monitor and follow-up upon the approved implementation framework. Besides, the Department of Industrial Works would be a focal point together with the Project Management Unit (PMU). The GEF would provide financial support in amount of 8.966 million USD, while all project partners would provide co-finance in amount of 120 million USD. The Project duration is 5-years. The Project was approved by the GEF in 2019 while would be kicked-off and executed in 2020, then it would be completed in 2025.

Moreover, under the direction and supervision of the Steering Committee, there would be 2 Technical Working Groups (TWG) appointed, as: (i) the Technical Working Group for Supporting the Resource Efficient and Cleaner Production (RECP) presided over by a representative of the Department of Industrial Works; and (ii) the Technical Working Group for Managing the Persistent Organic Pollutants (POPs), presided over by a representative of the Pollution Control Department. The PMU would be the secretariats of both TWGs. The Steering Committee should call for 1-2 meetings annually, while the TWGs should call for meeting at least once in every quarter.

The Project would be executed through 3 different alignments as: (i) the executing partners consisting of the FIT and Kasetsart University; (ii) the consultant(s) and; (iii) the PMU. For the selection process of consultant(s), the PMU would make a drafted TOR upon the project document and would consult with all relevant project partners, then the draft would be revised and presented to the TWGs with meeting(s) organized, once the TOR is approved, the UNIDO and the PMU would proceed the procurement. The TWGs and representative(s) of the UNIDO would join to assess and evaluate the proposal(s) made by bidding consultant(s). This would be for the selection of consultant(s) to carry-out and deliver work upon the TOR.

The Project would be run and manage in 3 target provinces, as: Rayong, Samutprakarn and Chonburi. The project components would be : (i) the policy development; (ii) the national capacity building and awareness raising on industry-urban symbiosis and POPs; (iii) the pilot demonstration of cleaner production, new POPs management and industry-urban symbiosis; and (iv) the development of National Eco-industrial Town Framework and its supporting system with detailed activities, presented in the meeting documents provided.

Activities enlisted below would be carried out by the Executing Partners:

- The FIT would be in charge of activities as: to organize the seminars for 3,000 audiences; to conduct trainings for 3,600 participants; to conduct the RECP assessment of 200 factories; to conduct feasibility study upon 100 projects and to implement and verify results for 50 projects, including to provide advices and suggestions to the Saha Pattana Inter- Holding Public Company Limited. These activities would cover budget allocated in amount of 2,024,824 USD.
- The Kasetsart University would be in charge of activities as: to develop training modules and curricula for practitioners and university students; to work on Material Flow Analysis (MFA) with identifying of opportunities for symbiosis of resources; and to provide advices and consultations to groups of PTT companies. These activities would cover budget allocated in amount of 735,400 USD.

And for the procurement of consultancy services relevant to RECP and POPs, they would be:

- 1) The development of 5 projects relating to RECP and industry-urban symbiosis, as:
 - 1.1) The project on Policy study to mobilize RECP, industrial symbiosis, industry-urban symbiosis under the concept of eco-industrial town with budget allocated in amount of 7.5 million THB;
 - 1.2) The pilot project on online waste database with budget allocated in amount of 5 million THB;
 - 1.3) The pilot project on development and implement industrial symbiosis/industry-urban symbiosis (business model) with budget allocated in amount of 16 million THB;
 - 1.4) The project on waste management and best practice of waste-to-energy plant with budget allocated in amount of 7 million THB;
 - 1.5) The project on develop the national eco-industrial development framework and implement in 3 provinces, with budget allocated in amount of 12 million THB.
- 2) The development of 4 projects relating to new industrial POPs, as:
 - 2.1) The project on policy study and Socio-economic study of new industrial POPs and monitoring of new industrial POPs in environment with budget allocated in amount of 25 million THB;
 - 2.2) The pilot project on e-waste management relevant to new industrial POPs with budget allocated in amount of 5 million THB;
 - 2.3) The pilot project on HBCD management in EPS foam with budget allocated in amount of 15 million THB;
 - 2.4) The project supporting the Project and PCD with budget allocated in amount of 10 million THB;

Each project would be implemented during 2020 – 2025, corresponding to its operational framework and timeframe, while should ensure the gender equality to take part and participate with the projects.

Mr. Prakob Vivitjinda reflected that there are plenty of details of all projects and activities with comprehensiveness, thus all members are requested to pay attentions to give comments and suggestions for helping the Project to accommodate with the current contexts and changes.

Mr. Pralong Dumrongthai shared his thoughts with agreement upon the appointment of the TWG in principle, while also requested to work on each TWG in details, including all projects and activities proposed by the secretariats. They all shall be contextualized and selective, while for the selection of consultant(s), the TWGs shall be engaged with both the TOR discretion and the selection process.

Mr. Somchai Wangwattanapanich, Deputy Chairperson, the FTI gave a reflection to the pilot project on e-waste management towards new industrial POPs that recently there is none of inspection and enlisting of POPs, thus these should be comprehensively worked out and consideration whether budget allocated in amount of 5 million THB would be sufficient or not. But if there is a limit of budgeting, the secretariats themselves need to be very clear while they are working on the TOR and so on.

Miss Pornpimon Chareonsong, Waste and Hazardous Substances Management Division, the Pollution Control Department clarified that the partaking of the PCD with the Project would be considered as in-kind support, valued in amount of 1,000,000 USD, nevertheless, the scope of work undertaken by the Division would be more or less beyond. Besides, she proposed the meeting to consider the unintentionally produced persistent organic pollutants (U-POPs) with added-on work, since they are consisting of dioxins which caused severe impacts to environment, surrounding and health of the people.

Miss Uma Wirutskulshai informed that the components of TWGs would be proposed in Agenda No.3.3, while the consideration of changing activities relevant to POPs would be in Agenda No.3.4.

Mrs. Sooksiri Chamsuk, UNIDO, gave more clarification that this Project would not cover U-POPs, as the UNIDO already initiated the cooperative project with the Department of Primary Industries and Mines, with support of the Global Environment Facility (GEF), entitled “Greening the Scrap Metal Value Chain through Promotion of BAT/BEP to Reduce U-POPs Releases from Recycling Facilities”. This project would be focusing on the unintentionally POPs (U-POPs) emitted from industrial sectors. The primary source of U-POPs in Thailand would be the outdoor burning activities in agriculture sector. And the main agency, under the GEF, in charge is the Food and Agriculture Organization of the United Nations (FAO). Hence there would be liaison and coordination to implementing project(s) targeting to the U-POPs emission from outdoor burning activities of agricultural wastes. This would be in collaboration with the Pollution Control Department for budgetary made and proposed in Round No.7 with more or less studying on dioxide substances emitted from outdoor burning activities.

- Meeting’s resolution:** **The meeting noted and requested the secretariat to deliver work upon opinions made by the Committee, as:**
- **To consider and revise the operational framework and workplan together with two technical working groups.**
 - **To consider and made the scope of work of pilot project(s) for e-waste management relevant to the new industrial POPs with more clarity.**

Agenda No.3 : Items for consideration

3.1 Designation of executing date of the Project

Miss Uma Wirutskulshai presented that the Project was approved by the Global Environment Facility on 2nd April 2019 and then with later adopting of the Cabinet on the date of 12th May 2020, but not yet scheduled with certain executing date.

The secretariat then proposed the executing date on 1st September 2020.

Mrs. Sooksiri Chamsuk clarified that the calculation of operational timeframe of any project under the Global Environment Facility would be on month, not the date.

Meeting's resolution: The meeting agreed and acknowledged the proposal made.

3.2 Designation of starting date of two executing agencies – the Federation of Thai Industries (FTI) and Kasetsart University

Miss Uma Wirutskulshai presented that the Federation of Thai Industries (FTI), by the Water and Environment Institute of Sustainability and together with Kasetsart University, by the Faculty of Engineering, Chemical Engineering Department, would be the Project's executing agencies with co-financing to the Project, upon the approval of the Global Environment Facility. And for the time being, the Procurement Unit of UNIDO has worked on the procurement process in accordance with the rules and regulations of the Global Environment Facility, but none of executive date (s) of two of them designed yet.

Thus, the Project's Steering Committee could design the executing date (s) of the FTI and Kasetsart University, which then would cause the Agreement between the UNIDO and these two executing agencies comes into force.

The secretariat proposed the executing date of two agencies - the FTI and Kasetsart University – should be the same date as the executing date of 1st September 2020.

Meeting's resolution: The meeting agreed and acknowledged the proposal made.

3.3 The appointment of technical working groups for supporting the resource efficiency and for managing the persistent organic pollutants (POPs)

Mrs. Ampaiwan Jairungsee referred the appointment of technical working groups with clarification in prior within Agenda No.2. The secretariat then proposed the appointment of two different technical working groups, as:

1. The Technical Working Group for Supporting the Resource Efficiency, presided over by the Deputy Director-General of the Department of Industrial Works assigned.
2. The Technical Working Group for Managing the Persistent Organic Pollutants (POPs) presided over by the Deputy Director-General of the Pollution Control Department assigned.

These two working groups shall be assigned with duties and powers to consider and endorse the Term of References (ToR) for the hiring of the relevant consultancy services and to monitor and evaluate the outputs and outcomes delivered by those relevant consultants and to give technical advices to the Project Management Unit.

Mr. Prakob Vivitjinda opined that the secretariat should consider adding more members of working groups and then accelerating the appointment of these two working groups in September 2020.

Mr. Pralong Dumrongthai opined that the Deputy Director-General assigned shall review the components of working groups, there should be not exceeding 12 members each and then accelerating the appointment undersigned by the Permanent Secretary to the Ministry of Industry.

Miss Pornpimon Chareonsong notified that these two technical working groups should be entrusted with powers and duties directly scoping to the implementation of the Project of Application of industry-urban symbiosis and green chemistry for low emission and persistent organic pollutants free industrial development in Thailand only. These would help to make clear demarcation with avoidance of overlapping to other recent working groups appointed.

Mrs. Ampaiwan Jairungsee proposed to the Chairperson of the Steering Committee for the matters of undersign given, the Technical Working Group for Resource Efficiency should be signed with appointment by Director-General of the Department of Industrial Works; and the Technical Working Group for Managing the Persistent Organic Pollutants (POPs) should be signed with appointment by Director-General of the Pollution Control Department.

Mr. Prakob Vivitjinda opined that for the matters of undersign given, it deemed appropriate that there should be co-signed by Director-General of the Department of Industrial Works together with Director-General of the Pollution Control Department in each appointment order.

Meeting's resolution: **The meeting agreed and acknowledged the proposal made, with the review of components of each technical working group and then proposing them for the co-signs of Director-General of the Department of Industrial Works together with Director-General of the Pollution Control Department in each appointment order. These should be taken into account, accelerated and completed within September 2020.**

3.4 The revision of detailed activities in matter of POPs corresponding to current contexts

Miss Teeraporn Wiriwutikorn, Director of Harmful Substances Unit, the Waste and Hazardous Substances Management Division, the Pollution Control Department, clarified details and background with justification for revision of activities in matter of POPs, as for the time being with the development of this Project, there would be another project, entitled “the Enabling activities to review and update the national implementation plan for the Stockholm Convention on Persistent Organic Pollutants”, being carried-out by the Pollution Control Department but not finished yet. Hence the revised POPs inventory was yet under the ongoing process, but nowadays this project was

completely done with the revised POPs inventory and its second national action plan. The Pollution Control Department would later on present this national action plan to all state parties of the Stockholm Convention. And for today, the secretariat would like to propose part of this study pertaining to the POPs inventory to the Committee for discretion, referring to the clarification made by the Project's coordinator in prior corresponding to two objectives of this Project, as: to mitigate greenhouse gas emission and to reduce or appropriately manage 620 tons of POPs emitted.

Previously within the Annex of Stockholm Convention, there would be 12 POPs enlisted, as: 9 pesticides, 1 industrial substance and 1 U-POP, but then some POPs were gradually added-up corresponding to their qualifications, as: half-life span within surroundings; accumulation within living creature(s); harmful affect to human beings including the range of widespread transferred or absorbed in the nature and surroundings. Recently there are 30 types of POPs enlisted, as: 17 pesticides, 13 industrial substance and 7 U-POPs being generated from heating and exhausting process such as dioxins, furans and all other substances. While some POPs were even popped-up as derivatives of other groups of substances, likewise by-products unintentionally incurred.

And for the POPs in industrial sectors, there were 13 of them with 3 initial enlisted as: dioxins, PCB and Hexachlorobenzene and new POPs, e.g. groups of HBB and of BDEs, as: Octa Penta decaBDE which were grouped with those consisting of Brominated flame retardant, fire-halting substance(s) and other item(s). The 13 POPs in industrial sectors could be classified into 3 groups as follows:

- 1) The flame retardant and fire-halting substance(s), as: PBB, PBDE and HBCDD, are mostly used and applied with goods and products with flame and fire safety, e.g. to use in electricity devices and electronic appliances;
- 2) The texture-adjusting substance(s), as: PFOS, PFOA and PFHxS, are used and applied with smoothing and preventing of dirt or dust, particularly in carpets or clothing garments. These substances could make water to mix with oil, they then are used to mix with fire extinguishing substances including to reduce oxygen bubble, such they would be used for coating pond and hydraulic oil with acid-resistance and lubricant;
- 3) The oily substance(s), as: HCBD, PeCB, PCN or PCB, are found within electrical insulation, transformers or electricity generating and restoring devices. Recently these products are completely terminated with no more production.

In conclusion, from the project enabling activities to review and update the national implementation plan for the Stockholm Convention on POPs, it found that : (i) the oily substances as electrical insulation, mostly known as Legacy POPs, would be in transformers which Thailand exported to eliminate in foreign countries and there would be only small amount left-over in Thailand. The Department of Industrial Works regulated that all owners are obliged to send them out to eliminate and there would be legal offences incurred once they omitted; (ii) the texture adjusting-substance(s) or PFOS would be applied with coating pond and fire extinguishing form and (iii) the BDE-responsive substance(s) would be applied with electrical device, but there is none of PentaBDE and OctaBDE produced, but still in the CRT monitor. While for the recent decaBDE enlisted in the year 2017 is in textile, electrical devices and electronic appliances.

Moreover, some new POPs are also introduced as: SCCP enlisted in 2017 and PFOA enlisted in 2019, but none of them are studied and included in the POPs inventory of Thailand.

From the report, the substantive matters of the POPs from industrial sector should summarize as follows:

- There was none of production of c-PentaBDE and c-OctaBDE worldwide for more than 20 years, hence they should be found in Thailand with very small amount, while there were around 0.3 ton of OctaBDE in ABS. The PentaBDE compound found in abandoned car seat pads being left with all municipal wastes.
- The c-decaBDE used for Polystyrene (PS) in CRT TV assembly were estimated being left in the functioning and malfunctioning devices around 500-820 tons, while there were around 3 tons of decaBDE in clothing garments.
- There were around 1,300 tons of HBCD and around 500-820 tons of decaBDE which would meet targeting goals for POPs management under the Project. Nevertheless, there are some concerns, as: PS foam could be recycled in form of general purpose polystyrene resins, while the distinguishing between flame-resisted and non-resisted EPS could not made with visibility, henceforth in the long run, once the EPS foam consisting with HBCD expired and removed, the EPS contaminated foam could be recycled.
- There were small portions of PFOS, only 3.7-5.5 tons, but they cause serious negative impacts to environment and human beings. Thus, they should be in spotlight.

The secretariat then would like to propose the initial pilot project for HBCD management in EPS and the policy study on new industrial POPs management whereas there is none of them in POPs inventory of Thailand, such as SCCP or PFOA.

Mr. Pralong Dumrongthai opined that the study of using of c-decaBDE and HBCD would be very useful, thus the scope of this study should be rechecked its coverage again.

Miss Uma Wirutskulshai informed that the study on c-decaBDE has been designed and put under the pilot project on e-waste management covering the new industrial POPs, with approximate budget in amount of 5 million baht, which for sure could be revised to contextualize it again.

Mrs. Sooksiri Chamsuk clarified that it is very difficult to manage penta-BDE mostly found in municipal wastes, while decaBDE found in clothing garment would not cover in this project.

Mr. Somchai Wangwattanapanich opined that the project would be implemented in 5 years with comprehensive details, the POPs management in such period of time could be limited with challenge and constraints too.

Miss Uma Wirutskulshai accepted and said that the secretariat had acknowledged opinions of electronic waste management pertaining to POPs and would take them into account and raise to the relevant technical working groups later on.

Meeting's resolution: **The meeting agreed and acknowledged the proposal made. The secretariat was assigned to raise issues of implementation framework to consult with the POPs technical working group and**

then to revise the ToR contextualizing and corresponding to recent situations and necessities.

3.5 The Action Plan for 1st year

Miss Uma Wirutskulshai presented the action plan for 1st year to the meeting, covering 3 actors, as: the Project Management Unit (PMU) and two executing agencies, as: the FTI and Kasetsart University.

There are projects implemented and supervised by the PMU, as follows:

- The project on Policy study to mobilize RECP, industrial symbiosis, industry-urban symbiosis under the concept of eco-industrial town);
- The project on develop the national eco-industrial development framework and implement in 3 provinces;
- The project on waste management and best practice of waste-to-energy plant;
- The pilot project on online waste database;
- The project on policy study and Socio-economic study of new industrial POPs and monitoring of new industrial POPs in environment;
- The pilot project on e-waste management relevant to new industrial POPs;
- The pilot project on HBCD management in EPS foam.

The initial efforts would be made for this is to establish relevant technical working groups within September and then to propose the ToR to these technical working groups, to proceed the procurement, to select proposal(s) and to start implementing these projects.

Mr. Kandis Sudsakorn, a representative of Department of Chemical Engineering, Faculty of Engineering, Kasetsart University, proposed the scope of work carried out by the University with 2 main tasks as follows:

- 1) The resource efficient and cleaner production (RECP) and symbiosis will be implemented in 3 targeted provinces, as: Samutprakarn, Chonburi and Rayong. These would cover the data collection on energy, the waste management, the emission of greenhouse gas and all relevant RECP activities in provinces. All data and information gathered would be analyzed through the Material Flow Analysis (MFA), corresponding to the energy consumption and wastes. These two prior tasks would be carried out by the team from Thammasat University and then after the MFA done, the potential hotspot(s) would be identified for greenhouse gas emission reduction, including relevant appropriate technologies for mitigating greenhouse gas emission. This part would be collaborated with relevant partners, as: the PTT Public Company Limited, the PTT Global Chemical Public Company Limited and the PTT Energy Company Limited together with coordination to the FTI, which would apply this part with the Saha Pattana Inter-Holding Public Company Limited. There would be sporadic measurement, assessment, and verification towards greenhouse gas emission. All findings and knowledge collected and synthesized would be put and framed into guidance based on practices with accomplishment in 3 provinces and then if possible, would be replicated to other areas for sustainable development.

- 2) For the trainings organized, they would be developed with starting from document review, data collection on technology, then they would be synthesized and analyzed to share with both Thai and international experts, including outcomes and outputs of the Project implemented. The training curricula developed will cover the short-termed training program(s); the academic program(s) for tertiary education; the short and intensive training program(s) for partners with the PTT and all relevant parties, including those from public and private sectors and all other interested persons. The university would be responsible for the curricula development, while the FTI would be an training organizer. The Kasetsart University would organize the Training of Trainers (ToT). And for sure the curricula developed would be under integrative and cohesive efforts made to the tertiary educations - bachelor and higher degrees, through other relevant faculties of Kasetsart University and then they would be encouraged to widely replicate in other universities.

Miss Viganda Varabuntoonvit clarified that for the 1st year action plan, it would be focusing on data and information gathering with then MFA carried out for identifying the opportunity (ies) to mitigate the greenhouse gas emission and symbiosis, together with supporting a group of PTT companies, through trainings, and gap analysis for RECP implementation, low carbon technologies and symbiosis as well as relevant training design.

Mr. Pongtheb Jaruampornpalrn, Advisor to the Water and Environment Institute for Sustainability, the FTI, presented the scope of work of the Project carried out by the FTI. It would focusing on the coordination with industrial sectors, e.g. the assessment of 200 facilities based on Eco Factory criteria relating to RECP issues; the feasibility study on techniques and finances of 100 projects; and the supporting the implementation of 50 projects identified during the feasibility study. The targeted areas would be in Rayong, Chonburi and Samutprakarn and would be under the DIW's Eco-industrial town development master plan and together with the industrial park of Sahaphat, Sri Racha, to mitigate the greenhouse gas emission, industrial symbiosis and industry-urban symbiosis. There would be 60 seminars and workshops conducted covering topics defined by the PMU covering 3,027 target audiences and 81 trainings for 3,705 participants.

And for the 1st year implementation of action plan carried-out by the FTI, there would be 5 seminars organized, each for one day, with 325 target audiences in total and there would be a 2-day user training with 50 participants organized, including the assessment of 67 facilities, the feasibility study for 34 projects and the following-up and assessment with 17 projects, together with consultation and support of implementation made by the Saha Pattana Inter-Holding Public Company Limited.

Mr. Pralong Dumrongthai inquired about differentiation of scope of work for training conducted by Kasetsart University and the FTI.

Mr. Kandis Sudsakorn replied that the Kasetsart University would design short-termed training, covering 1-day; 2-day; 3-day and 5-days period of trainings. Then there would be the ToT with detailed and comprehensive learning processes, covering training contents and documents. Moreover, there would be academic curricula with capacity and competency incubation and of course these would be hand-in-hand working-out with the FTI.

Mr. Pongtheb Jaruampornparn clarified the work carried-out by the FTI that there would be organizing training, providing training venues, and facilitating the training. The Kasetsart University would be responsible for training design and development. The PMU would provide the list of trainers then afterwards.

Miss Uma Wirutskulshai concluded that the Kasetsart University would be responsible for training course development, while the FTI would organize the trainings.

Mr. Pralong Dumrongthai summarized with reiteration that the Kasetsart University would be responsible for course design and development, while the FTI would organize them. The FTI's tasks would cover the invitation of participants, while the PMU would facilitate and provide resource persons.

Miss Uma Wirutskulshai clarified that resource persons would be trained and capacitated through the ToT in advance. The list of resource persons would be provided by the project partners.

Miss Panrat Phechpakdee, Senior Director, the Water and Environment Institute for Sustainability, the FTI, confirmed with reiteration that the Kasetsart University would be responsible for course design and development, while the FTI would organize them. The FTI's tasks would cover the invitation of participants, while the PMU would facilitate and provide resource persons.

Mrs. Sooksiri Chamsuk gave information to the meeting that the core capacity of UNIDO is to encourage the RECP with clean technology. UNIDO will pass the information on the international training courses to the Kasetsart University for customizing and contextualizing to Thai condition. The ToT would be provided in prior, then all data and information would be gathered and delivered to the FTI for further management.

Mr. Pralong Dumrongthai opined that for the courses designed by the Kasetsart University, they would indeed need to correspond to work of two technical working groups and together with links to experiences shared by the UNIDO which then contextualizing to Thailand. The FTI would understand the needs of Thai industries and the appropriateness for courses developed. Moreover, the proportion of contents somehow should focus on Thai contexts.

Miss Krissadaporn Boonyoo, Director of Eco Industrial Development Department, the Industrial Estate Authority of Thailand, inquired about targeted areas whether it would cover only areas under the DIW's eco-industrial town or with whole provinces and whether it should be expanded to other provinces apart of those 3 provinces targeted.

Miss Panrat Phechpakdee replied that the RECP assessment and its implementation would be carried out in the three selected provinces, as: Samutprakarn, Chonburi and Rayong.

Miss Krissadaporn Boonyoo asked about the procurement of consultancy service.

Miss Uma Wirutskulshai clarified that the UNIDO would open the bidding for consultancy service based on the ToRs approved and select the suitable consultant. After the selection made, the UNIDO's procurement unit at the UNIDO HQ would issue the contract.

Meeting's resolution: **The meeting agreed and acknowledged for the implementation plan by targeting three selected provinces, as: Rayong, Chonburi and Samutprakarn. The recommendations and comments of the Steering Committee shall be taken into account with revision of the Project to corresponding and contextualizing with the industrial sectors in Thailand.**

Agenda No.4: Other items (if any)

Miss Uma Wirutskulshai presented with request to organize the project inception workshop in Bangkok targeting 200 audiences, while there would be the smaller opening events in other provinces. Typically, the event should be presided over by the Minister of Industry or with entrustment to the Permanent Secretary of the Ministry of Industry to act on behalf. The secretariat proposed to organize this seminar by the end of this year or beginning of the next year.

Mr. Prakob Vivitjinda informed that the Ministry of Industry has scheduled to organize the Prime Minister's Awards by the end of this year. The project inception workshop should be organized in-between October or November.

Miss Uma Wirutskulshai proposed that if possible, these should be in-between November or beginning of December to allow the time for procurement of organizer.

Mr. Pralong Dumrongthai opined that the secretariat should consider this request and then deliver it in appropriateness within this year, but these should be corresponding to the work schedules of both the Minister and the relevant executive officers.

Meeting's resolution: **The meeting agreed upon the proposal of inception workshop organized and assigned the secretariat to work on liaison and readiness while bearing the work schedules of the Minister and the relevant executive officers of the Ministry of Industry.**

The meeting ended at 4.30 p.m.
