Asia-Pacific Economic Cooperation

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

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Progress: EWG20 2016A
Guidelines toward High Biodiesel Blend Diesel (eg B20) Specification in the APEC Region

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The 50th Meeting of
APEC Expert Group on New and Renewable Energy Technologies (EGNRET)

21 March 2018
Hilton Waikiki Beach Hotel, Hawaii, USA

EWG 20 2016A

- Project overseer
  - Department of Alternative Energy Development and Efficiency (DEDE)
  - Mr. Wanchai Bunluesinth & Ms. Munlika Sompranon
- Duration
  - March 2017 – April 2018
- Contractor & Team members
  - National Metal and Materials Technology Center (MTEC)

    ✓Mr. Nuwong Chollacoop, Ph.D. / Team Leader

    ✓Ms. Manida Tongroon, Ph.D. / Researcher

    ✓Ms. Wanita Powsakul, Secretary

Project details

- Objectives
  - To develop recommendation for guideline for high biodiesel blend specification.
  - To create a network of biodiesel experts in APEC region for future development of regulatory framework.
  - To ensure workshop participants gain knowledge in recent development of high biodiesel blend being introduced and used in APEC region.
- Workshops & seminar
  - 1st WS: Dec 2017 in Thailand
  - 2nd WS: Mar 2018 in Hawaii, USA
  - Seminar: Apr 2018 in Thailand (tentative)
- Network of BDF experts from APEC economies

Agenda of 1st workshop in Bangkok (13-14 Dec 17)

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ANNEXI
AGENDA (Draft)

The 1stAPEC Workshop on Guidelines toward High Biodiesel Blend Diesel (eg B20) Specification in the APEC Region
13-14 December 2017
Convention Center Room CC405
Thailand Science Park, Pathumthani, Thailand (https://goo.gl/maps/e9rEp72J4F12)

Wednesday, 13 December

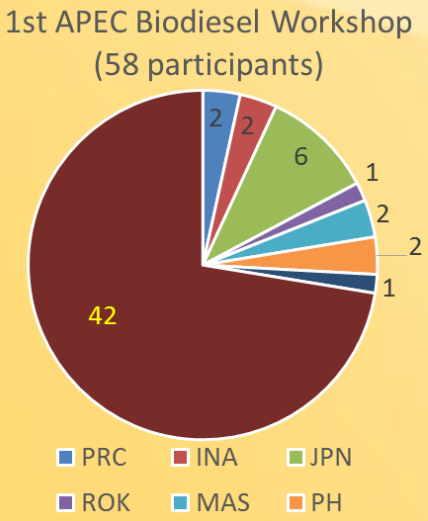
	Agenda
08.30	Registration
09.00	Opening Session and Workshop/Project Overview Welcoming Remark by Dr. Aree Thanaboonsombut, Deputy Executive Director, MTEC Project overview by Ms. Munlika Sompranon, DEDE & EGNRET Representative Opening Speech by Mr. Yongyuth Sawatdisawanee, Deputy Director General, DEDE Group Photo
09.30	**Keynote – Overview of biodiesel development in Thailand** Dr. Apiradee Thammanomai Department of Alternative Energy Development and Efficiency (DEDE)
10.00	Coffee Break
10.30	**Overview of biodiesel specifications from around the world** **People's Republic of China**: Ms. DU Guomin, Division Chief of Development Strategy, PetroChina Planning and Engineering Institute **Indonesia**: Prof. Tatang Hernas Soerawidjaja, Head of Center for Research on Natural Resource Utilization, Institut Teknologi Bandung (ITB) **Malaysia**: Dr. Harrison Lau Lik Nang, Leader of Biodiesel Technology Group, Malaysian Palm Oil Board (MPOB)
12.00	**Lunch**
13.00	**Overview of biodiesel specifications from around the world (cont'd)** **Republic of Korea**: Prof. Ocktaeck Lim, University of Ulsan **Philippines**: Mr. Ricardo S. Infante, Supervising Science Research Specialist, Department of Energy (DOE) **Thailand**: Dr. Manida Tongroon, National Metal and Materials Technology Center (MTEC)

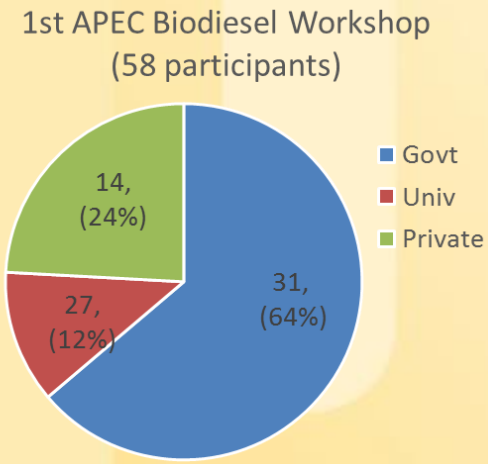
14.30	**Concern from automotive makers for higher blend of biodiesel** Mr. Tomoaki Kakihara, Chairman of Diesel Fuel Experts Group, Automobile Manufacturing Association (JAMA), Japan
15.00	Coffee Break
15.30	**Discussion on guidelines toward high biodiesel blend diesel** • Moderator will ask for opinion from participants on each technical specification
16.00	**Way forward for guidelines toward high biodiesel blend diesel** • Based on discussion from biodiesel producers and car makers, a way forward for guideline on high biodiesel blend diesel will be formulated.
16.30	**Wrap up** • The moderator will provide feedback and recommendations on potential guideline. All the feedback will be compiled for further discussion.
18.00	Welcome Dinner

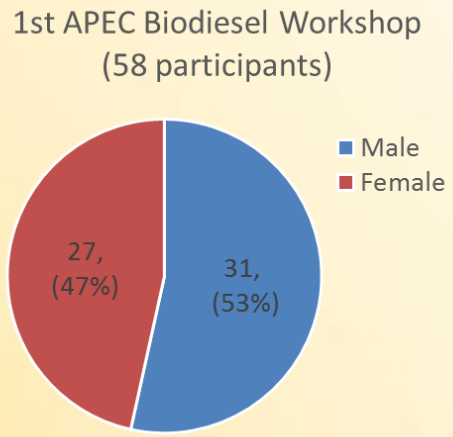
Thursday, 14 December
Thailand case study for higher blend of biodiesel & Site visit (by invitation)

	Agenda
08.30	Registration
09.00	**Overview of Thailand case study for higher blend of biodiesel** Dr. Nuwong Chollacoop, National Metal and Materials Technology Center (MTEC)
09.30	**Introduction of H-FAME Technology for Thai B10 program** Dr. Yuji Yoshimura Emeritus Researcher, National Institute of Advanced Industrial Science and Technology (AIST)
10.00	Coffee Break
10.30	**Site visit to H-FAME pilot plant at Thailand Institute of Scientific and Technological Research (TISTR)** https://goo.gl/maps/VVqBPFkcjmN2
12.00	**Lunch**
13.00	**Site visit to Thai commercial biodiesel plant: Bangchak Biofuel (https://goo.gl/maps/xGHbk5wGbsS2)**

Statistic of 1st BDF workshop

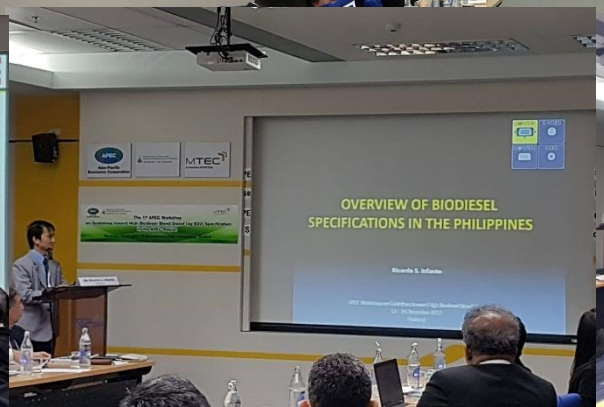






*Many MTEC staffs not in the photo

Day 1: 13 Dec 2017



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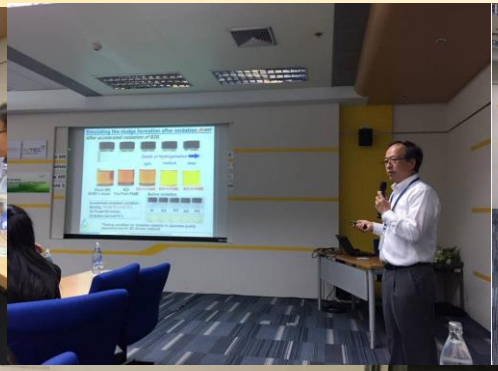
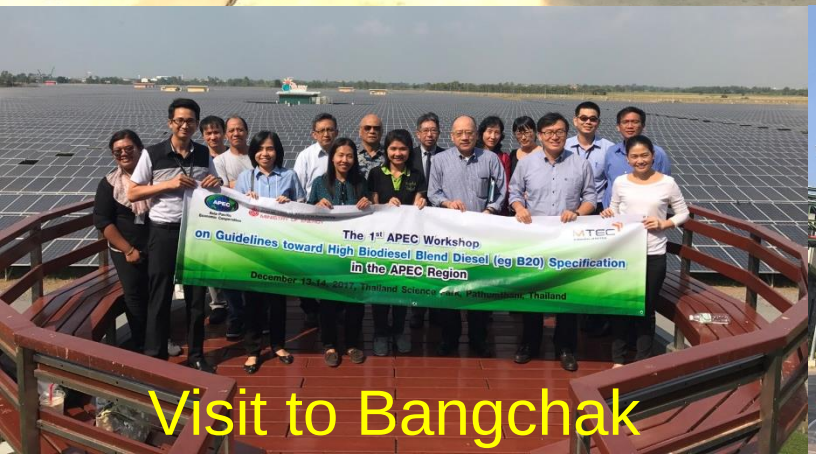
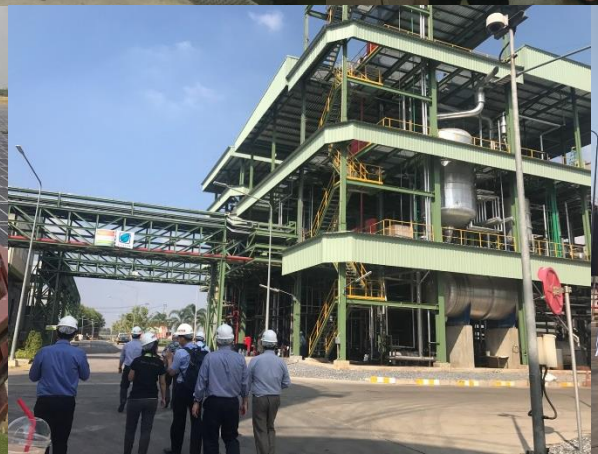


Visit to TISTR



Visit to Bangchak



Agenda of 2nd workshop in Honolulu (19 Mar 18)

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APEC Asia-Pacific Economic Cooperation | Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY | HNEI Hawai'i Natural Energy Institute University of Hawai'i at Mānoa | MTEC a member of NSTDA

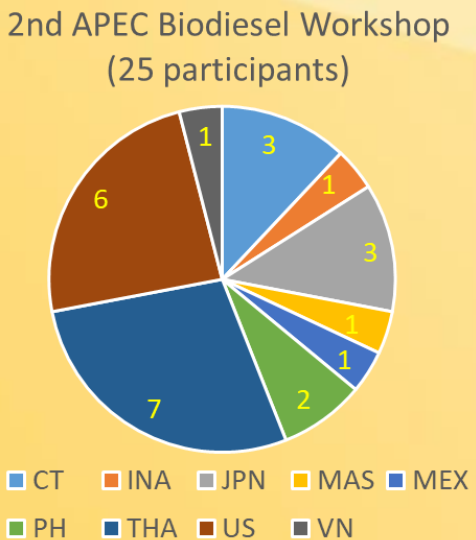
AGENDA

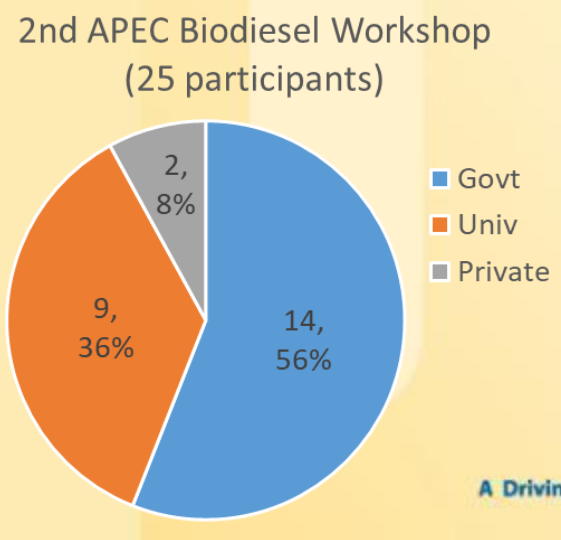
The 2nd APEC Workshop on Guidelines toward High Biodiesel Blend Diesel (eg B20) Specification in the APEC Region
19 March 2018
Territorial 1&2, Hilton Waikiki Beach Hotel, Hawaii, USA

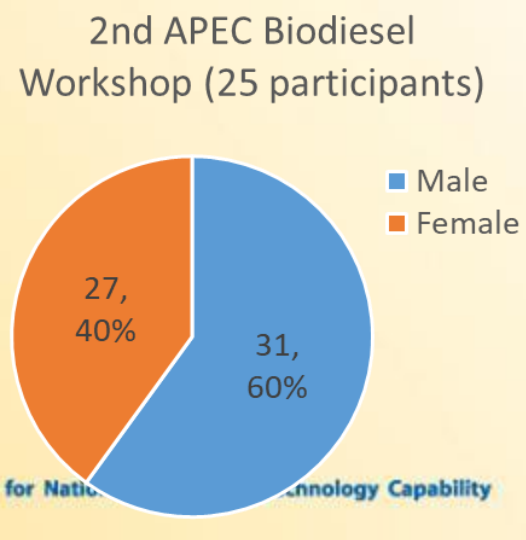
Monday 19 March 2018

	Agenda
08.30	Registration
09.00	Opening Session and Workshop/Project Overview Welcoming Remark by Dr. Richard Rocheleau, HNEI Director Project overview by Dr. Tom, H. T. Lee, EGNRET Representative Opening Speech by Ms. Sutharee Kiatman, DEDE, Thailand Group Photo
09.20	**Keynote – Overview of bioenergy development in Hawaii** Prof. Scott Q. Turn Researcher, Hawaii Natural Energy Institute (HNEI), University of Hawaii
09.50	**Keynote – Overview of biodiesel development in Hawaii** Mr. Robert King Pacific Biodiesel Technologies
10.20	Coffee Break
10.50	**Update of biodiesel specifications for high blend from around the world** **Indonesia**: Prof. Tatang Hernas Soerawidjaja, Head of Center for Research on Natural Resource Utilization, Institut Teknologi Bandung (ITB) **Malaysia**: Dr. Harrison Lau Lik Nang, Leader of Biodiesel Technology Group, Malaysian Palm Oil Board (MPOB) **Thailand**: Dr. Manida Tongroon, National Metal and Materials Technology Center (MTEC) **USA**: Prof. Scott Q. Turn, Hawaii Natural Energy Institute (HNEI), University of Hawaii
12.30	Lunch
14.00	**Summary from 1st workshop** Dr. Nuwong Chollacoop, MTEC
14.20	**Update from automotive makers for higher blend of biodiesel** Mr. Tomoaki Kakihara, Chairman of Diesel Fuel Experts Group, Automobile Manufacturing Association (JAMA), Japan
14.40	**Thailand case study on low carbon transportation** Mr. Siamnat Panassorn, Tripetch Isuzu Sales, Co., Ltd., Thailand
15.00	**Discussion on guidelines toward high biodiesel blend diesel** • Moderator will ask for opinion from participants on each technical specification
15.30	Coffee Break
16.00	**Drafting guidelines toward high biodiesel blend diesel** • Based on discussion from 1st and 2nd workshop, a draft for guideline on high biodiesel blend diesel will be formulated.
17.00	**Wrap up** • The moderator will provide feedback and recommendations on potential guideline. All the feedback will be compiled for further discussion.

Statistic of 1st BDF workshop







19 Mar 2018


Hilton
Hilton
Overview of Bioenergy Development in Hawaii
Scott Turn
March 19, 2018
Hawaii Natural Energy Institute
School of Ocean and Earth Science and Technology
University of Hawaii at Manoa
2nd APEC Workshop on Guidelines Toward
High Biodiesel Blend Diesel (eg B20)
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STATUS OF BIODIESEL IMPLEMENTATION
IN MALAYSIA
AND BIODIESEL SPECIFICATIONS
Hilton
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Summary (I)

- PRC
  - Specification: B100 (S50 & S10) for up to B5 blending
    - ✓ feedstock: waste cooking oil
  - B5 nationwide after 2017
    - ✓ various grade depending on surrounding ambient temp (CFPP, freezing point)
    - ✓ additional requirement on impurities, PAH for EuroVI
- INA
  - Specification: B100 for up to B20 blending
    - ✓ feedstock: palm oil
  - B20 nationwide after 2016
    - ✓ improvement on various properties: sulfur/phosphorous content, acid value, oxidation stability, MG limit
- MAS
  - Specification: B100 for up to B7 blending
    - ✓ feedstock: palm oil
  - B7 nationwide since 2015
    - ✓ planned for B10 in Jun 2016 but postponed (B7 for EuroV)

Summary (II)

- ROK
  - Specification: B100 for up to B2.5(2015) and B3(2018) blending
    - ✓ feedstock: imported palm oil (summer) & waste cooking oil (winter)
  - B3 nationwide after 2018
    - ✓ use of biodiesel mandated by RFS
- PH
  - Specification: B100 for up to B2 blending (since 2009)
    - ✓ feedstock: coconut oil
  - Plan for B5 (2018) but some problem on CME handling & cost
    - ✓ introduction of non-coconut biodiesel feedstock?
- TH
  - Specification: B100 for up to B7 blending
    - ✓ feedstock: palm oil
  - B7 nationwide since 2014
    - ✓ planned to introduce B10 with mandate in 2026
- USA
  - Specification: B100 for up to B5 & B6-B20 blending
    - ✓ feedstock: soybean oil (55%) and animal fat/canola/corn/grease (~10% each)
  - Various blending ratios across different states
    - ✓ financial supported from both federal & state

Summary (III)

- JAMA
  - Global statement to recommend up to 5% (or 7%) of biodiesel as for general public diesel fuel
  - Supplemental statement to accept up to 20% under conditions
    - ✓ Palm biodiesel,
    - ✓ Euro 4 diesel
    - ✓ Monoglyceride content in B100 & water content in Bxx
  - Recommend to keep conventional diesel fuel for older vehicle
  - Not sure impact of high FAME blends on EuroV
    - ✓ Higher boiling point of FAME (unburned FAME in exhaust)
    - ✓ Lower heating value of FAME to give enough exhaust gas temp for DPF regeneration
    - ✓ Poorer oxidation stability of FAME for potential sludge formation
  - Concern for applying AAF recommendation to APEC economies
    - ✓ Feedstock
    - ✓ % blending and emission regulation
    - ✓ Climate condition
    - ✓ Base diesel fuel

Guidelines

Property	Unit	B100 for B7	B100 for B7-20	Euro4	Euro5/6
Oxygenates					
FAME content	mass%	96.5 min	96.5 min		
	vol%			20 max	20 max
Alcohol content	vol%			Not detected	Not detected
Density, @15°C	g/cm3	Report	Report	0.82 - 0.845	0.82 - 0.845
Viscosity, @40°C	mm2/s	2.0 - 5.0	2.0 - 5.0	2.0 - 4.5	2.0 - 4.5
Flash point	°C	100 min	100 min	55 min	55 min
Sulfur content	ppm	15 max	10 max	50 max	10 max
Carbon residue, 10%	mass%	0.3 max	0.3 max	0.3 max	0.3 max
Carbon residue, 100%	mass%	0.05 max	0.05 max		
Cetane number	-	51 min	51 min	51 min	51 min
Sulfated ash content	mass%	0.02 max	0.02 max		
Ash content	mass%			0.01 max	0.01 max
Water content	ppm	500 max	500 max	200 max	200 max
Total contamination	ppm	24 max	24 max	24 max	24 max
Cooper corrosion	-	Class 1 max	Class 1 max	1 max	1 max
Acid number	mgKOH/g	0.50 max	0.50 max		
Oxidation stability					
Conventional method	g/m3			25 max	25 max
Rancimat method	hrs	10 min	10 min	35 min	35 min
PetroOXY method				65 min	65 min
Iodine number	-	120 max	120 max		
Methanol content	mass%	0.2 max	0.2 max		
Cold soak filterability	sec	360	360		
Mono-glyceride content	mass%	0.70/0.60* max	0.4		
Di-glyceride content	mass%	0.20 max	0.20 max		
Tri-glyceride content	mass%	0.20 max	0.20 max		
Free glycerin	mass%	0.02 max	0.02 max		
Total glycerin	mass%	0.25 max	0.25 max		
Metals (Na + K)	ppm	5.0 max	5.0 max		
Metals (Ca + Mg)	ppm	5.0 max	5.0 max		
Phosphorous content	ppm	4.0 max	4.0 max		
Cloud point	°C	Report	Report	Check requirement by economy	
Pour point	°C	Report	Report		
CFPP	°C	Report	Report		
Distillation					
T50	°C			Report	Report
T90	°C			Report	Report
T95	°C			360 max	360 max
End point	°C			Report	Report
PAH	max%			11 max	8 max
Lubricity (HFRR)	um			460 max	460 max

*where outside temp < 5°C in winter


Thank you
ขอบคุณ