Professionals in Energy Series

SPE Malaysia-Thailand JDA Summit
A Model for Joint Development in Overlapping Area Like No Other

2-3 December 2019 | Le Meridien Putrajaya, Malaysia

go.spe.org/20WM15S

Summit Programme
Message from the Summit Committee Co-Chairs

On behalf of the Malaysia-Thailand Joint Authority (MTJA), Programme Committee Members and the Society of Petroleum Engineers, welcome to the inaugural Professionals in Energy Series: SPE Malaysia-Thailand JDA Summit.

Themed “A Model for Joint Development in Overlapping Area Like No Other”, this summit is the platform for MTJA and our partners to share the success of the MTJDA’s unique business model. As we recently celebrated our 40th Anniversary of being “Brothers Drinking From the Same Well”, we are delighted to use this opportunity to share the success of this collaboration model with you.

Throughout the summit, you will have the opportunity to hear and discuss how this collaboration has enhanced the existing strong friendship, diplomatic ties, mutual collaboration and business relationship between two governments. MTJA, shareholders, operators of the MTJDA, and universities will be sharing over 15 technical and poster presentations on key case studies pertinent to the development of the projects and these include:

- Strategic Value Creation
- Subsurface - Unlocking the Extensive and Challenging Hydrocarbon Potential in JDA
- Surface - Efficiently Developing JDA Resources for a Safe and Reliable Gas Supply to Malaysia and Thailand
- Research and Development by Universities

We have also created ample networking opportunities for you to connect with MTJDA shareholders and partners over the next two days:

- Daily coffee breaks and luncheon
- Welcome dinner
- Networking reception
- SPE Malaysia-Thailand JDA Summit Golf Tournament at Palm Garden Golf Club

We hope you will find this summit enriching in experience and knowledge especially in Joint Development in Overlapping Area. Thank you for your support and participation.

Sincerely,
Summit Committee Co-Chairs

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* This Summit Programme is updated as at 25 November 2019
Committees

Steering Committee

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Dr. Witsarut Thungsuntonkhun
Chief Executive Officer
Malaysia-Thailand Joint Authority

Muluk Wahab
Deputy Chief Executive Officer
Malaysia-Thailand Joint Authority

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General Manager
Carigali Hess Operating Company

Hazanie Jamian
General Manager
Carigali-PTTEPI Operating Company

Zhao Zhiyong
Vice President Asia
Hess

Zulkarnain Ismail
Director
PC JDA Limited

Dr. Anun Chonchawalit
Senior Vice President
International Asset
PTTEP International Limited

Programme Committee

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Kumphon Kumnerdsiri
Manager
Exploration and Production
Malaysia-Thailand Joint Authority

Mahmood Hisham Nik Jaafar
Director
PC JDA Limited

Komson Tachapanich
Vice President
International Asset
PTTEP International Limited

Jan Hoejer
Senior Operations Manager
Hess
Committees

Programme Committee (continued)

Members
Pichit Treadtanongkiati
Team Leader
Business Planning
Carigali Hess Operating Company

Salahuddin Sulaiman
Senior Manager
Operations and Development
Carigali Hess Operating Company

Tham Siew Yen
Team Leader
Development Planning
Carigali Hess Operating Company

Richard Chia
Senior Manager
Subsurface
Carigali Hess Operating Company

Sumanti Jaaman
Secretary
Carigali Hess Operating Company

Oraporn Chunlaphan
Business Analyst
Carigali-PTTEPI Operating Company

James Chong Ki Woi
Business Support Analyst
Carigali-PTTEPI Operating Company

Suvaluck Ratanavanich
Petroleum Engineering Manager
Carigali-PTTEPI Operating Company

Zuraida Isa
GM Office
Carigali-PTTEPI Operating Company

Leong Siew Fong
Business Support Manager
Hess

Fazili Ilias
Assistant Manager
Exploration and Production
Malaysia-Thailand Joint Authority

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Senior Reservoir Engineer
Malaysia-Thailand Joint Authority

Noppanat Vanichanugon
Senior Production Engineer
Malaysia-Thailand Joint Authority

Warangkana Prapatikul
Senior HSE Officer
Malaysia-Thailand Joint Authority

Watcharaporn Phootong
Senior Geoscientist
Malaysia-Thailand Joint Authority

M Lukman Ghazali
PC JDA Representative
PC JDA Limited

Mohd Azmi Shari
PC JDA Representative
PC JDA Limited

Praveen Manaprat Mathews
PC JDA Representative
PC JDA Limited

Aizat Zakaria
PC JDA Representative
PC JDA Limited

A Fattah Hashim
PC JDA Representative
PC JDA Limited

Raieza Hanim Rahiman
PC JDA Representative
PC JDA Limited

Siti Nurin Alya Mohamad Shukry
PCJDA Representative
PC JDA Limited

Khanitta Tanadtang
Manager
MTJDA Joint Venture Asset
PTTEP International Limited

Kavin Punyasmita
PTTEPI Representative
PTTEP International Limited

Patchakorn Wattanan
PTTEPI Representative
PTTEP International Limited
Thank You to Our Sponsors

Gold Sponsors

MALAYSIA-THAILAND Joint Authority

PETRONAS

PTTEP

Silver Sponsors

CARIGALI HESS

CPOC CARIGALI-PTTEPI OPERATING COMPANY

SYNERGY MARINE
## Schedule of Events

### Monday, 2 December 2019

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<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
<td>0800 – 0850 hours</td>
<td>Arrival of Delegates, Registration and Welcome Refreshments</td>
<td>Millennium Ballroom Foyer, Level 1</td>
</tr>
<tr>
<td>0850 – 0900 hours</td>
<td>Safety Announcement by Hotel</td>
<td>Millennium Ballroom Foyer, Level 1</td>
</tr>
<tr>
<td>0900 – 1000 hours</td>
<td><strong>Session 1: Opening Session</strong></td>
<td>Millennium Ballroom 1, Level 1</td>
</tr>
<tr>
<td>1000 – 1030 hours</td>
<td>Group Photo / Coffee and Tea Break</td>
<td>Millennium Ballroom Foyer, Level 1</td>
</tr>
<tr>
<td>1030 – 1200 hours</td>
<td><strong>Session 2: Executive Panel Session – Collaboration, Alignment, Sharing and Learning: Together We are Better</strong></td>
<td>Millennium Ballroom 1, Level 1</td>
</tr>
<tr>
<td>1200 – 1300 hours</td>
<td>Networking Luncheon</td>
<td>Millennium Ballroom 2, Level 1</td>
</tr>
<tr>
<td>1300 – 1400 hours</td>
<td><strong>Session 3: Poster Session</strong></td>
<td>Millennium Ballroom Foyer, Level 1</td>
</tr>
<tr>
<td>1400 – 1600 hours</td>
<td><strong>Session 4: Strategic Value Creation</strong></td>
<td>Millennium Ballroom 1, Level 1</td>
</tr>
<tr>
<td>1600 – 1615 hours</td>
<td>Coffee and Tea Break</td>
<td>Millennium Ballroom Foyer, Level 1</td>
</tr>
<tr>
<td>1615 – 1815 hours</td>
<td><strong>Session 5: Subsurface – Unlocking the Extensive and Challenging Hydrocarbon Potential in JDA</strong></td>
<td>Millennium Ballroom 1, Level 1</td>
</tr>
<tr>
<td>1815 hours onwards</td>
<td>Welcome Dinner</td>
<td>Millennium Ballroom 2, Level 1</td>
</tr>
</tbody>
</table>

### Tuesday, 3 December 2019

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>0900 – 1100 hours</td>
<td><strong>Session 6: Surface – Efficiently Developing JDA Resources for a Safe and Reliable Gas Supply to Malaysia and Thailand</strong></td>
<td>Millennium Ballroom 1, Level 1</td>
</tr>
<tr>
<td>1100 – 1115 hours</td>
<td>Coffee and Tea Break</td>
<td>Millennium Ballroom Foyer, Level 1</td>
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<tr>
<td>1115 – 1200 hours</td>
<td><strong>Session 7: Closing Remarks</strong></td>
<td>Millennium Ballroom 1, Level 1</td>
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<tr>
<td>1200 – 1300 hours</td>
<td>Networking Luncheon</td>
<td>Millennium Ballroom 2, Level 1</td>
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<tr>
<td>1300 hours onwards</td>
<td>Golf Tournament</td>
<td>Palm Garden Golf Club</td>
</tr>
</tbody>
</table>
Attendee Survey

Tell us about your Professionals in Energy Series: SPE Malaysia-Thailand JDA Summit experience

Your feedback is important to us!

TWO EASY WAYS TO COMPLETE THE SURVEY

ONLINE
Visit http://go.spe.org/20WM15Attendee or scan the survey code with your mobile device

REGISTRATION COUNTER
General Information

REMARKER: SUMMIT BADGES MUST BE WORN AT ALL TIMES

Venue
Le Meridien Putrajaya
Lebuah IRC IOI Resort City,
62502 Putrajaya, Selangor
Tel: +603 8689 6888

Badge Collection
Summit badges are required for admission into the event and must be worn at all times. Badges are non-transferable. Use of a badge by a person not named on the badge is grounds for confiscation.

Badges can be collected at the Millennium Ballroom Foyer, Level 1 during the following registration hours:
• Monday, 2 December 2019: 0800 - 1815 hours
• Tuesday, 3 December 2019: 0800 - 0900 hours

Lost and Found
Lost and found items will be placed at SPE Registration Counter.

First Aid
In case of an emergency situation, please alert the nearest SPE staff immediately.

Business Centre
Business Centre for Le Meridien Putrajaya is located at Level 2.

Mobile Phone
As a courtesy to the speakers and your fellow attendees, please turn off all mobile phones during meetings and sessions.

Consent to Use of Multimedia
Attendance or participation in SPE events and other activities constitutes an agreement by the registrant to SPE’s use and distribution of the registrant’s image or voice in promoting future SPE events in any way SPE deems appropriate.

Safety and Security
The safety and security of our event attendees are of utmost importance. Please be aware of and observe the following:
• Summit badges must be worn at all times while at the event venue. Use of a badge by a person not named on the badge is grounds for confiscation. If you lose your badge, please return to the registration counter to obtain a replacement.
• No one under the age of 15 is permitted in the exhibition halls.
• Be aware of your surroundings, remain alert and be vigilant.
• Should you observe any suspicious packages or behaviour, please report to event/venue staff immediately.
• Please remember to stay hydrated throughout the event.
• In the event of an emergency, SPE and/or Le Meridien Putrajaya staff will provide attendees with the necessary information and instructions.

Photography and Videography
All summit sessions and the poster session are protected by international copyright laws.
Photography and video/audio recording of any kind in summit sessions are prohibited without prior written permission by SPE.

Alcohol
We recognise that legitimate serving of alcohol beverages in the process of conducting business and social activities is acceptable. However, we also recognise that the use and consumption of alcohol carries the requirement for all attendees to consume these beverages responsibly and in keeping with our professional code of ethics and conduct. We strongly oppose the abuse and misuse of alcohol.
Opening and Keynote Session

Monday, 2 December 2019 | 0900 - 1000 hours

Welcome Remarks

Dr. Witsarut Thungsuntontkhun
Chief Executive Officer
Malaysia-Thailand Joint Authority

Keynote Speakers

Dr. Kurujit Nakornthap
Co-Chairman
Malaysia-Thailand Joint Authority

Tan Sri Dr. Rahamat Bivi Yusoff
Co-Chairperson
Malaysia-Thailand Joint Authority
The successful development of petroleum resources from overlapping continental shelf claim area among two countries requires multi agreements and collaborations through several processes over a long period of time. The key point in achieving this is truly the understanding of each countries’ and stakeholders’ requirement in fulfilling energy security, and the business value chain created. Because of the nature of the business in each country, fine tuning and compromise are the main requirements needed in fulfilling stakeholders objectives. The current business model and structure in dealing with oil and gas development in the JDA is significant; particularly its regulatory body and its roles. The MTJA is the regulatory body that is fully in-charge in ensuring resources monetisation. The MTJA has been working closely and maintaining good relationships with governments and investors. Managed contractually, fiscally, and operationally by the MTJA with the collaboration of upstream to downstream investors brought us towards our common goal, which is to provide gas supply and energy security to both countries. This session will cover:

• Chronology of the success and key challenges
• Major role of the MTJA in reaching the common goals of both countries and investors
• Managing resources monetisation
• Investors perspectives on the JDA model and their investment plans
Technical Programme

Monday, 2 December 2019

**Session 4: Strategic Value Creation**
**Session Managers:** Mahmood Hisham Nik Jaafar, PC JDA Limited; Dinesh Cheryan, Hess; Komson Tachapanich, PTTEP International Limited

<table>
<thead>
<tr>
<th>Presentation</th>
</tr>
</thead>
</table>
| **MTJA Strategic Roadmap and Value Improvement**  
Kumphon Kumnerdsiri and Watcharaporn Phootong, Malaysia-Thailand Joint Authority |
| **JDA Block A-18 Unitisation: The Successful Collaboration and Value Creation for Petroleum Resources**  
Noppanat Vanichanugon, Malaysia-Thailand Joint Authority; Nurakmal Yunos, PETRONAS |
| **Timely Intervention to Achieve Cost Optimisation: A Shareholders’ Perspective**  
M Lukman Ghazali, PC JDA Limited |
| **Value Improvement to Sustain the Value**  
Komson Tachapanich, PTTEP International Limited |
| **Adding Value to the JDA through International Partnership**  
Dinesh Cheryan, Hess |

Monday, 2 December 2019

**Session 5: Subsurface - Unlocking the Extensive and Challenging Hydrocarbon Potential in JDA**
**Session Managers:** Richard Chia, Carigali Hess Operating Company; Suvaluck Ratanavanich, Carigali-PTTEPI Operating Company

<table>
<thead>
<tr>
<th>Presentation</th>
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</table>
| **Appraising and Developing Complex Depo-Facies in Block A-18: Challenges and Opportunities**  
Hasni Jusoh, Carigali Hess Operating Company |
| **Keeping the Gas Flowing: Complex Well Interventions Simplified**  
Jagdish Singh and Daniel Chua, Carigali Hess Operating Company |
| **Securing the Future Petroleum Potentials of Exploration Discoveries in North Malay Basin, Malaysia-Thailand Joint Development Area**  
Avidianto Suryo Setiawan, Carigali-PTTEPI Operating Company |
| **Reveal the Unrevealed: Deep Potential in North Malay Basin, MTJA Area**  
Sunantha Phaungphuak, Carigali-PTTEPI Operating Company |
## Technical Programme

**Tuesday, 3 December 2019** 0900 – 1100 hours | Millennium Ballroom 1, Level 1

### Session 6: Surface - Efficiently Developing JDA Resources for a Safe and Reliable Gas Supply to Malaysia and Thailand

**Session Managers:** Oraporn Chunlaphan, Carigali-PTTEPI Operating Company; Salahuddin Sulaiman, Carigali Hess Operating Company

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<th>Presentation</th>
<th>Description</th>
<th>Speaker</th>
<th>Company</th>
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<tr>
<td>The Challenges of Developing a Safe and Reliable Facility to Meet Growing Gas Demand in Malaysia and Thailand</td>
<td>Siti Fauwizah B Johari, Carigali Hess Operating Company</td>
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<tr>
<td>Older Doesn’t Mean Slower: Sustaining Asset Integrity and Production Reliability Over Time</td>
<td>Regukumaran Baskaran, Carigali Hess Operating Company</td>
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</tr>
<tr>
<td>Slim Hole Monobore Cemented Completion Design</td>
<td>Manoj Meghnani, Carigali-PTTEPI Operating Company</td>
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<tr>
<td>Partially CRA Cladded Pipeline Application for Cost Optimisation</td>
<td>Mohamad Effendi Mohd Zulkifli, Carigali-PTTEPI Operating Company</td>
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Knowledge Sharing Poster Sessions

During the Poster session, presenters will deliver their presentations in an informal setting and facilitate direct discussions with attendees at designated Poster stations. Attendees are encouraged to attend the sessions for more knowledge sharing and networking opportunities. Posters are also available for attendees' viewing at Poster stations throughout the event.

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<tr>
<th>Category</th>
<th>Presentation</th>
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<tbody>
<tr>
<td>Universities</td>
<td><strong>Enrichment of Methane Concentration From Methane-Carbon Dioxide Mixture Obtained From Oil and Gas Well</strong>&lt;br&gt;Mohd Ambar Yarmo, Universiti Kebangsaan Malaysia</td>
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<tr>
<td></td>
<td><strong>Energy Recovery in Petroleum Processing Via Integrated High Performance Technology</strong>&lt;br&gt;Srithar Rajoo, Universiti Teknologi Malaysia</td>
</tr>
<tr>
<td></td>
<td><strong>Solvent-Based Washing for Drill Cuttings Treatment in Oil and Gas Production</strong>&lt;br&gt;Dr. Thaksina Poyai and Dr. Nattawin Chawaloesphonsiya, Chulalongkorn University</td>
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<tr>
<td></td>
<td><strong>Carbon Dioxide (CO₂) Conversion to Higher Valued Products</strong>&lt;br&gt;Dr. Pattaraporn Kim-Lohsoontorn, Chulalongkorn University; Dr. Okorn Mekasuwandumrong, Silpakorn University; Dr. Panpailin Seeharaj, Mungkut’s Institute of Technology Ladkrabang</td>
</tr>
<tr>
<td>Industry</td>
<td><strong>Successful Synergistic Collaborations Between the JDA Operators</strong>&lt;br&gt;Dr. James Chong Ki Woi, Carigali-PTTEPI Operating Company; Pichit Treadtanongkiati, Carigali Hess Operating Company</td>
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<tr>
<td></td>
<td><strong>Extreme Ultrahigh Temperature Pressure and Sampling: First Field Applications in Asia</strong>&lt;br&gt;Yosef Ronald Costam and Ari Fadjarijanto, Carigali-PTTEPI Operating Company; Saifon Daungkaew, Schlumberger</td>
</tr>
<tr>
<td></td>
<td><strong>Extending the Life of Mature, Weakly Consolidated Reservoirs in Block A-18: Case for Open Hole Stand-Alone Screens</strong>&lt;br&gt;Mohd Khairul Hakimin Adon, Carigali Hess Operating Company</td>
</tr>
<tr>
<td></td>
<td><strong>Unlocking Potential Behind the Pipe with Through Tubing Sand Screen</strong>&lt;br&gt;Wong Chun Seng, Carigali Hess Operating Company</td>
</tr>
<tr>
<td></td>
<td><strong>Where Does All the Water Come From? Using AI to Identify Sources of Water</strong>&lt;br&gt;Akmal Aulia, Tan Chee Pin, Carigali Hess Operating Company</td>
</tr>
<tr>
<td></td>
<td><strong>Offline Cementing Practices - The Successful Application to Enhance Drilling Efficiency in CPOC</strong>&lt;br&gt;Kannikar Tangpatomwong, Carigali-PTTEPI Operating Company</td>
</tr>
<tr>
<td></td>
<td><strong>The Hidden Mystery of the Extraordinary Water Disposal Well in CPOC</strong>&lt;br&gt;Sawatdiwong Sarisittitham, Carigali-PTTEPI Operating Company</td>
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Monday, 2 December 2019 | 1300 - 1400 hours | Millennium Ballroom Foyer, Level 1
Social Activity

Society of Petroleum Engineers (SPE) Kuala Lumpur Section invites you to join the SPE Malaysia-Thailand JDA Summit Golf Tournament at the Palm Garden Golf Club. The event will be a great opportunity for you to network with senior executives and various parties involved in the MTJDA:

**Venue Information**

**Palm Garden Golf Club**

IOI Resort City, 62502 Putrajaya, Malaysia

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<tr>
<th>Time</th>
<th>Agenda</th>
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</thead>
<tbody>
<tr>
<td>1230 hours</td>
<td>Registration at Palm Garden Golf Club &amp; Hi-Tea</td>
</tr>
<tr>
<td>1315 hours</td>
<td>Gather at Buggy Station &amp; Group Photo Session</td>
</tr>
<tr>
<td>1330 hours</td>
<td>Tee Off (Shotgun Start)</td>
</tr>
<tr>
<td>1830 hours</td>
<td>Game End</td>
</tr>
<tr>
<td>1930 hours</td>
<td>Dinner</td>
</tr>
<tr>
<td>2000 hours</td>
<td>Prize Giving Ceremony, Lucky Draw &amp; Photo Session</td>
</tr>
<tr>
<td>2100 hours</td>
<td>End of Ceremony</td>
</tr>
</tbody>
</table>

On behalf of the Organising Committee, we look forward to seeing you there!
Abstracts and Speaker Biographies

Opening Session

Welcome Remarks
Dr. Witsarut Thungsuntonkhun, Chief Executive Officer, Malaysia-Thailand Joint Authority

Dr Witsarut Thungsuntonkhun is the Chief Executive Officer for Malaysia-Thailand Joint Authority (MTJA). He graduated from Mahidol University, Thailand with Bachelor of Science degree in Chemical Engineering in 1995. He later obtained his Master of Science in Petroleum Engineering from Colorado School of Mines, USA in 1999 and PhD in Petroleum Engineering from New Mexico Institute of Mining and Technology, USA back in 2003. Previously, he worked at Department of Mineral Fuels where he served as Senior Petroleum Engineering, Head of Facility Engineering Group and Director of Petroleum Safety and Environment Division. He has experience in managing projects such as Thailand E&P Installations Decommissioning Project, Thailand Carbon Capture and Storage (CCS) Roadmap Project and Flare Gas Utilization Project. He was also an adjunct lecturer for bachelor and master’s students in Petroleum Engineering Department at Chulalongkorn University and Asian Institute of Technology.

Keynote Speakers
Dr. Kurujit Nakornthap, Co-Chairman, Malaysia-Thailand Joint Authority

Dr Kurujit Nakornthap is the Co-Chairman (Thailand) of the Malaysia – Thailand Joint Authority (MTJA). He also holds the position of Executive Director of Petroleum Institute of Thailand, Councillor of the Council of State (Juridical Council) of Thailand and Chairman of the Board for Thailand Greenhouse Gas Management Organization. Dr Kurujit graduated as Bachelor of Science with special distinction in Petroleum Engineering from University of Oklahoma, USA in 1977. He then received his Master of Science in Petroleum Engineering in 1979 and PhD in Petroleum Engineering in 1983 from the same university. Before he appointed as Co-Chairman of MTJA, Dr Kurujit has earlier experiences as Permanent Secretary of the Thai Energy Ministry and Deputy Permanent Secretary of Energy, Thailand. He also worked at Department of Mineral Fuels (DMF) as Director-General, Deputy Director-General and Executive Director of the Technical Division. Besides, he held roles as Executive Director of International Energy Cooperation and the Acting Chief of the Energy Minister’s Office, Thailand and he was the Chief Executive Officer for Malaysia – Thailand Joint Authority in 2000 until 2004.

Tan Sri Dr. Rahamat Bivi Yusoff, Co-Chairperson, Malaysia-Thailand Joint Authority

Tan Sri Dr. Rahamat Bivi Yusoff is the Co-Chairperson of the Board of Directors of the Malaysia-Thailand Joint Authority from 29th June 2017 till date. Her extensive 30 years career in the Civil Service had begun in the Ministry of Finance from 1981 to 1988 and subsequently from 2006- 2011 for a total of 12 years. She also served at the Institute of Public Administration (INTAN) from 1988-1991 and at the Economic Planning Unit from 1991 - 2006 before becoming the Director-General of the Economic Planning Unit from October 2011 to June 2017. She was awarded with PhD for her research in Public Policy from Australian National University in 1999 and Master of Economics from the University of Western Michigan in 1986. Tan Sri Dr. Rahamat Bivi also serves on the Boards of Perbadanan Insurans Deposit Malaysia, IOI Corporation Berhad, Ekuiti Nasional Berhad and Bank Pembangunan Malaysia Berhad. She is also a member of the advisory council of the Asian Development Bank Institute (ABDI).
Executive Panel Session: Collaboration, Alignment, Sharing, and Learning : Together We Are Better

Dr. Witsarut Thungsuntonkhun, Chief Executive Officer, Malaysia-Thailand Joint Authority

Dr Witsarut Thungsuntonkhun is the Chief Executive Officer for Malaysia-Thailand Joint Authority (MTJA). He graduated from Mahidol University, Thailand with Bachelor of Science degree in Chemical Engineering in 1995. He later obtained his Master of Science in Petroleum Engineering from Colorado School of Mines, USA in 1999 and PhD in Petroleum Engineering from New Mexico Institute of Mining and Technology, USA back in 2003. Previously, he worked at Department of Mineral Fuels where he served as Senior Petroleum Engineering, Head of Facility Engineering Group and Director of Petroleum Safety and Environment Division. He has experience in managing projects such as Thailand E&P Installations Decommissioning Project, Thailand Carbon Capture and Storage (CCS) Roadmap Project and Flare Gas Utilization Project. He was also an adjunct lecturer for bachelor and master’s students in Petroleum Engineering Department at Chulalongkorn University and Asian Institute of Technology.

Muluk Wahab, Deputy Chief Executive Officer, Malaysia-Thailand Joint Authority

Muluk Wahab is currently the Deputy Chief Executive Officer for Malaysia-Thailand Joint Authority (MTJA), a unique international Joint-Authority statutory body set-up by the Government of Malaysia and Kingdom of Thailand to regulate the exploitation of hydrocarbon resources in Joint Development Area (JDA) offshore Malaysia-Thailand.

He is seconded from PETRONAS where he has been employed for the last 23 years. Prior to PETRONAS he was with British Gas Malaysia as Junior Geologist exploring in Sabah offshore area. His previous position in PETRONAS prior to MTJA was General Manager for Exploration PSC Malaysia, Malaysia Petroleum Management (MPM) responsible for all Production Sharing Contracts in Malaysia which are still at exploration stage. Prior to MPM, he held various positions in PETRONAS Carigali (PCSB) which include Operations Geologist, Business and Strategic Planner, JV Management for PCSB Exploration Peninsular Malaysia, and as Executive Assistant (EA) to Executive Vice President (EVP) Upstream PETRONAS. He also had work experience in PCSB’s international operations in Turkmenistan as Operations Geologist and in Iran as Commercial Planner.

He graduated from the University in Kansas, USA, in 1985 with a Bachelor of Science degree in Geology under PETRONAS’ scholarship.

Zulkarnain Ismail, Director, PC JDA Limited

Zulkarnain Ismail is currently the Senior General Manager of Joint Venture Malaysia for PETRONAS Carigali Sdn. Bhd. Under his current portfolio, he is managing 33 PSCs within Malaysia including 4 Joint Operating Blocks offshore Malaysia Thailand Joint Development Area. With more than 28 years of experience, Zulkarnain is known for his vast experience in drilling within PETRONAS Carigali Sdn. Bhd. He has been working for both domestic and international, covering from conceptual / detail wells engineering, wells procurement, drilling site preparation, supervision, production test / well completion and wells project management. In 2013, Zulkarnain assumed the role as a Country Chairman for PETRONAS Carigali Vietnam Ltd. Currently he sits in several Boards including PC JDA Ltd, Carigali PTTEPI Operating Company and Carigali Hess Operating Company. He also sits in various Management Committees together with other 22 PSC partners. Zulkarnain holds a Bachelor of Science Degree in Mining & Metallurgy from the Colorado School of Mines, USA.
Abstracts and Speaker Biographies

Executive Panel Session: Collaboration, Alignment, Sharing, and Learning : Together We Are Better

Dr. Anun Chonchawalit, Senior Vice President, International Asset, PTTEP International Limited

Anun has been in the oil, gas and power industry for more than 20 years, working for TOTAL initially and later PTTEP. His assignment has expanded from exploration and development geosciences to joint venture project management, gas marketing and commercial, new ventures and business development, PTTEP Corporate Strategy and Commercial. Now, Anun leads the International Non-Operating Ventures Division of PTTEP in various countries e.g. Mozambique, Vietnam, Oman, UAE, Indonesia, and MTJDA. He was instrumental in PTTEP’s key acquisitions both in Thailand and oversea. Anun spent several years in mining industry prior to joining the petroleum and power industry. Anun holds a PhD degree in Petroleum Geology and Basin Analysis from the University of British Columbia, Canada. He is now based in Bangkok, Thailand

Zhao Zhiyong, Vice President Asia, Hess

Zhiyong Zhao is Vice President, Asia for Hess Corporation, a global independent energy company engaged in the exploration and production of crude oil and natural gas.

Zhao manages the company’s operations and relationships in the region, which includes developments and producing assets offshore Malaysia and Thailand.

He joined Hess in 2009 as General Manager, Hess China, where he was responsible for overseeing all aspects of the company’s business in Beijing. He was Vice President, China, before taking on his current role in 2016.

Previously, Zhao worked as Upstream (E&P) Director, Shell China for four years. He spent 15 years with Western Geophysical/Schlumberger, where he served as Technical Adviser, Country Manager, General Manager of Western Atlas E&P Company, Global Sales Manager and Global Account Director. He began his career with China National Offshore Oil Corporation (CNOOC) as a geophysicist and project manager.

Zhao holds a bachelor’s degree in Geophysics from Jianghan Petroleum University and an M.B.A. from the University of Houston.
Session 3: Poster Session

Enrichment of Methane Concentration From Methane-Carbon Dioxide Mixture Obtained From Oil and Gas Well
Mohd Ambar Yarmo, Universiti Kebangsaan Malaysia

The global warming and the climate change are the major problem of mankind facing in 21st century. Global warming, which results climate change is mainly due to the accumulation of greenhouse gases in the atmosphere. Carbon dioxide (CO$_2$) is one of the main greenhouse gases and increased significantly (from 350 ppm in 1980 to 417 ppm in 2019). Although several attempts have been made by many researchers around the world without any significant success. Recently, at UKM 2012 made major contribution to break carbon dioxide to other products such as carbon monoxide (CO), hydrogen (H2) and methane (CH4). CO$_2$ is a very stable molecule which has the enthalpy formation ($\Delta$Hf) of -94 kcal/mole. Two years of theoretical works on thermodynamics and kinetics of CO$_2$ molecule yielded with proper choice of catalyst CO$_2$ can be broken into CO molecule at high temperature 850 oC.

Subsequently, these CO forms can be used to make hydrogen with H2O. Finally, combining carbon monoxide and hydrogen can produce high yield of methane. Initially, we carried out these reactions in quartz glass reactor and yield of CO in Reaction 1 was about 60-70% v/v. The other two reactions, namely production of hydrogen and production of methane were successfully carried out at 500 oC and 350 oC in the present of specific catalysts, respectively using Chemisorption Analyser Micromeratic 2010 with mass spectrometer mode Temperature Programme Reaction (TPX). Encourage by our laboratory results, we applied several patterns and also applied RCF grant from Malaysia-Thailand Joint Associate (MTJA). From MTJA grant, we decided to carry out these reactions in larger scale (input of CO$_2$ is 5 litre per hour) in steel reactor placed in series of reactors. Currently UKM research team are on optimisation reaction condition and finally evaluating on techno economy value.

Mohd Ambar Yarmo has been serving UKM since 1980 until now as a Professor of Chemistry. His research interest is on catalysis, surface analysis and CO$_2$ capturing and utilisation.

Catalysis Research Group at Department of Chemical Sciences, Faculty of Sciences and Technology, UKM lead by Professor Dr Mohd Ambar Yarmo had actively doing research on various chemical catalysis studies for more than thirty years. Some of the catalysis researches are covering on olefin metathesis reaction using transatation metals catalysts, reforming reaction using modified zeolite catalysts, oleochemistry based on metal acid and base catalysts. Due to current issue on global warming on drastic increasing carbon dioxide level from 350ppm in 1980 to 413 ppm in 2019, which mainly from burning of excessive fossil fuel and exploration of oil and gas activities.

Recently this research group is embark on breaking carbon dioxide using chemical catalysts reaction and followed hydrogen production to produce various ratio of synthetic gas composition. Encourage by our laboratory results, we applied several patterns and also applied RCF grant from Malaysia-Thailand Joint Associate (MTJA). From MTJA grant, we decided to carry out these reactions in larger scale in steel reactor placed in series of reactors. Currently UKM research team are on optimisation reaction condition using demonstration plant fibrate at Faculty of Science and Technology, UKM, Bangi. Finally this research wills scale up and evaluating on techno economy value before moving on the bigger scale of production of methane from carbon dioxide and water.
Energy Recovery in Petroleum Processing Via Integrated High Performance Technology
Srithar Rajoo, Universiti Kebangsaan Malaysia

Petroleum processes from upstream to downstream release significant amount of waste heat into the atmosphere. Data have shown that petroleum processes are the biggest waste heat emitters among all other industries, amounting to more than 40% of the total value. Waste heat could be reduced by improving the efficiency of a process, or being reused internally from one process to another. However, even with such efforts, there are still significant amount of the waste heat being lost to the atmosphere. This project aims to tackle the waste heat by recovering it through innovative methods. The technical solution envisaged in this project is the use of flow thermal energy recovery through electrical generation via an integrated high performance technology of turbocompound, organic rankine cycle (ORC) and thermoelectrics. Furthermore, the economic case needs to be made around the payback time of such an integrated technology implementation. Universiti Teknologi Malaysia, Imperial College London and King Mongkut’s University of Technology Thonburi Thailand are collaborating to design the whole system and build a pilot plant, consequently demonstrate the integrated technologies to recover waste heat. Currently each of the technology is being designed and fabricated for component level testing.

Dr. Srithar Rajoo is the Director of UTM Centre for Low Carbon Transport (LoCARtic), a collaborative research venture between Universiti Teknologi Malaysia and Imperial College London. He is also an Associate Professor at the School of Mechanical Engineering, Universiti Teknologi Malaysia. His research activities are mainly focusing on engine boosting and energy recovery, with specific interest on developing technologies and computational tools through experimental validation. He works closely with some prominent turbocharger and engine manufacturers, in the area of experiments and computational model development for engine turbocharger systems. Dr. Rajoo holds a PhD in Mechanical Engineering from Imperial College London.

Solvent-Based Washing for Drill Cuttings Treatment in Oil and Gas Production,
Dr. Thaksina Poyai, Dr. Nattawin Chawaloepphonsiya, Chulalongkorn University

In Southeast Asia, drill cuttings generated from offshore petroleum exploration and production are normally discarded without the legalized hydrocarbon contamination, leading to a potential risk particularly for the marine ecosystem. Whilst, most European states have forced 1 wt% oil-on-cuttings as the stringent limit allowed for offshore drill cuttings discharge. Arising from global environmental awareness, this work aims to propose a treatment option for offshore drill cuttings management. A washing method using green solvent ethyl lactate (EL) was applied throughout the work. The drill cuttings tested were mainly composed of rock particles larger than 4 mm and were contaminated by total petroleum hydrocarbons (TPH) of 3 wt%. Various washing parameters, including liquid-to-solid (L/S) ratio, washing time, stirring speed, rinse-to-solid (R/S) ratio, and rinsing time, were optimized. Under optimal washing conditions, the TPH up to 80% was removed from drill cuttings, resulting in the recyclable cuttings material with less than 0.6 wt% residual TPH. To minimize the operating cost and solvent waste, the spent EL polluted with TPH was purified through the low-energy adsorption onto granular activated carbon. Moreover, rinsed water generated from a rinsing step exhibited its characteristics similar to those of the produced water, suggesting the potential of their mutual management. In summary, the overall findings indicate that EL washing can be potentially an environmentally friendly method for offshore drill cuttings management.
Carbon Dioxide (CO2) Conversion to Higher Valued Products
Dr. Pattaraporn Kim-Lohsoontorn, Chulalongkorn University, Dr. Okorn Mekasuwandumrong, Silpakorn University; Dr. Panpailin Seeharaj, Mungkut’s Institute of Technology Ladkrabang

Technically, most of the energy stored in petroleum in fact originates from a renewable source: the sun. Prehistoric microorganisms extracted atmospheric CO2 and converted it into hydrocarbons with solar energy. These molecules were trapped underground and converted further over millions of years through a very slow natural process into petroleum. Though the origin of the stored energy was renewable, the lack of means to renew this material at the same rate as its consumption makes it lose its renewable status. The release of CO2 from petroleum processing and combustion of fossil fuels over the last few centuries is relatively instantaneous on the geological time scale and has shifted the climatic equilibrium. The global CO2 emission is at 6.2 trillion tons per year and it tends to increase. The increasing CO2 concentration in atmosphere was predicted to be 44% from 2006 to 2030. The natural gas drilling is one of the major CO2 sources, since the gas reservoir contains large amount of CO2. This leads to a consequent problem how to manage CO2 once it has been removed and stored. To preserve our environment and to keep up with the ever tougher regulations, technology for CO2 conversion should be developed to reduce the amounts vented to the atmosphere. This process will be even more important in the far but inevitable future when petroleum is depleted and human civilisation has moved on to other sources of energy; the reason is that carbon-based chemicals will still be needed. With the petroleum gone, carbon recycling will be crucial for the production of these commodities. This CO2 conversion project aims to pave a step towards such a future. It consists of two main project themes: technological breakthrough and technological foresight.

Project theme I (technological breakthrough):
Project theme I (technological breakthrough) combines five subprojects aiming at a breakthrough in CO2 conversion through thermochemical, electrochemical, photocatalytic, and photoelectrochemical processes, which are currently facing different challenges. As at the core of CO2 conversion to other chemicals is a catalyst, subproject 1, which proposes a study of polyamine and Ru catalysts for CO2 conversion to methanol, deals with this issue directly and will contribute to enhancing catalyst activity in thermochemical process. Subproject 2 proposes a new thermochemical process, tackling at energy intensive problem in conventional process. Subproject 2 proposes CO2 to methanol through an alcohol-assisted process – offering a reducing operating pressure and temperature. Product derivatives such as dimethyl ether (DME) and dimethyl carbonate (DMC) are synthesized further using methanol and CO2 as feedstock in subproject 2. Subprojects 3, 4, and 5 focus on this issue from different aspects. As energy from many renewable sources is available in the form of electricity, subprojects 3 and 4 exploit this for electrochemical conversion of CO2 at low temperatures. The former aims at developing an electrochemical reactor that is more practical for large-scale applications, while the latter proposes the development of novel electrocatalysts for that purpose. In addition, subproject 4 explores possibilities for integrating new electrocatalytic systems with locally available natural rubber
(NR)-based CO₂ capture materials. Lastly, subproject 5 focuses on extracting photon energy for activation of CO₂ through photocatalysts. Five subprojects in project theme I offer different strategies to utilize CO₂ emitted during NG drilling operation in JDA.

Project theme II (technological foresight):
Conversion of CO₂ to higher-value products based on existing technology usually involves (i) thermocatalytic reactions (ii) photocatalytic reactions or (iii) electrochemical reduction of CO₂. It is difficult to confirm which route of the CO₂-to-chemicals technology is the most feasible one for real application in industry. Although the in-direct process via syngas production has already been employed in commercial scale plants but it is energy intensive and multiple steps are required in the production. The direct conversion by either electoreduction or photoreduction is interesting but information of their reaction efficiency and energy efficiency as well as the scale-up possibility are very limited. The research theme II (technological foresight) aims to study and compare the conversion of CO₂ via different routes (thermochemical, electrochemical, and photocatalytic conversions) based on current available information. The best catalysts and conditions for each CO₂ conversion route will be selected and then suitable reactor type will be design. Bench-scale reactors of the three conversion routes will be fabricated and the most optimized process for CO₂ to higher-value products will be determined based on reaction efficiency and stability, energy efficiency, and scale-up possibility.

Pattaraporn Kim-Lohsoontorn obtained her degree in Earth Science and Engineering, emphasizing fuel cell engineering at Imperial College London, the United Kingdom, with the Royal Thai Government Scholarship. She has professional experience in the following positions:
- 2017-present Lecturer, Department of Chemical Engineering, Chulalongkorn University
- 2012-2017 Assistant professor, Department of Chemical Engineering, Mahidol University
- 2009-2011 Research Assistant Professor, KI for Eco-Energy, Korea Advanced Institute of Science and Technology (KAIST), Republic of Korea
- 2008-2011 Lecturer, Department of Chemical Engineering, Mahidol University
- 2002-2004 Researcher, PTT Research & Technology Institute, PTT Public Company Limited, Thailand

Selected awards:
- PTIT Scholar award 2015-2016, Petroleum Institute of Thailand
- Mahidol University Award for Research Excellence, Mahidol University, 2016
- Outstanding University Staff 2015, Faculty of Engineering, Mahidol University

Her current research interests is focused on CO₂ conversion to higher value product such as methanol, other chemicals, and carbon products. Research interest includes electrochemical devices for energy applications, with a particular focus on fuel cells and electrolyzers. Key research topics include:
- Techno-economic analysis of low temperature and pressure thermochemical CO₂ conversion to methanol
- Thermally self-sustained double reactor coupling hydrogen production from glycerol reforming and methanol production from carbon dioxide and generated hydrogen
- Development of metal-foam-supported solid oxide electrolysis cell for hydrogen production from steam electrolysis
- Coelectrolysis of steam/carbon dioxide electrolysis for syngas production and proton-conducting solid oxide fuel cell
Session 3: Poster Session (continued)

Dr. Okorn Mekasuwandumrong obtained his PhD degree in Chemical Engineering, from Department of Chemical Engineering, Chulalongkorn University, Thailand, with the Royal Golden Jubilee scholarship. He has professional experience in the following positions:

- 2003-2006: Lecturer, Department of Chemical Engineering, Faculty of Engineering and Industrial Technology, Silpakorn University, Sanam Chandra Palace Campus, Nakhon Pathom 73000, Thailand
- 2006-Present: Assistant professor, Department of Chemical Engineering, Faculty of Engineering and Industrial Technology, Silpakorn University

Selected awards:
- Young researcher award from TRF-CHE-SCOPUS

His current research interests are focused on synthesis of nanomaterials and its application as the catalyst in many reactions such as photocatalytic CO₂ reduction, CO₂ hydrogenation and hydrogenation of other organic compounds.

Successful Synergistic Collaborations Between the JDA Operators

Dr. James Chong Ki Woi, Carigali-PTTEPI Operating Company, Pichit Treadtanongkiati, Carigali Hess Operating Company

The JDA operators, Carigali Hess Operating Company (CHOC) and Carigali-PTTEPI Operating Company (CPOC), collaborated successfully on various activities resulting in mutual benefits. This poster session highlights the win-win cooperation on contracting, logistics, drilling, and other operational support approaches by both JDA operators. Examples of key collaborations are sharing of helicopter services, drilling rig, and technical experience.

Dr James Chong has been working as Business Support Analyst for Carigali-PTTEPI Operating Company Sdn. Bhd. (CPOC) for more than 10 years. He is part of the business support team responsible for Logistics, Procurement, HR, IT and Finance. He has previously worked in London with Coopers and Lybrand and has more than 30 years of working experience in finance and operations related areas. He is a qualified Chartered Accountant (ICAEW, UK) and has a BSc. (Joint Honours) degree in Accounting and Economics from City University, UK and postgraduate degrees, MBA and DBA from Southern Cross University, Australia.

Pichit is currently Team Leader – Business Planning of Carigali Hess Operating Company. He graduated Bachelor Degree in Chemical Engineering from King Mongkut University of Technology – Thonburi (Thailand) in 1989 and Master Degree in Business Administration (MBA) from Thammasat University (Thailand) in 1999. Prior to joining Carigali Hess, he worked for General Electric and Hess Corporation.

Extreme Ultrahigh Temperature Pressure and Sampling: First Field Applications in Asia

Yosef Ronald Costam and Ari Fadjarijanto, Carigali-PTTEPI Operating Company; Saifon Daungkaew, Schlumberger

More exploration and appraisal wells are now targeting deeper horizons, which tend to have lower porosities and High Temperature (HT). Several reservoirs in Asia region such as the North Malay basins in the joint development area between Thailand and Malaysia, and Deep Water in China are considered to have the highest
temperature gradient due to their geological settings. More than fifty percentage of wells drilled in these two areas have temperature close to/or higher than 170 degC. In number of projects in this area, the logging requires tools that can withstand up to 230 degC.

Traditional, wireline Formation Testers (FT) with fixed rate and volume pre-test and old sampling technique using a dumping chamber (i.e. without pumping capability) had been standard formation tester when temperature higher than 400degF (204 degC). The tool has not been flaked, and therefore, the temperature transient affects the quality and accuracy of pressure data 1,2. In addition, without the pump-out capability, collected samples usually contain mostly mud and mud filtrate, i.e. only small amount of diphase fluids (i.e. become two phase when open at surface).

This paper discusses a project for the new advanced ultrahigh temperature FT called “Merlin" to obtain downhole fluid sampling with pump-out capability and downhole fluid sensors such as viscosity, density and resistivity in such extreme HT environments. In addition, this Merlin tool dimension (slim tool) has more clearance between the tool and formation, and therefore, less chance of having this tool get stuck in the slim hole logging.

The tool was first deployed in the North Malay Basin, since Q2 2018, five exploration wells were logged. The main objectives for this FT tool are to obtain formation pressure, identify reservoir fluid and quantitative CO2 measurement zone by zone. For several jobs in the North Malay Basins, six pump-out and fluid sampling were conducted. The results will be discussed operationally and technically, in terms of data quality and accuracy compared with surface analyses. In addition, this tool shows much improve significantly operationally compared to the previous tool. Different operators have different perceptions on running Wireline FT tool with bigger OD, especially drilling department. By having this tool on board help them feel comfortable to run it.

For Deepwater China, client has been faced challenges to explore a brand-new block such as pore pressure distributions profile, reservoir quality, and extended logging period. The main objectives for the extreme FT are to obtain the formation pressure for drilling purpose, to understand reservoir potential to proper plan for DST test, and to narrow logging operation time window due to season weather. The Merlin tool were proposed to log in this environment. This field example shows a significantly improve pre-test and sampling capability in the lower mobility ranges that the probe FT has not be achieved in the past. The effective time for valid pretest can be achieved even in the range of mobility 0.01 mD/cp, high pressure of > 11000 psi, and high temperature of >180degC.

This paper discusses on pre-job planning and actual job execution results in both locations. The challenges of logging and lesson learned were addressed. This is the first attempt to try evaluating reservoirs in the deeper and HT sections to properly understand reservoir fluids.

Yosef Ronald Costam is an Operation Geologist for Carigali-PTTEPI Operating Company Sdn. Bhd. (CPOC) in Subsurface Division since 2015. He obtained his BS degree in Geology from Institute of Technology Bandung (ITB) in 2004 and MS degree in Geophysics from University of Indonesia in 2013. He has over 20 years of experience in the oil and gas industries with various areas, including Indonesia and Malaysia. As an Operation Geologist, he dealt with drilling for HPHT exploration and development wells and high CO2 content of reservoirs. Ronald currently member of Association of Indonesian Geologist (IAGI) and Society of Exploration Geophysicists (SEG).
Ari Fadjarijanto is a Senior Petrophysicist with more than 20 years’ experience with various work area in the Middle-East, Africa and Asia. He joined Carigali-PTTEPI Operating Company Sdn. Bhd. (CPOC) in 2013 and his primarily responsibilities are petrophysicist analysis and special studies of development and exploration projects on Joint Development Area (JDA) located near to the Gulf of Thailand. Prior to his present position, Fadjarijanto was a Wireline Field Engineer and held several other positions in wireline operations and formation evaluation between 1994 and 2013. He received a BS degree in Geology from Universitas of Pembangunan Nasional Yogyakarta (UNP). Fadjarijanto is a member of the Society of Petrophysicists and Well Log Analysts (SPWLA) and Society of Petroleum Engineers (SPE). He is also an author and co-author of several technical papers.

Dr. Saifon Daungkaew is the Principal Reservoir Engineer for Schlumberger. She has her first degree in Chemical Engineering from Prince of Songkla University, Thailand. She receives her Master and PhD degrees in Petroleum Engineering from The Royal School of Mines, Imperial College London in 2002. She has been working in the oil and gas industry more than 19 years. Her background is Well Test Analysis. She has been working in the Wireline Formation Testers (FT) since she has started her career. She has applied pressure transient analysis to the wireline formation tester data. She is the first to present the direct comparison between Interval Pressure Transient Test (IPTT) obtain from FT with DST in the SPE ATW in 2007. She has over 60 publications and three US patents. She has been supporting wireline formation testers for various locations including Southern Europe & Mediterranean Region and Asia Pacific (Malaysia, Brunei, Philippines, Thailand, Myanmar, Vietnam and Indonesia), and Oman. She has been served as visiting lecturers and Co-supervisor for Master Thesis from various universities such as Chulalongkorn University, Asian Institute of Technology, Walailak University (Thailand), University of Technology (Malaysia), Heriot Watt University (UK and Abu Dhabi), Curtin University (Australia). She also serves as judges for SPE Thailand Award and SPE young professional presentation award. She has been served as technical program committee for SPE, EAGE, IPTC conferences, and SPE ATW and SPE Forum Series since 2002. Including local technical publications such as the Geological Society of Malaysia. She just received the Regional Technical Award for Reservoir Description & Dynamics for the Northern Asia Pacific Region at the 2018 SPE Asia Pacific Oil and Gas Conference and Exposition (APOGCE) in Brisbane.

Extending the Life of Mature, Weakly Consolidated Reservoirs in Block A-18: Case for Open Hole Stand-Alone Screens
Mohd Khairul Hakimin Adon, Carigali Hess Operating Company

Geo-mechanical and sanding potential studies indicate sand production is likely to increase as Block A-18 reservoirs are depleted. An integrated sand management strategy has been developed for downhole sand control using standalone screens. The existing wells were completed with cemented liners or monobore cemented tubing using 5-1/2" tubing. Through tubing standalone screens have been installed in sand producing wells with mixed results. The use of through tubing sand control is historically challenging to achieve long term sand free production and usually requires restricted production rates.

Due to the increased sanding potential issue, the currently planned infill well design will utilize active downhole sand control in the form of Open Hole Stand Alone Screens (OHSAS). Sand Retention Tests were performed using representative Particle Size Distribution samples and tested with premium screen samples. The upcoming infill well development project is designed to penetrate multiple different sand bodies with
Unlocking Potential Behind the Pipe with Through Tubing Sand Screens
Wong Chun Seng, Carigali Hess Operating Company

Field A is a gas field located in Malaysia-Thailand Joint Development Area. As the field matures after 13 years of production, sand production is common in unconsolidated formation as pressure declines and water breaks through. Post booster compressor installation, sand production had increased almost 6 folds from 2 to 10 MT thus increasing risk of productivity impairment, damage to well completions or surface facilities if the issue is not resolved.

An in depth integrated sand management strategy had been developed, which recommended a combination of wells producing at Maximum Sand Rate (MASR) and downhole sand control using standalone screen. Conventional cased hole downhole sand control such as gravel pack and frac pack have been ruled out due to operation complexity in highly deviated wells and risk of formation damage in depleted reservoirs.

Standard metallic standalone screens are not recommended in cased hole gas well since they are susceptible to erosion from expected high gas velocity resulting in poor longevity. Hence, hang off ceramic screen has been evaluated as cost effective and fit for purpose short term downhole sand control and surface erosion mitigation solution in cased hole multi layer gas reservoir.

Ceramic sand screen made with sintered silicon carbide is fast emerging as alternative downhole sand control solution for gas field since it is 10 times as hard as metallic screen and provides for superior erosional resistance at speeds of 300 ft/s sand impingement velocity as compared to standard metallic screen. In addition, ceramic screen pilot results will be compared with performance of stackable standard metallic standalone screen which was installed in 2017, to select the optimal solution for the future.

Detailed analysis and planning contributed to 100% success in both installation and sand control in all 3 wells. This included velocity calculations, tool deployment simulations, improved end cap screen design, tool inspection and a detailed handling and lifting procedure. However, increased gas production rate was observed in only 1 well (by about 40%) under controlled condition with minimal sand production for 9 months since Jan 2019. The other benefit is the significant cost saving with total cost of only 14% of conventional gravel pack.
Analysis of the application and results is critical and ongoing. One well experienced some production degradation sooner than anticipated - the cause is uncertain; however, a combination of factors could be at play such as non-uniform sand, high deviation leading to partial screen or near bore plugging. A short term/long term mitigation plan to regain production has been evaluated and will be executed.

This poster presents a detailed case study of hang off ceramic screen pilot in 3 wells in terms of technology selection, lessons learnt and future recommendations. It is evident that hang off ceramic screen is technically and economically viable downhole sand control solution for cased hole multi layer gas producer thus potentially eliminating the need of expensive conventional gravel pack and frac pack solutions in mature gas field.

Wong Chun Seng is currently a Senior Well Surveillance Engineer at Carigali Hess. Prior to joining Carigali Hess in 2011, Wong was a Senior Production Engineer at Murphy (2010-2011) and Senior Production Technologist at Petronas Carigali (2002-2009). He had published several SPE papers related to acid simulation, idle well reactivation and well intervention. He had completed his Master of Science (Msc) in Petroleum Engineering from the University of Technology PETRONAS (2005) and graduated from University Science Malaysia with Bachelor of Engineering honour degree in Chemical Engineering in 2001.

Where Does All the Water Come From? Using AI to Identify Sources of Water
Akmal Aulia and Tan Chee Pin, Carigali Hess Operating Company

Aquifer encroachment is an unavoidable feature of many mature gas developments. Understanding how best to handle the produced water within facility limits while maintaining contracted production rates requires knowledge of not only the volumes being produced, but also where they are being produced from. In a large, offshore asset with many platforms and numerous wells producing from multiple zones, it is both impractical and expensive to place water measurement sensors on every well. In this case study, we present an analytical method to identify water-producing wells, with only limited input from metering.

The studied asset is offshore and very large, featuring around 9 Tcf of GIIP, 12 wellhead platforms, and more than 100 development wells, many of which produce gas comingle from several zones. From a geological perspective, the asset is also quite complex. In all fields, gas production is from multi-stacked sandstone reservoirs. Reservoir facies and reservoir properties can be highly variable, varying from low quality bioturbated, muddy sands, through moderate-high quality, laminated sands, to very high quality, massive sands.

Two analytical methods are presented to identify water-producing wells. Both methods employ artificial intelligence to identify relationships between various well measurements. The first method uses a well-known statistical learning method called Random Forests to establish a nonlinear relationship between measured well parameters and the amount of total water produced. The established relationship takes the form of a Random Forests model that can satisfactorily predict the total produced water at any given time. A permutation-based importance method can then be used to rank the wells.

The second method employs a well-established and relatively straightforward material balance technique, i.e. the product of water/gas ratio and the gross gas rate, which yields the produced water rate. The objective of the second method is to establish a well-by-well water/gas ratio, such that material conservation is satisfied.
for a chosen range of historical data. This approach presents a number of challenges, and requires the use of a global optimization method in order to converge to a satisfactory solution.

Akmal is currently a senior planner at Carigali Hess. Prior to Carigali Hess, Akmal was a reservoir engineer at Schlumberger and an assistant professor at Heriot-Watt University. He had published several papers related to reservoir simulation and machine learning. He had completed his PhD in Petroleum Engineering from the University of Technology PETRONAS, and his MSc in Computational Science from San Diego State University. He was a Chartered Mathematician, and a Schlumberger NeXT Certified Instructor for various reservoir simulation-related courses.

Offline Cementing Practices - The Successful Application to Enhance Drilling Efficiency in CPOC
Kannikar Tangpatomwong, Carigali-PTTEPI Operating Company

CPOC, on average, drills 4,146 meter measured-depth/3,395 meter total vertical depth 3-string design wells in approximately 15.3 days. In an attempt to minimize the drilling operation time to this performance and accelerate the date of first gas production, the factor that contributes most is the “offline” of as many drilling-rig activities as possible. Cementing operation is the activity which is consuming time but important as it is the method of zonal isolation which is a vital part of well control. The feasibility of conducting offline cementing for 7” and 9-5/8” section were evaluated and risk-assessed for several designs without affecting the safety of the operations. The concept was conceived and implemented, initially for 7” intermediate casings, for 9-5/8” section in the expansion project. This ability to cement casing offline allowed the rig to move to another slot and drill the next well in the batch campaign while simultaneously cementing on the previous well. Five of eleven wells had been initially cemented in ADA platform using offline cementing tools in 7” casing section, providing USD 0.2 million in total cost savings and reducing rig time approximately 5 hours per well. The cementing objectives were successfully achieved in all cases, including adequate top of cement (TOC) and integrity tests. As part of continuous performance improvement, the opportunity to perform cementing offline in 9-5/8” casing section has been developed and implemented.

Kannikar Tangpatomwong has been working as a completion engineer for Carigali-PTTEPI Operating Company Sdn. Bhd. (CPOC) since 2016. She has been taken the role of all completion operation management including completion design, managing the completion equipment, material selection and optimizing completion operation efficiencies. Prior to her present position, she has been a well engineer for PTTEP since 2012. She received the B.E. degree in electrical engineering from Chulalongkorn University (2nd class honor) in 2007.

The Hidden Mystery Of The Extraordinary Water Disposal Well In CPOC
Sawatdiwong Sarisittitham, Carigali-PTTEPI Operating Company

CPOC has been on production since 2009. As of January 2019, the total of 41.0 MMSTB of water has been injected into 2 water disposal wells to compile with the zero discharge policy. As the gas production is ongoing, water production is also increasing. Despite the attempts for water management, e.g. water shut off and additional perforation in current water disposals, the increasing trend of the field water production is still observed. It is currently observed that both wells are required for handling the current field water production level. If one of the well is going down, the field gas production has to be cut back.
The water injector performance review campaign was performed in 2018 to provide the health check for both water injectors and identify the necessity of any additional disposal well. The results are not only change the water allocation philosophy for the existing wells, but also highlights the need for the additional injectors. This is because of the limitation of well sparing, intervention operation, current operating envelop, and the out of zone injection observed in one of the well.

At present, two of the previous idle production wells are ongoing the well conversion operation to convert the wells to the additional water injectors. Once completed, the remediation action will be performed to solve the out of zone injection observed in the existing well. The lessons captured from this study are immediately applied for the perforation strategy of new wells and the future well surveillance. Ultimately, the results from this study strengthen the confidence of CPOC to manage the produced water handling capacity for ensuring the upcoming challenging production performance as the water handling is also one of the key backbone for the field production operation.

Sawatdiwong Sarisittitham has been working as a reservoir engineer for Carigali-PTTEPI Operating Company Sdn. Bhd. (CPOC) since 2017. He has been taken the role of reservoir surveillance for both producers and water disposal wells. He also takes responsible for field development plan project of CPOC. Prior to his present position, he has been a reservoir engineer for PTTEP since in 2009. He completed a BEng degree from Chulalongkorn University (1st class honor) and MSc from Heriot Watt University (Distinction) both in petroleum engineering subject.
MTJA Strategic Roadmap and Value Improvement
Kumphon Kumnerdsiri, Watcharaporn Phootong, Malaysia-Thailand Joint Authority

MTJDA currently consists of three Production Sharing Contracts (PSC) namely A-18, B-17&C-19, and B-17-01 which are operated by two group of Contractors. A-18 and B-17&C-19 PSCs were awarded in 1993, whereas B-17-01 PSC was awarded in 2004. The contract duration is 35 years. The PSCs are regulated by MTJA. This year marks the 40th anniversary of the MOU between the two countries with the successful achievement of cumulative 5 TCF of sale gas from those three PSCs. Nevertheless, behind the success story, MTJA and its PSC Contractors/Operators have faced multiple challenges throughout development and production milestone. This paper thus aims to share MTJA’s initiative and achievements in implementation of strategic roadmap-stage 1 as well as to share the next major challenge.

Key drivers for trigger MTJA Strategy Implementation Roadmap Study in 2014 were 1) to fulfil Gas Sale Agreement (GSA) obligation and 2) to create opportunity for selling more gas. The study by third party then focused on three pillars comprising Growth, Profitability and Risk Management. Key priorities were therefore set for three years action plan from 2015 to 2017. With the good effort and collaboration among MTJA and its Contractors/Operators, mitigation of shortfall in gas delivery and capturing more reserves from B-17 & C-19 and B-17-01 have been achieved, while upside gas potential in A-18 has been planned for future development to prolong gas supply beyond 2029. Moreover, there is also undergoing discussion on additional sales gas. Above-mentioned achievements sustain the growth of JDA gas supply. Under profitability pillar, overall JDA Unit Production Costs (UPC) was reduced more than target of 5% (compared YE2015 VS YE2014 baseline). In addition, MTJA have continue mitigated and re-evaluated their defined risks relating to operation, legislation and regulation, and cost recovery.

Now MTJA is facing the new crucial challenge for production continuity after PSCs expiry in 2029. Therefore, without consolidated roadmap and strategy to renew PSCs after expiry, the development and investment will be delayed and create further significant impacts of gas supply discontinuity and loss revenues to states. The development of strategy shall be urgently defined to assure the further asset growth, profitability and continuous of gas supply. The clarity of option will affect the timeframe for project sanction which may need at least 7 years prior PSC expiry. To minimize the risk to states and stakeholder, the development of the strategy and seeking for valid options is a top priority milestone for MTJA and targeted to achieve as soon as possible.

Mr. Kumphon Kumnerdsiri is currently E&P Manager of Malaysia-Thailand Joint Authority (MTJA). He has joined MTJA since 2017. Previously, he worked in Millennium Gold Exploration in 1997-1998 and then in Department of Mineral Fuels (DMF), Thailand from 2002-2016 as geologist and senior geologist respectively. His role in DMF was mainly in charge of international petroleum cooperation. During 2010-2012, he took part in Reservoir Analogue Research Group under University of Adelaide to carried out research in marginal marine-deltaic reservoir architecture. Kumphon hold BSc (Geology) from Chiangmai University, Thailand in 1997 and MSc (Basin Evolution & Dynamics) from Royal Holloway, University of London in 2005.

Ms. Watcharaporn Phootong has been currently working as a Senior Geoscientist at Malaysia-Thailand Joint Authority (MTJA) since March 2019. Before that, she had 6 years-work experiences as a geologist in Mineral Fuels Management Division, Department of Mineral Fuels (DMF), Thailand (2013-2019). For her educational background, she graduated with a BSc. Geology from Chulalongkorn University (2007-2010) and MSc. Petroleum Geosciences (Basin Evolution & Dynamics) from Royal Holloway, University of London (2011-2012).
Session 4: Strategic Value Creation

JDA Block A-18 Unitization: The Successful Collaboration and Value Creation for Petroleum Resources
Noppanat Vanichanugon, Malaysia-Thailand Joint Authority; Nurakmal Yunos, PETRONAS

Unitization or Unit Area Development is a widely accepted concept for developing a continuous hydrocarbon accumulation that straddles a boundary with two or more contiguous ownerships. The concept requires all stakeholders to establish an equitable arrangement to explore for and exploit petroleum resources in a cost-effective manner.

This paper showcases the success of Unitization involving Block A-18 asset. The process was initiated when the geological structures of the reservoir named “Bumi Field” in JDA Block A-18 area were believed to be connected to PETRONAS Block PM-301’s “Bumi South Field” in Malaysian territory. This culminated in The Head of Agreement (HOA) of Unitization for Bumi and Bumi South in 2008 which subsequently led to the Unitization Agreement (UA).

The journey of Unit Area development continues to evolve. Currently, Block A-18 and Malaysia PSC Blocks have established three Unit Area developments from which approximate 1.8 TCF Sales Gas have been delivered. This was achieved cost-effectively with Unit Production Cost (UPC) of less than 3.0 USD/BOE, a good record compared with Gulf of Thailand operations.

What is unique of A-18 Unitization or unitization in general? It is found in the management aspect. One can imagine how difficult it is to manage three Unit Areas to the satisfaction of all Parties i.e. Host Authorities, PSC Contractors and Unit Partners. Fortunately, this complicated web of interactions can be overcome by formulating two agreements namely, Unitization Agreement (UA) and Unit Area Operation Agreement (UAOA).

UA is the governing document between both Host Authorities, with varying participating interest (rights and obligation) shared by MTJA for Block A-18, and PETRONAS MPM for Block PM301 and Bakawali PSC Block. The key principles agreed consist of tract participation and redetermination, management of Work Program and Budget and Unit Management Committee. With clearly spelled out Unit Agreements, in place since 2011, MTJA and MPM has been able to manage the exploitation of contiguous resources without any dispute or interruption of ongoing developments and operations.

On the other hand, UAOA plays an important role at the operational level. Currently, Carigali Hess Operating Company (CHOC) operates the three Unit Areas on behalf of Block A-18 PSC contractors, PETRONAS Carigali Sdn Bhd (PCSB) and Hess, and on behalf of PM301 and Bakawali PSC Unit Operators. The key principles agreed consist of redetermination procedures, allocation of unit substance and Unit Operation Committee.

With a strong spirit of cooperation among all stakeholders, the JDA Block A-18 Unit Areas operations have proceeded smoothly to achieve the common goal of supplying natural gas for the benefit of the two Countries and meeting Gas Sales Agreement (GSA) obligations.

Mr. Noppanat Vanichanugon: Noppanat graduated bachelor’s degree in civil engineering in 2008 from Kasetsart University, Thailand. He was eligible as scholarship student to study in master’s degree of Petroleum Engineering at University of Adelaide in 2010. After he received Master Degree, he joined the Department of Mineral Fuels (DMF) and worked as petroleum engineer in reservoir engineering group as well as in the planning division. Currently, he joins MTJA and working as senior production engineer.
Abstracts and Speaker Biographies

Session 4: Strategic Value Creation

Nurakmal graduated with an honours degree in Economics and graduated in 2006 from Indiana University Bloomington, USA. She started her career in PETRONAS in 2006 as a Marketing Executive with Malaysia LNG Sdn. Bhd and later joined the Special Projects team under Gas Business. She then joined Malaysia Gas Management where she worked under various portfolios ranging from Gas Marketing to Gas Commercial. She currently holds the position of Head PAC Management – Cluster 1 under Governance & Strategic Relations department in Malaysia Petroleum Management (MPM) responsible in overseeing PAC governance and compliance of Operators’ in Malaysia as well as managing various Unitization portfolios.

Timely Intervention to Achieve Cost Optimisation: A Shareholders’ Perspective
M Lukman Ghazali, PC JDA Limited

Oil and gas has always been a costly business. This is especially prominent for facilities that have been around for many years, which require more attention by the Operators to manage - and therefore comes together with this is the cost, which will continue to escalate year by year as the facilities get older. It becomes tricky when the fields still bear substantial hydrocarbon resources beneath, which makes future developments possible under the right circumstances - and definitely cost is a factor that defines the possibility.

Cost optimization is the common interest shared by all stakeholders of the PSCs in MTJDA. Timing of which an intervention is exercised is crucial - as much as it is important to achieve the objective, it should be done in a way that is less disruptive to the ongoing operation to maintain its efficiency. The party most suitable to guide and steer the assets to achieve this is definitely the Shareholders - being the party in between the host authority and the Operators, with in depth understanding of the oil and gas business behaviours in both countries due to their experience. This is about how Shareholders leverage on these factors to timely intervene to successfully realize cost optimization in the assets.

Mohd Lukman bin Ghazali graduated from the Curtin University of Technology, Western Australia in Chemical Engineering. He have just over 10 years of experience in oil and gas industry with PETRONAS, starting his career as a Field Engineer in Kerteh, Terengganu. After that he moved to become a Field Analyst, focusing mainly on production planning, integrated activities planning and also asset performance analysis. From his 3rd to 7th year in the company, he was assigned as a Business Analyst, looking after the operational-commercial aspects of offshore assets. Currently he hold the position of a Manager, Venture Management, JV Malaysia Sector 3 with the key role of managing non-operated venture assets in JDA and North Malay Basin.

Value Improvement to Sustain the Value
Komson Tachapanich, PTTEP International Limited

A major E&P business risk often concerns the geological characteristics that a company faces. One such risk area involves the “Complex and Compartmentalized (Broken) Structure,” meaning a structure that requires more activities, a greater number of wells, and further investment to drain the same reserves when compared to a “Simple Prominent Structure” that needs less overall investment. It is clear then that any development scenario and investment strategy should be dynamic and periodically updated.

On top of the technical challenges presented, contractors should also thoroughly understand the impacts of all Fiscal Regime elements and how they will affect a project’s financial performance, as they attempt to monetize the underground resources/reserves and still remain within the economic requirements.
Moreover, any additional investment, after the initial phase is completed, needs to be optimized so as to ensure that the payback period and economic return are acceptable and that the investment is recovered within the PSC deadline. Fund requirements for additional investment should increase step by step, depending on the business environment, namely, current commitment, availability of current plant capacity, market opportunity, technical innovation, and remaining production period.

“Economy of Scale, Efficiency, Technical Innovation, Long Production Period”

**Adding Value to the JDA through International Partnership**

Dinesh Cheryan, Hess

This discussion with focus on the value that Hess and our partners contributes in the JDA. The discussion will cover 4 areas aligned to the House of Hess:

1. **Performance** – this will tie into the application of technology, for example in the use of Lean manufacturing techniques and new Seismic applications, borrowed from other parts of our company

2. **Operational excellence** – through ongoing rigor and focus, we have maintained reliability numbers of 98% since year 2005.

3. **National development** – we are a registered Thai company, with significant Malaysian/Thai professionals in significant positions across the company. We invest significantly in helping local communities. We have steered unitization agreements and transactions between JDA and Malaysian PSCs.

4. **We aim to be the most trusted energy partner in the world. Within the Hess portfolio, the JDA makes up >10% of our total yearly production. These two reasons means that this asset receives due attention from the leadership of our company. We continue to steward this resource with great care and concern because of its importance to both countries.**

**Dinesh Cheryan is Director, Commercial and New Business Development with accountability for all commercial, new business and valuation support for Hess Asia assets. In previous roles with Hess, he has been Chief Economist, Director in Global New Business Development, and has led the Value Assurance capital allocation stage gate process for the company while based in Houston. He has been with Hess for 12 years. He began his career with Shell in the Netherlands as a facilities engineer, and over a number of roles has worked in economics, new ventures and commercial areas in Europe, USA and Malaysia. Dinesh is a Malaysian national and holds degrees in Civil Engineering and Economics.**
Appraising and Developing Complex Depo-Facies in Block A-18: Challenges and Opportunities
Hasni Jusoh, Carigali Hess Operating Company

Gas was first discovered in the area in 1971 by well Pilong-1. However, exploration of Block A-18’s Central Inversion Zone (CIZ) did not begin in earnest until 1995, after the MTJA was formed. Over the next three years, the Cakerawala, Suriya, Bumi and Bulan fields were discovered and appraised, proving the existence of numerous multiple-stacked sandstone reservoirs, leading ultimately to today’s development.

The large geographical area and thick section are mirrored by a wide range of rock and fluid properties. In response, numerous specialized techniques and technologies were developed following first gas in 2005 to enable safe, efficient and reliable extraction.

Shallow and Intermediate reservoirs, between 3,500 and 7,000 ftess, contain most of the resource. These shallow marine to tidal channel sandstones are laterally extensive, mostly high quality and visible from seismic. However, weak lithification means they are prone to sand production, an issue that has been controlled through a regimen of production monitoring and management.

Reservoirs are also encountered in the Deep zone between around 7,000 ftess and 10,000 ftess. Gas was first produced from the Deep of the Cakerawala Field in 2006. However, this early deep production was short-lived, and it wasn’t until 2013 that more sustained production was achieved from Deep reservoirs in the Bumi Field. Development of Bumi Deep gas will be a key focus area over the next few years. The Deep sands are hot and over-pressured, and although their generally lower permeability is partly offset by high pressure, their channelized fluvial nature can lead to compartmentalization. Deep reservoirs are difficult to image seismically, therefore reliable well targeting depends on the latest seismic imaging technology.

Variations in gas composition are managed through phased blending, water reinjection and technology. Blending of gas to keep CO₂ concentrations under control is one of the primary inputs into long-term planning.

Undeveloped resources remain to be exploited in Block A-18, as near-field prospects within the CIZ, and as discovered fields further west. Their chances of successful exploitation are greatly improved thanks to experience gained developing CIZ resources.

Hasni Jusoh is currently the manager for Appraisal & Growth at Carigali Hess. Graduated from Imperial College in 1995 and started his career as a reservoir engineer in ExxonMobil Malaysia. Then, moved on to Carigali Hess in 2004 as a Reservoir-Petroleum Engineer. He assumed his current position in 2018 and has been at the forefront leading the effort in maturing opportunities for future development in Carigali Hess. To date, he had published several industry papers related to sand production issues.

Keeping the Gas Flowing: Complex Well Interventions Simplified
Jagdish Singh, Daniel Chua, Carigali Hess Operating Company; Suraj Singh Shergill, Schlumberger

Well intervention and its efficient execution has been a critical tool used by CHOC to ensure reliability of gas supply and create value throughout the life of the A-18 development. The asset consists of 128 production wells which are generally very highly deviated, have high H2S & CO2 levels and intersect multiple reservoir sequences resulting in challenging intervention environments.
Session 5: Subsurface - Unlocking the Extensive and Challenging Hydrocarbon Potential in JDA

Numerous new technologies and customized solutions have been operationalized with close collaboration between CHOC and its service providers which includes Schlumberger. This collaboration has resulted in the safe & efficient execution of both routine and complex well intervention activities with industry leading performance.

In addition to this, CHOC has developed a gate based system to enable identification, ranking and prioritization of opportunities to sustain overall field capacity ensuring that production meets and exceeds demand at all times.

Jagdish Singh is currently Well Services Superintendent at Carigali Hess. Prior to joining Carigali Hess in 2010, he held various Engineering and Field Supervisory roles in Schlumberger and Shell both locally and internationally. He is a Royal Military College alumni and holds a HND in Marine Engineering from Ungku Omar Polytechnic and a B.Eng. Degree in Mechanical Engineering from University of Sunderland.

Daniel Chua is currently a Senior Well Services Engineer at Carigali Hess. Prior to joining Carigali Hess in 2011, Daniel was a Chemical & Process Engineer at Techkem Water, dealing in treated industrial waste and process solutions. He had completed his Bachelor of Engineering, Chemical & Petrochemical from the University of Birmingham, UK.

Reveal the Unrevealed: Deep Potential in North Malay Basin, MTJA Area
Sunantha Phaungphuak, Carigali PTTEPI Operating Company

Naturally, the gas production will be declined over time. As a consequence, in order to be able to sustain gas production and meet the long term commitment, finding the new opportunities from existing assets become essential. One of the opportunity is appraising deep sand to evaluate the potential gas accumulation and its productivity. The focus of this paper is to present the successful discovery of the deepest depositional sequence (K sand), located at the A field, the eastern flank of Malaysia-Thailand Joint Area (MTJA). The cluster was discovered in 2007 by the two exploration wells followed by subsequent appraisal campaign in 2010 and 2015, subsequently. The A field consists of three structural compartments that is West, Horst, and East. Initial deepest K sand was discovered in 2010 with very poor sand quality. It follows by another appraisal well in 2015 which penetrated K sand with a better sand quality. However, production test was unable to perform and productivity performance is remain uncertain.

This area is located in the eastern flank of North Malay Basin described the sand heterogeneity in the Late Oligocene to Early Miocene sand intervals. East- & West-dipping normal faults forming two half-grabens and the horst structure where oriented North-South trending. The focus sand sequence is the K sand, deposited in the fluvio-lacustrine environment overlain by regionally thickflooded shale (K shale). Hydrocarbon accumulation were trapped on the North-South oriented plunging nose structure (West & East) and closed ramp structure (Horst) with combination trap configuration.

Due to the difficulty of deep sand imaging and mapping, many approaches have been taken into account to reduce the uncertainties. The geological understanding follows by thorough geophysical interpretation provides an initial indication of potential gas accumulation at the deepest K sand. One of solution is to improve top K sand seismic interpretations and mapping, the discontinuity seismic attributes have been implemented to perform the detail fault mapping referring to strike-slip evidence creating new structural...
map. Another one is to identify the hydrocarbon indicators on the Horst and East compartments where the sweet spots of bright-amplitude reflectors apparently exist and suggest the high confidence of sand presence. Those finding leads to define the prolific area for well targeting.

The integrated technical assessment in 2019 was resulted to a proposal of two appraisal cum development wells (well X & Y) to evaluate the entire section of K sand. The first well drilled was well X in the Horst compartment which was successfully discovered sizeable gas accumulation at K sand. Production test at well X demonstrates that this deepest sand is productive with a significant gas production rate. It follows another successful discovery at the East compartment by the well Y with similar sand character.

The integration of subsurface understanding successfully leading to meaningful discoveries and reveal the unrevealed deep gas sand potential in North Malay Basin at the Eastern Flank of MTJA.

Sunantha has 12 years in oil and gas exploration and development business. Graduated Bachelor’s Degree of Geology and Master’s Degree of Petroleum Geophysics from Chiang Mai University. Joined PTTEP in 2007. Worked as Geophysicist in the Onshore Oil Fields (Sirikit and Suphanburi areas) for almost 4 years (2008-2011). Worked as Geophysicist in the Offshore Gas Field (Bongkot) for 3.5 years (2012-2015). Worked as Geophysicist in the New Venture Project. Currently, working in CPOC Project over MTJDA area since September 2017.

Securing the Future Petroleum Potentials of Exploration Discoveries in North Malay Basin, Malaysia-Thailand Joint Development Area
Avidianto Suryo Setiawan, Carigali PTTEPI Operating Company

A comprehensive technical evaluation and development campaign were conducted after the completion of six exploration and appraisal wells in order to assess the future petroleum potentials in North Malay Basin, offshore Malaysia-Thailand Joint Development Area (MTJDA) in 2015. This paper focuses on the follow-ups of the major discoveries and findings from key wells, namely Well-E3 and Well-A2ST which are located at East flank of the area.

This paper will summarize the process, from appraisal, development plan, development campaign and future development plan of the additional petroleum potentials discovered during development campaign of Well-E3 and Well-A2ST area.

In 2015, Well-E3 and Well-A2ST were drilled to investigate the combination trap play (stratigraphic and structural) in the eastern flank of MTJDA area, the wells also explored the hydrocarbon potential in deeper depositional sequence such as in J-Sand down to K-Sand interval. In the process, the appraisal well planning and optimization was supported by seismic dataset and amplitude analyses to identify channel fairways, and qualitatively predict sand presence. As results, both wells encountered significant gasbearing sands while proving the combination trap style. In order to have such accumulation, it is required the channel’s orientation to be oblique with the axial anticline structure. In the post-drill analysis process, we were also using full integration of well log dataset, seismic attribute analysis, rock physics analysis and formation pressure test to differentiate gas from wet sand and coals and confirm the gas-bearing sands discoveries.

Eventually in 2018, based on the Field Development Plan approved in 2015, a development campaign of the area was carried out and successfully produce the main intervals of East-Flank area. During this development
campaign, it is also proven that J-Sand and K-Sand were also productive layers and important contributors. Along with this development result, we also secured the petroleum reserve of the area. Additionally, 2 (two) appraisal cum development wells were drilled into horst block area. The horst block area is located between west and east block. The objective of these two wells is to prove and unlock the petroleum potential, and to know the productivity of the area, down to the K-sand. As result, both wells discovered significant gas bearing sands with prolific productivity, even in K-sands. Based on this information, future development of horst block is planned in order to secure the petroleum potential of the area.

Full integration of the seismic attribute analyses, well log dataset, formation pressures, rock physics analysis, reservoir modelling and development result have improved the understanding of reservoir distribution and reduced the degree of uncertainty in reservoir connectivity, reservoir distribution, sand development, structure, pressure regime and productivity. Thus, allowing a more robust development strategy. The discoveries of this eastern flank area with deeper petroleum accumulations, have triggered more future petroleum potentials in MTJDA acreage.

Avidianto Suryo Setiawan has been working as a reservoir engineer for Carigali-PTTEPI Operating Company Sdn. Bhd (CPOC) since 2012, and his primary responsibilities are conducting the reservoir technical analysis, reservoir simulation and other reservoir engineering studies on development and exploration projects of CPOC. Prior to his present position, he was a senior reservoir engineer for Schlumberger in 2012 and TOTAL group between 2005 and 2012. He completed a BSc degree from Institute Technology Bandung (ITB) and MSc from Universiti Teknologi Malaysia (UTM) both in petroleum engineering subject. He is a member of the Society of Petroleum Engineers (SPE) and Association of Indonesian Petroleum Engineers (IATMI). He is an author and co-author to several technical papers which focus on development and exploration projects in JDA.
Abstracts and Speaker Biographies

Session 6: Surface - Efficiently Developing JDA Resources for a Safe and Reliable Gas Supply to Malaysia and Thailand

The Challenges of Developing a Safe and Reliable Facility to Meet Growing Gas Demand in Malaysia and Thailand
Siti Fauwizah B Johari, Abdul Muin Taib, Indra Noursahfandi and Mohd Farid Jaafar, Carigali Hess Operating Company

Production from JDA Block A-18 commenced in 2005 with Phase 1 facilities comprising of one central processing platform, one riser platform and three wellhead platforms. Currently, the gas is transported to Songkhla and Rayong, then piped to meet both Thailand’s and Malaysia’s demands. Both countries rely on stable gas supply from Block A-18 to generate power and produce petro-chemicals. Southern Thailand in particular, relies on this supply. Reliability is therefore essential for the long-term energy planning of both countries. To meet this reliability requirement, equipment sparing was a key philosophy during the design and sanction phase.

During the design and implementation of Phase 1 facilities, the removal of bulk CO2 from the gas stream was a key challenge. Membrane separation technology was selected although it was relatively new in the industry then. Proper design and operation of the pre-treatment and gas conditioning were the key drivers to maintain and extend the performance of the membrane unit.

Another challenge during Phase 1 Project Development was the requirement for facilities and pipeline mothballing due to onshore Gas Separation Plant (GSP) facilities constraints. Then, during the early years of operations, mercury was observed in Cakerawala Processing (CKP) facilities; this risk was overcome with the installation of Mercury Removal Units in 2010, thanks to space allocated in Phase 1 design for uncertainties such as this.

Equipment sparing and material selection philosophy, proper pre-treatment and gas conditioning system upstream of a relatively new CO2 removal system, and flexibility in structural design contributed to high availability to meet growing demand in both countries despite the contaminants challenge in the fluid properties.

Indra Noursahfandi is currently holding the position of Team Lead for the Process Engineering, Facilities & Engineering Department at Carigali Hess. He graduated from Sepuluh November Institute of Technology with Bachelor of Chemical Engineering in 1994. He has overseen the surface development plan and process optimization on existing surface facilities in Carigali Hess since 2012. Prior to joining Carigali Hess, Indra was a Senior Process Optimization Engineer at Petroleum Development Oman (2010-2012) and fully involved on Deep Water Development and Operation in West Seno Field Indonesia as Facility Engineer. He has been involved in various aspects of Process Engineering covering design, commissioning, start-up and operations of Oil & Gas facilities.

Fauwizah is currently a Senior Process Engineer at Carigali Hess. Fauwizah graduated from Universiti Teknologi PETRONAS with a Bachelor in Chemical Engineering in 2001. Prior to Carigali Hess, Fauwizah was a Process Engineer at PETRONAS Carigali from 2001-2008 and worked with design engineering consultants Penspen Andrew Palmer and Ranhill Worley from 2009-2012. She is a member of SPE, IchemE and NFOGM.
Session 6: Surface - Efficiently Developing JDA Resources for a Safe and Reliable Gas Supply to Malaysia and Thailand

Older Doesn’t Mean Slower: Sustaining Asset Integrity and Production Reliability over Time
Regukumaran Baskaran, Carigali Hess Operating Company

Carigali Hess facilities were installed in various phases since 2002. From one central processing platform, one riser platform, three wellhead platforms and an FSO, the facilities expanded with subsequent phases of Brownfield and Greenfield developments to the current twelve wellhead platforms and most recently the Booster compression platform, which was installed in 2016. Overall, the Block A-18 asset is connected with twelve intra-field pipelines, flexible hose to a purpose built FSO and two gas export lines to shore.

The asset is maturing after 17 years since installation and this poses significant challenges in ensuring that asset integrity and reliability are well maintained to meet the Buyers’ expectation as a reliable gas producer. This includes managing growing risks associated with aging equipment and facilities to ensure that People, Environment, Asset and Reputation (PEAR) are not adversely affected.

Key to sustaining reliable operations has been Carigali Hess’ Asset Integrity Management (AIM) system. This was implemented in 2012 to cover all aspects from Design, Fabrication, Installation and Commissioning to Operations and Maintenance. It integrates all functions and disciplines that can impact integrity, reliability and performance. The safeguards implemented are based on the concept of Prevention, Detection, Control and Mitigation.

This paper presents a review of Carigali Hess’ application of AIM to establish integrity and reliability performance assurances in a holistic way to sustain asset integrity and production reliability in meeting the expectations of MTJA, Shareholders and Buyers as a prudent gas operator.

Regukumaran Baskaran is currently holding the position of Team Lead for the Integrity Management, Engineering & Construction Department at Carigali Hess. He graduated from University Technology Malaysia with Bachelor of Mechanical Engineering in 1990. He has overseen the implementation of Asset Integrity Management (AIM) in Carigali Hess since 2012. Prior to joining Carigali Hess in 2007, Regu was a Lead Engineer cum Project Manager at Germanischer Lloyd (1990-2007). He has been involved in various aspects of Integrity management and quality assurance covering design, fabrication, installation and commissioning and operations of Oil & Gas facilities upstream and downstream.

Slim Hole Monobore Cemented Completion Design
Manoj Meghnani, Carigali Hess Operating Company

Slim Hole monobore cemented completion design is the approach of Carigali-PTTEPI Operating Company (CPOC) for their drilling operations in Block B-17 & C-19 and Block B-17-01 located in Malaysia-Thailand joint development area. The monobore concept may be new to some operators and may have negative perception on technical feasibilities and safety. However, CPOC has successfully applied this approach since 2007 in various exploration & appraisal, development and infill drilling campaigns involving high pressure high temperature, high deviation and long departure wells targeting single or multi-zone reservoirs. It also includes well testing in exploration wells.

This design philosophy plays key role in the success of CPOC’s operations to deliver safe, low cost and fit for purpose wells enabling CPOC to unlock reserves which may not be otherwise economically viable with
conventional methods. With years of learning curve from drilling hundreds of wells, monobore design have evolved since then to be more robust and optimized and is backed by detailed well engineering, defined operation guidelines and right mindset to deliver safe and usable wells.

CPOC’s downhole drilling conditions are very challenging and extreme involving high formation pressure, narrow mud weight window, ultra high temperatures (> 200°C), extremely hard formations (>25 ksi), long open hole lengths, high inclinations, weak formations, high ECD, high CO2 / H2S, small targets and unavailability of directional tools suited for this environment. This makes implementation of monobore well design even more complex; however CPOC have overcome these challenges and delivered the wells safely at a very low cost using this technique. The key success of these wells depends on the collaboration between subsurface and drilling team to align on the common achievable objectives, detailed engineering to mitigate the identified risks and optimization of drilling operations.

In summary, unique approach of well engineering has delivered reliable exploration and development drilling projects for more than 10 years in CPOC. Monobore well design will continue to get better and deliver success with higher profits to CPOC in the future.

Manoj Meghnani joined CPOC in 2018. As a Head Drilling Engineer, he is responsible for designing, engineering and planning of drilling activities in CPOC to deliver safe, efficient, fit for purpose and usable wells. Manoj holds a Bachelor degree in Petroleum Engineering from Maharashtra Institute of Technology. Worked in various geographical locations with multiple operators, over 16 years of diverse experience in drilling engineering and operations, Manoj have delivered many complex drilling projects. Manoj has been a speaker at two different international technical forums related to drilling engineering and has been author of SPE paper ‘Offshore Automated Managed Pressure Drilling in Fractured Basement Granite Reservoir’. Before joining CPOC, Manoj has worked for over 6 years in Gulf of Thailand (GOT) with PTTEP specializing in Slim Hole Monobore Design architecture for development, infill, re-entry and exploration wells. Manoj is currently working on CPOC’s development, infill and exploration drilling campaigns being drilled in MTJDA using similar methodology.

Partially CRA Cladded Pipeline Application for Cost Optimisation
Mohamad Effendi Mohd Zulkifli, Carigali PTTEPI Operating Company

In certain parts of this region, there are some areas having high CO2 content in their reservoirs. After completion of project development, well fluids will be flowing from the wells and transferred to the Processing Platform via subsea pipeline for further processing the product.

Over the years, high CO2 become a concern to pipeline where the suitable pipeline material shall be selected to withstand the CO2 corrosive characteristic. Ranges of pipeline material options are available in market to overcome the corrosion issue. However, pipeline itself can be considered as one of the major cost for the project development and its cost can become on the high side if the corrosivity of the well fluid requires the use of Corrosion-Resistant Alloy (CRA) pipe instead of normal carbon steel pipe. Therefore, expenditure and reliability for the pipeline shall be intensively studied for life cycle investment evaluation and also code & standard compliance prior to finalizing the pipeline material selection.
In CPOC Phase 3 Development, two pipelines were used CRA + Carbon Steel pipe throughout the length. The early section of the pipeline (hot end) is CRA pipe and the next section after that (cold end) is carbon steel pipe. These two pipelines has been installed in 2015 and been in operation since then.

This is the first time in CPOC that the CRA pipe has been used. In previous project development, all pipelines were carbon steel pipe. However, due to the high CO2 % from TPA and MTA which is up to 80% of CO2 content, CRA pipeline option were considered as one of the option to overcome the corrosion issue.

In this session, it will covers from the process of pipeline material selection, cost analysis, constructability assessment including operating and maintenance matter.

Objective

The objective of this session is to share CPOC experience in his Phase 3 project development whereby two of the new Wellhead Platforms namely Tapi-A (TPA) and Melati (MTA) are having higher CO2 content up to 80%. Challenges on selecting pipeline material to withstand the high CO2 content in the well fluid will be shared during this session. This session will share on selecting the cost effective pipeline material and concept to overcome the highly corrosive well fluid flowing in the pipeline. The selection process consider comparison among various pipeline material options and life cycle investment to maximize cost effectiveness for the project development.

This session will benefit the participants to:

Learn CPOC experience in selecting the pipeline material based on challenging product characteristic especially on high CO2 content (as high as 80% CO2). Exchange ideas or methods for other potential concepts to overcome high CO2 issue in pipeline.

Mohamad Effendi Mohd Zulkifli is working as Pipeline Engineer in CPOC - DPE. Place of birth: Petaling Jaya, Selangor - Married. Education/Qualification: Bachelor Degree in Chemical Engineering, Universiti Teknologi Malaysia, graduated in 2001. Member of the Institute of Marine Engineering and Science Technology (IMarEST) and Board of Engineers Malaysia (BEM). Working Experience: Since 2001 till 2013, has been worked with various pipeline engineering consultants in Malaysia namely Pegasus Asia Pacific, Det Norske Veritas (DNV), Intec (SEA) Engineering and RNZ. Joined CPOC in 2013, start with the FEED of Phase 3 development till completion (pipelines already in operation). Then involved in Phase 4 development till completion in 2018 Hobby: Movies and Travelling
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Sami Alnuaim, Saudi Aramco

2020 SPE President
Shauna Noonan, Occidental Petroleum

2018 SPE President
Darcy Spady, Independent Director

History
Officially founded in 1957, SPE’s predecessor organizations date from the birth of the oil industry in the late 1880s.

Background
SPE is a not-for-profit professional society whose members are engaged in energy resources development and production. SPE is a key resource for technical knowledge related to the oil and gas exploration and production industry, and provides services through publications, events, training courses and online resources at www.spe.org. Income from SPE events and services is invested back into SPE to support many other society programs.

Mission
To collect, disseminate and exchange technical knowledge concerning the exploration, development and production of oil and gas resources, and related technologies for the public benefit; and to provide opportunities for professionals to enhance their technical and professional competence.

Major Technical Disciplines
Upstream oil and gas operations, including Drilling; Completions; Health, Safety, and Environment; Management and Information; Production and Operations; Projects; Facilities and Construction; and Reservoir.

Membership
More than 156,000 members in 154 countries participate in 201 sections and 396 student chapters. SPE’s membership includes more than 72,000 student members.

Resources
SPE.org: view the global events calendar and register for upcoming SPE conferences, workshops, and forums; search SPE technical papers; find industry reference information; read SPE publications and journals; and purchase technical books and merchandise. Members can manage their membership account, collaborate with colleagues through online communities, submit technical papers for conference presentation or publication, nominate colleagues for awards, or enroll in webinars or training courses.


SPE Technical Resources: Books, textbooks, and monographs; Petroleum Engineering Handbook; reports, training courses, PetroWiki, SPE technical papers in OnePetro, surveys, and webinars.

Energy4me.org: SPE’s energy education website provides resources for speakers, teachers, and students on all energy sources and energy careers.

Conferences and Exhibitions
SPE sponsors more than 110 conferences, exhibitions, forums and workshops each year. The technical programs are presented and created by SPE members and industry professionals. For a complete listing of SPE events and dates, visit www.spe.org/events.

Governing Body
Board of Directors: four officers, one director for academia, one at-large directors, 13 regional directors, and six technical directors.

Board Committees: audit; engagement and development; finance; knowledge capture and delivery; member programs; and meetings and training.

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