Accelerated Green Asset Evaluation with DELFI

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Agenda

Accelerated Green Asset Evaluation with DELFI

Background
- JERA, the world’s biggest LNG buyer
- JERA Assets

CaseStudy
- Project “Kraken”
- DELFI Accelerated Asset Evaluation

Way Forward
- Current Deployment
- More Accelerated Evaluation

Conclusion & Acknowledgement
### Background, JERA the world’s biggest LNG buyer

**JERA = Japan’s Energy for a new eRA**

Before | MOU between TEPCO*¹ and Chubu Electric Power*² Alliance for entire value chain, upstream investment - power generation
---|---
Apr, 2015  | JERA Established
After | Succeeding parent company’s…
- Upstream Assets
- Sales & Procurement Agreements
- Fuel Transport & Trading
- Fuel Receiving, Storage & Gas export
- Thermal Power Generation
- New Venture Business

*¹ TEPCO; Japan, 1st Electric Power Company, Revenue= 57B USD
*² Chubu; Japan, 3rd Electric Power Company, Revenue= 27B USD
Background, JERA
the world’s biggest LNG buyer

JERA Value Chain

- Total Assets: Approx. 3.8 trillion JPY
- LNG Transaction Volume: Approx. 35 MTPA
- Sales: Approx. 3.6 trillion JPY
- Among the largest in the world

= 36B USD
= 1.68 TCF per year
= 4,600 MMSCF/D
= 34B USD

As of April 2019
1...Fiscal year ended March 2018
2...Estimate value for FY2019
3...Includes jointly operated terminals
4...Includes capacity under construction
5...As of December 2018

LNG Tank Capacity in Japan
7.74 Million KL
Equivalent to approx. 40% of LNG tank capacity in Japan
8 LNG Receiving Terminals in Japan

Electricity and Gas Sales

Upstream Development
Fuel Procurement
5 Upstream Investment Projects
17 Countries
Sourced from Chevron Australia

Fuel Trading

Fuel Transportation
18 LNG Fleet Carriers

Domestic Power Generation
26 Thermal Power Stations
Power Generation Capacity
Approx. 67 GW
Power Generation Output
Approx. 292.5 TWh
Equivalent to approx. 33% of power generation in Japan

Overseas Power Generation
25 Projects
In more than 10 Countries
Power Generation Capacity
Approx. 9 GW
Renewables Development Capacity
Approx. 0.7 GW
Background, JERA the world’s biggest LNG buyer

JERA Investment Assets
(from Austrasia area only)

- Looking for new Green Field Assets...
- Need accelerated evaluation scheme...
### Kraken Field General Information

Late Triassic Fluvial Gas Sand Reservoir
Main&West Block, Fault segmented, Fractured, Water Drive

- ✔ Full 3D Seismic Coverage
- ✔ 7 Appraisal wells
- ✔ Core from 4wells
- ✔ DST for 3wells
- ✔ Porosity; Approx. 10%
- ✔ Permeability; 1mD – D
- ✔ CO2: 10%, Low CGR

GIIP; 7.0 TCF
EUR; 4.6 TCF

*Remark, “Kraken” is hypothetical field.

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Project Kraken, Asset Evaluation Timeline

**Operator**

**Exploration**
- Seismic; Acquisition
- Pre-Reprocessing
  - Re-Interpretation
  - Well1
  - Well2-4
- Reprocessing
- Well5-6

**Appraisal**
- Seismic; Acquisition
- Interpretation
- Reprocessing
  - Re-Interpretation
  - Well1
  - Well2-4
- Petrophysics
  - Core; RCA/SCAL

**Pre-FEED**
- Static
  - Static Ver1
  - Dynamic Ver1
- Dynamic
  - Static Ver2
  - Dynamic Ver2
- Fracture
- Re-Stratigraphy / Depo concept

**FEED**
- Static
  - Static Ver3
- Dynamic
  - Dynamic Ver3
- Final
  - Ver4

**Execute/Operation**
- DG

**JERA**

**Evaluation**
- Initial prospect study (6month)
- Facies/Depositional Study (3month)
- Static & Dynamic Base case, v1
- BTC Model Study, Review (2month)
- Low Mid High Model, v2
- Model Update and Low-High Model (2month)
- Model Update (1.5month)

**JERA Final Model v3**

**Need Accelerated Evaluation scheme**

**EUR; 4.6 TCF Plateau; 15yrs Phase1; 7wells Phase2; 3wells**

- Part of Due Diligence study
- Approx. 3yrs engagement (Subsurface)
- 5 Reviews/DataRooms conducted
- Evaluating latest operator’s models

16 October 2018

1st Review
2nd Review
3rd Review
4th Review
5th Review

1st Review
2nd Review
3rd Review
4th Review
5th Review

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**Project Kraken, Asset Evaluation Timeline with**

**Operator**

**Exploration**
- Seismic; Acquisition
- Well1
- Regional, Static Ver0
- Petrophysics
- Core; RCA/SCAL
- Facies/Depositional Study (6 months)

**Appraisal**
- Interpretation
- Well2-4
- Static Ver1
- Dynamic Ver1
- BTC Model Study, Review (2 months)
- Model Update and Low-High Model (2 months)

**Pre-FEED**
- Reprocessing
- Well5-6
- Dynamic Ver2
- Static Ver2
- Re-Stratigraphy / Depo concept
- Re-Stratigraphy

**FEED**
- Re-Interpret
- Static Ver3
- Dynamic Ver3
- Final Ver4

**Execute/Operation**
- FID
- EUR: 4.6 TCF
- Plateau: 15 yrs
- Phase1: 7 wells
- Phase2: 3 wells

**JERA**
- Initial prospect study (6 months)
- Jera Final Model v3
- Initial prospect study (6 months)
- Core; RCA/SCAL
- EUR: 4.6 TCF
- Plateau: 15 yrs
- Phase1: 7 wells
- Phase2: 3 wells

**Evaluation**
- Part of Due Diligence study
- Approx. 3 yrs engagement (Subsurface)
- 5 Reviews/DataRooms conducted
- Evaluating latest operator’s models

**Need Accelerated Evaluation scheme**
Accelerated Evaluation Workflow with DELFI

- Set-up DELFI JERA Tenant & Profile
- Set-up Multi-domain/parties Workspace
- QC Horizon & Faults
- Fracture Evaluation with all required modules
- Update/Change Depositional Concept
- Re-Build Structural/Grid Model
- Rebuild Facies Model
- Rebuild Poro-Permeability-Sw
- GIIP (Deterministic Cases)
- Low/Mid/High simultaneously
- Simulation (ECLIPSE)/Optimization ×15 cases
- Sensitivity Check without HPC issue
- Due Diligence Decision Making
Project Kraken, Accelerated Evaluation with DELFI

Accelerated Asset Evaluation
Start-Up with DELFI

❖ Proof-Of-Concept Agreement
   ➢ 1st commercial use of DELFI in Australia

❖ JERA Tenant/Workspace Set-Up
   ➢ JERA Users & SLB Experts Accounts

❖ Data Uploading to DELFI Storage
   ➢ Project Files (Petrel, ECLIPSE)
   ➢ Data & Report (Incl. PDF, PPT, Excels...)

Accelerated Accessibility & Collaboration
Project Kraken, Asset Evaluation Workflow

Accelerated Evaluation with DELFI Optimization

- 15 ECLIPSE Runs
  - Sensitivity Check, Multiples runs w Low/Mid/High Scenario
  - Well Location Optimization Algorithm Applied for EUR/Plateau/EOFL*

*More technical/workflow detail will be explained in EAGE Workshop on Faster Subsurface Characterisation 2019, Nov, Perth, Australia
Project Kraken, Accelerated Evaluation with

Accelerated Decision Making in DELFI Cloud

JERA HQ (Tokyo) – Decision Making Hub
❖ Due Diligence main decision making hub
❖ Supervising subsurface study
❖ Monitor the progress in Perth & DELFI-Sydney

JERA-A & SLB Perth – Subsurface Evaluation Hub
❖ Physical subsurface review (DataRoom, discussions…)
❖ Sent the DELFI job, Report to HQ

SLB@Vietnam – Subsurface Working Hub
❖ Sent the DELFI job, Report to Perth Hub
The Way Forward
The Way Forward, Current Deployment

Workspace Solutions

Projects

- Ichthys LNG Project Australia
- Wheatstone LNG Project Australia
- Gorgon LNG Project Australia
- Darwin LNG Project Australia & East Timor
- Project Kraken
- Another Green Field

On Going Deployment (Outside of DELFI)

Production Data Management System

*MockUp on DELFI Portal
The Way Forward

More Accelerated Environment, Multidiscipline Collaboration & Decision Making

Accelerated Green Asset Evaluation with DELFI

Background
- JERA, the world’s biggest LNG buyer
  - Upstream Investment - Power Generation Value Chain
- JERA Assets
  - Look for new Green Assets & Need Accelerated Evaluation scheme

Case Study
- Project “Kraken”
  - PoC DELFI, 1st Commercial Use of DELFI in Australia
- DELFI Accelerated Asset Evaluation
  - Accessibility, Collaboration, Scalability, Productivity & Decision Support

Way Forward
- Current Deployment
  - DELFI + Avocet/PowerBI
- More Accelerated Evaluation
  - Accelerated Multidiscipline Collaboration & Decision Making
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“Accelerated Green Asset Evaluation with DELFI”

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