Overview of Indian Sedimentary Basins and Blocks-on-Offer (under OALP Bid Round III)
Presentation outline

- Indian Sedimentary Basins
- Hydrocarbon Resources Reassessment Study
- Contract Areas-on-Offer
- Basin-wise Brief of Contract Areas
- Summary
INDIAN SEDIMENTARY BASINS
Basin category

• A new 3-tier category for 26 basins
• A simplified approach to present the Category based on the maturity of resources in line with PRMS standard
• **Category I:** 7 basins which are commercially producing from established petroleum resources (“RESERVES”)
• **Category II:** 5 basins which have established petroleum resources but are yet to produce commercially (“CONTINGENT RESOURCES”)
• **Category III:** 14 basins which have prognosticated resources but still to be discovered (“PROSPECTIVE RESOURCES”)
Basins under category

**Category I**
- KRISHNA-GODAVARI(KG), MUMBAI OFFSHORE, ASSAM SHELF, RAJASTHAN, CAUVERY, ASSAM-ARAKAN FOLD BELT and CAMBAY

**Category II**
- Saurashtra, Kutch, Vindhyan, MAHANADI, BENGAL-PURNEA and Andaman

**Category III**
- KERALA-KONKAN, Ganga-Punjab, PRANHITA-GODAVARI(PG), SATPURA-SOUTH REWA-DAMODAR, Himalyan Foreland, Chattisgarh, Narmada, Spiti-Zanskar, Deccan Syneclise, Cuddapah, Karewa, Bhima-Kaladgi and Bastar

*Shown in bold caps are the target basins under Round III Offer*
HYDROCARBON RESOURCES REASSESSMENT STUDY
Overview of the study

• During 2017-18, hydrocarbon reassessment was carried out for all 26 basins
• **Assessment done for conventional reservoirs only**
• Reviewed by international domain-specialists and Indian basin-experts
• Assessed 13 basins with adequate datasets through “Petroleum System Modeling”
  • 9 basins (Assam Shelf, Cambay, Rajasthan, Mumbai, KG, Cauvery, Mahanadi, Bengal-Purnea and Kerala-Konkan) : entire area
  • 4 basins (Assam Arakan, Andaman, Kutch and Saurashtra) : part area
• **Identified a total of 177 Plays**
  • 87 in Tertiary, 53 in Mesozoic and 37 Pre-Mesozoic
• **Identified new plays**
  • Mesozoic reservoirs in 14 basins
  • Basement fractures in many new discoveries
Results of the Study

• Last assessment done in 1995-96 for 15 sedimentary basins:
  • Total Inplace assessed: 28,085 MMTOE (206 BBBLOE)
  • Deepwater separately assessed with 7,000 MMTOE inplace
• Current assessment done for all 26 basins with deepwater areas included
  • Inplace Reassessed: 41,872 MMTOE (307 BBBLOE), including 11 basins not earlier assessed with 868 MMTOE inplace
    – Discovered: 12,076 MMTOE (89 BBBLOE)
    – Undiscovered: 29,796 MMTOE (218 BBBLOE), 71% of the total inplace
• Increase of total hydrocarbon estimate: 49.1%
• Reassessment at hydrocarbon play level
• A complete geoscientific database with easy-to-use subsurface models, maps and reports
Results compared

1995-96 study
- Carried out for 15 basins
- Simplistic tools and limited datasets
- Areal Yield (AY) method used for all basins
- Assessment at ‘basin’ level
- Deepwater areas excluded and assessed separately

2017-18 study
- All 26 basins re-assessed
- Sophisticated tools and expanded datasets
- 13 basins/basin areas with enough datasets were assessed through 3D petroleum system modeling
- Assessment at ‘play’ level
- Deepwater included and assessed with basins
CONTRACT AREAS-ON-OFFER
Basin-wise Hydrocarbon Resources
(Target Basins under Bid Round III)

Petroleum inplace, MMTOE (conventional and mostly unrisked)

<table>
<thead>
<tr>
<th>Basin</th>
<th>Undiscovered</th>
<th>Established</th>
</tr>
</thead>
<tbody>
<tr>
<td>Krishna-Godavari (KG)</td>
<td>7,578</td>
<td>1,977</td>
</tr>
<tr>
<td>Mumbai Offshore</td>
<td>4,852</td>
<td>4,794</td>
</tr>
<tr>
<td>Assam Shelf</td>
<td>4,133</td>
<td>1,868</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>3,188</td>
<td>938</td>
</tr>
<tr>
<td>Cauvery</td>
<td>1,672</td>
<td>292</td>
</tr>
<tr>
<td>Assam-Arakan Fold Belt (AAFB)</td>
<td>1,455</td>
<td>178</td>
</tr>
<tr>
<td>Cambay</td>
<td>786</td>
<td>1,800</td>
</tr>
<tr>
<td>Mahanadi</td>
<td>574</td>
<td>77</td>
</tr>
<tr>
<td>Bengal-Purnea</td>
<td>828</td>
<td>0</td>
</tr>
<tr>
<td>Kerla-Konkan</td>
<td>1,245</td>
<td>0</td>
</tr>
<tr>
<td>Pranhita-Godavari (PG)</td>
<td>95</td>
<td>0</td>
</tr>
<tr>
<td>Satpura-South Rewa-Damodar</td>
<td>63</td>
<td>0</td>
</tr>
</tbody>
</table>
OALP Blocks across Basins

- Total 23 blocks on offer including 5 CBM
- Distributed into 12 sedimentary basins
- Satpura-South Rewa-Damodar Basin has most number of blocks (4) - all CBM
- 14 blocks from Category I basins
- 3 blocks from Category II
- 6 blocks from Category III
Basin Area across Blocks

- **Total area 31,722 sq km**
- Mumbai, Mahanadi, Assam Shelf and Kerala-Konkan have maximum acreage

- **14 blocks in Onland**
  (17,818 sq km, 56% of total offering)
- 3 in Shallow-water
  (9,456 sq km, 30%)
- 1 block in Deepwater
  (2,491 sq km, 8%)
- 5 block under CBM
  (1,957 sq km, 6%)
BASIN-WISE BRIEF OF CONTRACT AREAS
Krishna-Godavari Basin

KG-ONHP-2018/1

KG-ONHP-2018/2

Prognosticated Resources (In-place MMTOE)

<table>
<thead>
<tr>
<th></th>
<th>Discovered</th>
<th>Undiscovered</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>KG-ONHP-2018/1</td>
<td>1,977</td>
<td>7,578</td>
<td>9,555</td>
</tr>
</tbody>
</table>

➢ Blocks-on-offer: 2
➢ Cumulative area: 2,831 sq km
Krishna-Godavari Basin

**KG-ONHP-2018/1**

- Commercial hydrocarbon accumulations in Archean fractured basement and synrift Gollapalli sandstone are established.
- Endamuru, Kommugudem, Draksharama, Dangeru and Mandapeta areas have reported major discoveries in multiple pays.
- Target Depth: 2,000 m.
- Approximate Area: 2,601 Sq. Km.
- Datasets: 2D Seismic, 5 Wells, 10 Reports

**KG-ONHP-2018/2**

- Located on the flanks of Kaza tectonic high.
- Rift-fill sequence of Nikkamaru area and gas producing sequence in Nandigama are expected.
- Jurassic-to- Early Cretaceous (Gollapalli) and Cretaceous-L. Cretaceous (Raghavapuram) plays are envisaged in this block.
- Target Depth: 4,000 m.
- Approximate Area: 230 Sq. Km.
- Datasets: 2D Seismic, 3D Seismic, 1 Well, 2 Reports
Krishna-Godavari Basin

- KG Onland Paleozoic
- Gas @ 25k+ SCMD
- Choke: 16/64"
- Formation: Kommugudem (Permo-Triassic)
- Depth: ~3,300m
Mumbai Offshore Basin

- Blocks on offer: 2
- Cumulative area: 5,936 sq km

Prognosticated Resources (In-place MMTOE)

<table>
<thead>
<tr>
<th></th>
<th>Discovered</th>
<th>Undiscovered</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB-OSHP-2018/1</td>
<td>4,794</td>
<td></td>
<td>4,852</td>
</tr>
<tr>
<td>MB-OSHP-2018/2</td>
<td></td>
<td></td>
<td>2,220</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Basement</th>
<th>Prognosticated Resources (MMTOE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement - Basal Clastics</td>
<td>188</td>
</tr>
<tr>
<td>Mid-Late Eocene</td>
<td>2,220</td>
</tr>
<tr>
<td>Early Oligocene</td>
<td>170</td>
</tr>
<tr>
<td>Late Oligocene</td>
<td>2,293</td>
</tr>
<tr>
<td>Mid Miocene</td>
<td>402</td>
</tr>
<tr>
<td>Early Miocene</td>
<td>126</td>
</tr>
<tr>
<td>Pliocene - Biogenic</td>
<td>138</td>
</tr>
<tr>
<td>Pleistocene - Recent Biogenic</td>
<td>2</td>
</tr>
</tbody>
</table>

Play-wise Conventional Hydrocarbon In-place (MMTOE)
Mumbai Offshore Basin

MB-OSHP-2018/1
- Hydrocarbons are established in Mahim, Daman and Mahuva formations in C-37, NMT, Mid Tapti and Ambe fields.
- Prospects in Panna, Diu, Mahuva and Mahim formations.
- Target Depth: 1,400 m
- Approximate Area 1,268 Sq. Km.
- Datasets: 2D Seismic, 3D seismic, 8 Wells, 14 Reports.

MB-OSHP-2018/2
- Hydrocarbons are established in B-170, B-66, South Bassein, North Heera and Heera fields.
- Prospects in Panna and Bassein Formation. Hydrocarbon indications are reported from Alibag and Bombay formations.
- Target Depth: 1,200 m (1600-2200-DDR)
- Approximate Area 4,668 Sq. Km.
- Datasets: 2D Seismic, 3D seismic, 12 Wells, 21 Reports.
Mumbai Offshore Basin

- Discovery in Daman
- Gas @ 32 k m^3/d (Choke: ½"")
- Formation: Daman (U. Oligocene)
- Depth: ~2515-2526m

- Discovery in Daman
- Gas @ 42 k m^3/d (Choke: ½"")
- Formation: Daman (U. Oligocene)
- Depth: ~2549-2555m

Recent Discovery in Daman-Diu
Assam Shelf

- **Blocks on offer**: 3
- **Cumulative area**: 4,010 sq km

<table>
<thead>
<tr>
<th>Play-wise Conventional Hydrocarbon Inplace (MMTOE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement - AS</td>
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<tr>
<td>Late Eocene - Kopili</td>
</tr>
<tr>
<td>Early Eocene - Sylhet</td>
</tr>
<tr>
<td>Late Oligocene - BCS</td>
</tr>
<tr>
<td>Miocene - Tipam</td>
</tr>
<tr>
<td>Pliocene - Girujan</td>
</tr>
</tbody>
</table>

**Prognosticated Resources (In-place MMTOE)**

<table>
<thead>
<tr>
<th></th>
<th>Discovered</th>
<th>Undiscovered</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>AA-ONHP-2018/1</td>
<td>1868</td>
<td>4133</td>
<td>6001</td>
</tr>
<tr>
<td>AA-ONHP-2018/2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AA-ONHP-2018/3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Assam Shelf

AA-ONHP-2018/1

- Hydrocarbons are established from areas of Lakhibari East, Hazarigaon, Kalanpur and Suphyam (Bokabil formation).
- Potential exists within Tura, Sylhet, Kopili and Barail, including Gondwana rift fill sequences.
- Target Depth: 1,500 m.
- Approximate Area 249 Sq. Km.
- Datasets: 2 D Seismic, 3D Seismic, 3 Wells, 3 reports.

AA-ONHP-2018/2

- Located over thrust-related anticlines in the Naga-Schuppen belt, well known for hydrocarbon sources.
- Hydrocarbon potential exists within Eocene-Paleocene Formation.
- Target Depth: 1,500 m.
- Approximate Area 2,527 Sq. Km.
- Datasets: No Seismic data (adjacent 2D seismic data of Hakejanaga-Chumuked area), 1 Well, 2 Reports.
Assam Shelf

- Located in similar geologic/geological set-up with nearby fields like Khoraghat and Nambar.
- Hydrocarbon potential exists within Palaeocene-to-Lower Eocene section (Tura/Sylhet) and Oligocene (Barail).
- Target Depth: 2,000 m.
- Approximate Area 1,234 Sq. Km.
- Datasets: 2D Seismic, (adjacent well data of TNPH-1, RJPH-1).

Recent Discovery Khoraghat
Assam Shelf

- Discovery in Basal Sandstone & Sylhet
- Flowed Gas
- Depth-1493-1542

Discovery in Hazarigaon
Assam-Arakan Fold Belt Basin

AA-ONHP-2018/5
AA-ONHP-2018/4

Play-wise Conventional Hydrocarbon Inplace (MMTOE)

- Pliocene - Tipam: 122
- Late Miocene - Bokabil: 101
- Mid Miocene Up - Up Bhuban: 23
- Mid Miocene Lr - Mid Bhuban: 152
- Early Miocene - Lr Bhuban: 140
- Oligocene - Renji: 10
- Eocene: 1,085

Prognosticated Resources (In-place MMTOE)

<table>
<thead>
<tr>
<th></th>
<th>Discovered</th>
<th>Undiscovered</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>178</td>
<td>1,455</td>
<td>1,633</td>
</tr>
</tbody>
</table>

- Blocks-on-offer: 2
- Cumulative area: 252 sq km
Assam-Arakan Fold Belt Basin

AA-ONHP-2018/4

- The region has established petroleum system with likely gaseous hydrocarbon over oil.
- Prospectivity is identified in Bokabil, Upper Bhuban, Middle Bhuban and Miocene of Surma Group, with Jenam-Bhuban-Bokabil petroleum system.
- Target Depth: 3,000 m.
- Approximate Area 44 Sq. Km.
- Datasets: 2D Seismic, (adjacent well data of GJLA-10, 11, 12, 13)

AA-ONHP-2018/5

- The region has established petroleum system with likely gaseous hydrocarbon over oil.
- Prospectivity lies within Bokabil, Upper Bhuban, multi-stacked sandstones of Middle Bhuban, all confined into Oligocene—to-Middle Miocene sequences.
- Target Depth: 2,500 m.
- Approximate Area 208 Sq. Km.
- Datasets: 2D Seismic, (adjacent well data of GJLA-10, 11, 12, 13)
Rajasthan (Bikaner-Nagaur Sub-basin)

- **Play-wise Conventional Hydrocarbon Inplace (MMTOE)**

<table>
<thead>
<tr>
<th>Play</th>
<th>Discovered</th>
<th>Undiscovered</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>basement - Malani</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Cretaceous - Goru</td>
<td>7</td>
<td></td>
<td>178</td>
</tr>
<tr>
<td>Early Cretaceous - Pariwar</td>
<td>11</td>
<td></td>
<td>285</td>
</tr>
<tr>
<td>Late Jurassic - B&amp;B</td>
<td>15</td>
<td></td>
<td>136</td>
</tr>
<tr>
<td>Mid Jurassic - Jaisalmer</td>
<td>108</td>
<td></td>
<td>53</td>
</tr>
<tr>
<td>Early Jurassic - Lathi</td>
<td>143</td>
<td></td>
<td>117</td>
</tr>
<tr>
<td>Permo-Triassic - Bhuana</td>
<td>166</td>
<td></td>
<td>143</td>
</tr>
<tr>
<td>Infra-Cambrian - Up Jodhpur</td>
<td>106</td>
<td></td>
<td>299</td>
</tr>
<tr>
<td>Infra-Cambrian - Bilara</td>
<td>106</td>
<td></td>
<td>143</td>
</tr>
<tr>
<td>Infra-Cambrian - Up Cambre</td>
<td>45</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Eocene - Thumbl</td>
<td>166</td>
<td></td>
<td>672</td>
</tr>
<tr>
<td>Eocene - Dharvi-Dungar</td>
<td>106</td>
<td></td>
<td>166</td>
</tr>
<tr>
<td>Paleocene - Barmer Hill</td>
<td>101</td>
<td></td>
<td>101</td>
</tr>
<tr>
<td>Volcanics - Rageshwari</td>
<td>45</td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>Cretaceous - Ghaggar-Hakra</td>
<td>101</td>
<td></td>
<td>101</td>
</tr>
<tr>
<td>Basement - Malani</td>
<td>8</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>443</strong></td>
<td><strong>458</strong></td>
</tr>
</tbody>
</table>

- **Prognosticated Resources (In-place MMTOE)**

- **Block-on-offer: 1**
- **Cumulative area: 3,016 sq km**

RJ-ONHP-2018/2
Rajasthan (Bikaner-Nagaur Sub-basin)

- **RJ-ONHP-2018/2**
  - Prospectivity lies in Jodhpur Formation and Shallower Upper Carbonate Formation
  - Jodhpur Formation has established hydrocarbon (Baghewala heavy oil discovery)
  - Target Depth: 900 m.
  - Approximate Area 3,016 Sq. Km.
  - Datasets: 2D Seismic, No wells (adjacent wells of Baghewala, Nanuwala)

Oil and Gas Accumulation Map
Cauvery Basin

- **Play-wise Conventional Hydrocarbon Inplace (MMTOE):**

<table>
<thead>
<tr>
<th>Era</th>
<th>Inplace MMTOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miocene</td>
<td>0</td>
</tr>
<tr>
<td>Oligocene</td>
<td>0</td>
</tr>
<tr>
<td>Paleocene-Eocene</td>
<td>13</td>
</tr>
<tr>
<td>Maastrictian-Campanian</td>
<td>4</td>
</tr>
<tr>
<td>Santonian</td>
<td>4</td>
</tr>
<tr>
<td>Turonian-Cenomanian</td>
<td>28</td>
</tr>
<tr>
<td>Early Cretaceous</td>
<td>821</td>
</tr>
<tr>
<td>Jurassic</td>
<td>0</td>
</tr>
<tr>
<td>Basement - CY</td>
<td>21</td>
</tr>
</tbody>
</table>

  **Total:** 1,893 MMTOE

- **Prognosticated Resources (In-place MMTOE):**

<table>
<thead>
<tr>
<th></th>
<th>Discovered</th>
<th>Undiscovered</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>292</td>
<td>1,672</td>
<td>1,964</td>
</tr>
</tbody>
</table>

- **Blocks on offer:** 2
- **Cumulative area:** 1,863 sq km

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**CY-ONHP-2018/2**

**CY-ONHP-2018/3**
Cauvery Basin

CY-ONHP-2018/2

- Commercial hydrocarbons are established in fractured gneissic basement in Madanam and Pandanallur.
- Potential in Basement play and Nannilam sands.
- Target Depth: 3,000 m.
- Approximate Area 460 Sq. Km.
- Datasets: 3D Seismic, 2D Seismic, 11 Wells, 18 Reports.

CY-ONHP-2018/3

- Significant production is achieved in Ramnad sub-basin from the Nannilam and Bhuvanagiri formations.
- Potential in Andimadam, Bhuvanagiri and Nannilam formations.
- Target Depth: 1,800 m.
- Approximate Area 1,403 Sq. Km.
- Datasets: 2D Seismic, 3D Seismic, 5 Wells, 10 Reports.
Cauvery Basin

- Discovery in Madnam
- Gas @ 40k+ SCMD (Choke: 5mm)
- Formation: Kamalapuram (Eocene)
- Depth: ~1,500m

Discovery Mattur West-1 in Cauvery Basin
Cambay Basin

- Blocks on offer: 2
- Cumulative area: 1,078 sq km

Prognosticated Resources (In-place MMTOE)

<table>
<thead>
<tr>
<th></th>
<th>Discovered</th>
<th>Undiscovered</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,800</td>
<td>786</td>
<td>2,586</td>
</tr>
</tbody>
</table>

Play-wise Conventional Hydrocarbon Inplace (MMTOE)

- Cretaceous - Deccan Trap
- Late Eocene
- Middle Eocene
- Early Eocene
- Late Paleocene
- Early Paleocene
- Oligo-Miocene

CB-ONHP-2018/3
CB-ONHP-2018/4
Cambay Basin

**CB-ONHP-2018/3**
- Situated in northeast of Cambay field in Tarapur block.
- Multiple leads identified at Kalol and Cambay shale level.
- Target Depth: 1,500m.
- Approximate Area: 519 Sq. Km.
- 2D seismic, 2 wells, 4 Reports

**CB-ONHP-2018/4**
- Situated in south of Padra field in eastern basin margin.
- Multiple leads identified at Kalol and Basement level.
- Target Depth: 1,000m.
- Approximate Area: 559 Sq. Km.
- 2D and 3D seismic, 11 wells, 20 reports
Cambay Basin

Miocene Basal Sands (MBS)
- Oil discovery
- Oil @ 200+ BOPD, 5mm bean
- Southern part (Akholjuni area)
- Depth: ~1,450m

K-III/K-IV
- Oil discovery
- Oil @ 25+ BOPD, 12/64" bean
- Eastern margin (Dehgam area)
- Depth: ~1,250m
Mahanadi Basin

Prognosticated Resources (In-place MMTOE)

<table>
<thead>
<tr>
<th>Discovered</th>
<th>Undiscovered</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>77</td>
<td>574</td>
<td>651</td>
</tr>
</tbody>
</table>

- Blocks-on-offer: 2
- Area: 4,791 sq km
Mahanadi Basin

MN-DWHP-2018/1

- Gas discoveries were made in the surrounding blocks in shallow and deepwater (MN-OSN 2000/2 and MN-DWN-98/3).
- 4 plays identified – one structural (Pliocene rollover anticline) and the rest stratigraphic (Mio-Pliocene channels/ slope fans).
- Target Depth for wells: 2,750m.
- Approximate Area: 2,491 Sq. Km.
- 2D/3D seismic data, 11 wells, 23 reports.

MN-ONHP-2018/5

- Surrounded by OALP-II blocks-on-offer.
- Prospectivity inferred from drilled well, MON-2 which established rich source rock potential of Early Cretaceous age.
- Target Depth for wells: 2,500m.
- Approximate Area: 2,300 Sq. Km.
- 2D seismic data, 1 well and 1 Report.
Mahanadi Basin

Schematic geological section across Mahanadi Basin

2D seismic sections from recently acquired data of NSP
Bengal-Purnea Basin

**BP-ONHP-2018/1**

### Prognosticated Resources (In-place MMTOE)

<table>
<thead>
<tr>
<th></th>
<th>Discovered</th>
<th>Undiscovered</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>828</td>
<td>828</td>
</tr>
</tbody>
</table>

- Block-on-offer: 1
- Area: 2,468 sq km

**Play-wise Conventional Hydrocarbon Inplace (MMTOE)**

- **Purnea:**
  - Gondwana - Karharbari: 17
  - Gondwana - Barakar: 10
  - Gondwana - Ranigunj: 1
- **Cretaceous:**
  - Pliocene: 54
  - Miocene: 38
  - Oligocene: 126
  - Eocene: 110
- **Eocene:**
  - Paleocene: 21
  - Gondwana: 42
- **Mid Miocene:**
  - Pliocene: 13
  - Upper Miocene: 14
  - Mid Miocene: 110
- **Upper Miocene:**
  - Oligocene: 70
  - Eocene: 10

**Indian Sedimentary Basins**

- **Offshore**
- **Onshore**

**Discovered vs Undiscovered Resources**

- **Discoveries:**
  - BP-ONHP-2018/1

**Legend:**

- **Offshore**
- **Onshore**
- **Block on offer:** 1
- **Area:** 2,468 sq km

**Source:** BP-ONHP-2018/1
Bengal-Purnea Basin

BP-ONHP-2018/1

- Located over similar petroleum habitat of the recent oil and gas discovery well, Ashoknagar-1 (NELP Block WB-ONN-2005/4)
- Inferred the presence of Mio-Pliocene channel-levee-complex with thermogenic hydrocarbon, charged from underlying Paleogene source rocks
- 2 plays are identified: ‘Thermogenic’ hydrocarbon in Lower Pliocene-Miocene sequence and ‘Biogenic’ from Upper Pliocene sequence
- Target Depth for wells: 2,500m
- Approximate Area: 2,468 Sq. Km.
- Datasets: 2D seismic, 4 wells and 6 reports
Recent discovery at well, Ashokenagar-1 in onland part of Bengal-Purnea Basin

- Notified gas discovery in Upper Miocene Object-I (2,377-88m)
- Flowed gas 73k SCMD through 6 mm bean
Kerala-Konkan Basin

- Block-on-offer: 1
- Area: 3,520 sq km

Play-wise Conventional Hydrocarbon Inplace (MMTOE)

- Early Cretaceous
  - Oligo-Miocene: 0
  - Late Cretaceous: 970
  - Early Eocene: 274
  - Late Eocene: 0

Prognosticated Resources (In-place MMTOE)

<table>
<thead>
<tr>
<th></th>
<th>Discovered</th>
<th>Undiscovered</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>KK-OSHP-2018/1</td>
<td>0</td>
<td>1,245</td>
<td>1245</td>
</tr>
</tbody>
</table>
Kerala-Konkan Basin

KK-OSHP-2018/1

- Prospective petroleum systems are identified in Mesozoic-Mesozoic, Mesozoic-Tertiary and Tertiary-Tertiary.
- Target Depth for wells: 2,000m.
- Approximate Area: 3,520 Sq. Km.
- Datasets: 2D/3D seismic.

West-East seismic section in Kerala-Konkan Area
CBM Operation and Production

- Globally, India has 4th largest coal reserves. CBM resources of 2,600 BCM
- CBM activity is covered under Oil Fields Regulation & Development Act (1948), P&NG Rules (1959) and CBM Policy (1997)
- 33 blocks were awarded in 4 rounds for 63% of 26,000 sq km available coal-bearing acreage across 11 states with prognosticated resources of 1,800 BCM, of which established is 281 BCM
- Production from 5 blocks, Ranigunj(South & East), Sohagpur(West & East), Jharia
Pranhita-Godavari Basin

- Block-on-offer: 1
- Cumulative area: 625 km²

Geological section across Central Sector, PG Basin

PG-ONHP(CBM)-2018/1
The carved-out block is located in the eastern part of Wardha Valley Coal Field.
The block has logistic advantage due to well-developed infrastructure facility and proximity to power plants.
Barakar Formation (Lower Permian) is the coal-bearing unit, containing one thick composite coal horizon.
Target Depth: 1,200m.
Approximate Area 625 Sq. Km.
Datasets: 2 wells, 1 report.
Satpura-South Rewa-Damodar Basin

- Blocks-on-offer: 4
- Cumulative area: 1,332 sq km
Satpura-South Rewa-Damodar Basin

**DR-ONHP(CBM)-2018/1**

- The carved-out block lies in the south part of South Karanpura Coalfield.
- Barakar Formation (L. Permian) is the coal bearing unit.
- Depth range: 0 to 480 m.
- Approximate Area 138 Sq. Km.
- Datasets: 13 Wells, 4 Reports

**DR-ONHP(CBM)-2018/2**

- The carved-out block is in the north-northeastern part of North Karanpura coalfield of the Damodar Valley, Jharkhand.
- Lower Permian Barakar Formation is the coal bearing unit and crop out in the peripheral region of the ovate coalfield.
- Depth range: 0 to 300 m.
- Approximate Area 348 Sq. Km.
- Datasets: 8 Wells, 1 Report
Satpura-South Rewa-Damodar Basin

SR-ONHP(CBM)-2018/1

- The carved-out block is located in the Singrauli Main Basin which is an part of South Rewa Basin containing Sohagpur-Johilla coalfields.
- Coal seams are confined to the upper part of the middle member of Barakar formation.
- Depth range: 300-800 m.
- Approximate Area 400 Sq. Km.
- Datasets: 2D Seismic (184 LKM), 8 Wells, 9 Reports.

SR-ONHP(CBM)-2018/2

- The carved-out block is located in the central part of the Johilla coalfield in Shahdol district of MP.
- Lower Gondwana rocks of Talchir, Barakars and beds of Raniganj are well-developed.
- Depth range: 0-1,200 m.
- Approximate Area 446 Sq. Km.
- Datasets: 2D Seismic (16 LKM), 1 Well, 1 Report.
Brief of contract areas

- Contract blocks-on-offer: 23 Blocks (18 conventional + 5 CBM)
- Target basins: 12 including 2 for CBM only
- Prospectivity level: Category I (14), Category II (3), Category III (6)
- Acreage spread: Onland 19 + Shallow water 3 + Deepwater 1
- Total area on offer: 31,722 sq km (including 1,957 sq km of CBM Area)
- Individual area size: 44 to 4,668 sq km (CBM-138 to 625 sq km)
- Shallowest target depth: 900 m (Conventional only)
- Deepest target depth: 4,000 m (CBM-1200m)
- Datasets: Seismic, wells, reports including HC resources study
Opportunities to OALP bidders

– Contract areas are largely pre-assessed by prospective bidders
  – Information on block-level prospectivity outlined by originator through due diligence report
  – Basin-specific Technical Booklets are available online for constituent contract areas

– NDR has already set up the data rooms
  – Industry-standard interpretation software with full G&G functionality are available for basic interpretation

– Continued chance of access to NDR for more/missed-out data
  – NDR is updated with new data continuously
  – Basin-specific information on hydrocarbon resources are now available

– NCR (“National Core Repository”) is now conceptualized on a global industry standard
  – Access to Cores/ Drill-cuttings/ Fluid samples is however available from across basins from NOC’s Core Labs, now declared National Asset
Welcome to an opportunity ..

of exploring the ‘undiscovered’ potential of both conventional and un-conventional hydrocarbons, under two contract formats.. Leveraging fiscal benefits and contractual simplicity..