Status of Oil and Gas Development & Production in Viet Nam

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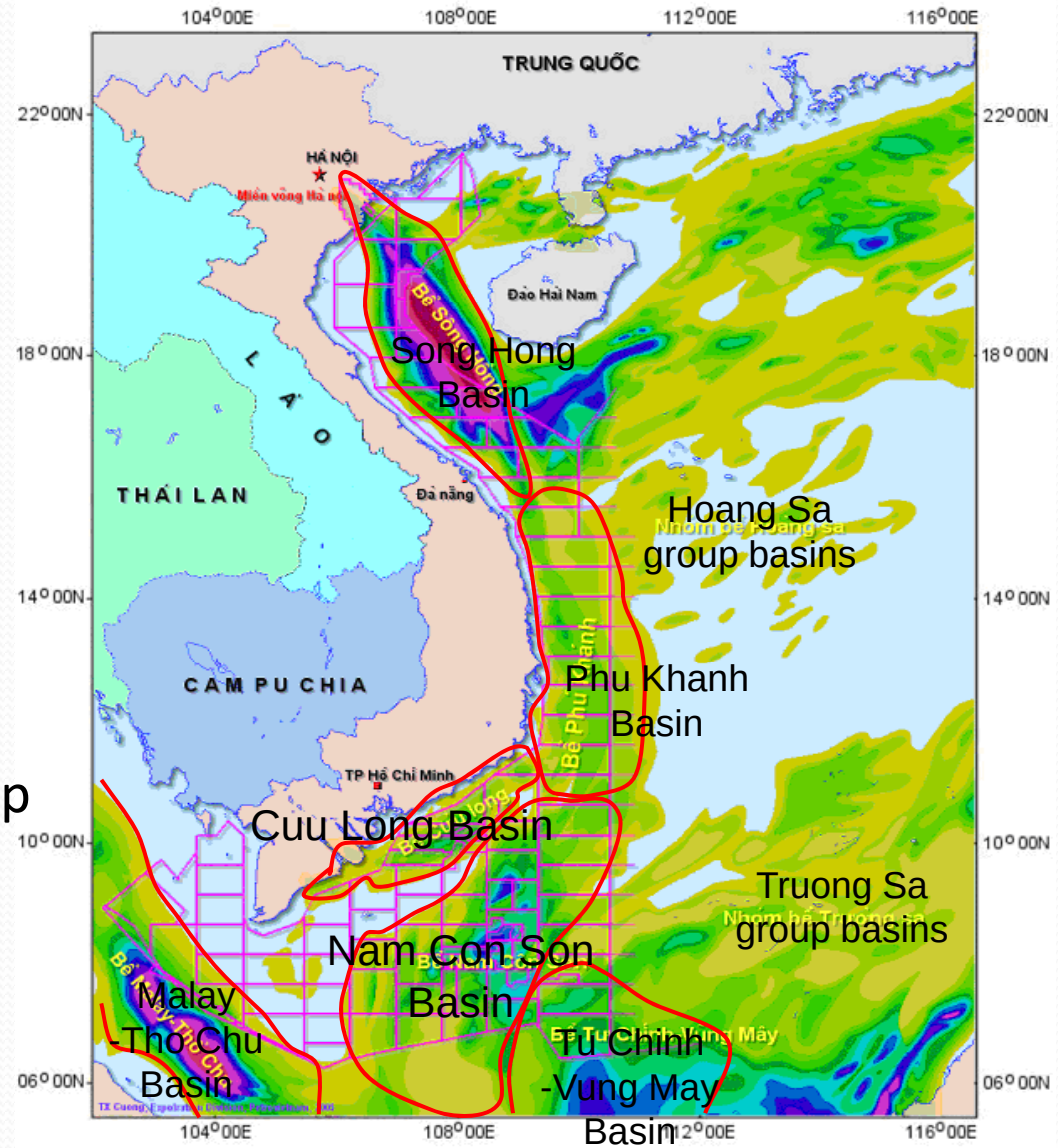
Major Milestone

- 1981 : 1st Gas from Tien Hai "C"
- 1986: 1st Oil from Bach Ho
- 1995: 1st Associated Gas from Bach Ho to shore
- 2002: 1st Natural Gas from Lan Tay to shore

8 identified sedimentary basins:

- ✓ Song Hong
- ✓ Phu Khanh
- ✓ Cuu Long
- ✓ Nam Con Son
- ✓ Malay-Tho chu
- ✓ Tu Chinh-Vung May
- ✓ Hoang Sa & Truong Sa group of basins



Reservoir type and characterizations

- **Clastic Reservoir**
  - ✓ Structures, stratigraphy and combination traps, shale and fault seals
  - ✓ Strong variation in vertical succession and horizontal distribution (Fluvial-Delta)
  - ✓ From poor to high reservoir qualities
  - ✓ Oil rim and oil leg
- **Carbonate (mainly gas bearing)**
  - ✓ Reef carbonate structure
  - ✓ High porosity and permeability
- **Fractured Granite Basement**
  - ✓ Complex fracture networks, compartmented, highly heterogeneous reservoir
  - ✓ Tend to be located around faults systems.
  - ✓ Low porosity/perm granite matrix with high perm macro, micro fractures
  - ✓ Vugs, fractures essentially provide both storage and paths for fluid flows.
  - ✓ Dual porosity and permeability
  - ✓ Difficult to determine OWC

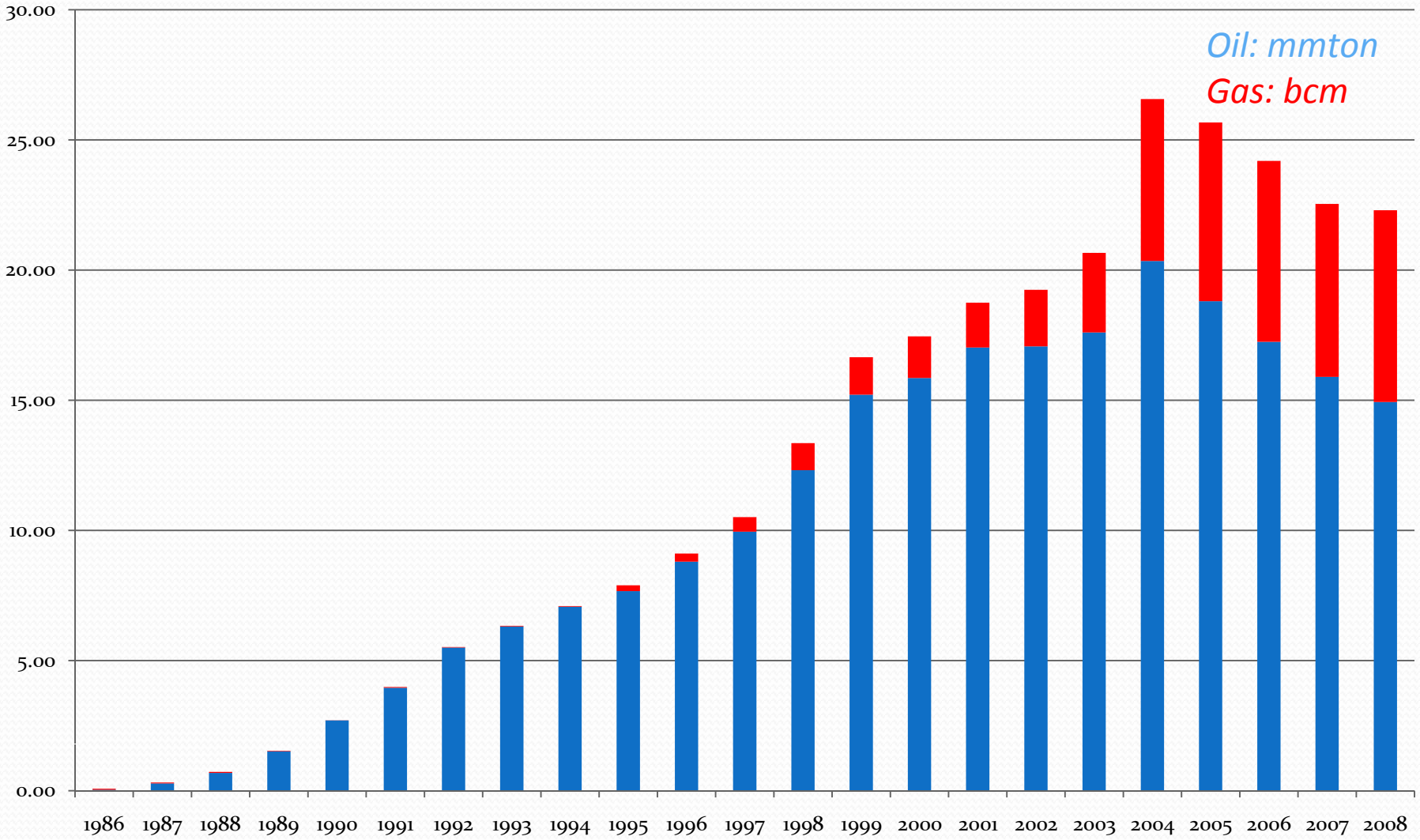
Oil and Gas properties

- Good quality of Oil, Sweet crude oil, range from Medium to Volatile
- Gas from 2 main source:
  - ✓ Nam Con Son Basin: Lan Tay and Rong Doi - less CO2
  - ✓ Malay Tho Chu: Block 46-2, PM3 CAA: high CO2

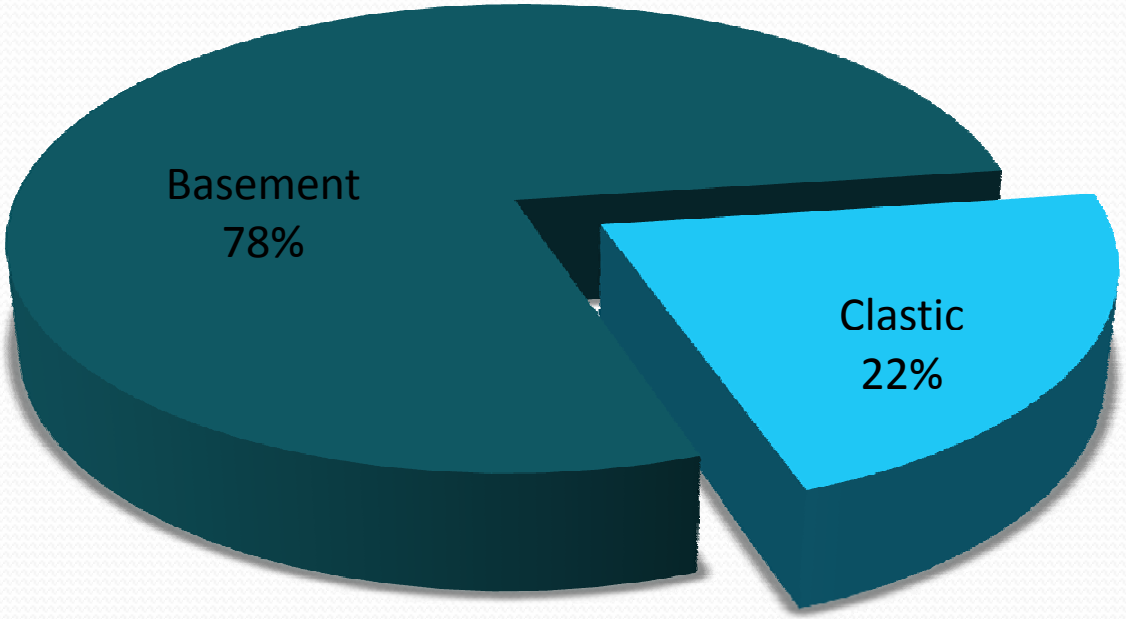
Oil and Gas Production Status

- Fields in production : 12 oil fields , 3 gas fields
- Fields in development : 3 gas fields, 7 oil fields
- Major Production
  - Oil from Cuulong Basin
  - Gas from Nam Con Son Basin
- Offshore, Water depth : 40m – 150 m
- Facilities : FPSO, FSO,PUQC, CPP, WHP and Subsea completion
- Gas Pipelines :
  - 350 km 2 phase flow from Nam Con Son basin to shore
  - ~300km 1 phase from PM3 CAA to shore
  - 140 km gas pipeline 2 phase from Cuu Long Basin to shore
  - ~400 km 1 phase flow from Block B to shore..

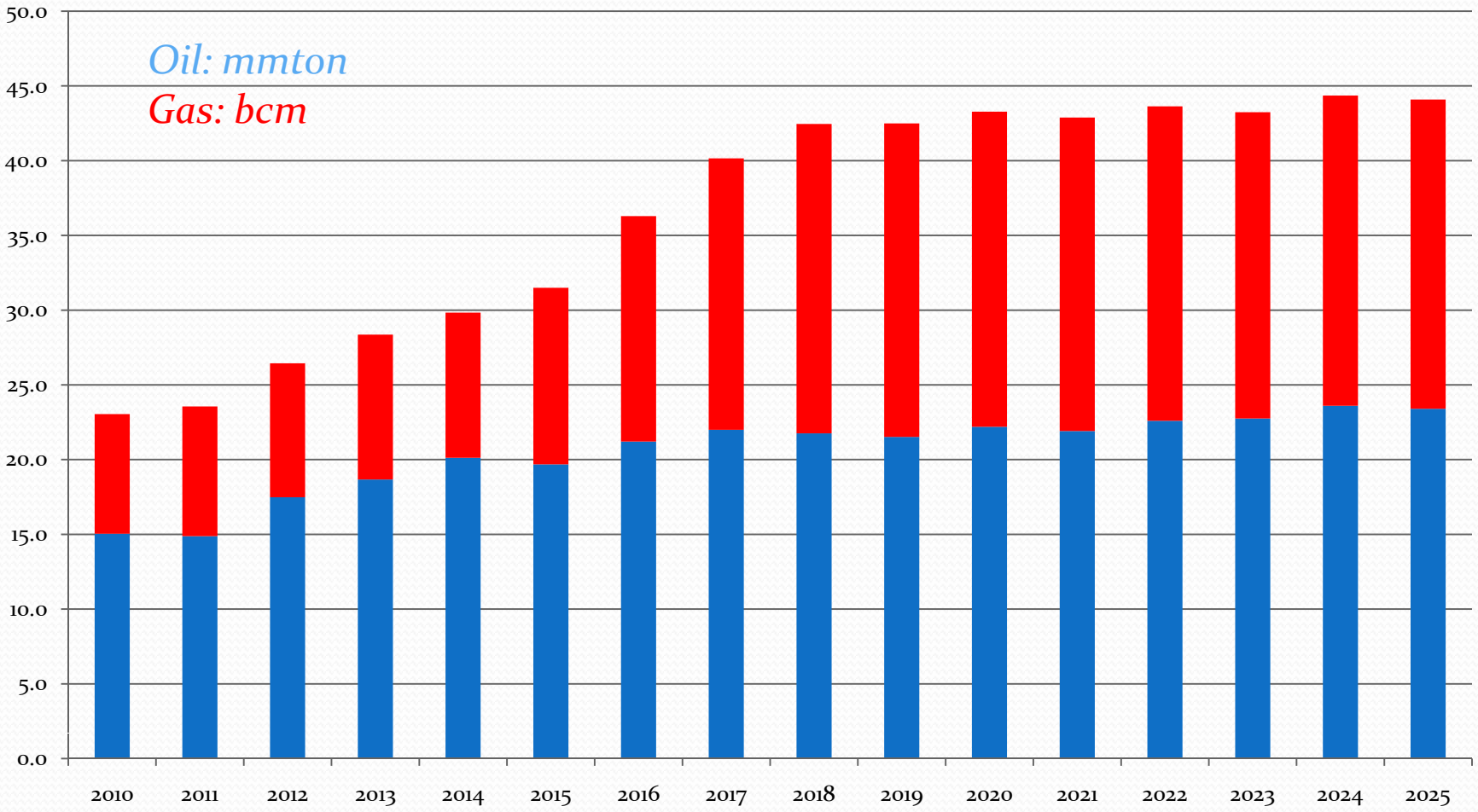
Annual Oil and Gas production



Production from Basement vs. Clastic



Oil and Gas Production Forecast



Current methods apply of IOR/EOR in oil fields and effects

- **Energy impacts on reservoir**
  - ✓ Water Injection (Very Common)
- **Technologies to improve well performance**
  - ✓ Acidizing,
  - ✓ Hydraulic Fracturing
  - ✓ Gas lift
  - ✓ ESP pump
- **Optimal well design and well locations**
  - ✓ Horizontal wells, well trajectory
  - ✓ Sidetrack wells, infill wells

- **Clastic reservoir: RF improved from 18-20 % up to 35 – 40 %**
- **Granite Basement : RF improved from 25-30 up to 45%**

Current study on other application of IOR/EOR

- **Energy impacts on reservoir**
  - ✓ Gas injection
- **Technologies to improve well bottom hole area**
  - ✓ Acid - Frac
  - ✓ Hydraulic Fracturing in basement
  - ✓ Water control

Conclusion

- Oil and Gas Production increase in near future
- Some production fields are in decline period
- Accelerate to develop the new field for more production
- Current IOR/EOR successfully applied in our fields : Water injection, stimulation, infill and sidetrack drilling…
- To continue studying and applying the IOR/EOR methods to maintain and increase production

Thank you !