

**THIRD US-INDIA  
WORKING GROUP  
MEETING ON COAL**

# CLEAN COAL TECHNOLOGY

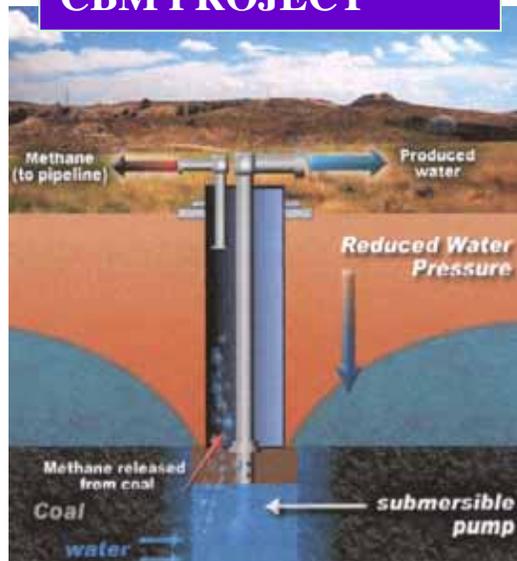
- Coal bed methane &
- In-situ Coal Gasification

**To gainfully utilize the vast potential of lignite deposits which are uneconomical for conventional mining, the following non-conventional / Clean Coal technologies are considered.**

- ❖ Coal Bed Methane (CBM)**
- ❖ Underground Coal Gasification (UCG)**

# DEVELOPMENTAL SCHEME FOR CBM AND UCG

## CBM PROJECT



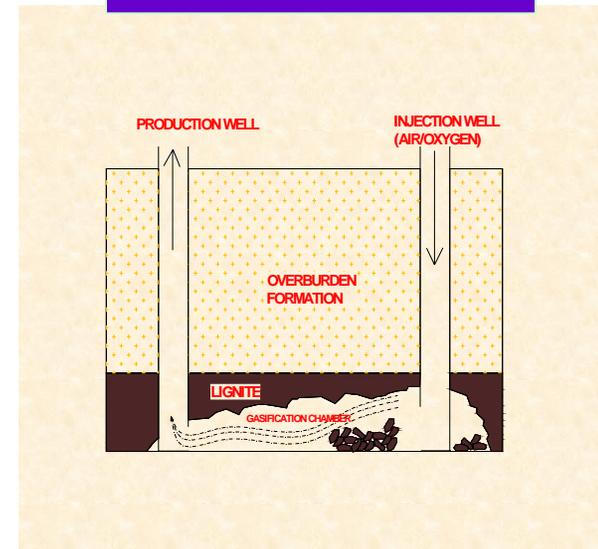
Extraction of Methane by non conventional process from Coal / lignite beds

### Coal Bed Methane

Methane adsorbed on coal matrix and in fracture/cleats

- Product of Coalification  
Biogenic & Thermogenic  
2-10M<sup>3</sup>/tonne of coal  
Low Pressure
- Environmentally safe
- Large Indian Reserves
- 69% of known reserves are unmineable

## UCG PROJECT



Extraction of product gas from Coal / Lignite beds by insitu conversion process

### Underground Coal Gasification

- Syngas (Coal gas) is produced by partial burning of lignite insitu
- Calorific Value 800 – 3000 Kcal/m<sup>3</sup>
- Cheap source of energy  
350 M<sup>3</sup> per ton of lignite
- Environmentally safe

# COAL BED METHANE

- **NLC started its endeavor to enter into the field of CBM in the year 2000.**
- **Requested CMPDI to provide technical consultancy .**
- **CMPDI submitted a proposal for undertaking consultancy.**
- **NLC wrote to different consultants including US Embassy for consultancy –so far no reply received.**

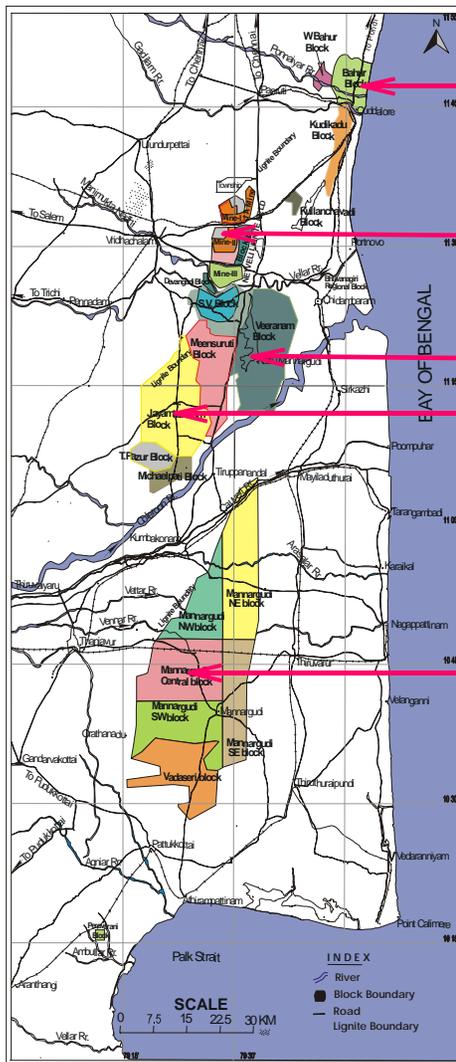
- **In Neyveli basin total available reserves of lignite for CBM development is 5500 MT.**
- **Likely gas reserves is 8250 MCM.**
- **Geological setup is similar to Powder River basin of USA**
- **2400 MT reserves are already in NLC's leasehold.**
- **Additionally 1000 MT in Jayamkondam is applied for lease**
- **The above areas can be taken for immediate studies for exploitation of 5100 Mcum gas.**

## TAMILNADU LIGNITE FIELD AS CBM RESOURCE:

Tamilnadu has the largest established resource of LIGNIT in country. These are mainly developed in three Basins

1. BAHUR	Bahur	574.39 MT.
	Kudikadu	133.38 MT.
	West of Bahur:	58.60 MT.
	Total	766.37 MT
2 NEYVELI	Kulanchawadi block	175.00 MT
	Neyveli Block	4150.00 MT
	Jayankondam Block	1168.00 MT
	Veeranam Block	1342.45 MT
	Total	6835.45 MT
3 MANNARGUDI	Mannargudi	19788.68MT

# Lignite Fields of Tamilnadu & Pondicherry



Bahur field

Neyveli Lignite field

Veeranam field

Jayamkondam field

**Neyveli Sector**

Mannargudi field

Mannargudi Central  
Mannargudi NW  
Mannargudi NE  
Mannargudi SW  
Mannargudi SE  
Vadaseri

**Mannargudi Sector**

*Comparison of Lignite deposits of Tamilnadu /  
Mannargudi and Powder River Basin, Wyoming, USA*

<b>Parameters</b>	<b>Lignite deposits of Tamilnadu / Mannargudi</b>	<b>Lignite of Powder River Basin, USA</b>
<b>Depositional Environment</b>	<b>Detalic lacustine setting.</b>	<b>Detalic lacustine setting.</b>
<b>Geological Age</b>	<b>Mio-Pilocene</b>	<b>Pelaeocene</b>
<b>Depth Range</b>	<b>50 –600 m</b>	<b>60 –200 m</b>
<b>Average Thickness of seams</b>	<b>45 m</b>	<b>30 m</b>
<b>Ash</b>	<b>2 - 12</b>	<b>Low to moderate</b>
<b>Reflectance</b>	<b>0.35 – 0.41</b>	<b>0.34 – 0.39</b>
<b>Hydro-geological conditions</b>	<b>Lignite seams associated with aquifer zones</b>	<b>Lignite itself act as aquifer between less permeable sand stones</b>
<b>Gas content</b>	<b>1 - 2 m<sup>3</sup> /t</b>	<b>1-74 Scft/t (0.03 – 2.3 m<sup>3</sup> /t</b>
<b>Permeability</b>	<b>NA</b>	<b>Very favourable 1 – 10 m/d</b>

A study for CBM in NLC lease hold area can be advantageous for:

- \* The study can start immediately
- \* if suitable surrounding area can be added for resources.
- \* Carbon sequestration can be possible in CBM voids - help in getting carbon credits.
- \* The experience and expertise gained in process will be helpful in getting Mannargudi block for major Commercial exploitation.

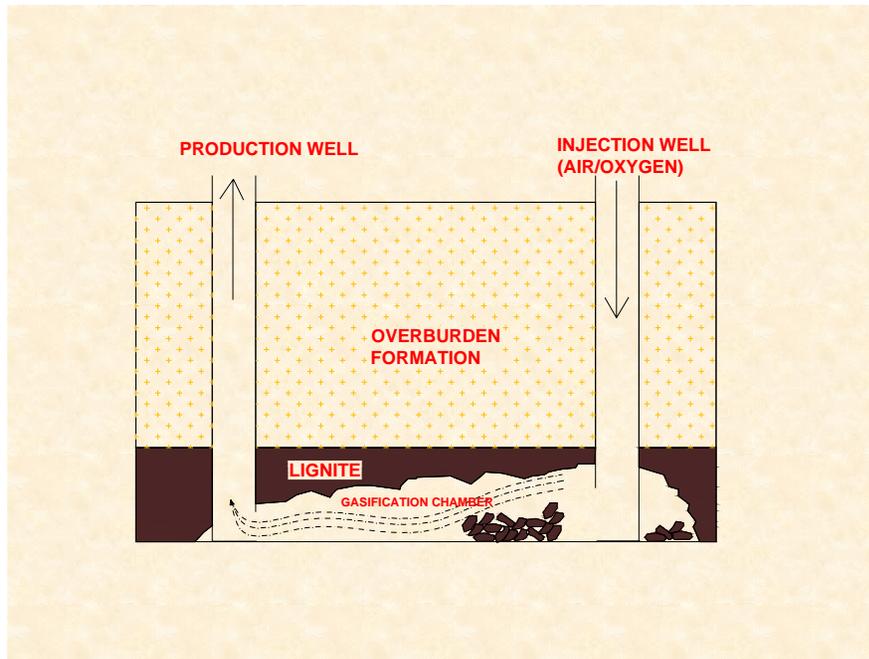
## Requirement of NLC:

Strategic Partnership with parties having experience in CBM exploitation from Lignite field .

# ***UNDERGROUND COAL GASIFICATION***

***(UCG)***

# UNDERGROUND COAL GASIFICATION



UCG is the insitu conversion of unworkable (deep seated, thin seam, steep dipping) coal/lignite into a combustible product gas.

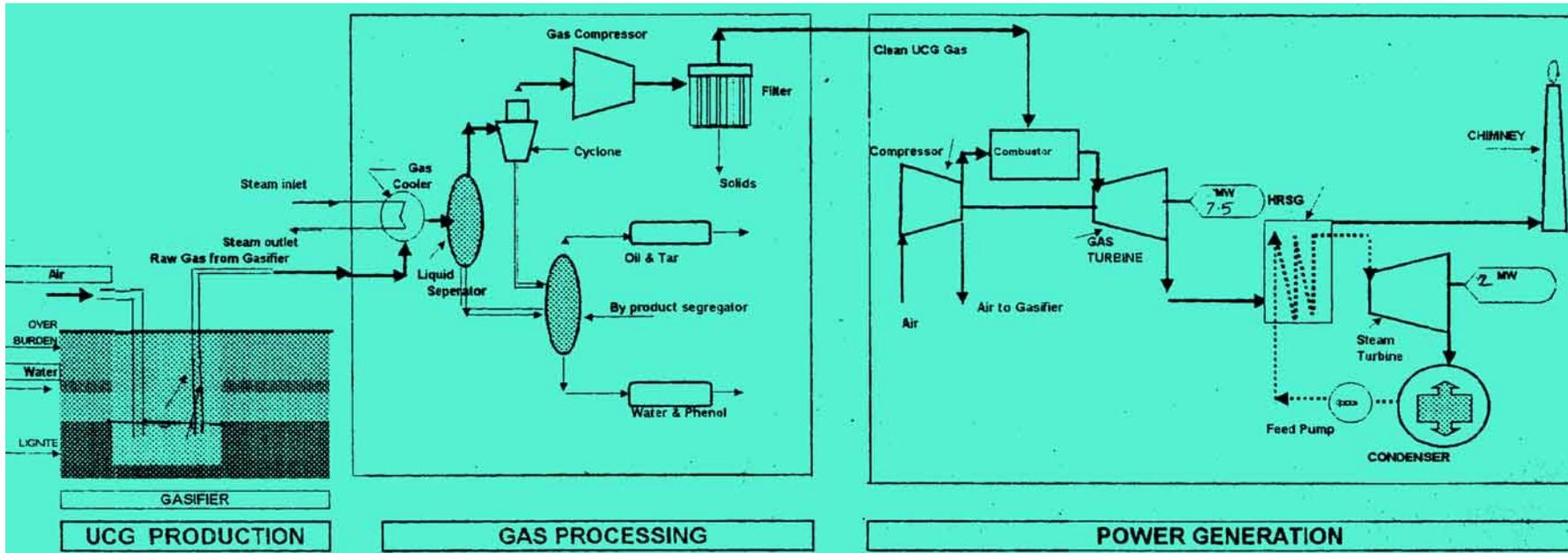
UCG operation is initiated by drilling two adjacent boreholes into the coal seam and injecting pressurised oxidants like hot air, oxygen or steam into the coal seam, igniting the coal seam and recovering the combustion gasses through the adjacent borehole. The connectivity between the injection and producer wells are made by special linking techniques.

# USES OF PRODUCT GAS

The UCG gases consists mainly a mixture of Hydrogen, Carbon-monoxide, methane, carbon-dioxide and higher Hydrocarbons.

The raw gas after processing can be utilized for power generation in Integrated Gas combined cycle power plant of suitable capacity. The gas is also suitable for industrial heating or hydrogen and natural gas production.

# UTILIZATION OF PRODUCED GAS – FLOW DIAGRAM



# UCG Projects

## 1. NLC-ONGC Joint venture project

- NLC's Board has approved for entering into an understanding with ONGC for undertaking a UCG project in deep seated lignite deposit in India.
- Certain lignite blocks in Tamil Nadu like Mannargudi North west, Veeranam and Kullanchavadi blocks may be considered for undertaking preliminary UCG studies to assess their suitability.
- The UCG studies will lead in deciding the future strategy about UCG development.

# NLC's UCG PROJECT

## 2. Project funded by Coal S&T, NLC and DST

- A UCG study project is to be undertaken in a suitable lignite block in Rajasthan.
- Approved cost of the project : Rs.1125 Lakhs
- Project duration : 4 years
- If the project studies are proved successful, commercial UCG operation would be initiated for utilization of the product gas in a suitable Integrated Gas Combined cycle(IGCC)Power plant.

**A project titled “Underground Coal Gasification (UCG) and its Utilization for power generation studies in lignite deposits in Rajasthan” is proposed to be undertaken by Neyveli Lignite Corporation Limited in association with Internationally reputed UCG expert agency under Coal S&T grant of Ministry of Coal, Government of India.**

**REQUIREMENT OF NLC:**

**TECHNICAL CONSULTANCY FOR  
UCG PROJECT OF NLC  
IN RAJASTHAN STATE**

THANK YOU