

UCG-- Country Status

Asia Pacific Partnership
On
Clean Development and Climate

Dr. D. M. Kale

Coal

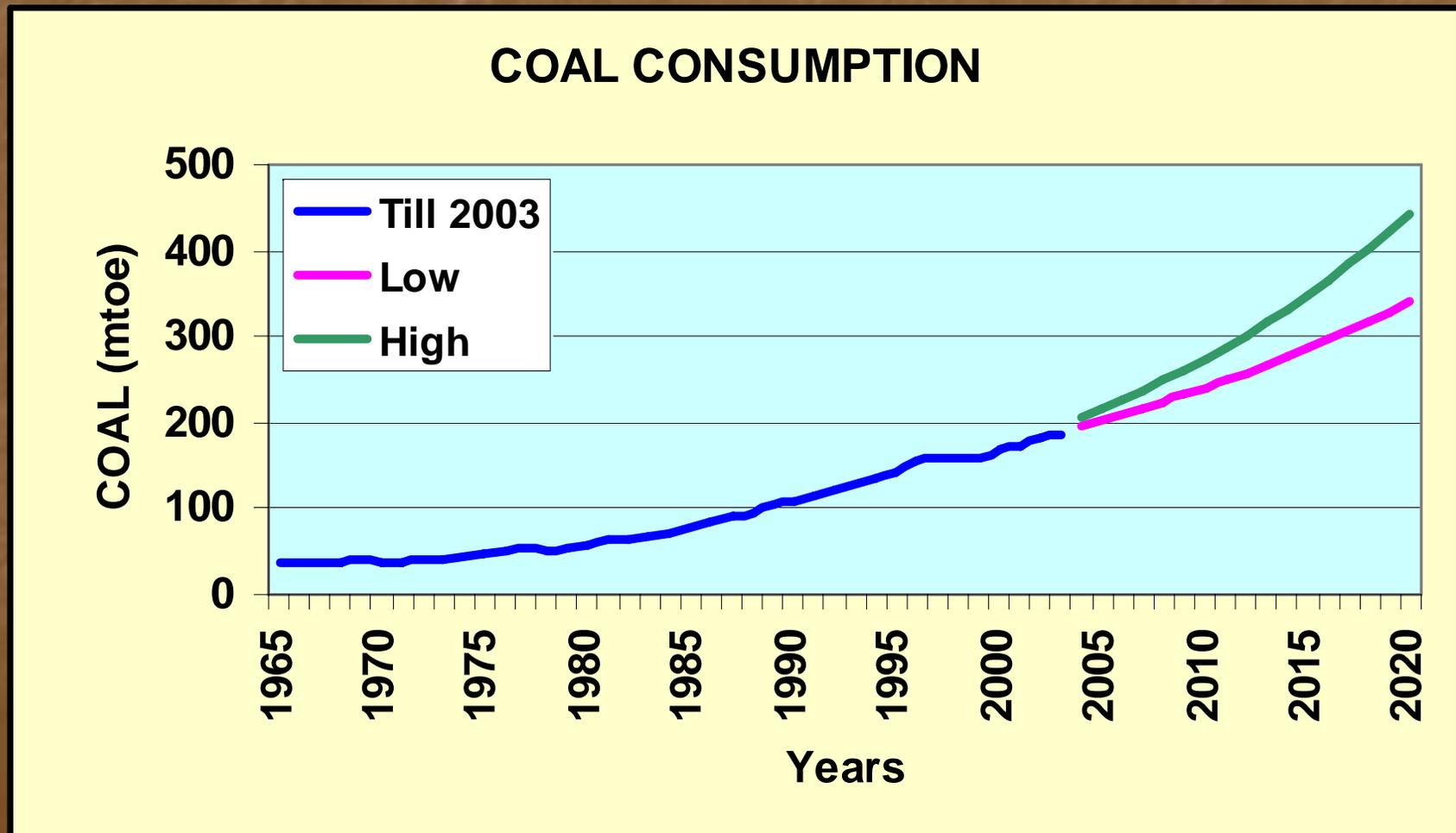
Gods Gift

Ancient Sunlight



Coal - India

A Case

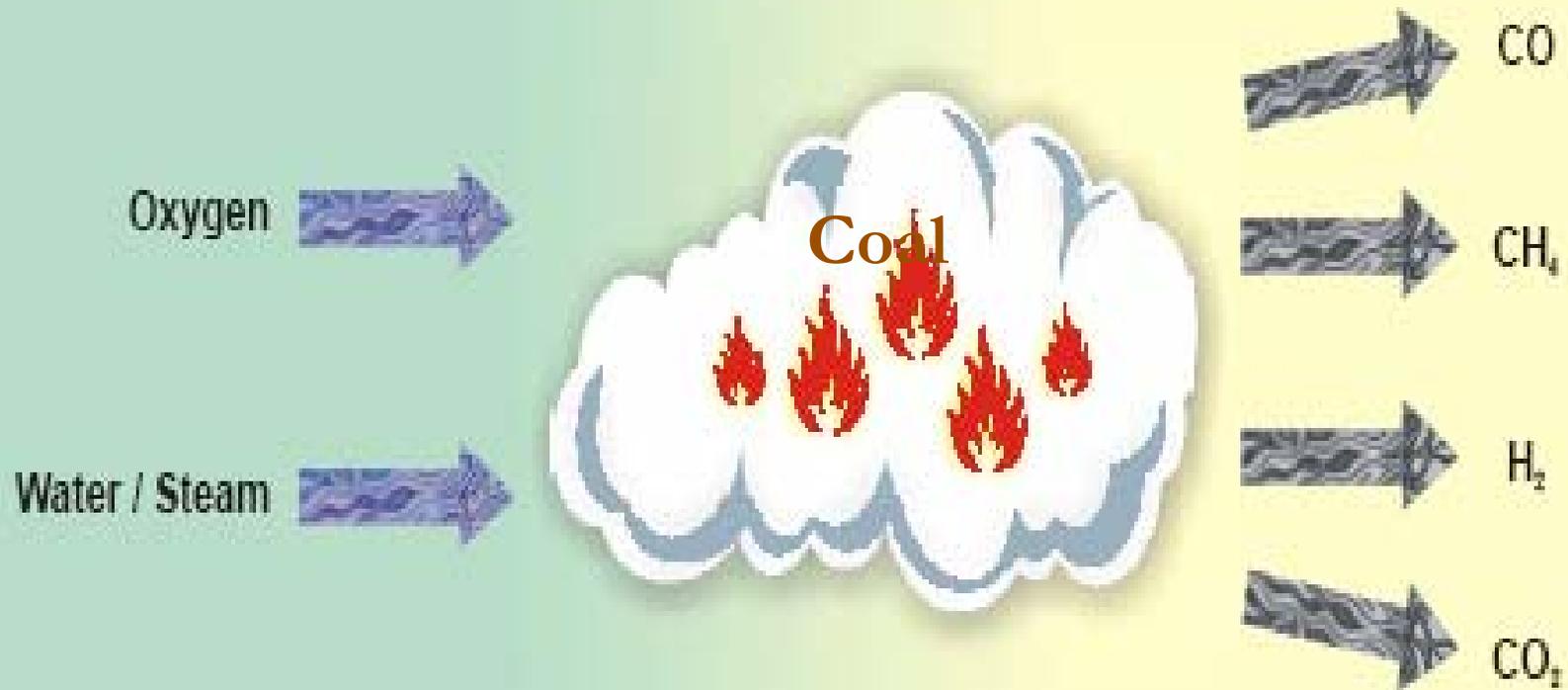


Coal Gasification

Coal gasification - Controlled combustion of coal to obtain syn gas.

- ◆ Underground Coal Gasification (UCG)
- ◆ Surface Coal Gasification (SCG)

UCG - Products



Underground Coal Gasification (UCG)

A process for converting Coal deposits into Gas insitu.

UCG - Potential

UN MINEABLE COAL RESOURCES	: 210.14 Billion tons
UN MINEABLE LIGNITE RESOURCES	: 32.76 Billion tons
TOTAL UNMINEABLE RESOURCES	: 242.90 Billion tons
PERCENTAGE OF COAL AMENABLE TO UCG	: 30 %
COAL RESERVES AMENABLE TO UCG	: 72.87 Billion tons
UCG GAS (considering 2700 m ³ /ton)	: 196.749 Trillion m ³
NATURAL GAS EQUIVALENT	: 19.67 Trillion m ³
CALORIFIC VALUE OF PRODUCED GAS	: 3- 5 MJ/m ³

UCG - Potential

UCG - Potential Gujarat

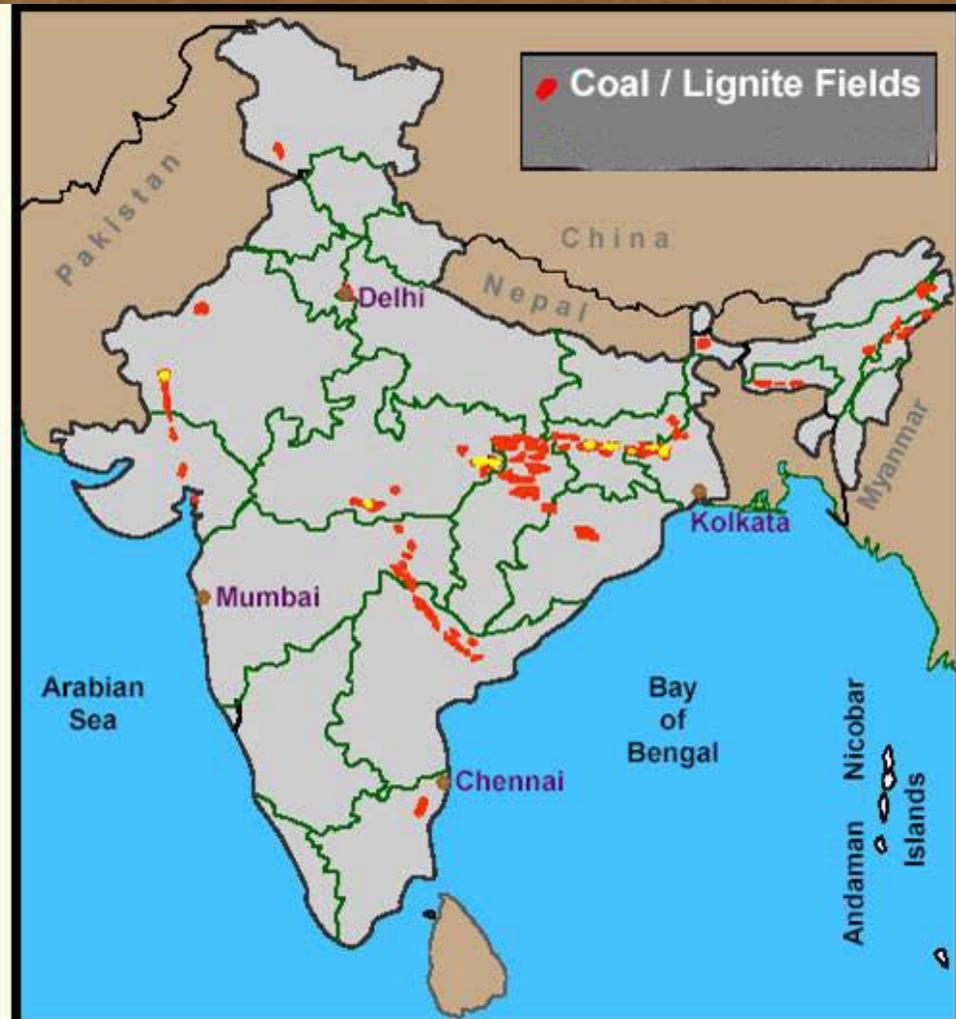
Coal Reserves estimated by ONGC in Gujarat :

- Patan Tharad block : 60 Billion tons
- Ahmedabad Mehsana block : 63 Billion tons
- Natural Gas Equivalent of UCG
- Gas from one block 6 Billion tons (10%) of coal Reserves : 1.5 Trillion M³

UCG - Concept

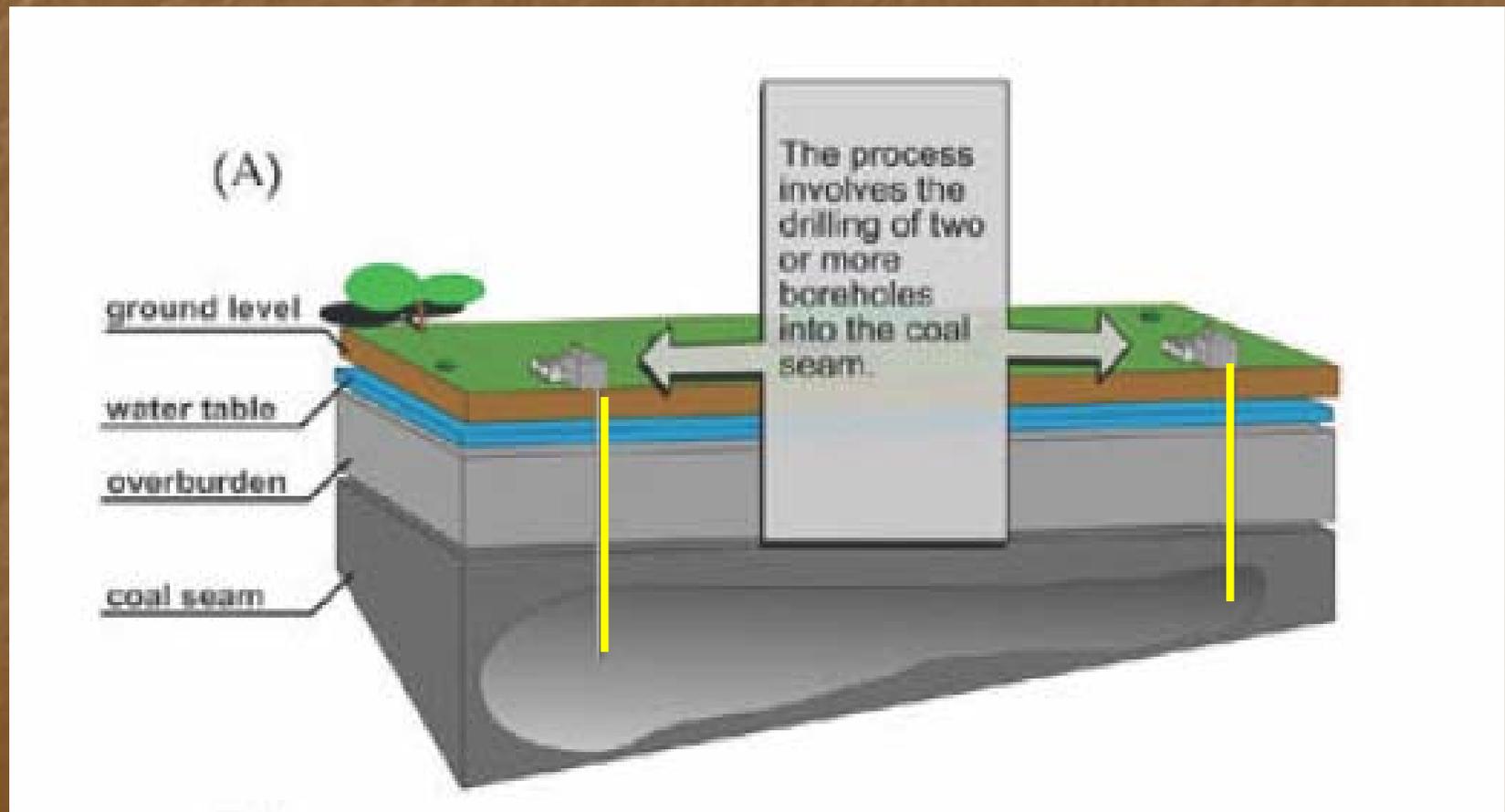
- ◆ Two boreholes are drilled into the coal seam
- ◆ Coal is ignited, combustion is maintained by injecting air or oxygen and steam
- ◆ The resulting gases are brought to surface by the second bore hole

Coal Lignite fields in INDIA



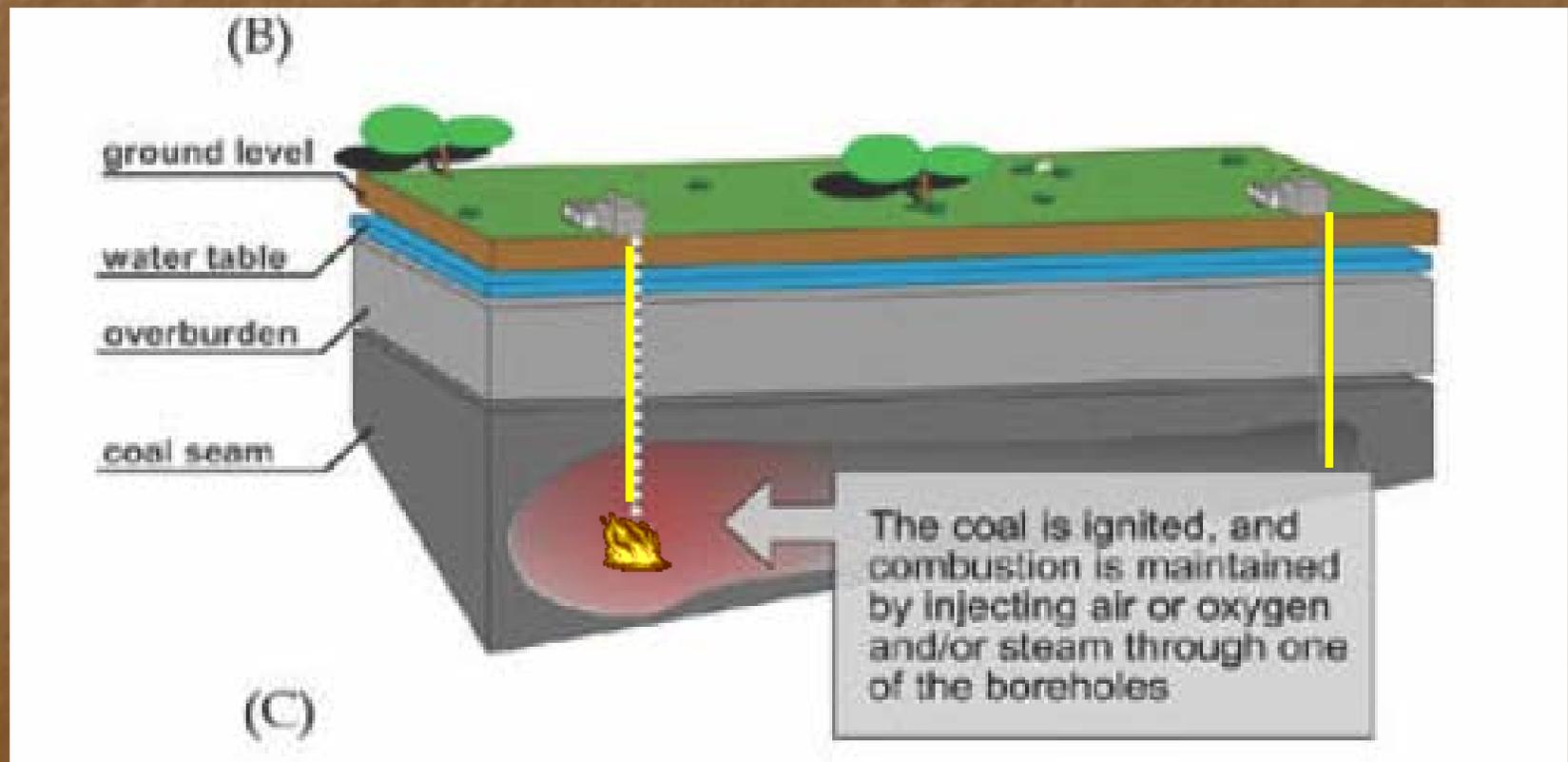
UCG - Concept

Two boreholes are drilled into the coal seam



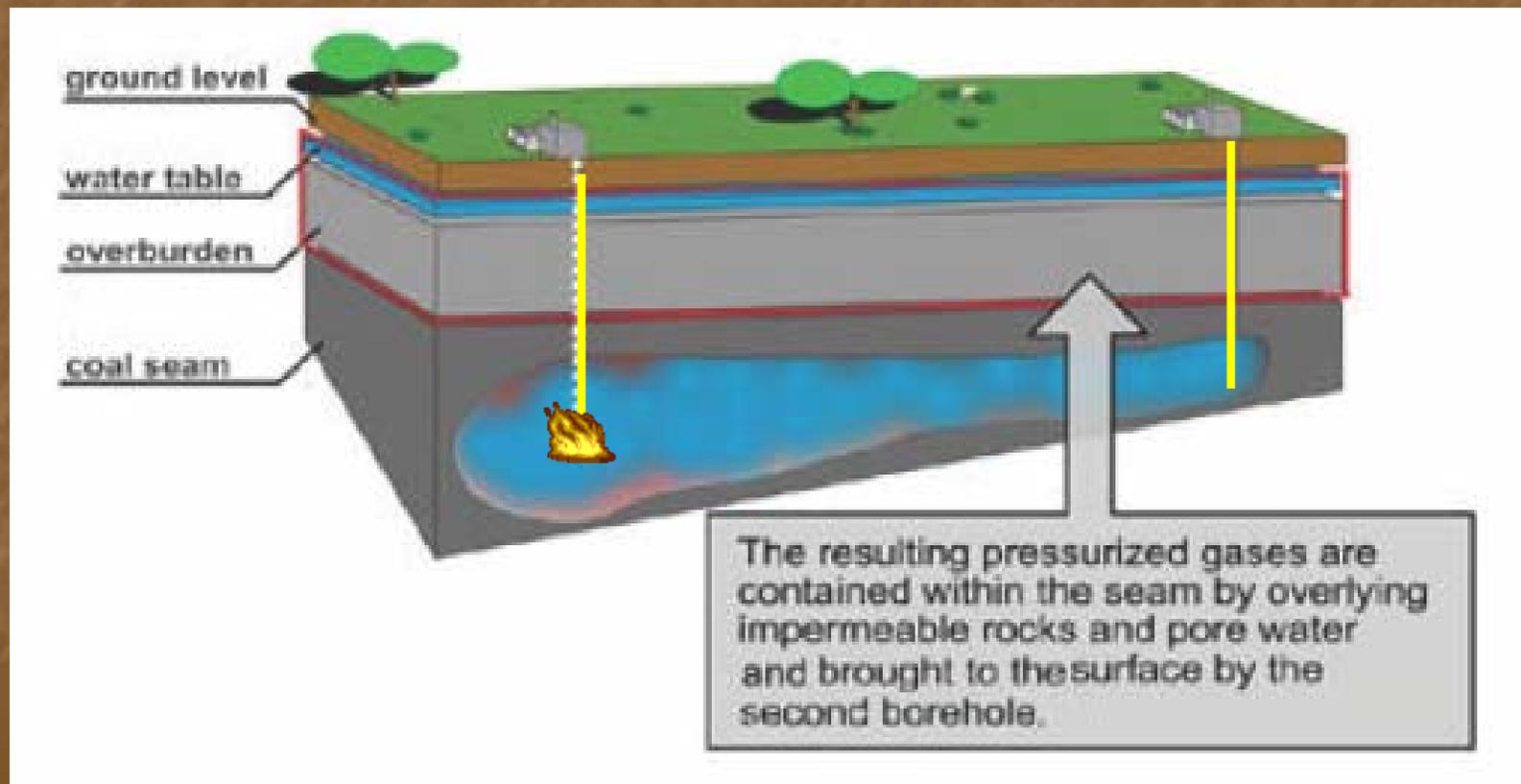
UCG - Concept

Coal is ignited, combustion is maintained by injecting air or oxygen and steam

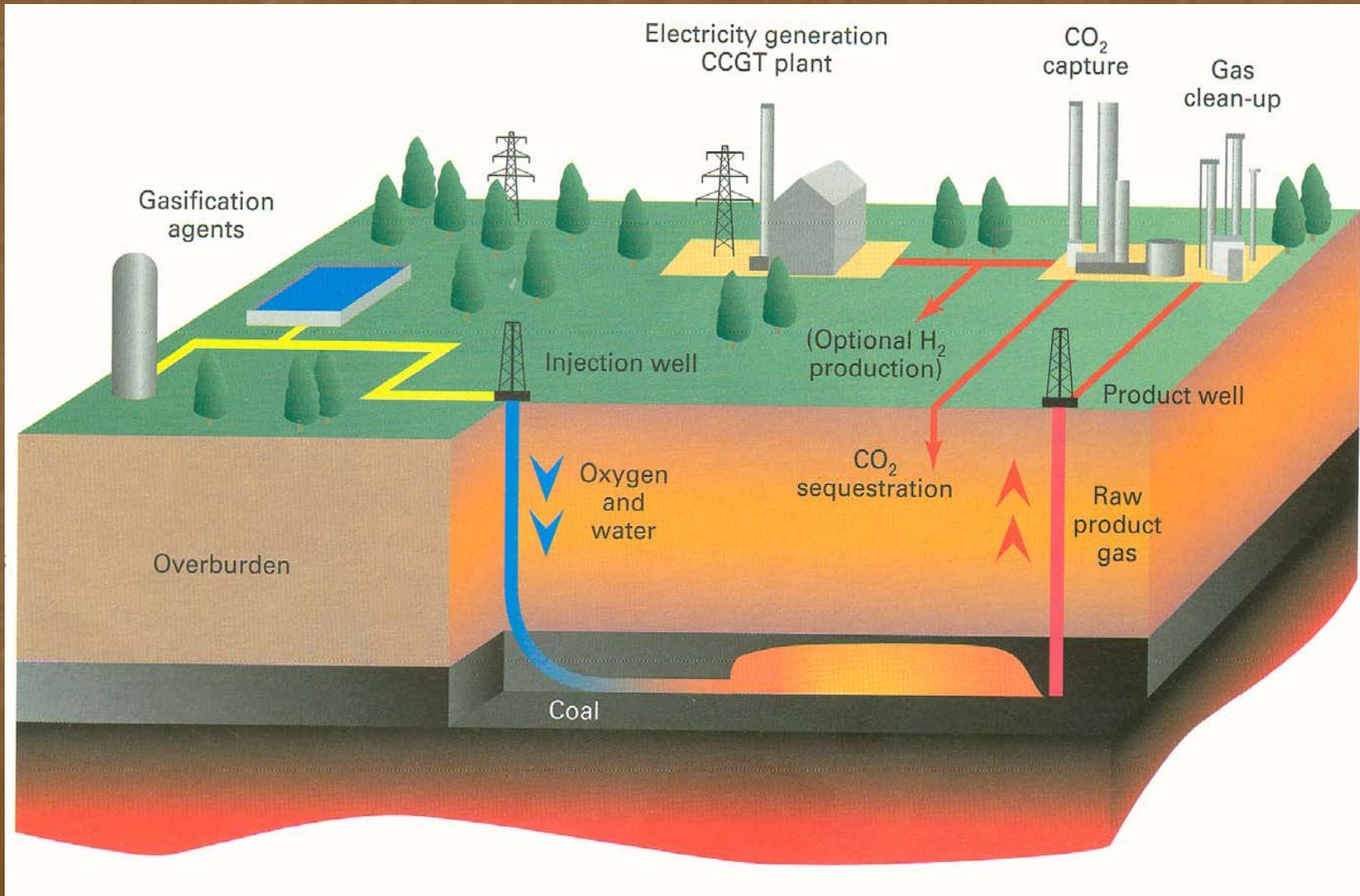


UCG - Concept

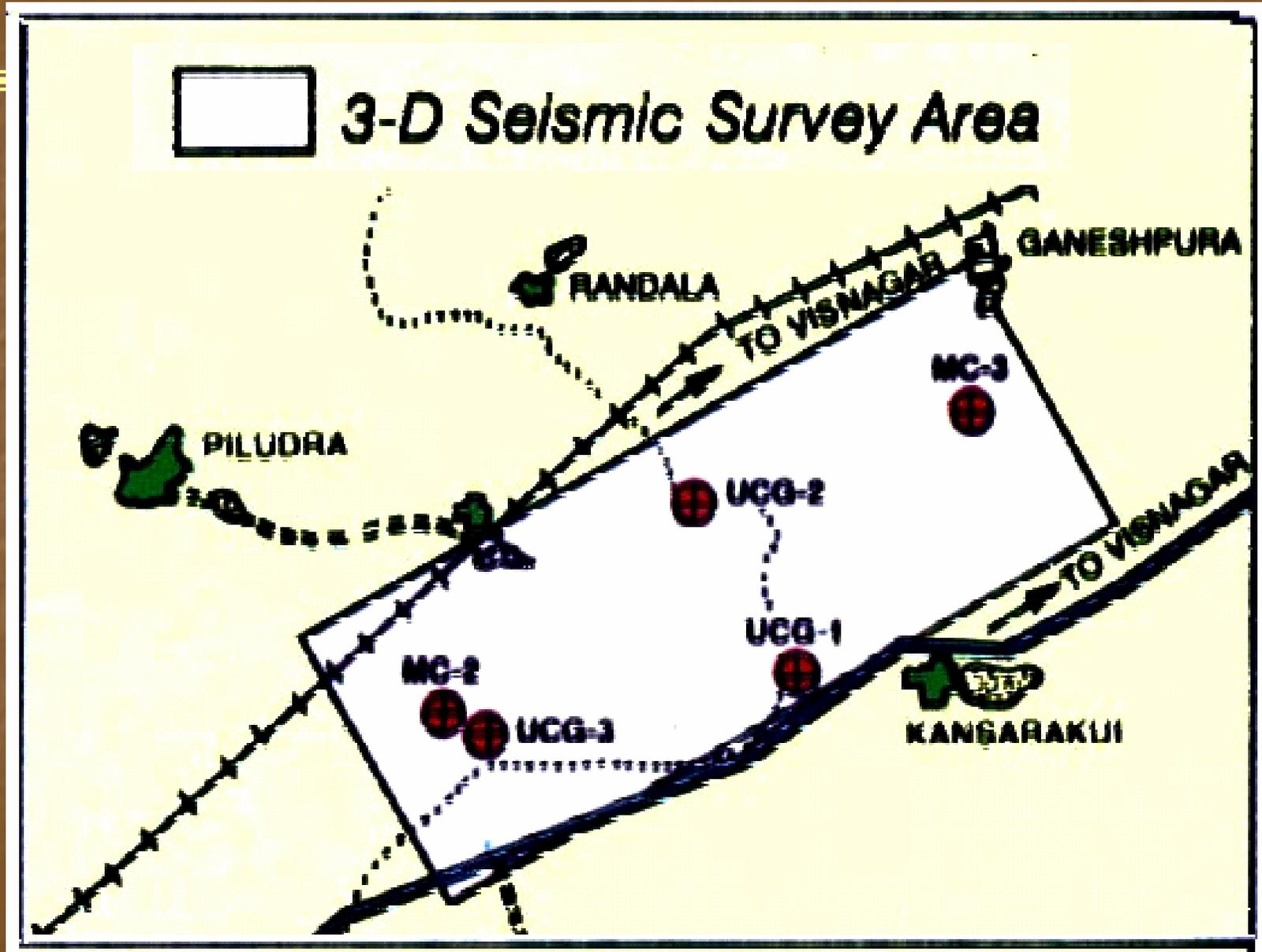
The resulting gases are brought to surface by the second bore hole



UCG - Concept



Earlier Proposed Site for UCG Pilot



INFORMATION WELLS

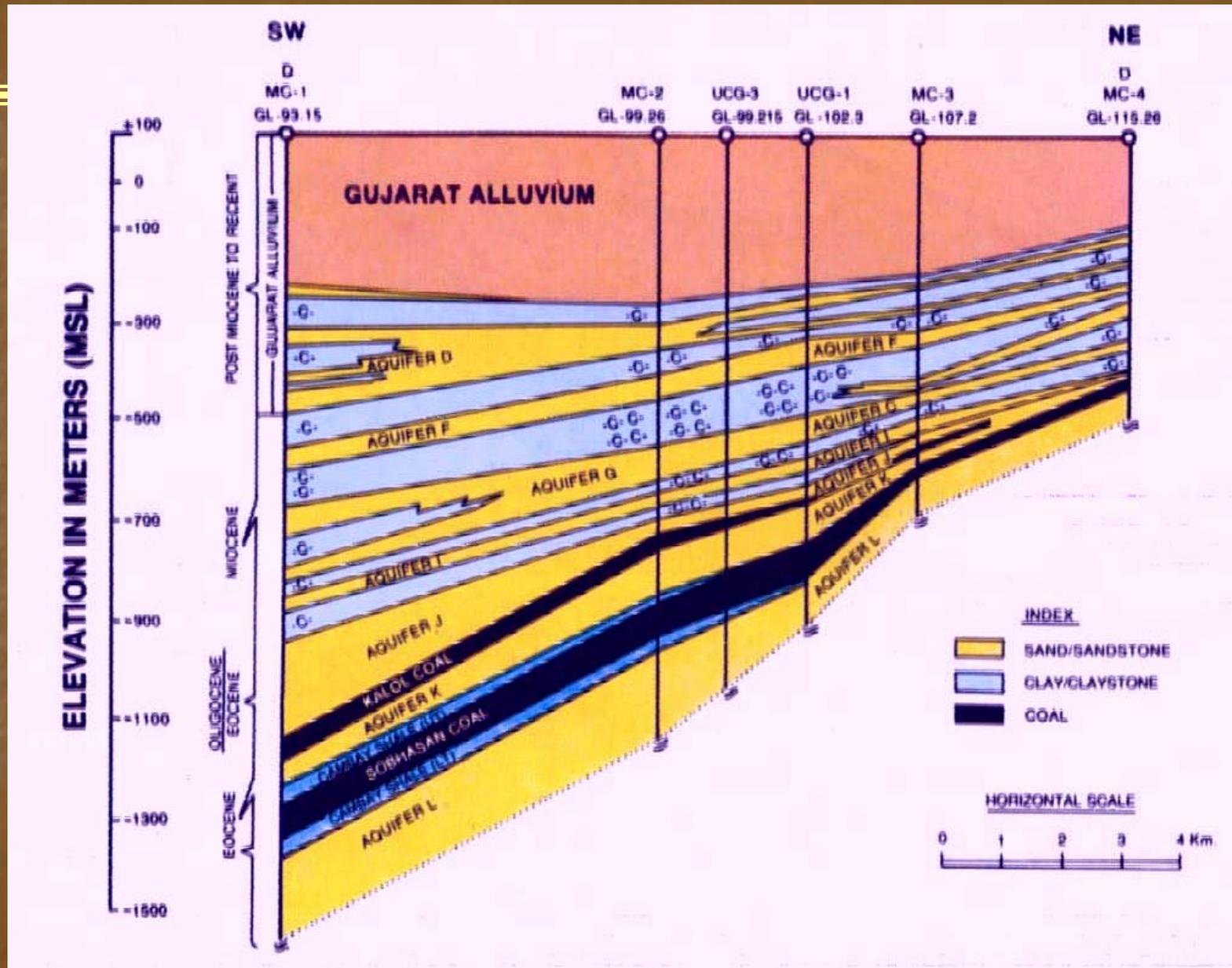
	UCG-1	UCG-2
Spud Date	25-6-1986	16-3-1990
Drilling completed	30-8-1986	22-5-1990
Location	12Km NE MC	300m MC-2
Drilled depth	1005m	1159.9m
Coring length	345.50m	265.25m
Targeted coal seam	Sobhasan –I	Sobhasan -III
Interval	855 - 872m	1013.5-1026m
Thickness	16.5m	12.5m

- UCG-1**
- ◆ Hydrological : 14 objects,
 - ◆ Coal samples : 57 boxes,
 - ◆ Non-coal samples : 180 boxes,
 - ◆ Petrophysical, Chemical and Analytical studies:
 - ◆ KDMIPE, Dehradun; Coal Survey Lab, RRL; CMPDIL, Ranchi;
 - ◆ Subsidence studies: CMRS, Dhanbad.

Proximate Analysis Coal samples of Gujarat

	S-1	S-2	S-3	S-4	S-5
Moisture	3.84	4.38	4.84	3.26	4.34
Ash	1.88	3.68	5.51	1.37	3.00
Volatiles	47.63	50.07	48.05	50.24	50.23
F-Carbon	46.65	41.87	41.60	45.13	42.43
CV cal/gm	7129	6792	6769	7382	7065

Hydrogeological Section of Tertiary Aquifers



Esteemed Partners

- ◆ ONGC
- ◆ CIL
- ◆ NLC
- ◆ SCCL
- ◆ GIPCL
- ◆ GMDC
- ◆ GSPC

Demonstrated Expertise & Strength

◆ Expertise in:

- ◆ Drilling
- ◆ In-Situ Combustion
- ◆ 3-D Seismic
- ◆ Geological Mapping

◆ Capability of Handling High Pressures

CONSULTANTS, LABORATORY BACK-UP

- UCG Expertise from Skochinsky Institute of Mining
- IIT, Bombay; IICT, Hyderabad; CMRI, Dhanbad.

Experience in:

- **Ignition , Tracking Combustion Front**

More than 50 air injectors

- **Compression & Injection of Oxygen/ Air/ Steam:**

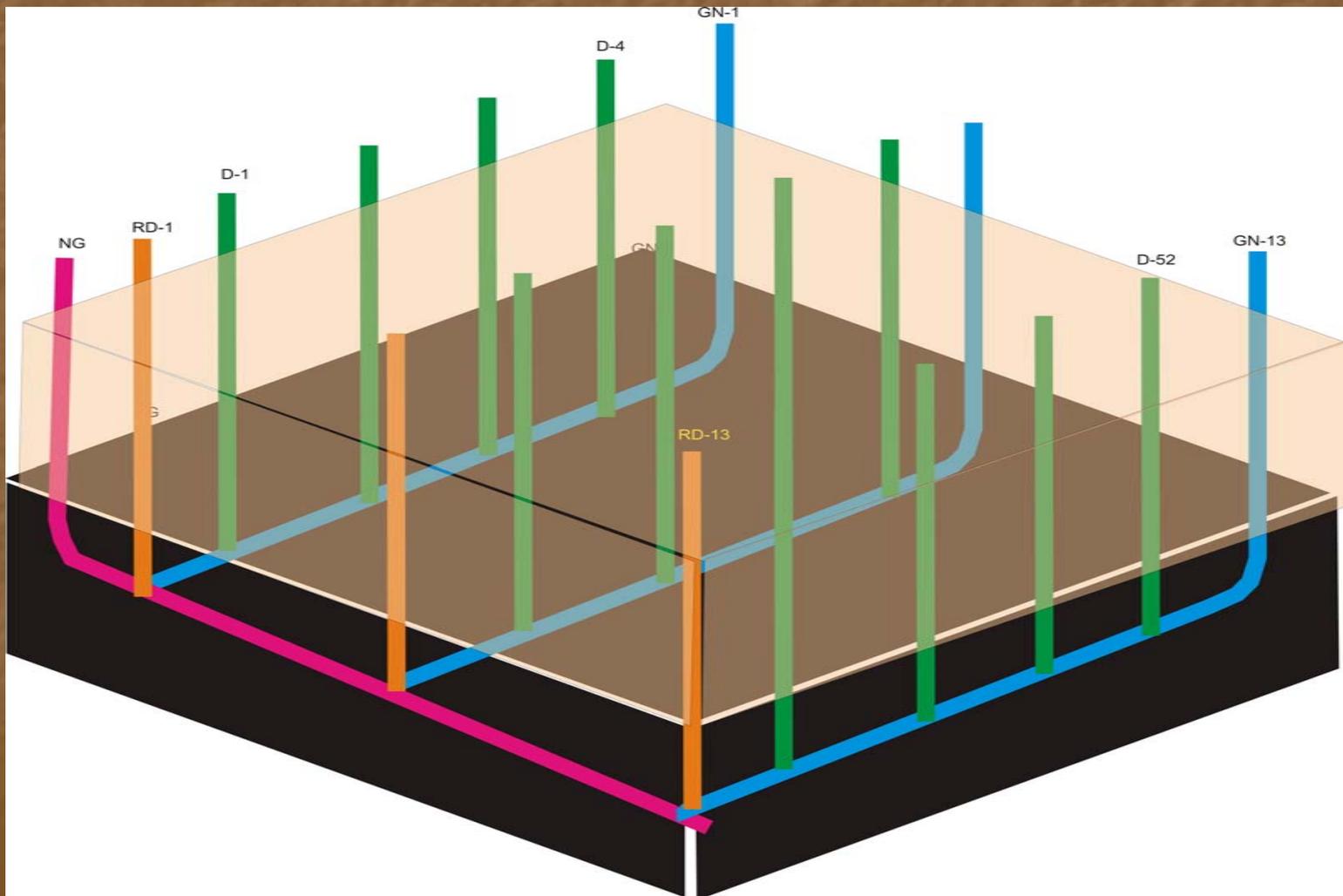
Air injection @ 2 million m³/day is already going on in Balol & Santhal field

Similar facilities may be required for UCG

- **Flue gas utilisation:**

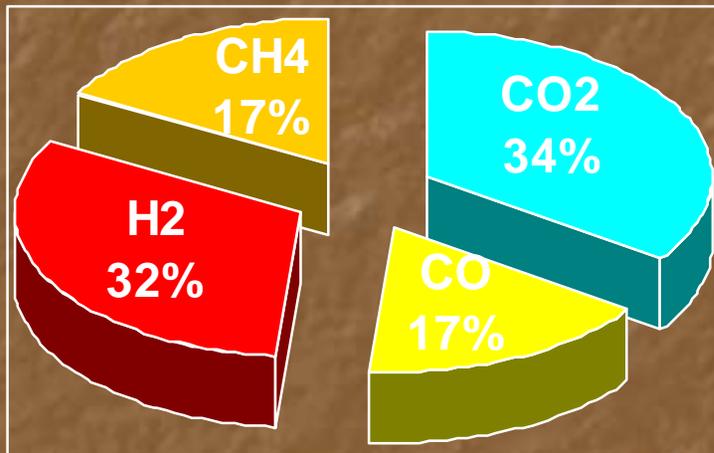
Flue gases producing from heavy oil areas are comparable with the UCG gases

Schematic of a UCG Project

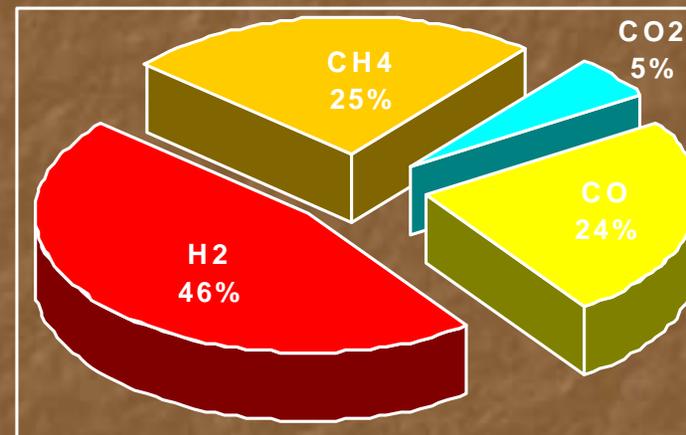


UCG - Concept

Typical composition of UCG Dry Syn Gas

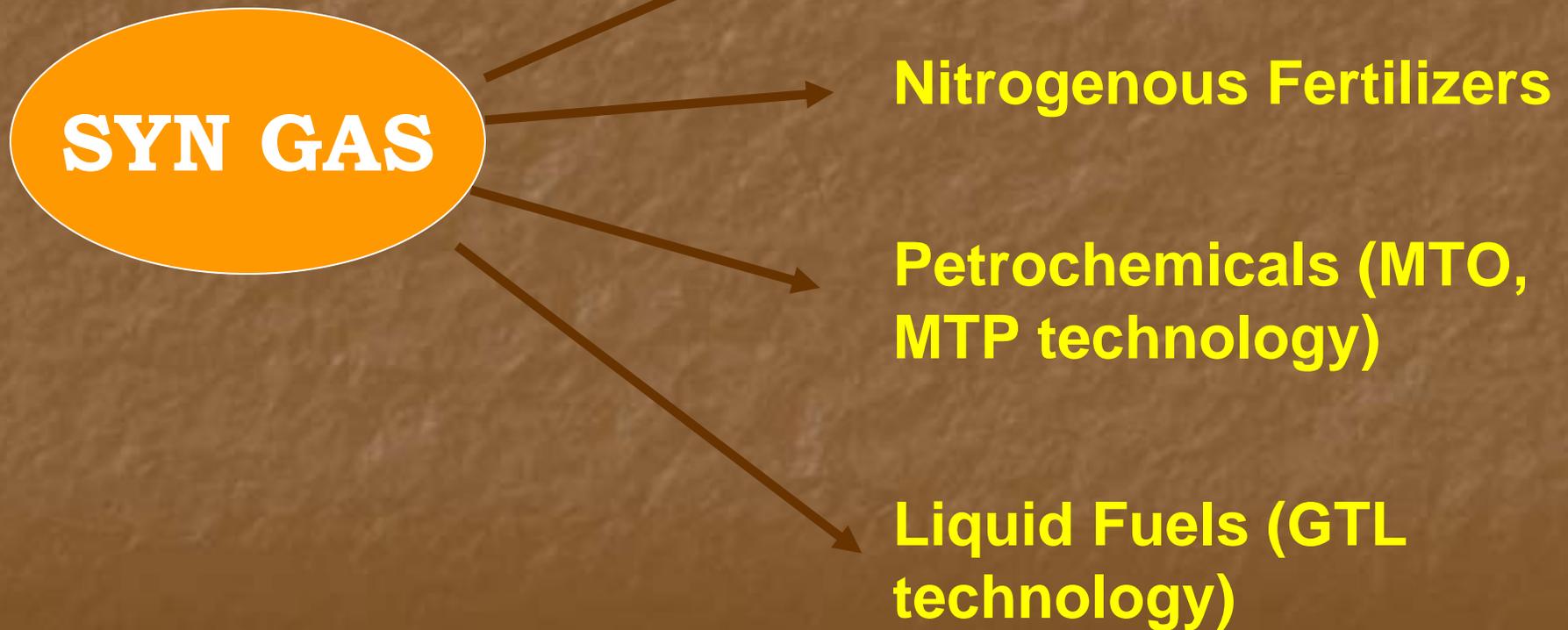


Calorific Value 2600 Kcal / sm³
With no CO₂ capture



Calorific Value 4000 Kcal / sm³
With CO₂ capture

UCG - Utility



UCG – Project Timeline

UCG - Road Map

PROPOSED WORK PLAN FOR ENTERPRISE UCG CREATION

ID	Task Name	2005			2006				2007				2008				2009				2	
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
1	Site selection for UCG	■	■																			
2	Detailed Geological & Hydrogeological evaluation of selected site				■	■	■															
3	Obtaining permission for land						■	■														
4	Project Design & techno economic analysis							■	■	■	■	■	■									
5	Construction of Enterprise UCG													■	■	■	■	■	■	■	■	■

UCG - Advantage

- ◆ Facilitates exploitation of deep / unminable coal reserves
- ◆ Higher efficiency coupled with low capital costs than conventional coal-fired station
- ◆ Eliminates SO₂ emission

UCG - Advantage

- ◆ Environmentally friendly
 - ◆ Significant reduction in CO₂, SO_x, NO_x emissions
 - ◆ No Waste disposal (Ash Trapped Underground)
 - ◆ Reduced emission of Green House Gases by CO₂ Sequestration
- ◆ Short Construction and Commissioning Time

UCG - Advantage

- Replacing underground mines under complicated, risky conditions of operation.
- Environmental protection.
- Augment and replace dwindling valuable fuels as oil and gas

UCG – Policies

Decision requiring attention

- ◆ Royalty for coal in case of UCG need be nominal since without UCG resource can not be exploited.
- ◆ Initially low tariffs to encourage investments.
- ◆ Power generation from UCG needs special fiscal regime.
- ◆ Deploying UCG / SCG syn-gas towards chemical feedstock and for liquefaction needs R&D as well as high incentives.

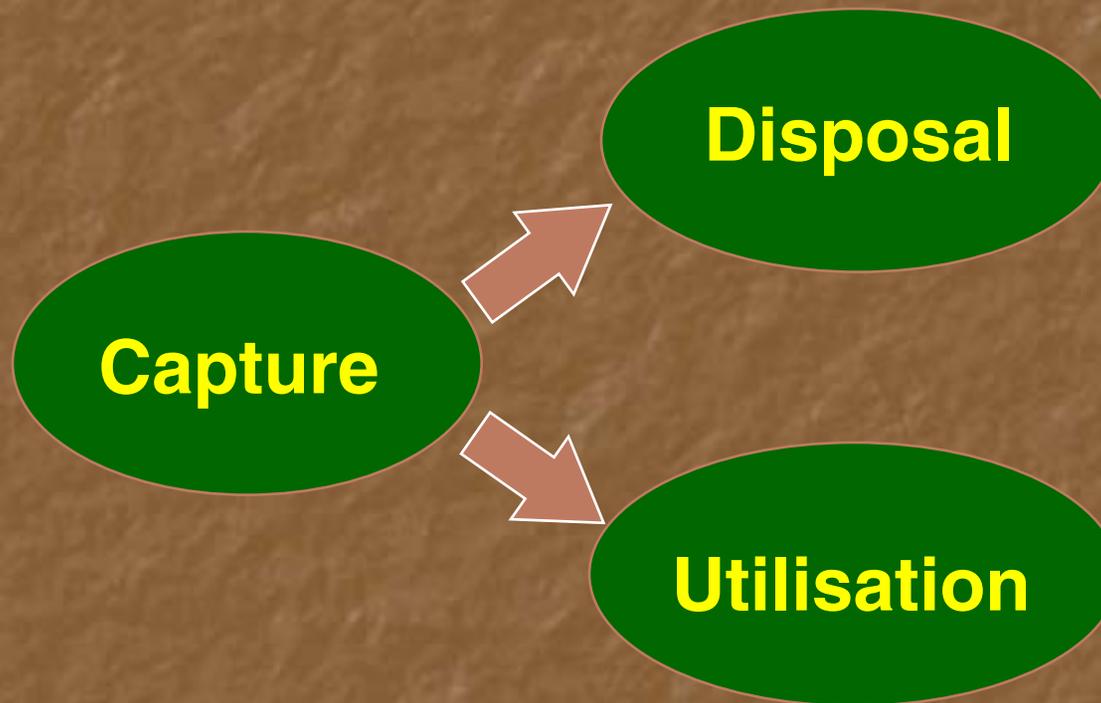
CDM Issues

- Annual Global CO₂ emissions of 24 Gt
- CO₂ emissions in India are 900 MMt

Background

- Global concern on rising concentration of CO_2
- Increased from 280 to 370 ppm

Carbon Sequestration



- Depleted Oil & gas reservoirs
- Saline formations
- Salt caverns
- Mineralisation
- Deep oceans

- EOR
- Coalbed Methane



What do you have to lose?



For our beautiful planet

