

UNDERGROUND COAL GASIFICATION

By

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Presentation Outline

- Technology
 - Site characterisation and selection
 - Drilling & linking of wells
 - UCG modeling
 - Environment and Safety
- Policy & Regulation
 - Area allocation to companies other than PSUs
- Gas Use Markets
 - Power generation
 - Value addition



UNDERGROUND COAL GASIFICATION – CRITICAL ISSUES Growth is Life

TECHNOLOGY

Site characterisation and selection

- UCG needed information available is not adequate

Sizable investment required upfront

Drilling of wells

- Vertical wells
- Horizontal wells

*Technical know how and resources are available,
having developed oil & gas industry in India*

Linking of wells

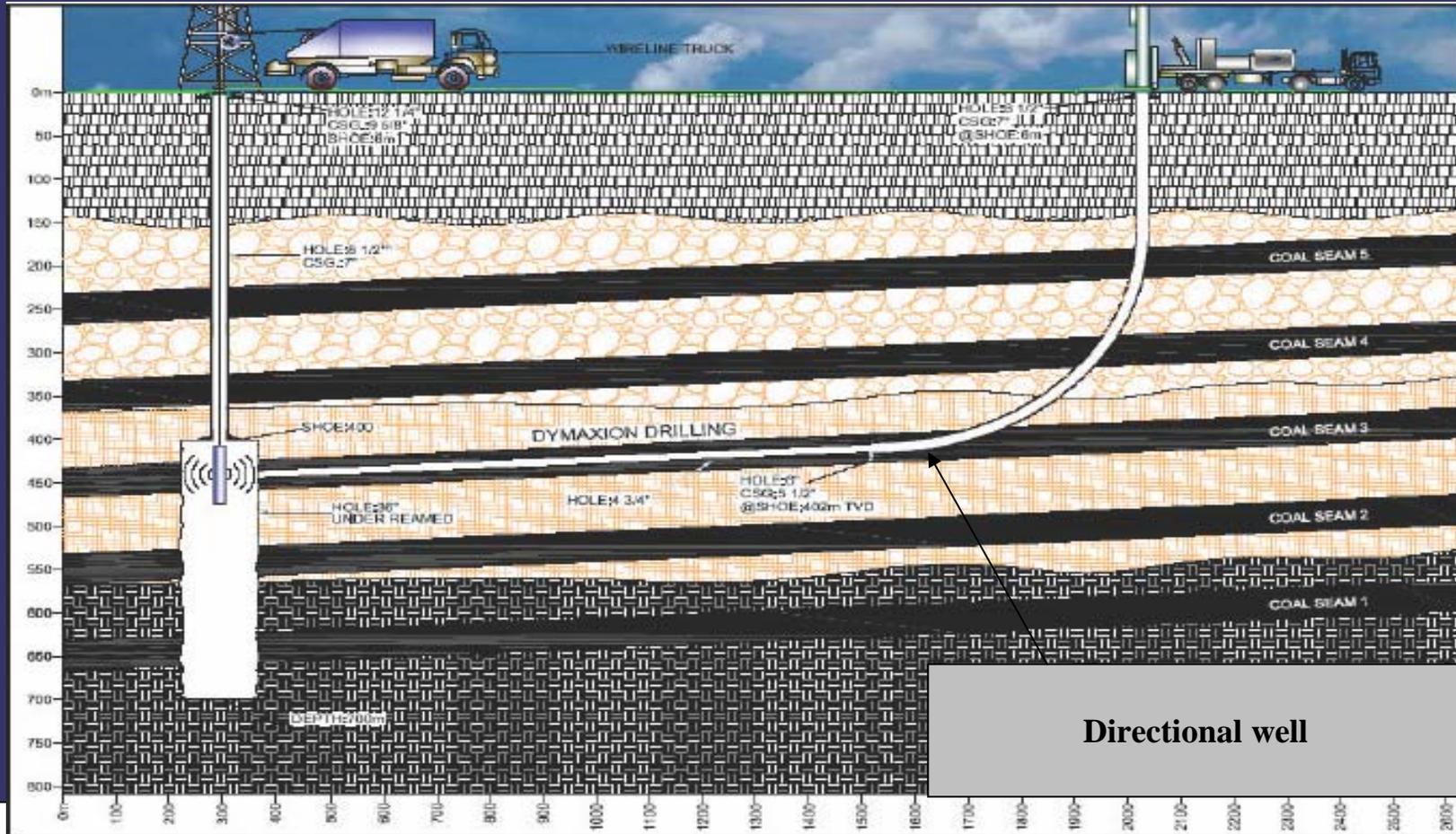
- Air Injection
- Hydraulic Fracturing
- Directional drilling

Can be performed using indigenous resources

UNDERGROUND COAL GASIFICATION – CRITICAL ISSUES Growth is Life

TECHNOLOGY

Drilling In Seam - Directional Well



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TECHNOLOGY

Directional Well Drilling Rig



UNDERGROUND COAL GASIFICATION – CRITICAL ISSUES

TECHNOLOGY

- Cavity modeling
Modeling assistance needed
- Ground water monitoring
Easy to carry out
- Land subsidence impact studies
Easy to carry out



UNDERGROUND COAL GASIFICATION – CRITICAL ISSUES Growth is Life

ENVIRONMENT AND SAFETY

Underground Fire

- Case histories have demonstrated that UCG operations are safe, controllable and containable
- Notional fears of underground fires need to be dispelled by conducting pilot scale UCG operations in India

• Land Subsidence

Is likely to be similar as for conventional underground mining operations and not alarming

- UCG operations in Uzbekistan have demonstrated negligible land subsidence

• Ground Water Pollution

Can be mitigated by maintaining sufficient separation between aquifers and UCG target coal seam

UCG Policy, Regulation & fiscal needs

POLICY & REGULATION: GREY AREAS

- No existing act/regulation covers UCG development
 - Present legal framework does not specify grant of Reconnaissance Permit (RP), Prospecting License (PL) or Mining License (ML) for lignite or coal mining for underground or surface coal gasification
- Area overlap : Coal/lignite areas suitable for UCG overlaps the deeper oil & gas PELs
- Applications by companies other than PSUs for UCG blocks await clearance owing to the above reasons

POLICY & REGULATION: SUGGESTIONS

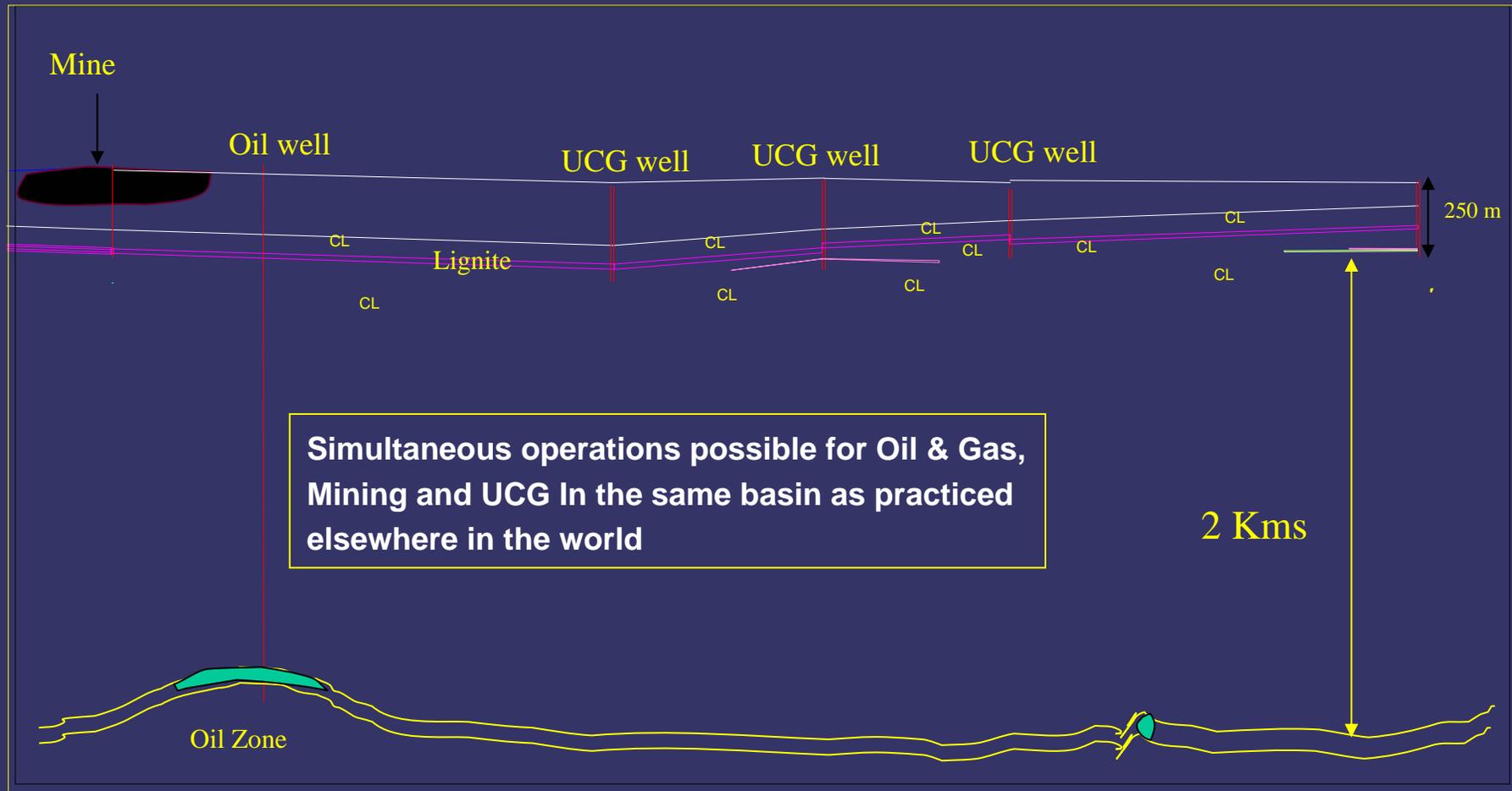
- Under the existing Coal Mines (Nationalisation) Act 1973, as amended till date, grant of areas for mining of coal/lignite to companies other than PSUs is allowed for captive consumption for:
 - a) *the production of iron and steel*
 - b) *generation of power*
 - c) *washing of coal obtained from a mine*
 - d) *production of cement, or*
 - e) *such other end use as the Central Government may, by notification, specify***
- **A Gazette Notification by the Central Government to include captive mining of coal / lignite for UCG as end use on the similar lines of power, production of iron & steel and cement under Coal Mines (Nationalisation) Act would bring legality for allotment of UCG blocks under MMDR Act**



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POLICY & REGULATION – MULTIPLE PL



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KEY FISCAL RECOMMENDATIONS

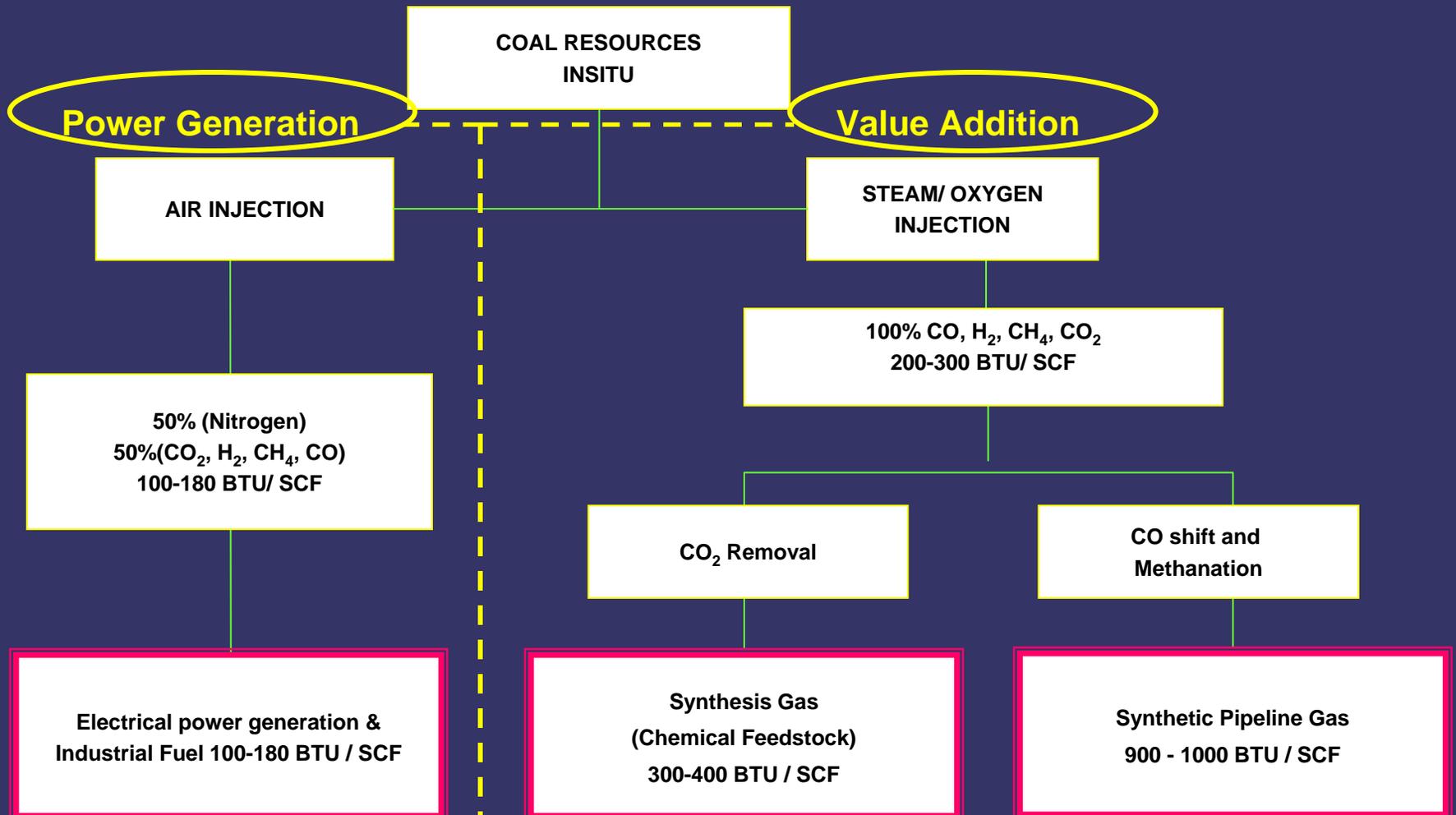
Similar to CBM & NELP policies.

- Zero customs duty
- Tax holiday of 7 years
- No carried interest of the government
- No upfront payments
- Freedom for marketing and pricing of produced gas

UCG Gas Use Markets

UNDER GROUND COAL GASIFICATION GAS-USE MARKETS

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Path forward

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- First stage UCG prospect screening needs
 - Site Location : Sparsely populated area
No ecologically sensitive or important archaeological monument in the vicinity
 - Coal/Lignite : Thickness 2+ m, Depth 200 - 400 m
 - Area Advantage : Small area can produce large energy
 - UCG Advantages : UCG would utilize un-mineable lignites Ash & other solid wastes remain underground
Long term sustainable gas supplies at competitive rates
Clean coal technology
 - Useful By-product : Hydrocarbon, water, Phenol, Anhydrous Ammonia
- Depths of target coal deposits and impermeable strata above and below are important for initial projects

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- Available Underground Coal Gasification technologies need to be adapted for specifically chosen deposits
- Private sector participation needs to be encouraged for expeditious development of UCG
- Grant of Reconnaissance Permit, Prospecting License and Mining License to allow insitu / surface coal gasification can happen under MMDR Act, 1957

- "... a sharp reduction in the cost of coal fuel can be expected in future only provided it is converted into generator gas underground, as far as possible in the seams ... "
- *D.Mendeleyev*



Thank You