

Indo-German **Energy Forum : Sub-Group 1**

Efficiency Enhancement In Fossil Fuels Based Power Plants

BRIEF UPDATE ON PILOT PROJECTS IGCC AND ULTRA-SUPER-CRITICAL POWER PLANTS



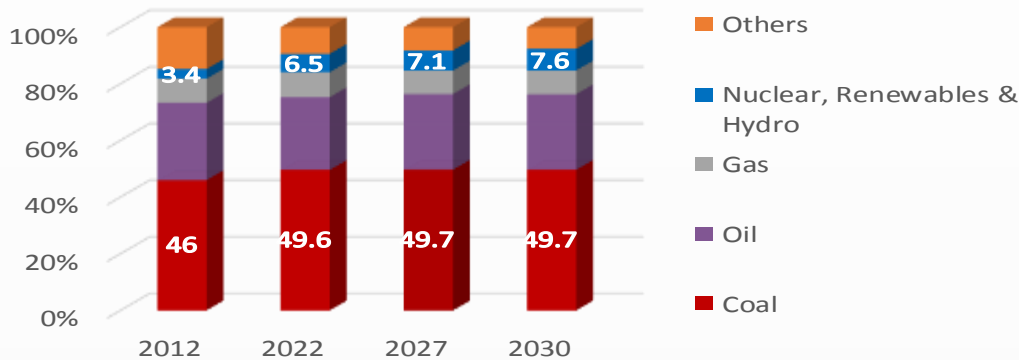
A Presentation by:
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Presentation Outline

- **Coal : Integral to India's energy security**
- **Exploring Technology Options**
- **NTPC Clean Power Focus**
- **Clean use of Coal**
- **IGCC - Technology option explored**
- **Indo-German Partnership: Suggested themes**

Coal to remain integral to India's energy security

Primary Energy Mix



Source: IESS, 2047, NITI Aayog

Growth Drivers for Coal Based TPS

- India has 4th largest coal reserves & 3rd largest producer on the globe. Coal prices are less volatile- **Affordability**
- Conventional coal based power generation technology is quite mature. We now manufacture power plants which work for almost 100% of the time- **Maturity/reliability**
- Limited availability / technological constraints of other energy sources

Coal will remain one of the major contributors to electricity capacity for a few decades



Electricity Mix

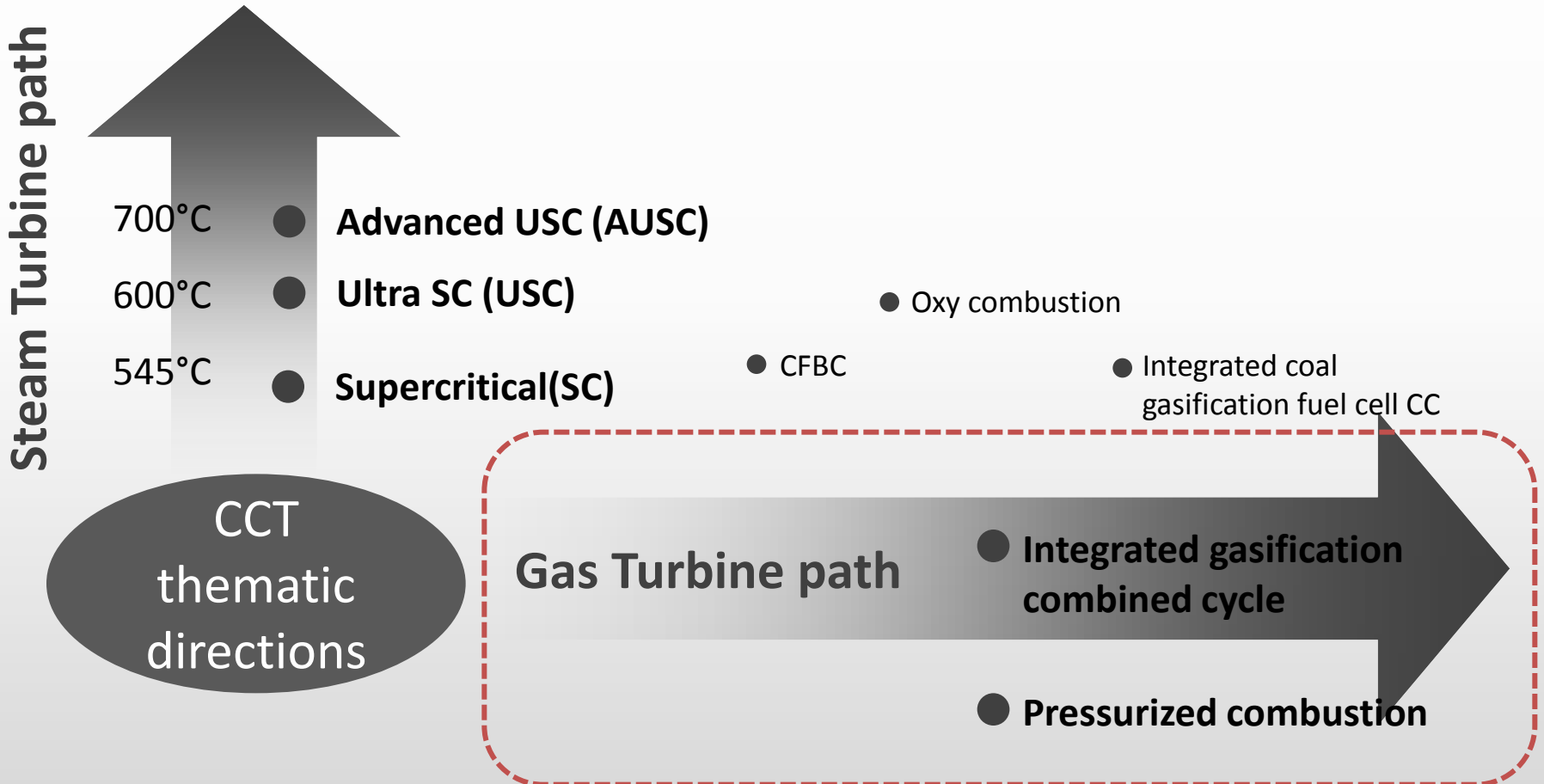


Source: IESS, 2047, NITI Aayog

The predicted energy use and targeted emissions reduction calls for dramatically improving efficiency of coal fired power plants.

Exploring other technology options

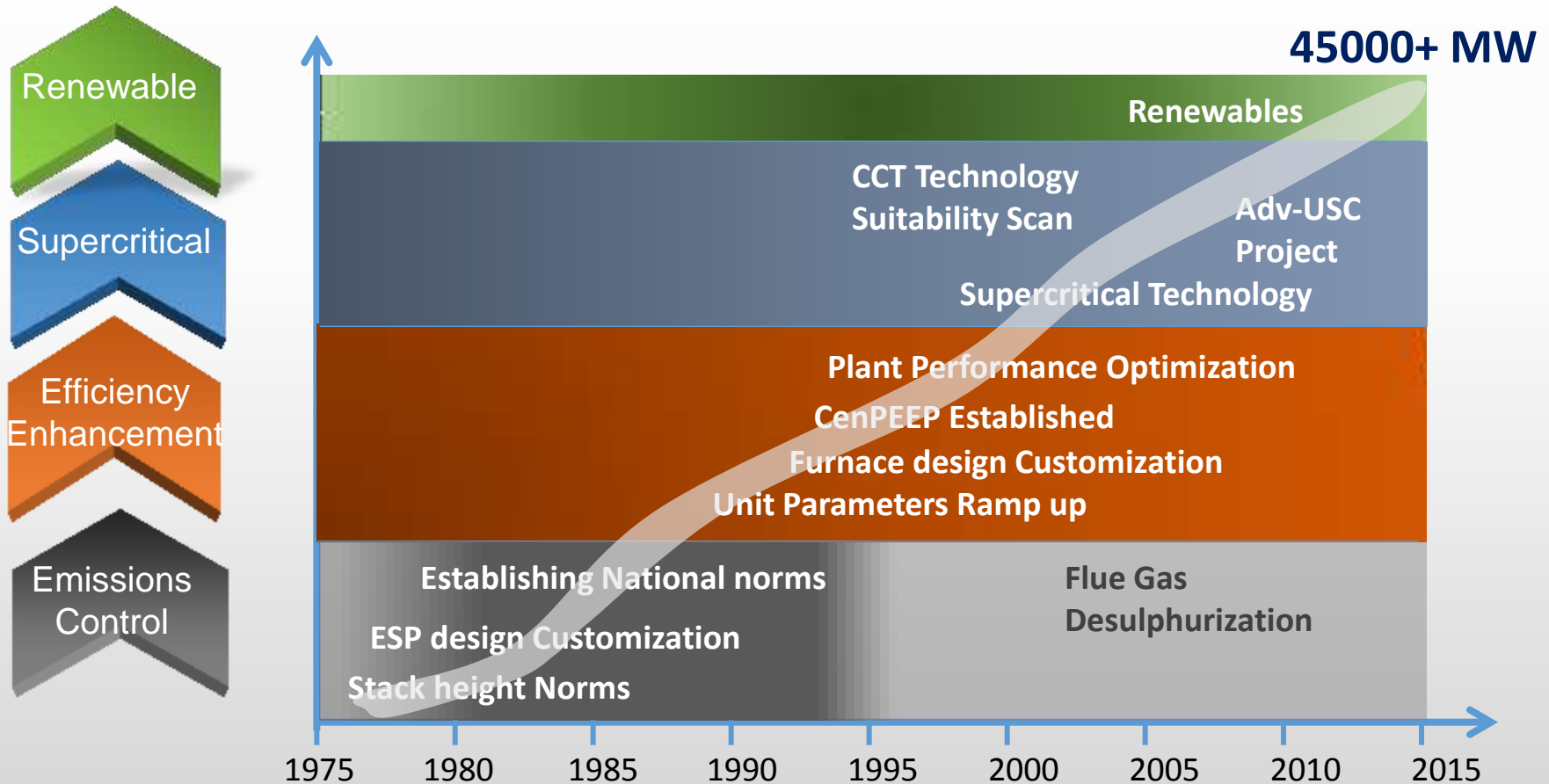
Technology options like coal gasification and pressurized combustion were developed to a stage in the 1980s and 90s after which R&D plummeted with oil prices and later due to economic crisis.



NTPC experience with CCTs is important as coal will remain important for the country's energy scenario in foreseeable future.

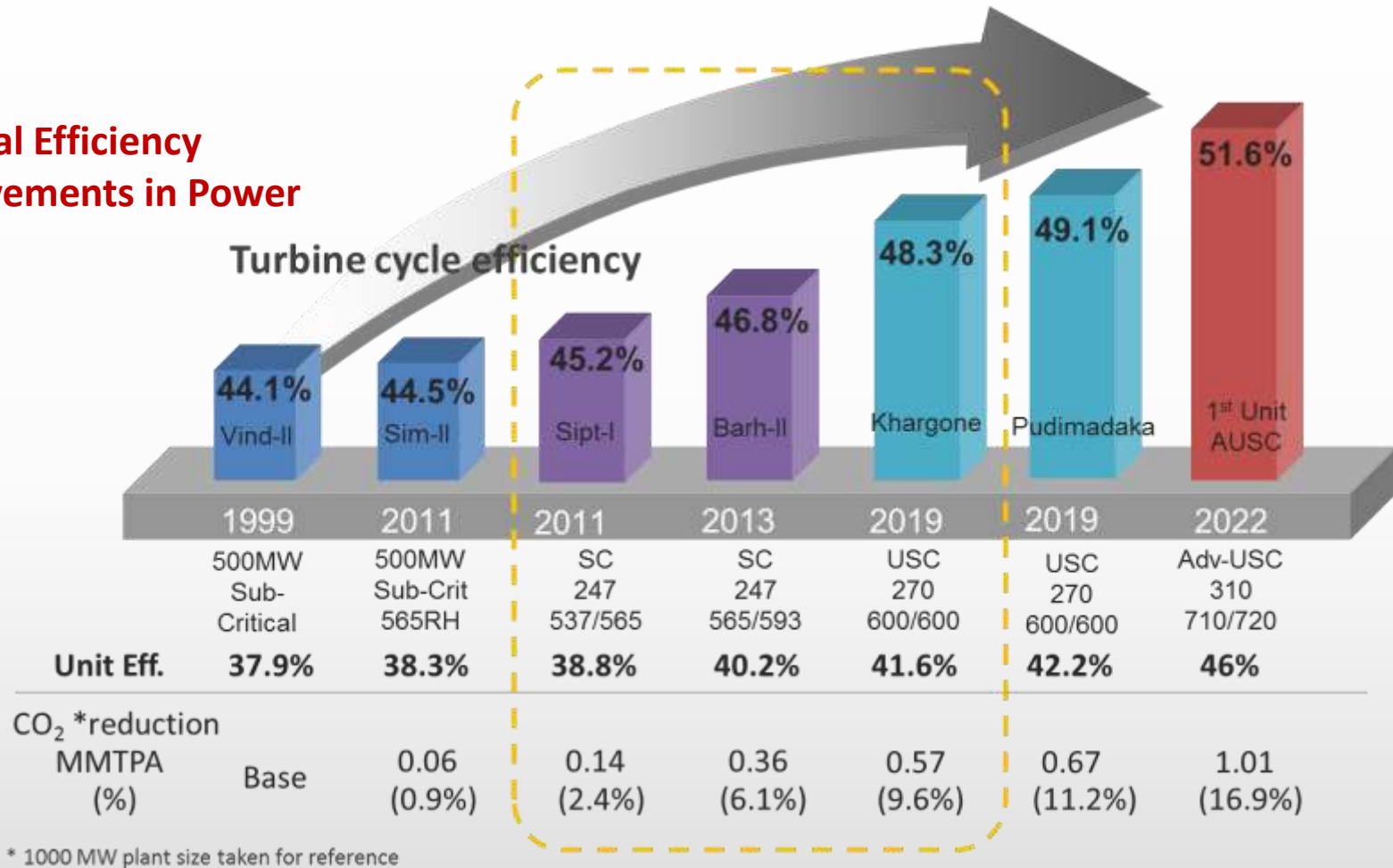
NTPC clean power focus

NTPC always had a CCT and high efficiency focus initially prompted by control of “local pollution” which later metamorphosed to high efficiency with rise of “climate concerns”



Clean Use of Coal - High Efficiency Trajectory

Thermal Efficiency improvements in Power Plants



Ultra supercritical technology with steam temperatures upto 600°C is being specified for new 600/800/1000 MW units. 19740 MW of generation capacity currently under construction is based on SC/USC technology

IGCC- the other technology option explored in India

While fair level of progress has been made so far, no tailor made technology available- **India specific development is required**

IGCC



- **Feasibility study of 100 MWe Net capacity IGCC demo Plant in phased manner**
 - Ph I- Gassifier
 - Ph II- Combined Cycle
- **Plant Location: NTPC Dadri**
- **Fluidized bed Technology**
- **Tech. Specs Phase-I finalized**
- **Estimated project cost Rs.15 cr/MW**

Technology Demo Project Objectives

- Establish the gasification process for Indian coals.
- Establish design for Gasification Island and other key equipment.
- Establish the IGCC process package.
- Establish in-house Engineering capability for IGCC plants
- Establish O&M systems for IGCC plant
- Establish commercial viability with non recourse funding

Current techno-economics is not favourable and expected to be more suited when CCS becomes a viable option, hence project has been kept under hold

Indo-German Partnership – suggested themes...

- Adaptation of coal fired power plants to large integration of renewables in the grid in particular increased cyclic loading of coal based plants
 - Sharing of German technical expertise policy and technical interventions
- Sharing of German expertise on advanced Coal Conversion technologies such as gasification, pressurized combustion, oxy-combustion etc.
- Collaboration of German companies with Indian Utilities for control of emission from coal based power plants - sharing of technical expertise, longer term in-location training, pilot/rig tests retrofitting in existing plants etc.
- R&M - efficiency & up-gradation of old units
- **Sharing of German** practices and experience on development of materials for high temperature application, specialised design needs etc.

THANK YOU

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