



About Ankur Scientific &

Gasification

Confidentiality Note

This presentation contains confidential information intended for select recipients. Any disclosure, copying, or distribution within this presentation, or taking of any action based on it, is strictly prohibited.



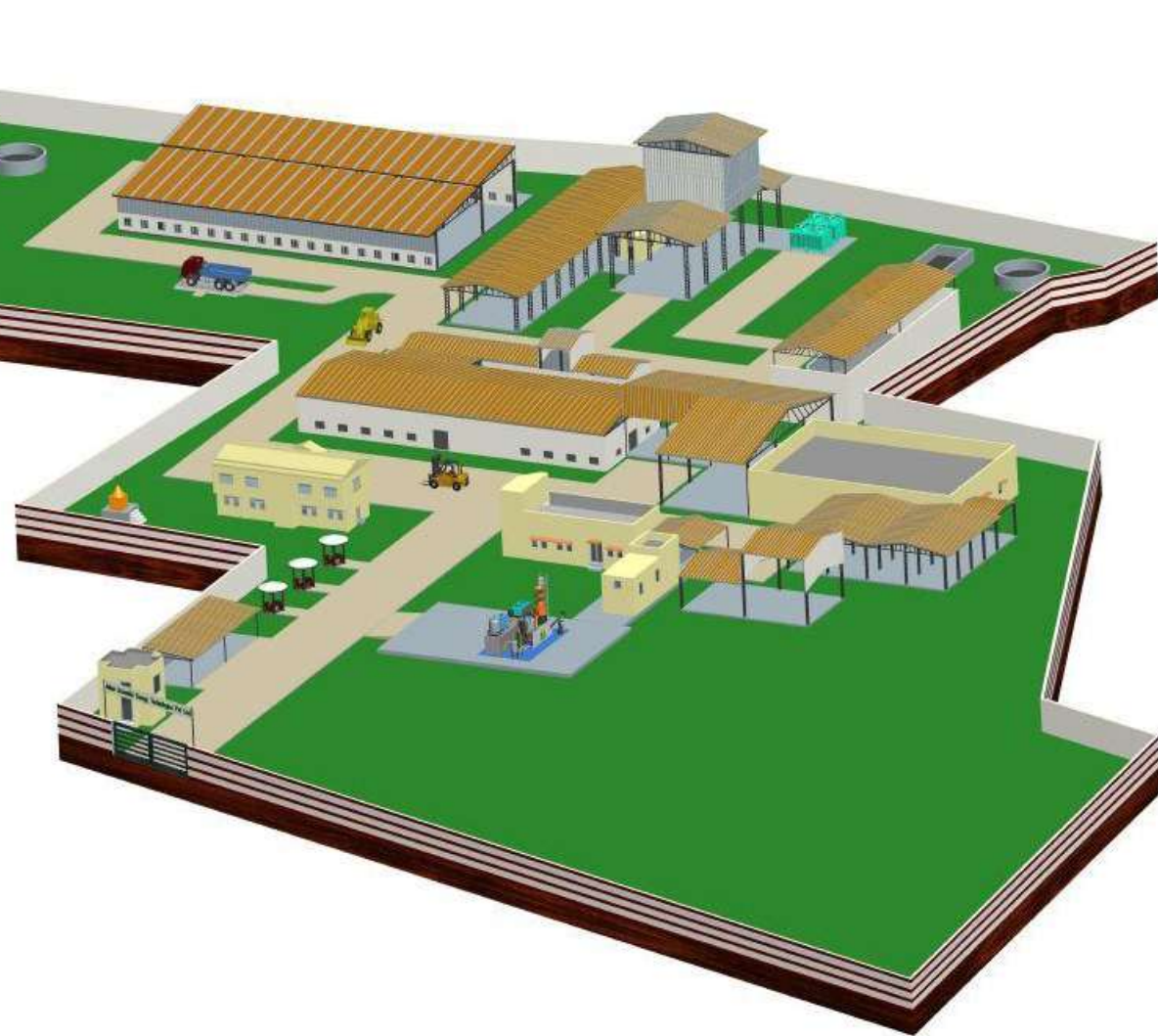
Agenda

- ✓ About Ankur Scientific
- ✓ Biomass as a Fuel
- ✓ What is Gasification? Why Gasification?
- ✓ Ankur Technology
 - ✓ Ankur's Ultra Clean Gasification Technology
 - ✓ Advantages of the Technology
 - ✓ Schematic
 - ✓ Video of the Technology
 - ✓ Applications
- ✓ Infrastructure and Strengths



Ankur Scientific Energy Technologies Pvt. Ltd.

About Ankur Scientific





Mission

To be seen as a world leader in

- ✓ Development
- ✓ Design
- ✓ Manufacture
- ✓ Sale
- ✓ Service

Of equipment for converting various biomasses / coal
into energy through R&D and Innovation



Vision

We want to provide energy that is

- **Green**
- **Clean**
- **Sustainable**
- **Convenient**

At costs that enable all to use it.



Ankur Scientific – The Best SME

- ✓ Founded **in 1986** by Dr. B.C.Jain, an internationally acclaimed technocrat & recently awarded with **Bio-Energy Man of the Year** (for 2011-12).
- ✓ The Company awarded the **Best SME** of India and for Manufacturing by Business Today & Yes Bank (for 2011-12).
- ✓ In March 2015 - declared **one of the top 10 medium sized Companies in India** by Vodafone
- ✓ State-of-the-Art Manufacturing & R&D facilities, with more than **350 employees**.
- ✓ More than **900 systems** installed in more than **35 Countries** across the Globe.



Dr. B. C. Jain-
Bio-Energy
Man of the
Year





Biomass as a Fuel

- ✓ Age-old and most widely used fuel source -
Annual consumption was estimated to be of the order of 20 million tonnes a few years ago
- ✓ A **Cheap**, abundantly available fuel
- ✓ A very **Clean** fuel
 - ✓ Biomass has no Sulphur content
 - ✓ Short CO₂ fixation cycle
- ✓ **Renewable**



Ankur systems can use > 50 different types of Biomass, like.....

Firewood

(fallen branches and twigs)



Waste wood chips & Wood slices



Plywood & saw mill wastes



Bamboo pieces



Pine needles



Different types of shells like almond, cashew nut, arcenut, groundnut, coconut (including fronds)



Different agri residues and stalks like cotton, tur, soya bean, mustard etc.



Corncoobs





Ankur systems can use > 50 different types of Biomass, like.....

Wild bushes and weeds like Prosopis Juliflora (Vilayati babul / ganda baval), Lantana etc.



Rice husk and sunflower husk (without the need to be briquetted).



Sugarcane bagasse & trash



Briquettes and pellets can also be used depending on the proximate analysis & physical characteristics.



Greening of waste lands through production of sturdy energy species like bamboo, melia dubia, subabul etc. can be planned and used.





Why Biomass Gasification?

Biomass



Producer Gas

Gasification

Highly Efficient Process

Can be applied over a range of output ratings (few to thousands of kW)

Can be used for thermal applications & electricity generation

Low initial investment and cost of power production

Allows better process control and convenience

Cleaner combustion in connected equipment

Elimination of all pollution related to Biomass use



What is Biomass Gasification?

Basic Process Chemistry

- Conversion of solid fuels into combustible gas mixture called producer gas ($\text{CO} + \text{H}_2 + \text{CH}_4$)
- Involves partial combustion of biomass
- Four distinct process in the gasifier viz.
 - Drying
 - Pyrolysis
 - Combustion
 - Reduction

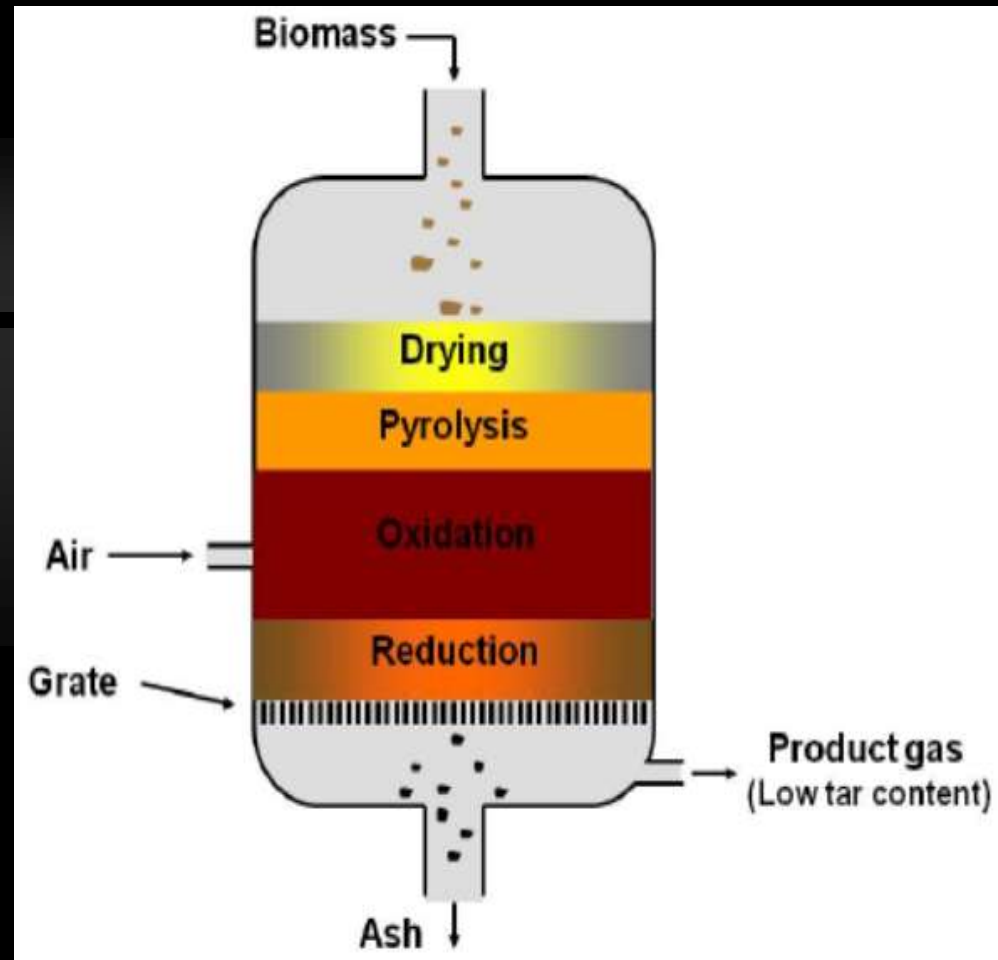


Ankur Scientific Energy Technologies Pvt. Ltd.

Ankur Technology

Ankur's Ultra Clean Gasification Technology

- ✓ The systems offered use a **Downdraft** process instead of the conventional updraft process
- ✓ In the downdraft, the biomass / coal is fed from the top while the gas generated is taken out from the bottom.
- ✓ This leads to the gas being **almost tar free**

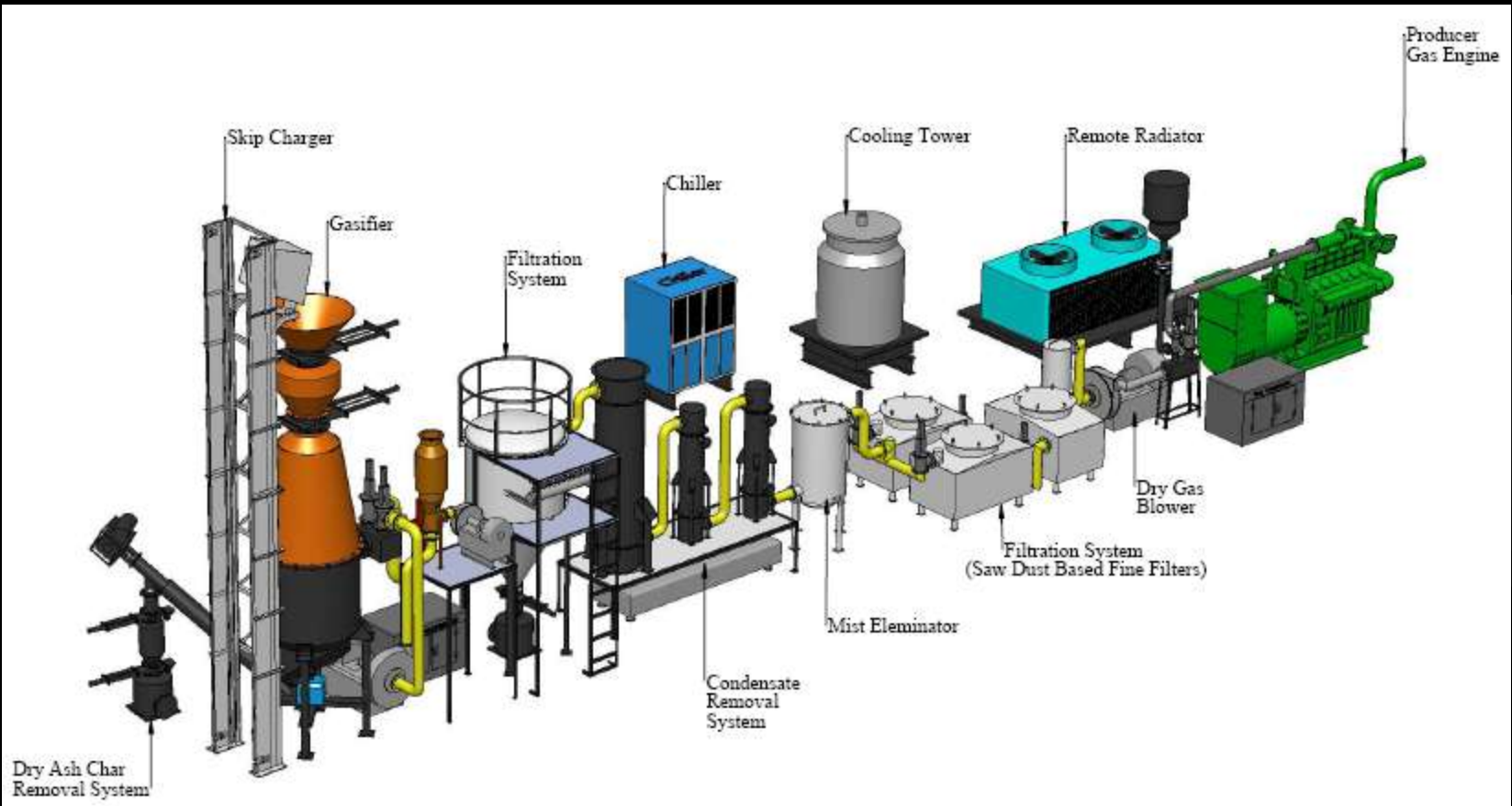




Advantages of Ankur Technology

- ✓ The systems are cleaner, easy to operate & maintain.
- ✓ Less requirement of Water & Space as compared to other technologies.
- ✓ Flexible & Modular, standardized solution that can be installed quickly and scaled up as needed.
- ✓ Various systems providing flexibility of using Indonesian Coal or various types of biomass / agri-residues / wild bushes and sturdy energy plantations.

Indicative Schematic – Power Generation





Ankur's Ultra Clean Gasification Technology

- ✓ Systems need **no forced pressure / steam** and are in **negative pressure**.
- ✓ This ensures that there are **no pressure related explosions**. Thus **much Safer**.
- ✓ A **State-of-the-Art Dry Gas Cleaning** Technology is used to cool and clean the gas.
- ✓ Thus the systems are **environmentally sound** as not only do they **not generate tars**, but also because the water used to cool the gas does not come in touch with the gas (thus **no process water is created**).



Ankur's Ultra Clean Gasification Technology

To summarize:

- ✓ No Tars
- ✓ No need of ESP/ Tar Cracker
- ✓ No Dirty Water
- ✓ Pollution Control Board Compliant
- ✓ Negative Pressure
- ✓ Extremely Safe System
- ✓ The system is **completely PLC controlled** allowing for **safeties** leading to system **alarms, shut downs** etc.





Video of Ultra Clean Gasification Technology

The video on our Gasification technology using the State-of-the-Art Dry Gas Cleaning system (used for both – Biomass & Coal) can be seen by clicking on the following link:

<https://www.youtube.com/watch?v=nd37-o8z1L8&feature=youtu.be>

As the video is uploaded on YouTube, internet connection would be required.



Applications

Power Generation

- o Grid-fed Power from Energy Plantations on Wastelands
- o Captive Power (*Industries*)
- o Irrigation Pumping
- o Village Electrification
- o Simultaneous Charcoal and Power Production

Thermal Applications

- o Hot Air Generators
- o Dryers
- o Boilers
- o Thermic Fluid Heaters
- o Ovens
- o Furnaces & Kilns



Ankur Scientific Energy Technologies Pvt. Ltd.

Infrastructure & Strengths



Ankur - Strengths

- ✓ **One stop shop** - designing to servicing done in house - unlike competitors.
- ✓ **Simple System** - Extremely clean gas generated from the gasifier, making downstream cleaning systems simple.
- ✓ **Organizational ability** to handle large international projects - We do at least 10 international assignments an year.
- ✓ **Largest field experience** - 'Ankur' makes more gasifiers than all other manufacturers cumulatively.



Manufacturing and QC / QA at Ankur Scientific

- ✓ Largest Biomass Gasification Facility (Mfgg. and R&D) in the world.
- ✓ Spread over 300,000 sq.ft. with a built-up area of close to 80,000 sq.ft.
- ✓ Additional land opposite the existing factory procured for expansion in the near future.
- ✓ Fully equipped In-House Manufacturing Facility with State-of-Art Plant and Machinery.
- ✓ Current single shift production level of over 150 gasifiers per annum, including the very large 1.6 Mwe/6 MWth gasifiers.



Testing and R&D Capabilities at Ankur

- ✓ A total of (12) test beds for hot / operational testing of gasifiers from 10 kWe to 1.6-MWe.
- ✓ Extensive materials handling, data acquisition, data analysis and communication system for both routine testing as well as Gasification R&D.
- ✓ DSIR approved R&D Centre since inception in 1989.
- ✓ Extensive laboratory facilities for Biomass Characterization including Proximate Analysis, Gas Calorimetry, furnaces for ash fusion properties.
- ✓ Annual R&D Expenditure of 3-4% of turnover.



R&D Laboratory View



**Laboratory
Facilities**



**An Inside View of some of
the Laboratory Facilities**



Ankur Scientific Energy Technologies Pvt. Ltd.

Thank You