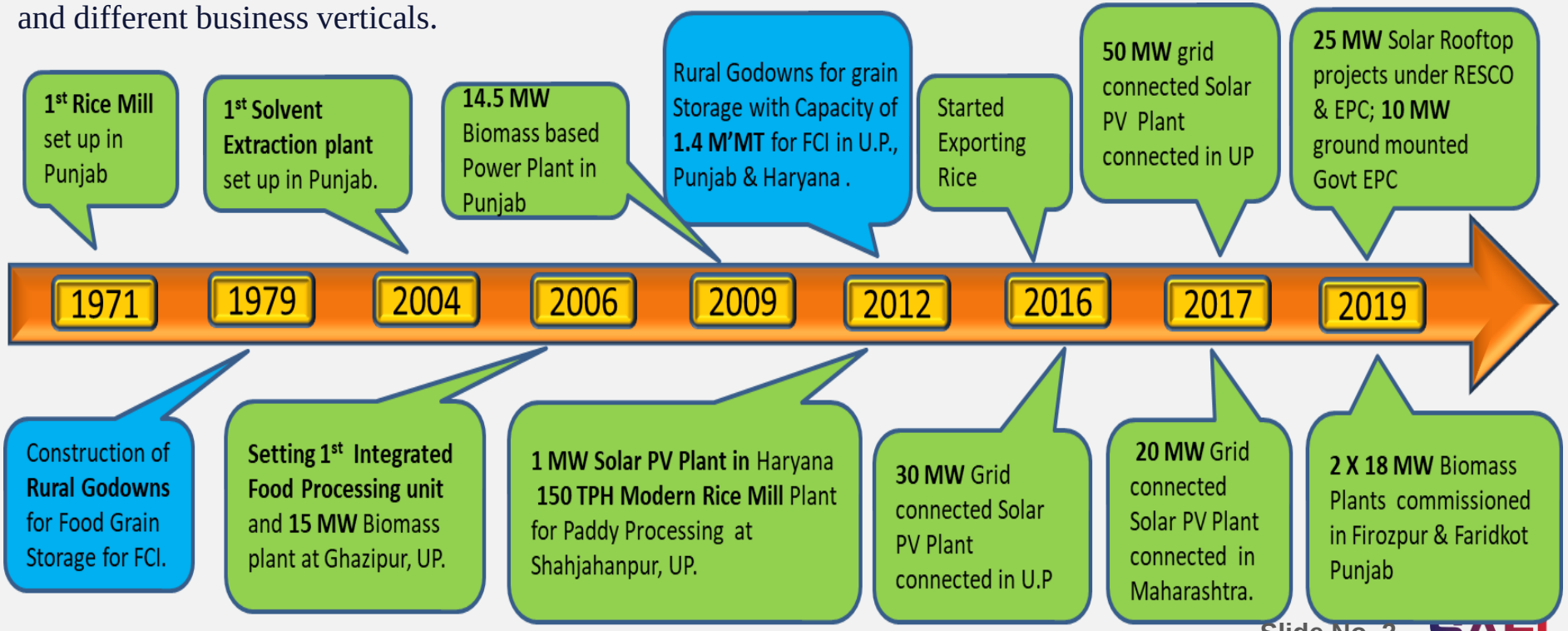
Ved Ratna Sinha – COO BIOMASS

SAEL
SUSTAINABLE & AFFORDABLE ENERGY FOR LIFE

Today **SAEL is a complete Agro Energy Company and** has taken giant strides to reach its current position of market leader. As an integrated and diversified Agro-Energy company, it has successfully forayed into procurement, processing, refining, warehousing, and distribution of rice, rice by-products, solvent extraction, renewable energy solutions.

Globally recognized and lauded for technological innovation, sustainable energy creation, conversion and utilization, powering sustainable and scalable farming practices and for promoting and safeguarding the gamut of producer-consumer interests, SAEL spells the premier brand for an end to end solution for Agro-Energy products and services.

The current turnover of the company is $435 M'USD and the company employs 1350 persons across pan India and different business verticals.



Business Verticals

Rice Milling 205 TPH

- **5 TPH Guruharshai,** Punjab
- **50 TPH Ghazipur,** UP
- **150 TPH Shahjahanpur ,** UP
- **Export of Rice**- 200,000 MT yearly

Solvent Extraction 700 TPD

- **500 TPD** Ghazipur, UP
- **200 TPD** Guruharshai, Punjab

Renewable Energy (Solar & Biomass) 343 MW

Operational - 248 MW

- **2*15 MW** Paddy Straw based Biomass Power Plants, Haryana.
- **36 MW (2x18MW)** Paddy Straw based Biomass Power Plant, Punjab
- **15 MW Biomass Based** Ghazipur, UP (SAEL)
- **14.5 MW Biomass Based,** Punjab (Universal Biomass)
- **7.5 MW Canal top Solar PV** Project, Punjab (Canal Solar)
- **150 MW Solar Utility Scale Projects**
- **25 MW Solar Rooftop**

Under Implementation - 90 MW (B/M)

- **50+ MW** Solar IPP & EPC

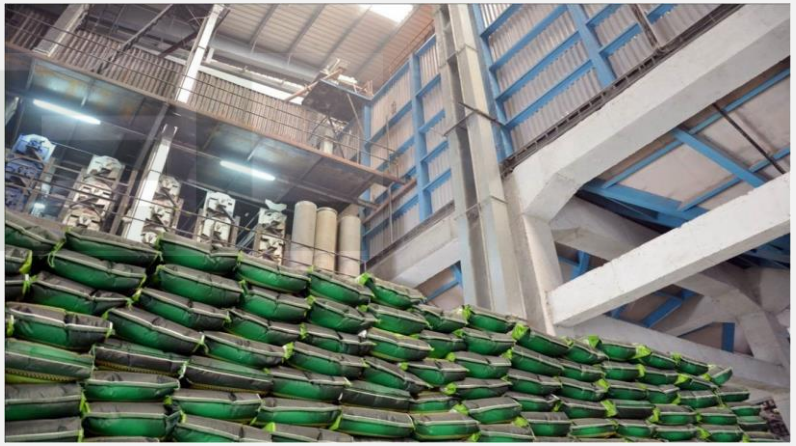
Warehousing

Storage Capacity **14.33 Lakhs MT** across UP, Punjab and Haryana. Under lease to FCI under 10 years guarantee scheme.

SAEL: Business Verticals



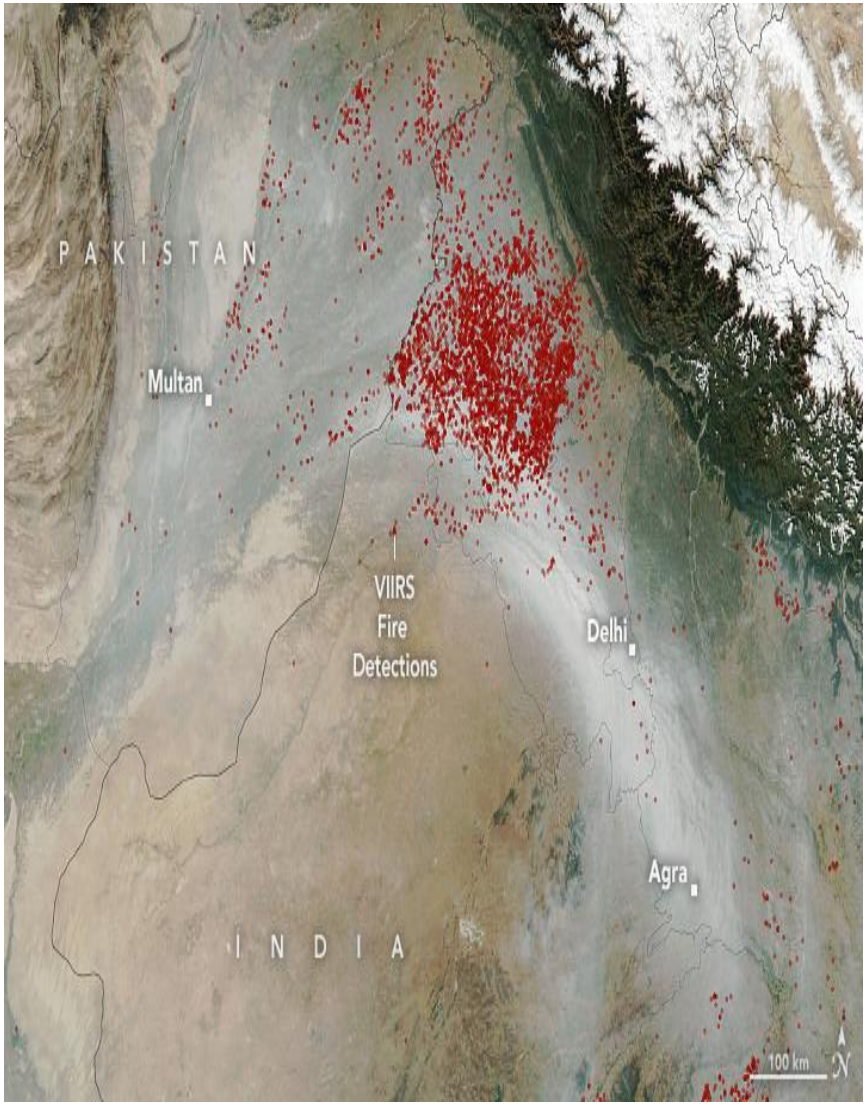




Key issues caused by burning of agricultural residues

- Studies indicate that crop residue left after harvesting is disposed off by burning it in the fields – a major cause of air pollution in North India
- AQI in Delhi typically reaches 450-1000 in winter months of October to January due to stubble burning in neighboring areas, which is more than 20 times the limit deemed safe by the WHO
- Apart from smog and a sharp rise in CO2 levels, the paddy-straw burning by farmers also significantly reduces the organic matter, major nutrients and microbial biomass in the soil affecting crops for the next season
- SAEL is effectively utilizing paddy straw in operating Waste to Energy plants, thereby providing a better alternative to burning of agri residue. In 2019, 20 per cent of all deaths in the country were attributable to air pollution, costing an estimated 1.36 per cent of GDP.
- The burning of one tonne of paddy straw releases 3 kg particulate matter, 60 kg CO, 1460 kg CO2, 199 kg ash and 2 kg SO2. These gases affect human health due to general degradation in air quality resulting in aggravation of eye and skin diseases. Fine particles can also aggravate chronic heart and lung diseases.
- 01 Ton of paddy straw contains approximately 5.5 kg N, 2.3 kg P2O5, 25 kg K2O, 1.2 kg S, 50-70% of micro-nutrients absorbed by rice and 400 kg of carbon, which are lost due to burning of paddy straw. Apart from loss of nutrients, some of the soil properties like soil temperature, pH, moisture, available phosphorus and soil organic matter are greatly affected due to burning.

NASA image of pollution in North Western India



WHY BIOMASS FUEL for POWER Generation :

India has a tremendous potential for power generation through biomass energy. The current availability of biomass in India is estimated at about 500 million metric tonnes per year. The surplus biomass availability is estimated about 120-150 million metric tonnes per annum covering agricultural and forestry residues corresponding to a potential of about 18,000 MW. Biomass fuel has many other advantages also:

1) Biomass is widely available source of energy
2) It's a renewable source of energy and Carbon Neutral which helps in cleanliness of our environment.
3) It's a comparatively lesser pollution generating energy and helps climate change by reducing GHG. At present we are saving 4.5 LTPA CO2 equivalent in biomass division.
4) Waste minimization reduces pollution and spread of diseases.
5) Open and unclean burning leads to pollution.
6) It provides manure for the agriculture and gardens and reduces the dependence on fossil fuels for electricity generation

SAEL is the first and only the company in India which have installed Power Plants based on 100% Paddy straw (18 MW each in Faridkot & Ferozepur, Punjab and 15 MW each in Kaithal & Kurukshetra, Haryana) with a investment of Rs.150 Crores for each project.

For the said projects, SAEL procured Vibrating Grate Boiler from Boiler supplier Thyssen Krupp & ISGEC (Technical tie-up with BWSC, Denmark) for 80 TPH boiler capacity. "Thyssen Krupp" and "BWSC" are both pioneer and world-renowned technology provider having the commercial track record in "Proven Technology" for more than decade.

PROJECT CAPACITY	BUSINESS ENTITY	FUEL USED	Year of Commencement
14.5 MW	Universal Biomass Energy Private Ltd. Channu, Dist.-Sri Mukatsar Sahib, Punjab	Paddy Straw, Cotton stalk & other agricultural wastes	2009
15 MW	Sukhbir Agro Energy Limited Vill-Fatehullpur, Dist.-Ghazipur, U.P.	Rice Husk & Other agriculture wastes	2009
18MW	Sukhbir Agro Energy Limited Distt- Ferozepur, Punjab	Paddy Straw	2019
18 MW	Sukhbir Agro Energy Limited Distt- Fardikot, Punjab	Paddy Straw	2019
15 MW	Sukhbir Agro Energy Limited Distt- Kaithal, Haryana	Paddy Straw	2022
15 MW	Sukhbir Agro Energy Limited Distt- Kurukshetra, Haryana	Paddy Straw	2022

AUGMENTATION TO RURAL ECONOMY

Economic Benefits	The biomass power plant generation takes place in a controlled environment and the controlled paddy straw disposal helps reduce deterioration of soil and quality. Below figures pertain to a new 15 MW Waste to Energy plant: A project of 15 MW has an expenditure of ~INR 5 crores (~US$ 670k) which goes directly towards cost of biomass fuel and salary / wages which get distributed to the rural economy of the state thereby generating direct and indirect employment for about 2000 people in the rural economy
Awareness Programs	The collection centers are used to promote various awareness programs such as healthcare camps, education drives, rehabilitation and literacy and polio camps.
Opportunities for New Entrepreneurs	The power plants provide opportunity for new entrepreneurs who are engaged in operation of Baler, Rakers, Reaper & Chipper. Network of 100 new entrepreneurs are established for fuel handling.
Development of Local Community	This is the only industry where the raw material is available in abundance in the states of Punjab, Haryana, Western UP and will engage local labor and power generated will be used for the benefit of the state & revenue will be pumped in rural economy

Activities	Workers Employed	Category
Plant operation including the feeding of paddy straw	400	Skilled & Semi-Skilled
Cutting, Collection and storage of Paddy Straw from fields	800 (10 collection centers will be opened)	Skilled/Unskilled
Transportation, Loading & Unloading	800	Unskilled
Total Employment	2,000	Includes Engineers, MBAs, Plant operators, ITIs, etc.

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Employment Generation

Job Creation - Each project of 20 MW will provide direct and indirect employment to about 2500 persons, amounting to total employment of 15000 persons considering 6 such biomass plants of 20 MW capacity each.

Activities	**Machinery Required**	**Manpower Employed**	**Category**
Plant operation- including the feeding of paddy straw	120 MW- 100 % Paddy Straw based Power Plant	1200	Includes Engineers, MBA's, Plants operators, ITI's, etc.
Cutting ,Raking & Bailing of Paddy Straw	600 Reapers, Rakers & Balers with tractors	1800	Unskilled
Loading & Transportation from Field to Collection centers/Plant	600 Tractors with Trolleys	6600	Unskilled
Unloading, Stacking of Paddy Straw at Collection Centers		2400	Unskilled
Chipping	120 Chippers with Tractors	600	Unskilled
Manpower at Collection Centres (Weighbridge , Accountants, Security Guard) (120 Centres)		1200	Skilled & Semi-Skilled
Unloading cum feeding of Fuel & disposal of ash		1200	Unskilled
Total Employment		**15000**	

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WASTE TO ENERGY PROJECTS SNAPSHOTS

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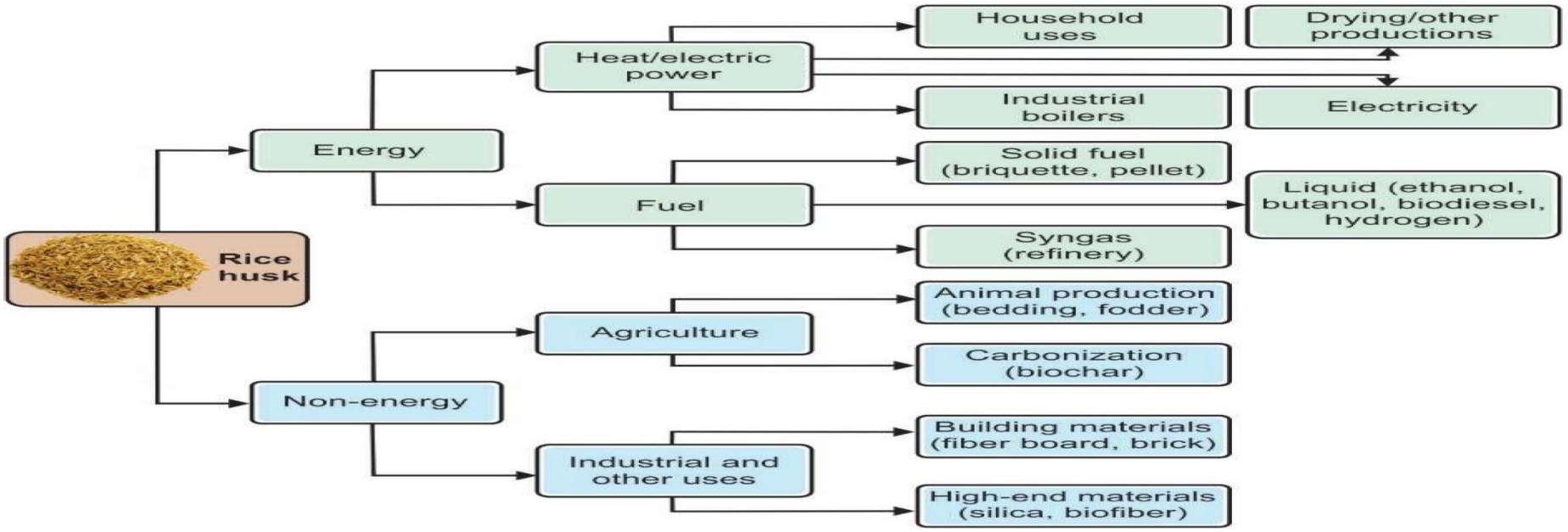
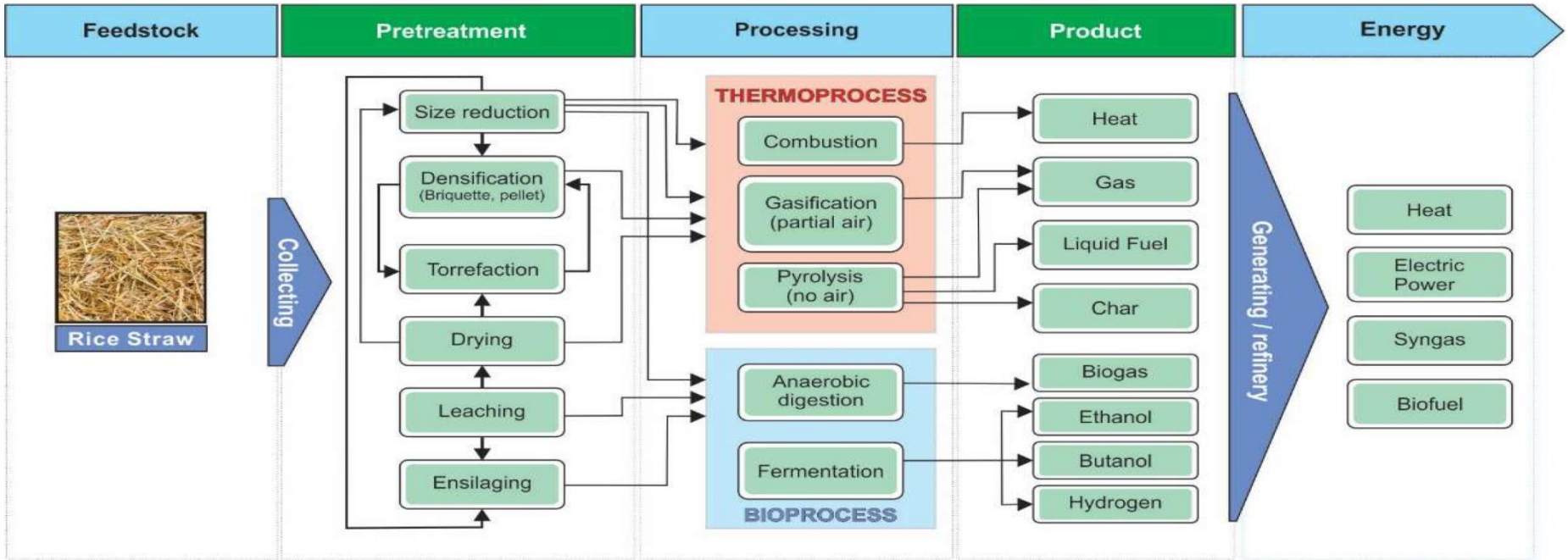
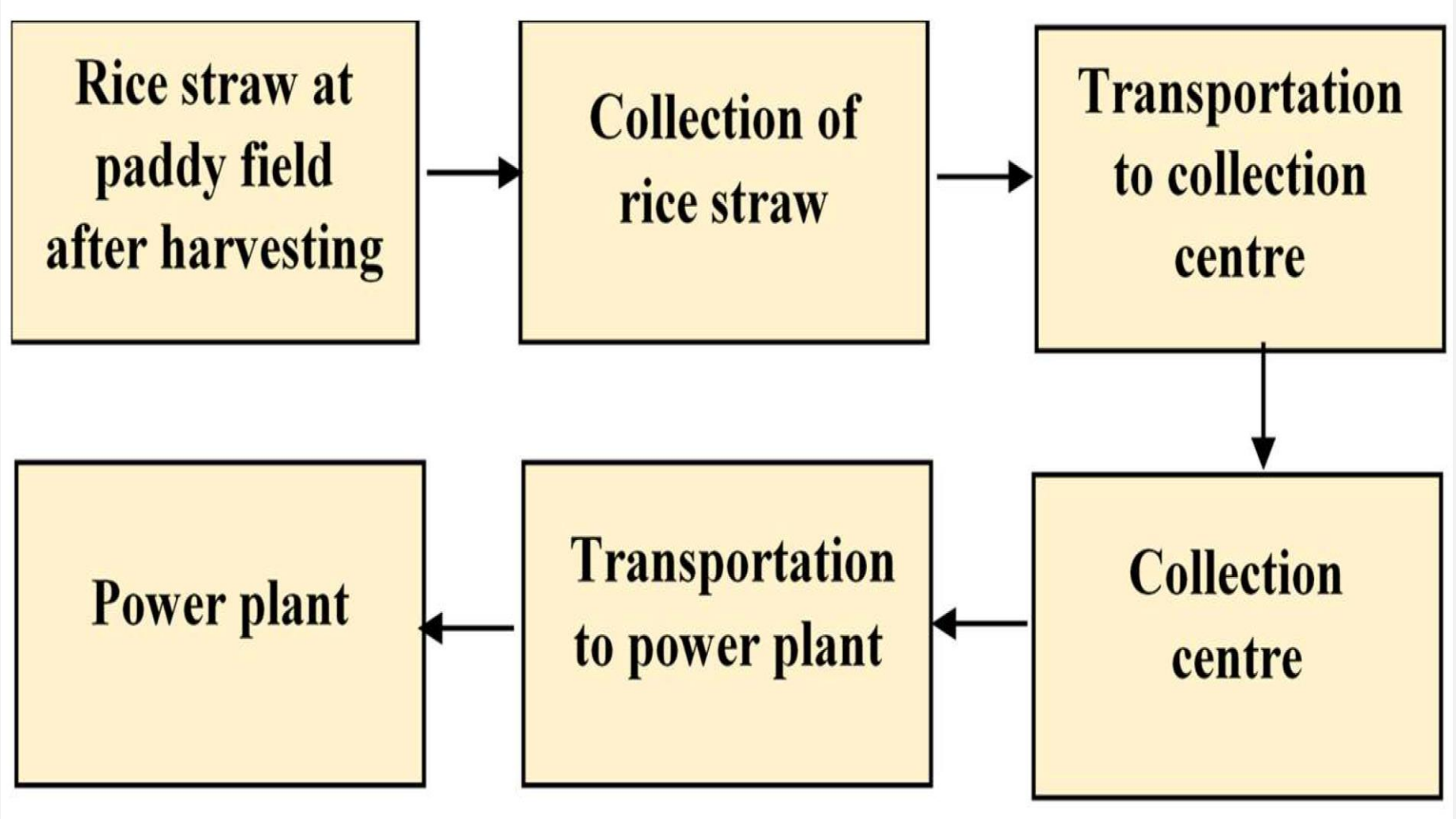
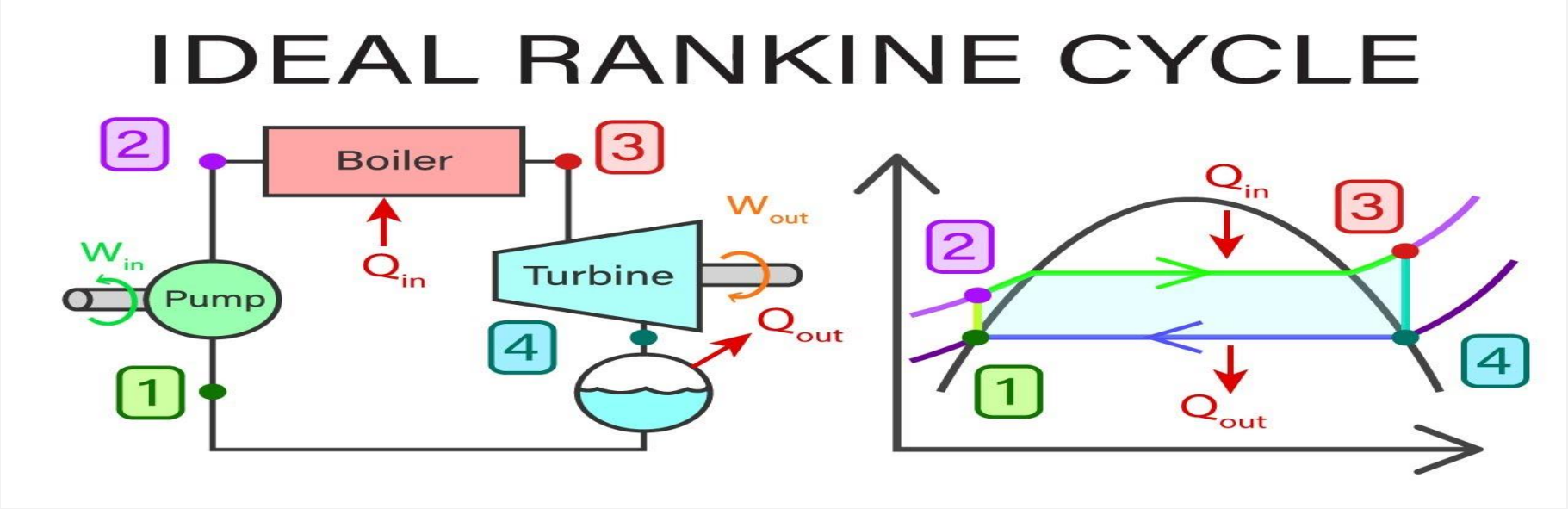

Rice husk
Energy
Non-energy
Heat/electric power
Fuel
Agriculture
Industrial and other uses
Household uses
Drying/other productions
Industrial boilers
Electricity
Solid fuel (briquette, pellet)
Liquid (ethanol, butanol, biodiesel, hydrogen)
Syngas (refinery)
Animal production (bedding, fodder)
Carbonization (biochar)
Building materials (fiber board, brick)
High-end materials (silica, biofiber)

(a)

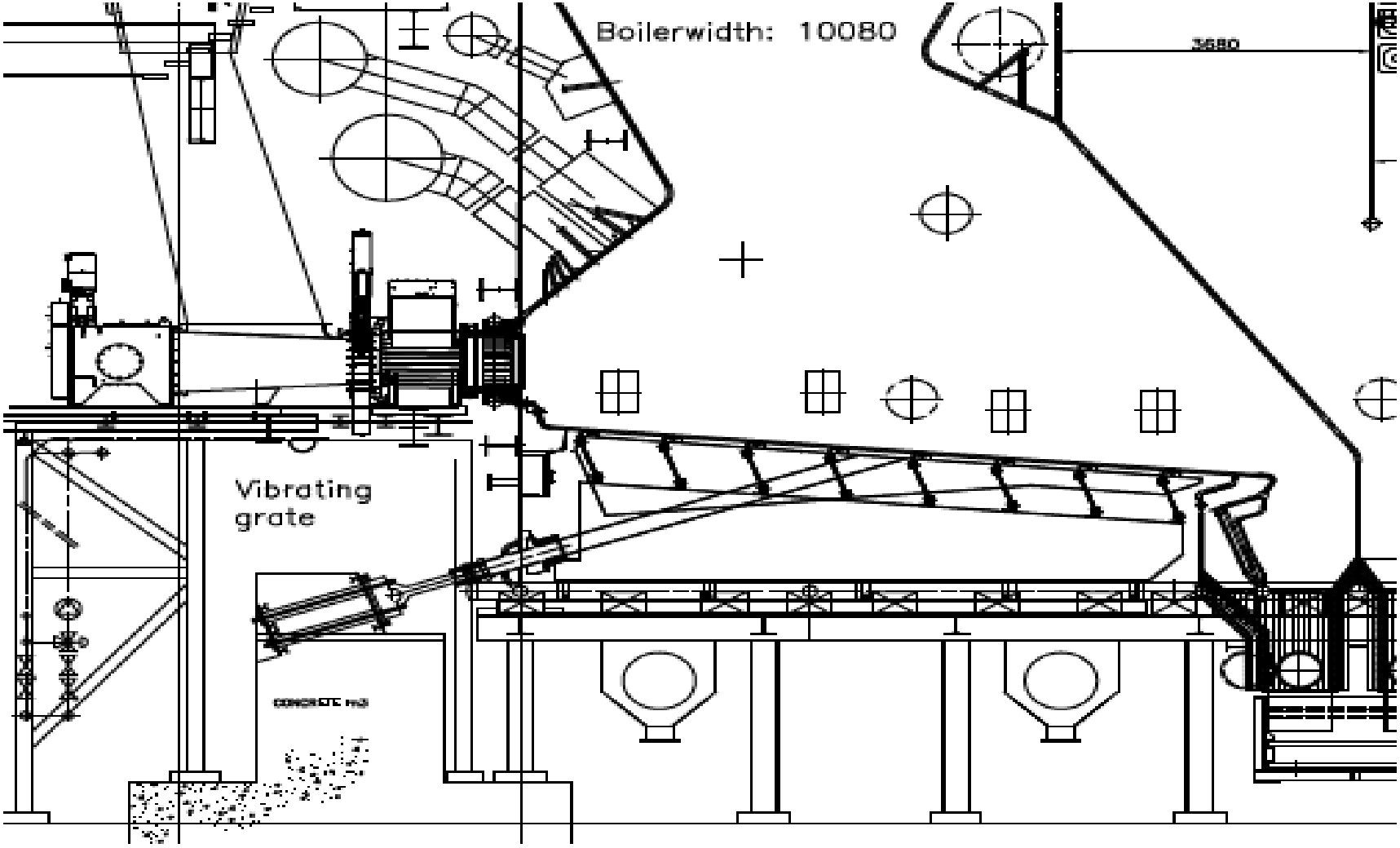

Feedstock
Pretreatment
Processing
Product
Energy
Rice Straw
Collecting
Size reduction
Densification (Briquette, pellet)
Torrefaction
Drying
Leaching
Ensilaging
THERMOPROCESS
Combustion
Gasification (partial air)
Pyrolysis (no air)
Anaerobic digestion
Fermentation
BIOPROCESS
Heat
Gas
Liquid Fuel
Char
Biogas
Ethanol
Butanol
Hydrogen
Generating / refinery
Heat
Electric Power
Syngas
Biofuel

(b)

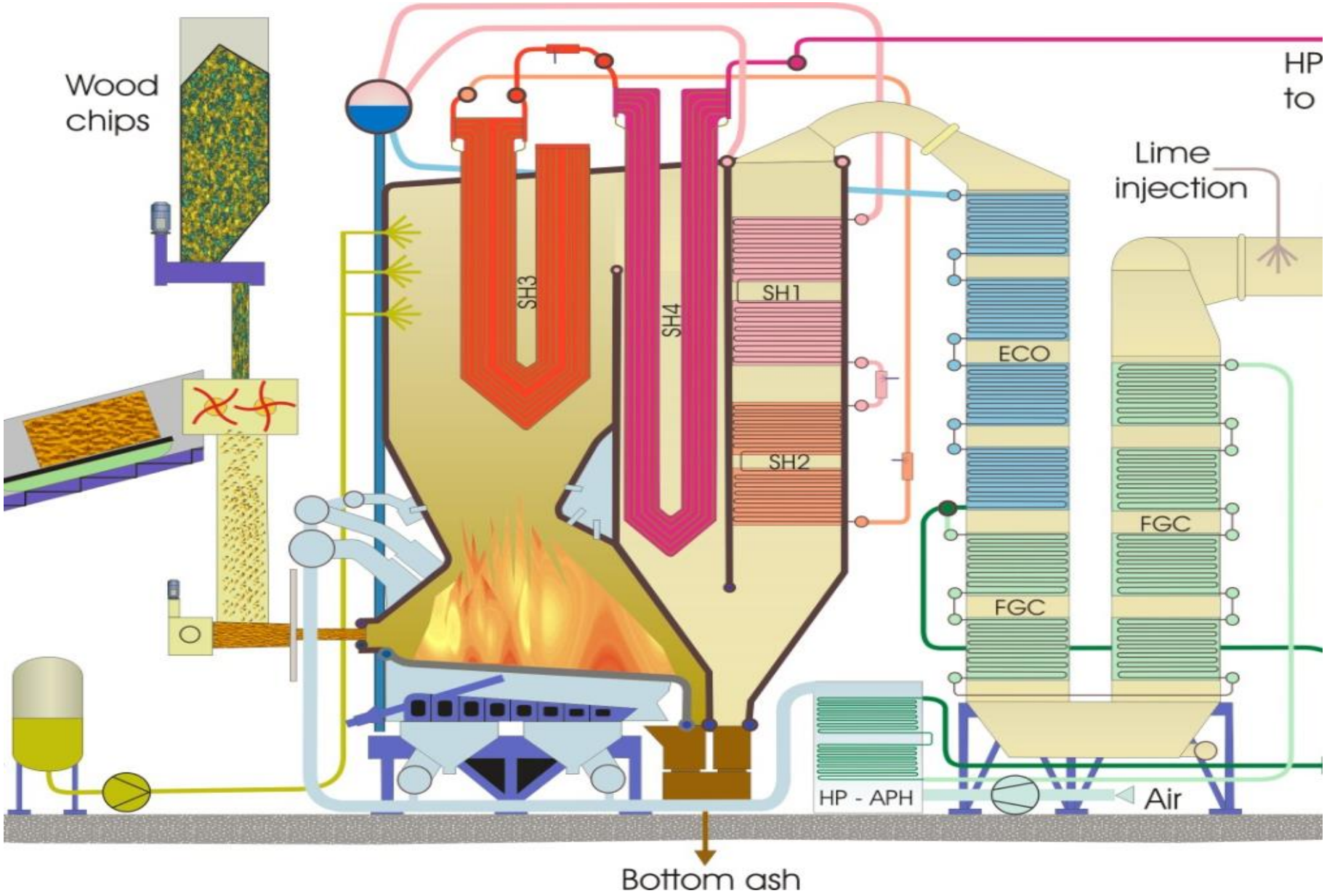

Rice straw at paddy field after harvesting
Collection of rice straw
Transportation to collection centre
Collection centre
Transportation to power plant
Power plant


IDEAL RANKINE CYCLE
2
Boiler
3
W in
Pump
Q in
Turbine
W out
Q out
4
1
Q in
2
3
4
1
Q out

WATER COOLED VIBRATING GRATE



DESIGN / TYPICAL STRAW BOILER



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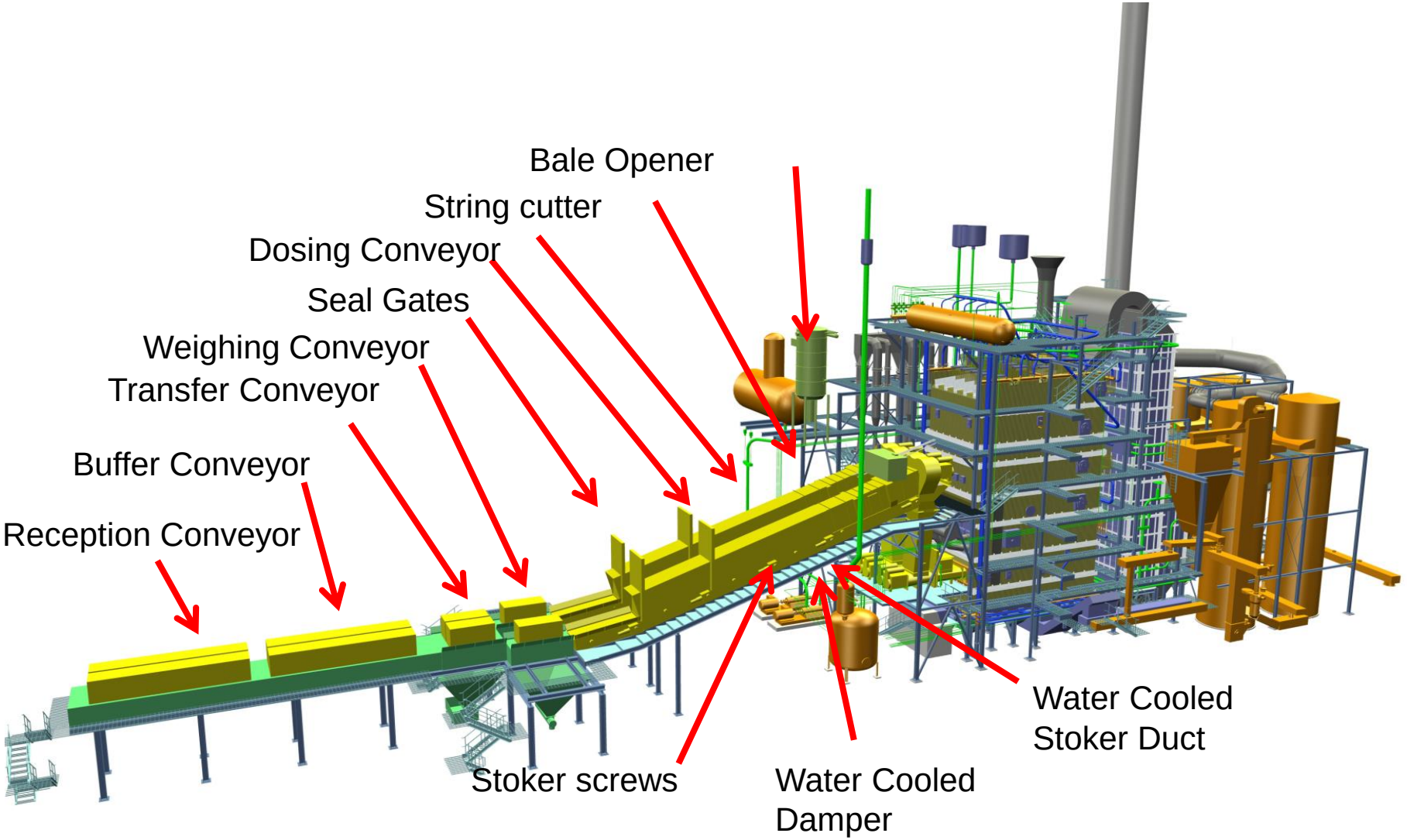
STRAW FEEDING STANDARD DESIGN 4´x 4´and 4´x 3´ BALES



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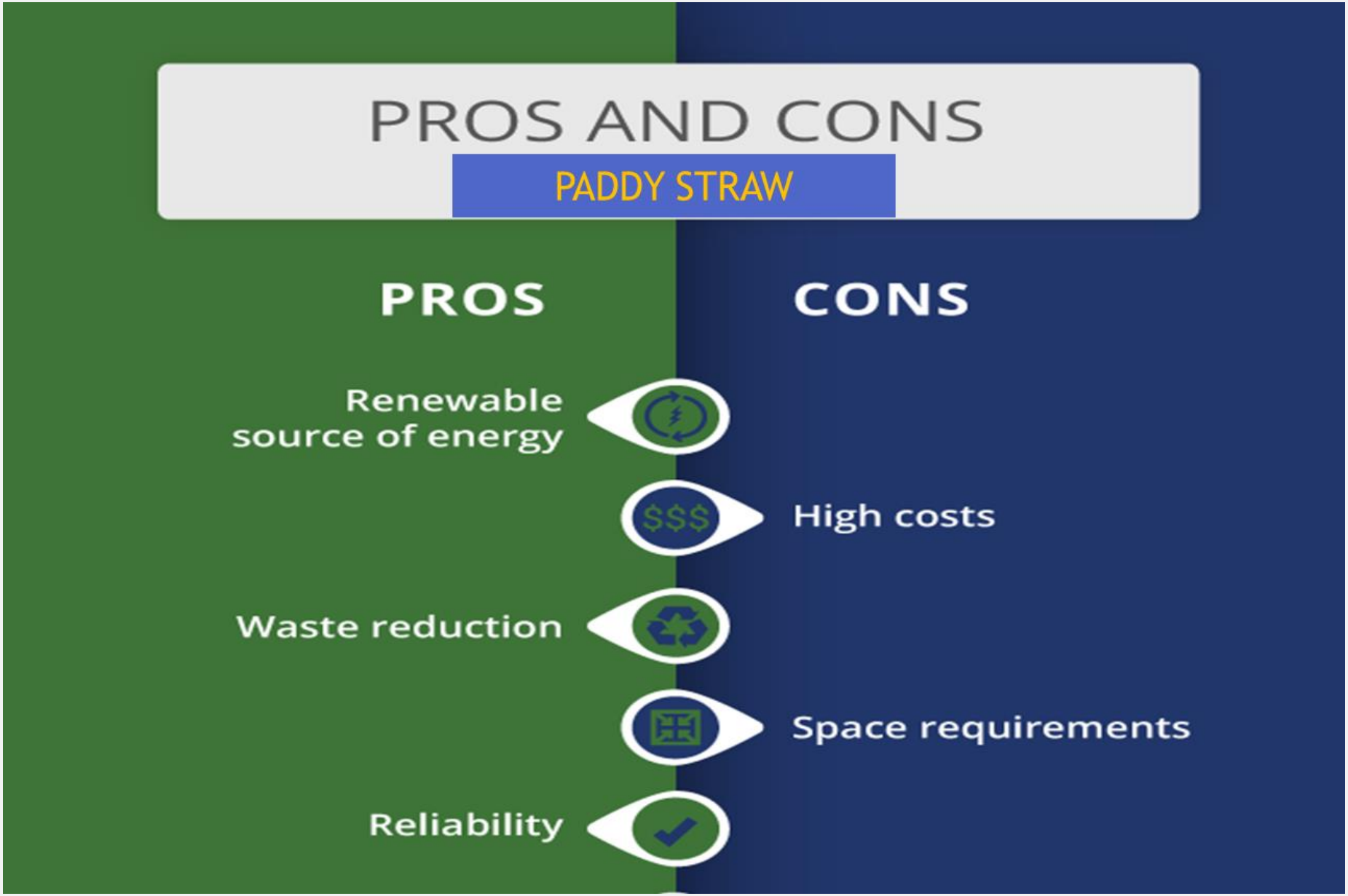
PROS AND CONS
PADDY STRAW
PROS
CONS
Renewable source of energy
High costs
Waste reduction
Space requirements
Reliability

- Training program for fresher with the collaboration of ITI Jalalabad

➢ Ambulance facility with all medical support for Firozpur District

- Supply of medical oxygen to Hospitals for COVID-19 treatment through set up of new oxygen plant in Jalalabad

- FICCI, New Delhi has appreciated the efforts and achievement of the company in developing Grid Interactive 15 MW Biomass based Power Plant generating electricity by using Rice Husk as fuel which is first of its kind in the state of U.P.

- Eminent jury members have accredited our efforts for Promoting Renewal Source of Energy and Reducing Emission of GHGs by Generating Precious Power in 'Paddy to Power' Chain and awarded the FICCI Annual Award 2009-10 for "Innovation & Excellence in Promotion of Renewable Energy"

Chandigarh Administration
Chandigarh Renewable Energy and Science & Technology Promotion Society

CREST

AWARD FOR OUTSTANDING PERFORMANCE

(Issued on Akshay Urja Diwas-2016)

Amongst the EPC Contractors for Solar Power Plant Installation,

M/s. Universal Saur Urja Pvt. Ltd., New Delhi has been ranked second for the Highest Installations without subsidy by EPC Contractors in UT, Chandigarh

Chandigarh Renewable Energy and Science & Technology Promotion Society (CREST) appreciates the efforts made by firm for installing solar power plants and thereby contributing towards renewable energy and sustainable development in persuit of climate change action plan.

19th August 2016
Chandigarh

SANTOSH KUMAR, IFS
Chief Executive Officer
CREST, Chandigarh

'पंजाब केसरी' चंडीगढ़ के सोलर प्लांट के लिए यूनिवर्सल सौर ऊर्जा को क्रैस्ट अवार्ड!

रूफटॉप सोलर पावर प्लांट, 'पंजाब केसरी' की चंडीगढ़ स्थित बिल्डिंग तथा (इनसैट) अवार्ड प्राप्त करते यूनिवर्सल सौर ऊर्जा के खालिद नदीम।

चंडीगढ़, 2 सितम्बर (ब्यूरो): पंजाब केसरी ग्रुप, चंडीगढ़ की बिल्डिंग के रूफटॉप पर सोलर पावर प्लांट लगाने के लिए चंडीगढ़ प्रशासन ने मैसर्स यूनिवर्सल सौर ऊर्जा प्राइवेट लिमिटेड नई दिल्ली को क्रैस्ट अवार्ड से सम्मानित किया है। यह प्लांट 406 किलोवाट की सामर्थ्य वाला है। चंडीगढ़ रिन्यूएबल साइंस एंड प्रोमोशन सोसायटी (क्रैस्ट) द्वारा अक्षय ऊर्जा दिवस के संबंध में आयोजित हुए कार्यक्रम में चंडीगढ़ के प्रशासक के सलाहकार परिमल राय ने कंपनी के अधिकारियों को यह अवार्ड प्रदान किया। इस अवसर पर 'ग्रीन चंडीगढ़ सोलर चंडीगढ़' थीम पर एक कार्यशाला भी आयोजित की गई। इस मौके पर क्रैस्ट के सी.ई.ओ. संतोष कुमार भी उपस्थित थे। उन्होंने कहा कि अब लोग सोलर एनर्जी के माध्यम से कमाई भी कर सकते हैं।

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THANK YOU

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