Urja Mandir Institute on War Revolution & Peace (WaRP Institute®)
War on ' Perpetual Poverty and Climate Changes'
Revolution through 'Science & Technologies'
Peace for ' The Underpriviledged'
war.revolution.peace.institute@gmail.com

CALGI℠

The Golden Gate between California & Gujarat
California Gujarat Initiative
calgioutreach@gmail.com

Bhasker Patel:
Inventor of "The Miracles of Coal Molecule®"

Ref# 1 **Miracles of AED's Patented HT (Hydro-Thermal) Process:**

Ref # 2 *Basically ,'Controlled HT' (HT) is a method of converting any carbonaceous material to the next higher grade feedstock; HT sub-bituminous coal is upgraded to bituminous coal; lignite into sub-bituminous; and biomass into a lignite.*

Ref# 3 *Therefore HT actually causes partial coalification of the biomass to occur in a matter of minutes as opposed to the millions of years Mother Nature requires. In essence you are taking an ultra low Sulfur, Ash, and Trace Metals biomass and converting it into a very clean LRC (Low Rank Coal). If the biomass fed to the boiler is over 40% moisture, then energy density of LRCWF (Low Rank Coal Water Fuel) would be slightly higher even though it will contain 40% water.*

Ref# 4 *This is due to the HT temperature being high enough to cause some week bonds in the coal "molecule" to break and release CO2. Since the "carbon bonded to oxygen" has no heating value, its removal will increase the energy content. The increase in energy is typically around 10% for lignite and could be as much as double that depending on the type of biomass.*

Ref # 5 *The significant harmful emissions reduction when comparing raw biomass feedstock to BWF(Biomass Water Fuel) feedstock would be NOx, which would be highly dependent on the type of combustor used and is resources specific..*

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Energy & Environmental Research Center

University of North Dakota

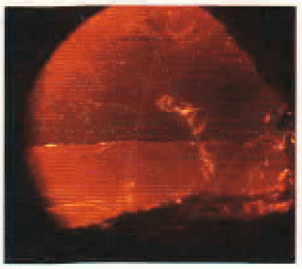
Box 8213, University Station/Grand Forks, ND 58202-8213 USA

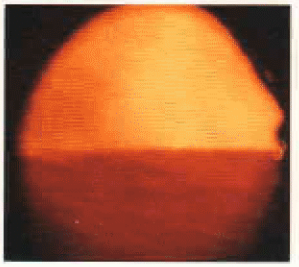
References for Proof & Demonstration

" Miracles of Coal Molecule "

(For Internal / Restricted Circulation : Edited Notes

CWFs

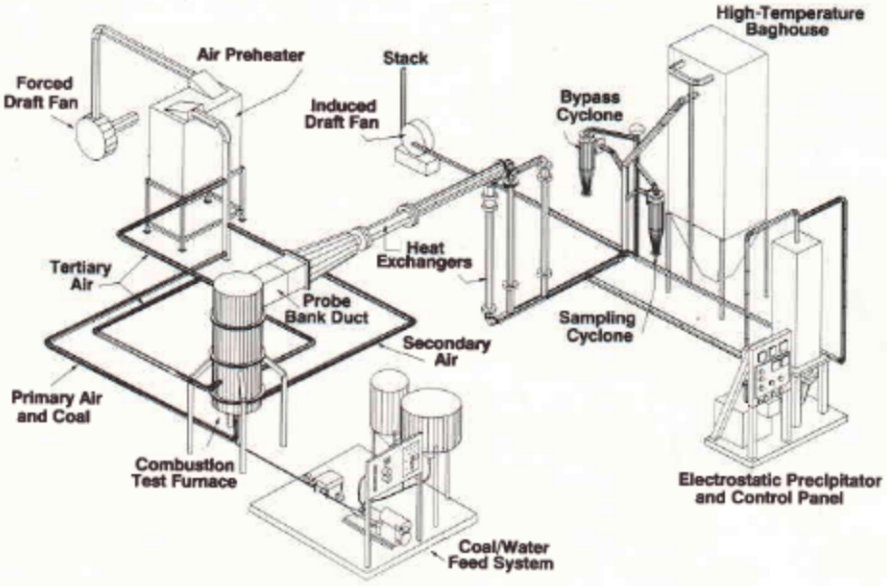




Coal/Water Fuels

CWF Combustion Testing

- Laminar flow drop-tube furnace
- 400,000-Btu/hr fluidized-bed combustor
- 700,000-Btu/hr bottom-fired combustor
- 2,000,000-Btu/hr fluidized-bed combustor



700,000-Btu/hr Bottom-Fired Combustor

The combustion units can be used for the following:

- Determine ash-fouling rates and the strength, composition, and structure of fouling deposits;
- Study particulate-size distribution and velocity prior to deposition on convective section, heat-transfer surfaces;
- Evaluate corrosion and erosion rates of system components as function of fuel, bed, and sorbent materials, and operating parameters;
- Evaluate the effectiveness of ash-fouling combustion additives;
- Study high-temperature baghouse operation and performance;
- Evaluate sorbent addition for SO_2 control.

Other Information

Information concerning other programs at UNDEERC is available in the following brochures and in the Center's numerous technical reports.

- Analytical Instruments
- Advanced Process Chemistry
- Ash and Slag Research
- Coal Sampling and Processing
- Coal Beneficiation
- Combustion and Environmental Research
- Combustion Test Service
- High-Temperature/Pressure Research
- Waste Management Services

If you are interested in knowing more about producing CWFs from high-moisture feedstocks, or would like to have tests conducted by our staff, contact Warrack G. Willson, Director of the Fuels and Process Chemistry Research Institute, telephone (701) 777-5100, or write:

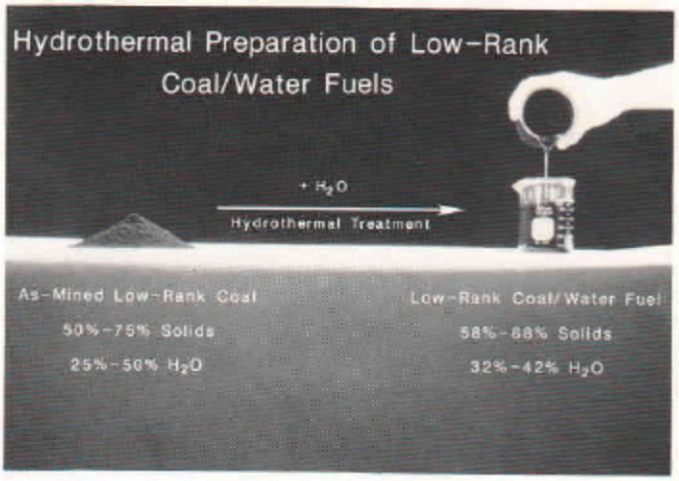
Energy & Environmental Research Center
University of North Dakota
Box 8213, University Station
Grand Forks, ND 58202-8213
USA

Fax (701) 777-5181

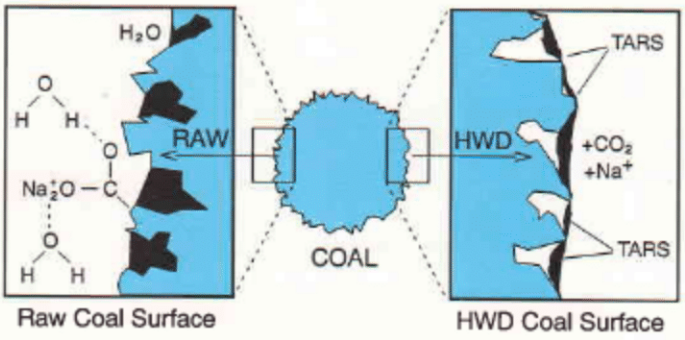
Coal/Water Fuels (CWFs) Technology at the EERC

#2

CWFs are promising alternate fuels to meet future energy needs. However, the cheapest and most abundant feeds -- low-ranks coals (LRCs), peat and biomass -- have been overlooked because of their high inherent moisture. Research conducted at the Energy & Environmental Research Center (EERC) has shown that the energy densities of slurries made from high moisture feeds can be enhanced significantly by hydrothermal treatment. Hydrothermal treatment, or hot-water drying (HWD), induces coalification by heating a slurry to coal-specific temperatures above about 240°C at saturated steam pressures for a few minutes. By causing coalification to occur under pressure in an aqueous phase, a uniform tar coating is obtained, sealing the micropores to minimize moisture readsorption. HWD produces a material with a much lower equilibrium moisture content than the feed coal and which, in many cases, can essentially be slurried in its own inherent moisture to produce a liquid fuel with the same or higher energy density than the original coal.



#3



Hydrothermal Treatment

Technical feasibility has been demonstrated in a 6-tpd process development unit (PDU) at the EERC with 24 different LRC feeds from around the world. Lignite and subbituminous CWFs have been produced with solid contents of 58 to 68 wt% and energy densities from 6,000 to 8,000 Btu/lb. Biomass, peat, and brown coal/water fuels have been produced with energy densities of 6,000 Btu/lb, all without the use of costly additives.

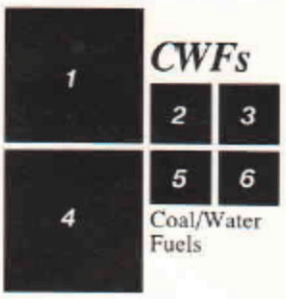
The HWD process is compatible with physical coal-cleaning methods, such as froth flotation and oil agglomeration, which also are being developed at the EERC. Cleaned lignite and subbituminous coals have been hot-water dried to produce CWFs suitable for advanced applications such as turbine and diesel engines.

Preliminary process economics, while being coal and site specific, appear promising with cost estimates ranging from $1.40 - $2.00 per MM Btu, including the cost of the coal. The EERC is working with several foreign and domestic companies to demonstrate the technology at a commercial scale. The much greater reactivity of LRCs in comparison to bituminous coals, illustrated by comparing the incomplete combustion of a commercial bituminous CWF, Photo No. 5, with the LRCWF flame, Photo No. 6, in the EERC test combustors, has also been demonstrated in a G.E. diesel and an Allison turbine as part of the DOE program to use coal in advanced heat engines

Ref #4 Proof Demonstrated

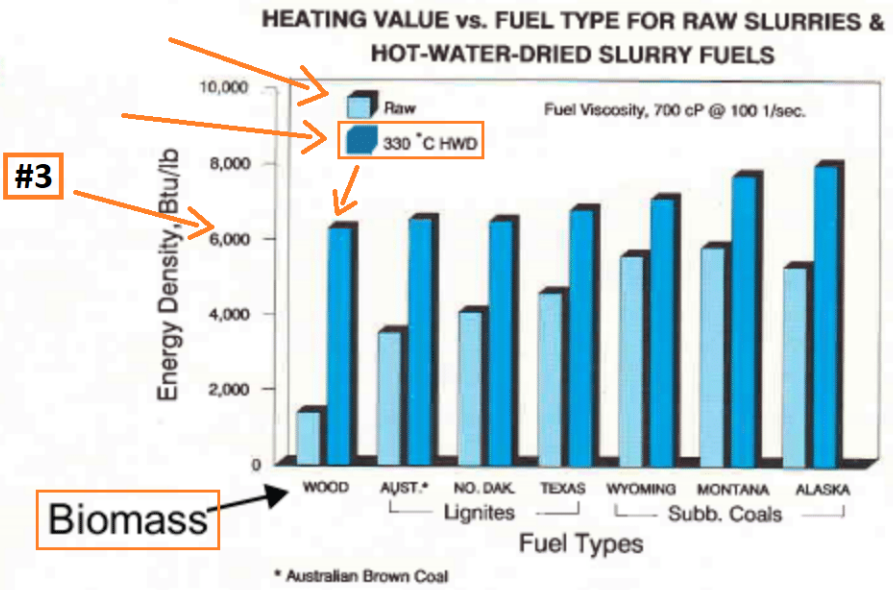
On the cover:

1. Hydrothermal Process Development Unit
2. 8000-Btu/lb HWD Subbituminous CWF
3. High-Temperature/Pressure Batch HWD Autoclaves
4. Bottom-Fired Combustor
5. Combustion of Bituminous CWF
6. Combustion of HWD LRCWF (same conditions)



Advantages of Hydrothermal Treatment - Hot-Water Drying (HWD)

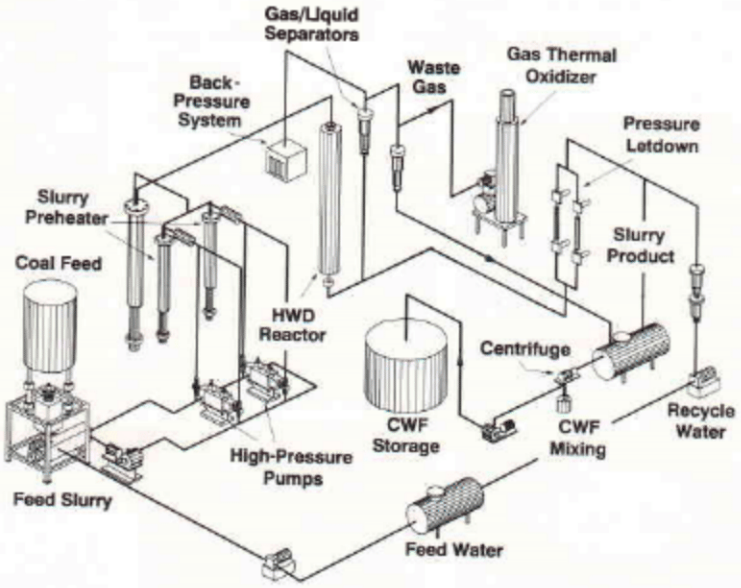
- Premium liquid fuels from LRCs
- Highly reactive fuel
- Irreversible moisture removal
- Energy efficient
- Increased calorific value
- Continuous process
- Relatively low-cost CWFs
- Minimal water requirements



01 *EERC CWF Test Facilities*

CWF Production

- Coal crushing and grinding
- Batch autoclave HWD
- Bench- and PDU-scale float/sink
- Bench-scale oil agglomeration
- PDU acid leaching
- 6-tpd HWD PDU



6-ton/day Hydrothermal Process Development Unit

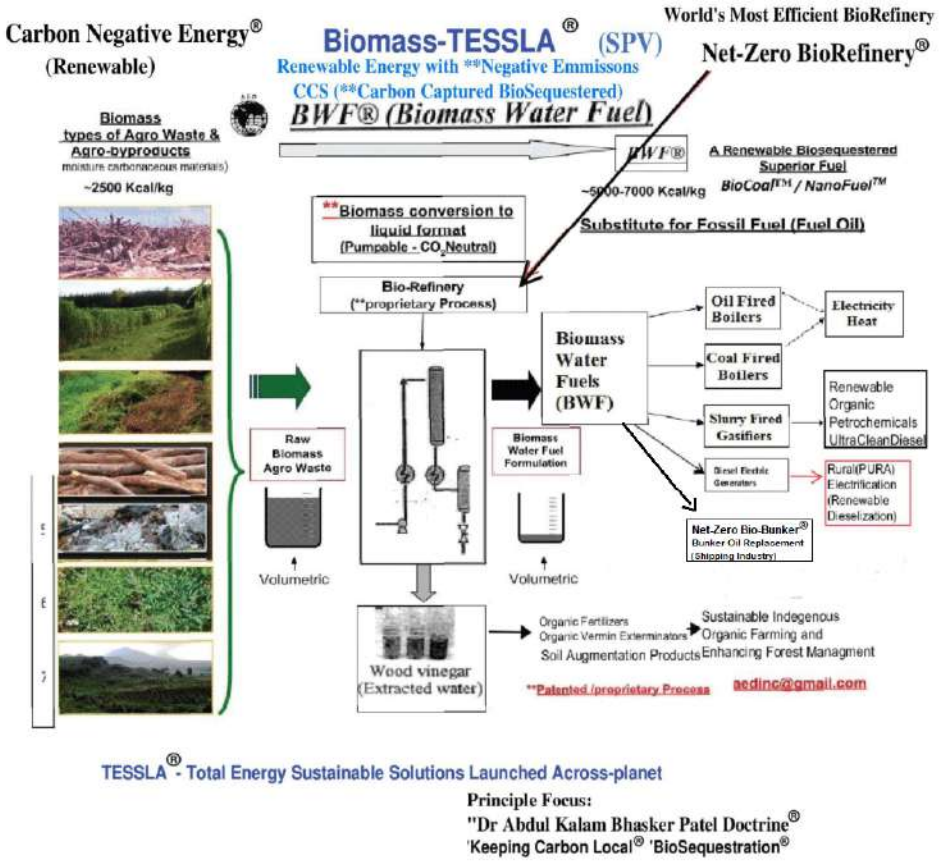
CWF Characterization

- Proximate and ultimate analyses
- Mineral and ash composition
- Calorific value/reactivity
- Particle-size distribution
- CWF rheology
- Heat-transfer coefficients

Analytical Analyses

- X-ray diffraction and fluorescence
- Auger spectroscopy
- Solid-state ^{13}C NMR
- Scanning electron microscopy with microprobe
- Haake viscometry 10-10,000 cP @ 0-1170 sec^{-1} at temperatures to 280°C and pressure to 15 psia
- High-shear viscometry to 200,000 sec^{-1}

Harnessing Miracles of Coal Molecule®



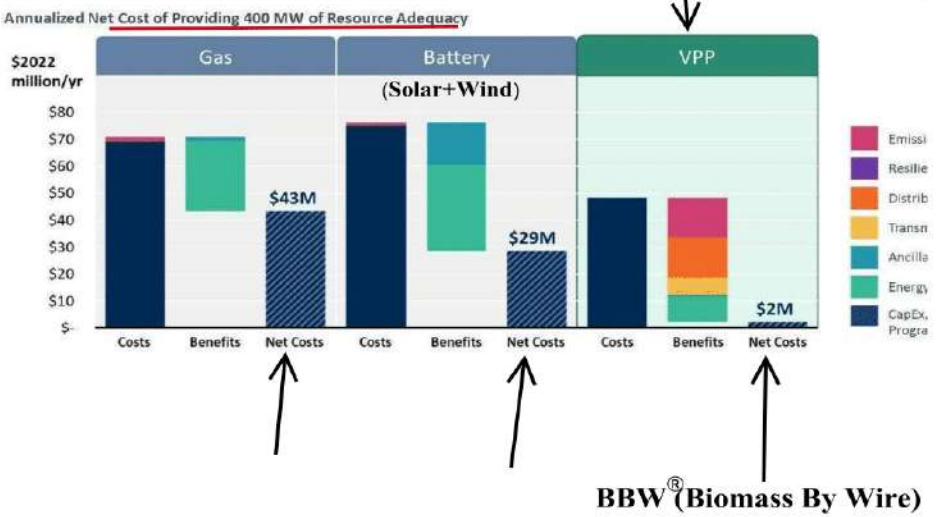
TESSLA® - Total Energy Sustainable Solutions Launched Across-planet

Principle Focus:
"Dr Abdul Kalam Bhasker Patel Doctrine®
'Keeping Carbon Local® 'BioSequestration®

AED's BBW®(Biomass By Wire) / Biomass-TESSLA® Power Plants
(Patented/Proprietory Technologies) Carbon Negative Energy (Renewable)

Resource Adequacy... For Cheap

The VPP could provide the same resource adequacy at a significant cost discount relative to the alternatives.



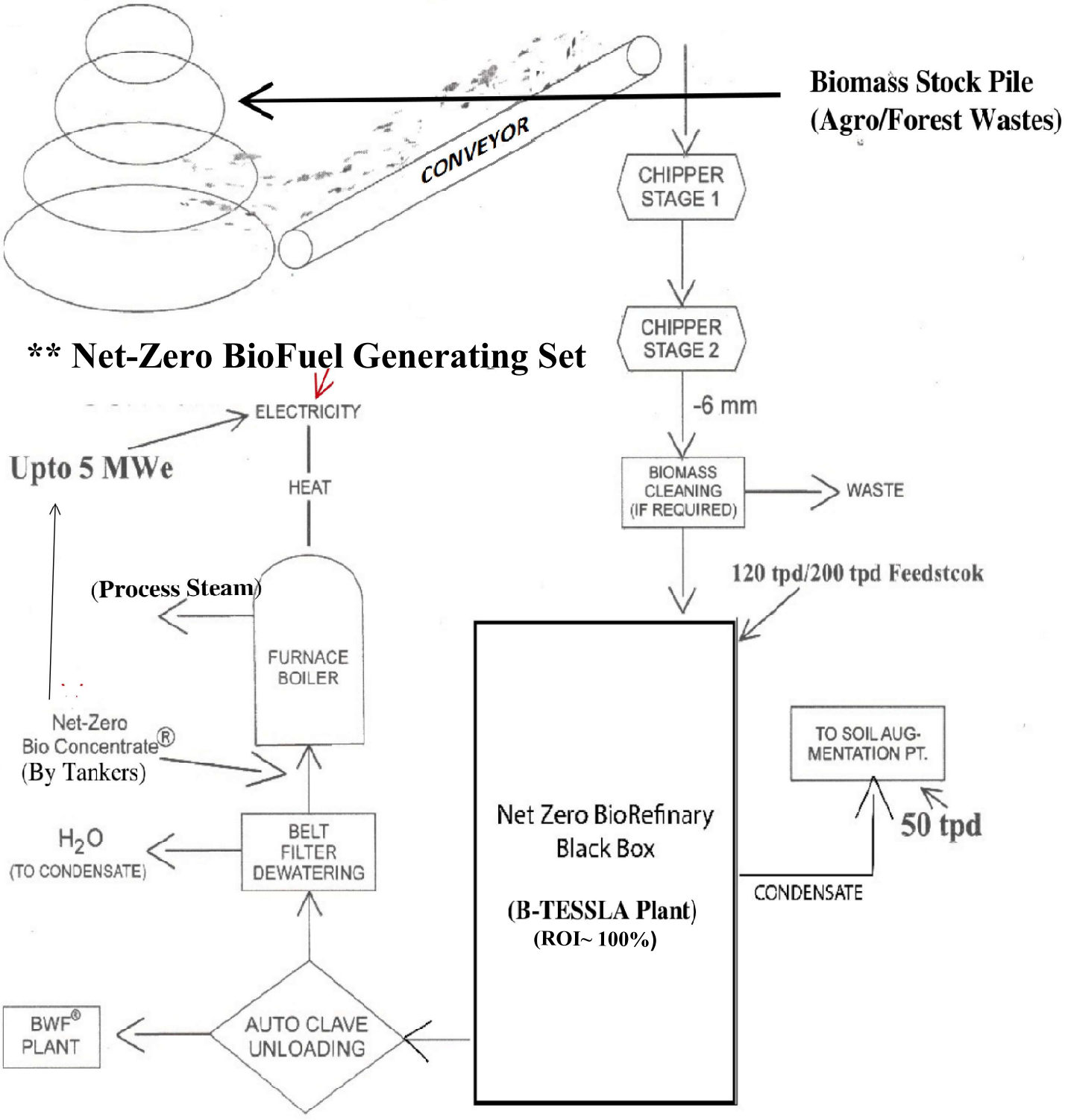
BBW®(Biomass By Wire)

For AI-Data Centres (*Existing Urban locations)- North America

(*Space Reqd:40'x75'x15')

Net-Zero Renewable Utility GRID (RUG)-- 5 MWe (Modular)** (*Basement or Parking lot)

*Within 150 miles of B-TESSLA plant,located near Existing Compost Centres



(Patented Propritory Technologies)

Carbon Negative Energy®(Renewable)

(Draft-F PL 2/25)