Renewable Electrical Power from Composting

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Tenaya Lodge, Yosemite, California
TRACK 5B
Wednesday, April 10th
8:00 am - 9:00 am
WASTE CONVERSION
Research Network

- Cal Poly Pomona Univ.
  Dr. Prof. Kevin Anderson P.E.

- University of New Mexico
  Dr. Peter Vorobieff
  Dr. Nima Fathi

- SolarWall
  Mr. John Hollick
Outline

- Intro. to SUT+CWH+TSC Power Plant Renewable Energy Technology
  - SUT = Solar Updraft Tower
  - CWH = Compost Waste Heat
  - TSC = Transpired Solar Collector
- Project Benefits
- Numerical Simulations
- Prototype Experimental Test Set Up
- Summary / Q&A
- References
Compo Energy Renewable Electrical Power from Composting
Intro. SUT+CWH+TSC Power Plant

COMPO ENERGY INC. CF. http://www.compoenergyinc.com/
The Smartest Name in Renewable Energy from Waste

US PATENT #7956487 Canadian PATENT #2720544
Intro. SUT+CWH+TSC Power Plant

- Staged Shrouded Turbine R&D

Turbine placement options:
- a) Single vertical axis
- b) multiple vertical axis
- c) multiple horizontal axis

https://www.windpowerengineering.com/
Intro. SUT+CWH+TSC Power Plant

- Leverages tipping fees, recycling and compost revenue generation
Waste-to-Energy Power Plant with no Incinerators

- PROVIDING CLEAN RENEWABLE ENERGY AND SOLVING WASTE DISPOSAL ISSUES FOR THIS AND FUTURE GENERATIONS

- A systematic method for converting heat energy released by compostable matter into electricity, using a compost updraft tower. This compost updraft tower is comprised of:
  1) a collector region that contains compostable matter
  2) one or more towers that rise through the collector region
  3) one or more turbines

- The air within the collector region is heated through the composting process and that heated air flows through the collector region toward the open first end of one or more of the towers, and from there to the open second end of the tower

- This heated air flowing through the system drives turbines that generate electricity
Waste-to-Energy Power Plant with no Incinerators

- In one prototype the roof of the collector region is transparent to allow solar radiation to also penetrate the collector region from the outside and heat air within.
- The end product is compost from household waste for agricultural use.
- Therefore, the volume of waste transported to the landfills is drastically reduced.
- This is a SMART ALTERNATIVE FOR OUR CURRENT LANDFILL WASTE OPERATIONS.
- One plant can generate at least 14.5 MW/+ (3.6 MW per section) of clean renewable energy, enough for 13,500 +/- homes.
  - A smaller size plant 500’ x 500’ can accept 1,000 tons of waste 24/7, and a full-size power plant 1000’ x 1000’ can take 4,000+ tons of household and green waste 24/7.
Waste-to-Energy Power Plant with no Incinerators

- There are four ways to generate revenue in this project:

- 1) Tipping fees in Los Angeles area are approximately $60/ton; a 1000-ton plant will generate $60,000 per day, and a full-size plant 4,000 tons at $240,000 per day

- 2) Sale of the electricity generated for 13,500 +/- homes

- 3) Revenue from recyclable materials

- 4) Sale of compost for agricultural use
Prototype Experimental Test Set-Up

- 1/5th Scale Prototype constructed at Cal Poly Pomona Univ.

Holes used to mimic TSC effect
Numerical Simulations

- Carried out at The University of New Mexico

- CHIMNEY CENTERLINE
- HEAT FLUX DUE TO COMPOST

- SUT CHIMNEY
- SUT ROOF WITH TSC COMPOSTING
Numerical Simulations
Summary

- SUT+CWH+TSC solves problem of waste management without using incineration
- Technology can be scaled up / down according to the customer needs
- Q&A
- Thank You
References


4. University of New Mexico SUT+TSC report 2/15/19