

Recycling of Fiberglass Boats

By: Jon Benvenuto

Problem

- Fiberglass boats beyond life span
- No way disposing other than cutting up and taking pieces to landfill



Problem

- If boats are not disposed of, they often sit in yards and pose as an eyesore.
- Contaminates from boat can be harmful to environment if not contained.



www.fieldandstream.com



www.boattrader.com

Can we recycle fiberglass boats?

- **YES!!!!!!**
- The technology is available to recycle fiberglass.
- Not implemented in U.S. commercially due to low profitability from byproducts and abundance of cheap virgin materials.
- Technology has improved over the last few years to improve profitability of waste materials.

Different Ways to Recycle Fiberglass Boats

- Make a wreck out of it:



www.redbubble.com

- Restore it:



www.nautilusrestorations.com

Different Ways to Recycle Fiberglass Boats

- During construction recycling scraps of virgin material to re-implement into product reducing waste.
- Grind up into very small particles (fiberglass powder) and use to make thermoforming molds or other structures.
- Grind up into small pieces (approx. 2 cm square) and use as fuel for concrete furnace. Ash to be implemented into concrete with little affect on strength of concrete.



www.werlor.com



www.fiberglass-china.com

Different Ways to Recycle Fiberglass Boats

- Pyrolysis, i.e. breaking down a material into solid, liquid and gas by applying heat through a fixed period of time w/o presence of oxygen.
 - Two main type of pyrolysis researched:
 - Conventional – uses convection to heat up material (heats material from outside).
 - Microwave – uses microwaves to heat up material uniformly. Technology is innovative.

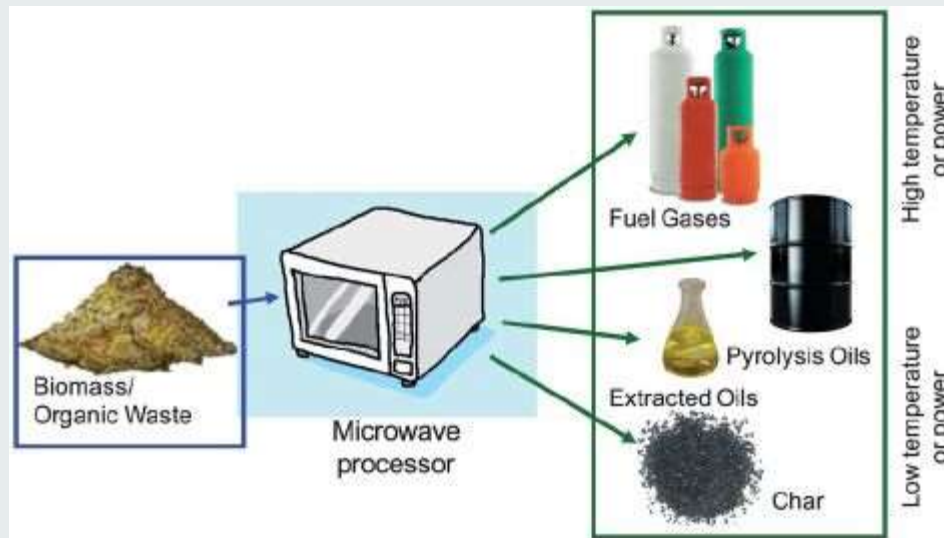


What Should Rhode Island Do?

- 1. Recommend Rhode Island investigate use of Microwave Pyrolysis as a primary means of recycling.**
2. Turn into fiberglass powder, unclear of affects when other products are in powder, i.e. paint, wood, etc.
3. Use of particles as furnace fuel for concrete manufacturing would be last recommendation; gases from burn process harmful to the environment.
4. Other methods seem impracticable on a large scale.

Microwave Pyrolysis

- Developed by Tech-En Ltd. In Hainault, UK.
- Energy efficient; gas from heating used as fuel.
- Liquid by-product, oil, can be substituted for heavy crude oil.
- If the right temperature is used, the solid by-product or “char” can be re-used as recycled fiber.



Business Model

- Collect old boats and strip them of usable/ “recyclable” parts (i.e. rubber, steel, aluminum, copper, brass, glass, oil, fuel, etc.).
- Usable parts to be sold on secondary market for profit.
- Boat will then be ground or cut into manageable pieces that can fit into Pyrolysis reactor.
- By products will be sold for a profit or used in process.



www.shipwreckusedparts.com



www.marineplusparts.com

Conclusion

- Rhode Island (and the rest of the U.S.) has a need to recycle fiberglass boats.
- A system to do such can be implemented across many industries which use Fiber Reinforced Plastics (FRP).
- Using Pyrolysis can not only be used to recycle fiberglass, but it can recycle most non metallic materials.

Any Questions?