

City of
Warrenton



Green Initiative

WARRENTON GREEN INITIATIVE

PATH TO SUSTAINABILITY

City of
Warrenton



Green Initiative

Background

- ✦ Launched in May 2006
- ✦ Goal: Become the greenest, most sustainable community
- ✦ How: Do what others are doing and then some
- ✦ Largest reduction of the carbon footprint in the shortest period of time: **25% reduction by 2015**
- ✦ Be the first community to produce its own electricity and fuel from renewable, sustainable resources






Green Initiative

Don't Waste the Wastes

The community uses waste and residues from "its own backyard" to:


- ✦ Produce its own electricity and fuel
- ✦ Become more sustainable and self-reliant
- ✦ Reduce costs
- ✦ Improve the environment



Biomass Plant



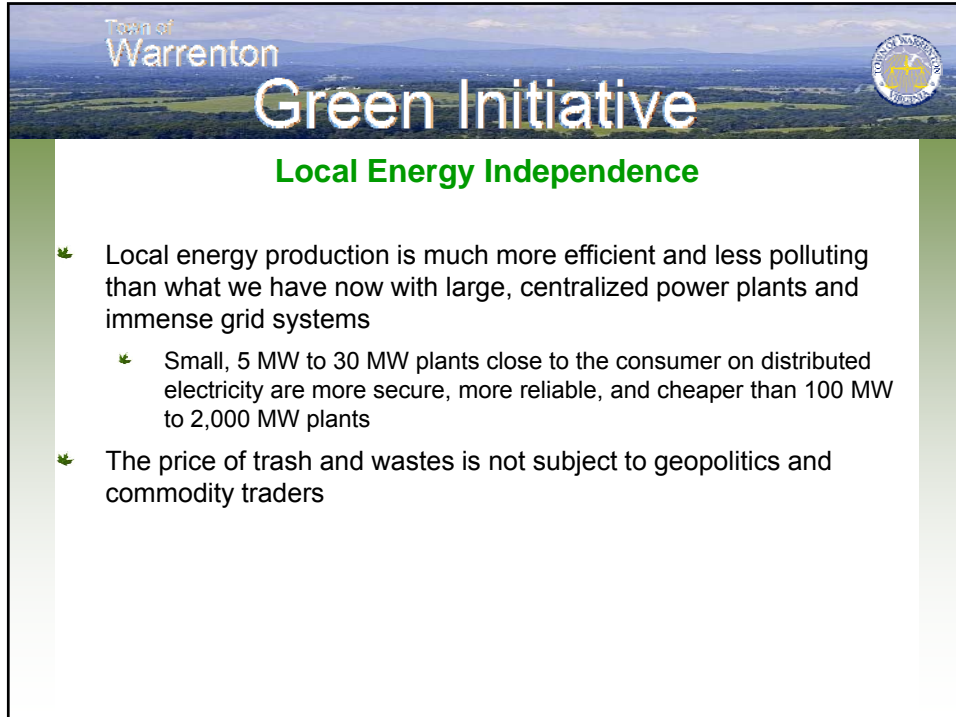
Traditional Landfill




Green Initiative

Local Energy Independence

- ✦ Communities can become energy-independent from wastes and residues found in their own backyards
- ✦ Technology has arrived to efficiently produce electricity and fuel from a variety of wastes with less pollution
- ✦ There should be enough trash being dumped at the landfill that cannot be recycled to electrify one fourth the homes in the community
- ✦ Landfills represent a huge, untapped source of electricity and fuel
 - ✦ 300 million tons of MSW and 300 million tons of C&D are dumped at landfills
 - ✦ That's 30 million homes powered with green electricity or 20 billion gallons of ethanol
 - ✦ Landfill gas or methane capture is just a small part of it



Town of
Warrenton

Green Initiative

Local Energy Independence

- ✦ Local energy production is much more efficient and less polluting than what we have now with large, centralized power plants and immense grid systems
 - ✦ Small, 5 MW to 30 MW plants close to the consumer on distributed electricity are more secure, more reliable, and cheaper than 100 MW to 2,000 MW plants
- ✦ The price of trash and wastes is not subject to geopolitics and commodity traders

Energy Production from Waste

- The necessity to better manage waste
 - Recycling material from waste is getting better
 - But there will always be a part that can not be recycled
 - People don't want landfills and reject incinerators
- How do we turn waste into energy?
 - Without polluting emissions
 - Without any ultimate residues
 - With minimized transports
 - At a high conversion rate

LANDFILLS ARE LIABILITIES



Turning a liability into an asset:

- Accumulation of municipal solid waste is a serious problem with worldwide environmental consequences
- Land is becoming scarce and landfills are filling up
 - For example, one of the L.A. county landfills will close in 2010 and the best option is to rail the MSW 120 miles into the Nevada desert
- Burying trash in a hole releases methane gas—24 times more toxic than carbon dioxide—and leachate into the groundwater
- Every ton of trash buried in a hole emits 1 ton of greenhouse gases
 - Our small plant will prevent 75,000 tons of GHG


Town of
Warrenton


Green Initiative

How Will It Work?

The centerpiece is a public-private partnership

- ✦ A commercial company will build, finance, operate, and maintain the plant
- ✦ The community will provide space for the plant at the municipal landfill
 - ✦ Infrastructure is already in place
 - ✦ Environmental permits have already been issued
- ✦ Landfill operating expenses will greatly decrease
 - ✦ Less trash must be buried
 - ✦ Less landfill maintenance will be required
- ✦ The community will realize a profit
 - ✦ The sale of locally produced fuel
 - ✦ The sale of electricity to the grid



Landfill maintenance never ends...




Green Initiative



What Can Be Used?

Almost anything:

- ✦ Household trash
- ✦ MSW
- ✦ C&D
- ✦ Restaurant waste
- ✦ Tree clippings
- ✦ Agricultural residues
- ✦ Sewer sludge
- ✦ Animal manures and wastes
- ✦ Used tires
- ✦ Auto shredded material



"Put Warrenton on a low carbon diet."
 —Mayor George B. Fitch


Green Initiative

Benefits

This not your traditional waste-to-energy plant with tall smokestacks burning garbage. There are hardly any emissions and it is well within EPA and State environmental regulations.

The closed loop biomass plant will:

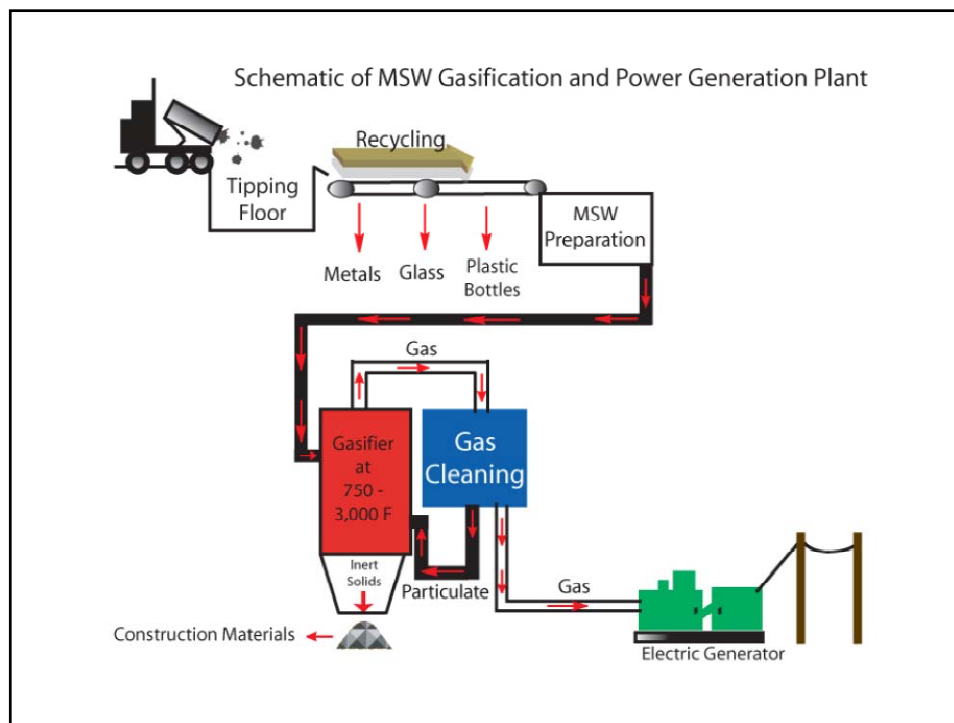
- ✦ generate its own power
- ✦ require not one ounce of fossil fuels
- ✦ produce negligible particulate emissions
- ✦ pay for itself, not require taxpayer dollars
- ✦ make a community energy independent
- ✦ be scalable as more feedstocks are captured
- ✦ not divert food crops like corn and beans to make renewable fuels
- ✦ capture methane leaking from landfills
- ✦ free up space needed for landfills
- ✦ return idle farmland into production of dedicated energy crops
- ✦ reduce the carbon footprint for the community



"Modern" waste-to-energy plant

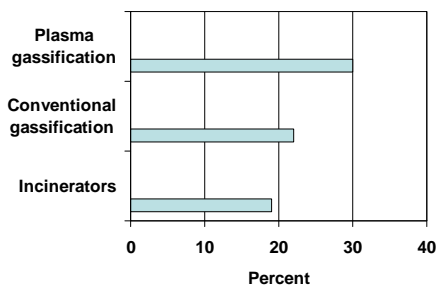
ECONOMICS OF WASTE TO ENERGY

- MSW has low BTU and requires expensive presorting so plant must have negative feedstock cost
 - Most of the tipping fee must go to the plant
- Capital costs are very high, so operating costs must be low
- Revenues from tipping fees are required to supplement the revenue from electricity or fuel sales
- If we can afford large negative feedstock costs from MSW and C&D, then we can afford to buy other feedstocks like wood chips
 - If we get paid a tipping fee of \$40/ton to take MSW and C&D, then we can afford to pay \$25/ton for wood chips
- The gasification process yields 1,100 KWH per ton of MSW vs. 500 KWH from traditional mass-burn (incinerator) plants.

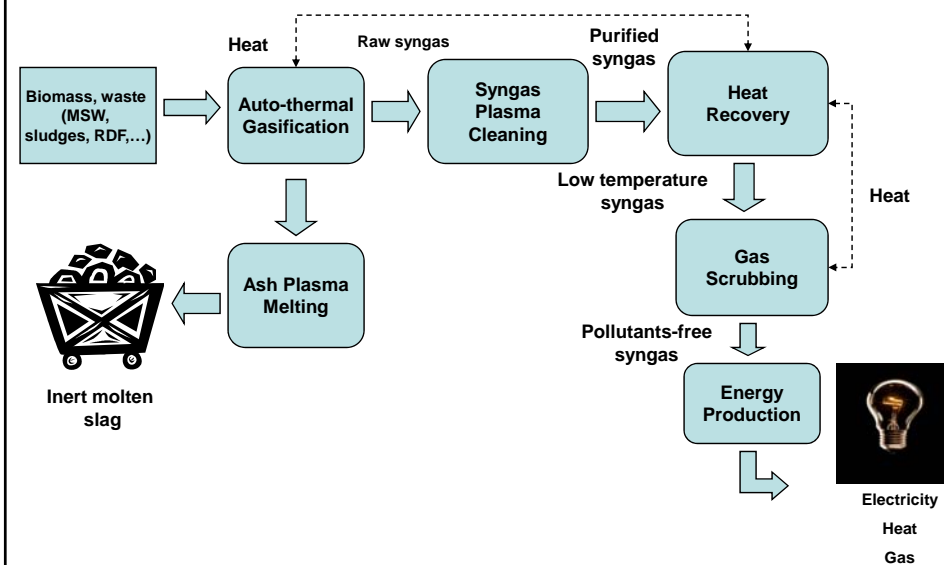


The Gasification Advantages

- An excellent efficiency
- No remaining ashes and no by-products
- No harmful emissions
- Nice looking compact plants that are better accepted by the population
- Less transport

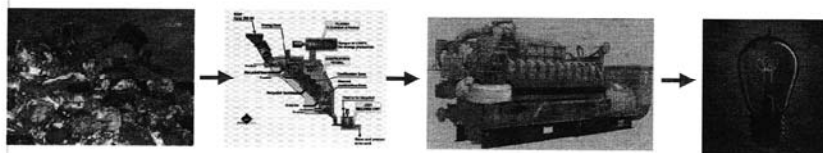


The CHO-Power Process



The right technology : the gasification

- Gasification is a process where waste is heated in very low oxygen atmosphere, in rather small furnaces.
- Output is a hot gas (CO/H₂) carrying thermal energy along with high calorific potential.
- This gas feeds a gas engine to produce electricity, and the heat can be delivered as such or converted as well.
- **The waste does not burn as there is not oxygen enough but downgrades into simple elements CO and H₂, called "syngas".**



A plasma torch for more energy production

