



# Alternative Fuels for Electric Generation and Steam

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# Alternative Gaseous Fuels

- Methane Gas / Landfill Gas
  - Made as solid waste decomposes
- Producer Gas / Syngas
  - Made using a thermal process called “gasification”



# Why look at alternative fuels?

- Fuel Costs
  - Natural gas prices have risen dramatically in the last ten years.
- Fuel Price Stability
  - Petroleum-based fuels have high price volatility
  - Alternative fuels allow for longer-term fixed-prices fuel contracts
- Energy Security/ Domestic Sourcing
- Environmental Benefits

# Landfill Gas



- Landfill gas
  - Is about 50% CH<sub>4</sub> (Methane)
  - Is about 50% CO<sub>2</sub>
  - Contains other trace gases & elements
  - Is naturally created by the decomposition of garbage
  - Has a very high greenhouse effect
  - Has a heating content of about 1/4 that of natural gas
  
- Methane creates roughly 20 times the greenhouse effect of CO<sub>2</sub>  
... unless you burn it!





# Syngas / Producer Gas

- Syngas
  - Is created through a thermal process called “gasification”
  - Is typically made from biomass, so it is usually “carbon neutral”
  - Has a heating content about 1/6 that of natural gas
  - Is too bulky to compress and move around like propane, so must be used where its created



# Gasifiers





# How can we use these fuels?

- Direct Use Project
  - Gas is piped to a boiler, where it is combusted to make heat or steam.
- Electric Generation Project
  - Gas is piped to a nearby electric generator, where it is combusted to make electricity.
- Pipeline Injection Project
  - CO content is minimized. Gas is compressed, then injected into a natural gas pipeline.



# Direct Use

- For a Landfill Gas Project, gas is
  - Collected at a landfill through a network of wells
  - Conditioned, if necessary, to remove challenging trace gases.
  - Piped from the landfill to a nearby end user that requires steam, hot water or hot air.
  - Used at the facility (in place of gas or fuel oil)
- For a Syngas project, gas is
  - Created (usually from biomass) in a gasifier
  - Combusted in an adjacent boiler to make steam, hot water or hot air.



# Direct Use Syngas at Shaw





# Electric Generation

- Landfill gas is collected and conditioned (possibly cleaned), then burned in a reciprocating engine.
- Syngas is created, cooled and cleaned and then burned in a boiler and electricity is generated from a steam turbine
- Syngas may also need to be enriched with traditional fuels, so that it burns more consistently.



# Landfill Gas Project





# Would you like to know more about this session?

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- Don't forget to fill out and drop off your session evaluations.



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