# Solar-Assisted Conversion Of Sewer Sludge Into Biofuels Using Aerogels To Increase The Solar Collector Thermal Efficiency.

Water effluent after secondar

treatment

Chemical

addition for

pH control

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Wastewater Treatment Plant

Filtration & membrane

Combustion products

Electricity

Feedwater

Pump

Generator

Combustion

Coolingtower

products

Recovery boiler

filtration for demineralization

# Schematic of Solar Assisted Pyrolysis Reactor Vessel

Sewer Sludge Receiver tube Glass cover tube Wet pyrolysis products Non-volatile residue (bio-char)

# Schematic of Parabolic Trough Receiver



Process Flow Diagram Illustrating How The Proposed Solar Assisted Pyrolysis System Could Be Integrated With A Wastewater Treatment Facility

**Circulation Fan** 

Concentrated Sludge

(~70% water)

Heat Exchanger

Combustion turbine

firing pyrolysis fuel

Superheated steam

Feedwater condenser

Solar Assisted Sludge Drying

Superheated steam

Dry pyrolysis gas

Bio-oil

Steam Turbine &

Generator

Dried Sludge

Condenser

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Parabolic Solar Collector

Solar Assisted Pyrolysis

Water gas

shift reactor

Electricity

#### Uses of a Transparent Aerogel

- Good Insulator.
- Excellent Radiative Properties.
- Increases the solar collector's thermal efficiency
- Cost Effective and Recyclable.

# **CONTRACT OF CONTRACT OF CONTRACT.**

#### Parabolic Solar Collector, from Wikipedia



# Benefits of Solar Assisted Pyrolysis of Sewer Sludge

Bio-oil and bio-gas fuels used as replacements for fossil fuels

- Electricity and associated CO2 reductions for wastewater treatment were computed to be 53%, by replacing fossil with bio-fuels.
- CH4 and N2O from sludge degradation in wastewater treatment systems could largely be reduced.
- Heavy metals trapped in bio-char are less susceptible to natural lixiviation (leaching) than heavy metals in ashes from combustion or in raw sewage sludge.
- The proposed process uses steam as the pyrolysis medium, which appears to offer benefits in terms of cost and process enhancement.