Pacific Northwest NATIONAL LABORATORY

Proudly Operated by **Battelle** *Since 1965*

Battelle Number(s):

15416-B

Patent(s) Issued

Available for licensing in all fields

U.S. DEPARTMENT OF ENERGY

Available Technologies

Introducing Fuel Oil into a Steam Reformer with Reduced Carbon Deposition

SUMMARY

The patent "Method and System for Introducing Fuel Oil into a Steam Reformer with Reduced Carbon Deposition" describes features of a steam reforming system that can reduce the tendency to deposit carbon within the system. The formation of carbonaceous deposits is a key concern when operating a steam reforming system on liquid fuel. The key features of the system include:

* A vaporizer capable of producing superheated steam at a steady rate without oscillations.

* A steam superheater that adds enough superheat to allow the fuel to be vaporized without condensing any steam.

* A fuel injection approach in which fuel is injected without preheating and is then atomized off the tip of a needle by superheated steam to produce a uniform mixture of fuel and steam while avoiding premature heating of the fuel in the absence of steam.

* A recuperative prereformer where the steam reforming reaction is started as the gas is heated to the temperature at the inlet of the steam reforming reactor.

* A steam reformer in which the wall of the inlet distribution header is lined with reforming catalyst to encourage reforming rather than pyrolysis of the hydrocarbon before entering the primary catalyzed reaction channels.

These features reduce the potential to form carbon. When combined with appropriate controls on the steam-to-carbon ratio and reformer temperature, it maximizes the potential to operate in a carbon-free manner.

ADVANTAGES

* Lower volatility hydrocarbon fuels with high boiling ranges -- such as home heating oil, diesel fuel, and JP-8 -- may be reformed to generate hydrogen
* Increases the efficiency of the reformate system as well as reduces the production of unwanted byproduct

* Reduces clogging and catalyst deactivation from carbon deposition

Patents & Intellectual Property

» Patent #: 7,862,633

Technology Portfolio(s)

» Fuel Cells

» Microtechnology

» Microsystems

Potential Industry Applications

» Aerospace & Defense

» Automotive & Transportation

» Energy & Utilities

» Oil & Gas

Dave L. Greenslade
Pacific Northwest National Laboratory
(509) 375-6555
david.greenslade@pnnl.gov
http://availabletechnologies.pnnl.gov

Pacific Northwest
NATIONAL LABORATORY

Proudly Operated by **Battelle** *Since 1965*