

Coal-based jet fuel poised for next step

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A jet fuel comparable to Jet A or military JP 8, but derived from at least 50 percent bituminous coal, has successfully powered a helicopter jet engine, according to a Penn State fuel scientist. "Because the fuel is 50 percent derived from coal, it could reduce our use of imported petroleum for this purpose by half," says Dr. Harold H. Schobert, professor of fuel science and director of Penn State's Energy Institute. "We have shown in tests that the mix can go to at least 75 percent coal."

The fuel, provisionally designated JP900, is produced in one of two processes under investigation by Schobert. The process uses light cycle oil – a petroleum byproduct -- and coal-derived refined chemical oil -- a byproduct of the coke industry. The researchers mix the two components and add hydrogen. When distilled, jet fuel comes off as a distillate. The process can be carried out in existing refineries with some retrofitting and small amounts of the leftover components will feed into various portions of the petroleum stream. The lighter portions will go to the pool of chemicals that make gasoline and the heavier ones go to the diesel or fuel oil streams.

"The combustion tests showed that JP900 meets or exceeds almost all specification for JP8 and Jet A," Schobert told attendees at the 231st meeting of the American Chemical Society today (March 27) in Atlanta, Ga.

These tests showed that JP900 has a flash point higher than required for JP8, a lower viscosity and freezing point and a higher smoke point. The coal-based fuel is lower in aromatics – such compounds as benzene and

toluene – than conventional jet fuels and is almost sulfur free. From an energy point of view, JP900 produces almost exactly the same Btu as JP8.

Not only does JP900 meet most of the specification for JP8, but it also has the high flash point required of JP5, naval jet fuel and the thermal stability of JP7, a high performance fuel.

While originally, this project began to develop jet fuel for the next generation of high performance aircraft that would require very thermally stable fuels. Now that fuel prices have soared and we need to lower fuel costs, develop secure fuel sources and decrease dependence on foreign oil, there is a major shift in thinking about fuel and its sources.

"The fact that our fuel is almost dead on to JP 8 is something that the Air Force likes," says Schobert. "This fuel was intended to be a high heat sink fuel, which it is, but it can also be used in existing engines."

The project now targets coal-based replacement for existing fuels with the hope that this will interest both commercial and military users. So far the Penn State project has produced 500 gallons of fuel in a pilot plant operated by Intertek of Warren, Pa. The Penn State researcher would now like to produce about 4,500 gallons, or about 100 barrels, of the fuel for future testing by the Air Force and others.

Source: Penn State

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