What is claimed is:

1. A system comprising:

a fuel separation system onboard a vehicle having an engine for generation of motive power, the fuel separation system comprising:

a mixer configured to mix a fuel stream with a solvent to form a mixed stream, the solvent having a higher affinity for a second component of the fuel stream than for a first component of the fuel stream;

a first separator configured to separate the mixed stream into (i) a first fuel fraction including the first component of the fuel stream and (ii) a mixed fraction including the second component of the fuel stream based on a difference in volatility of the first fuel fraction and the mixed fraction; and

a second separator configured to separate the mixed fraction into (i) a second fuel fraction including the second component of the fuel stream and (ii) a solvent fraction, the second separator in fluid communication with the mixer for recycling the solvent fraction to the mixer, wherein an output of the fuel separation system is connected to the engine, the output comprising at least one of the first fuel fraction or the second fuel fraction.

2. The system of claim 1, in which the first fuel fraction has a different auto-ignition characteristic value than the second fuel fraction.

3. The system of claim 1, in which the mixer is configured to mix the fuel stream with at least a portion of the solvent fraction from the second separator.

4. The system of claim 1, comprising a first heater configured to heat the mixed stream; and

in which the first separator is configured to separate the heated mixed stream.

5. The system of claim 4, in which the first heater comprises a heat exchanger configured to heat the mixed stream by exchange with the first fuel fraction from the first separator.

6. The system of claim 1, comprising a second heater configured to heat the mixed fraction; and

in which the second separator is configured to separate the heated mixed fraction.

7. The system of claim 6, in which the second heater comprises a heat exchanger configured to heat the mixed fraction by exchange with the second fuel fraction from the second separator.

8. The system of claim 1, in which the first separator comprises a flash distillation separator.

9. The system of claim 1, in which the second separator comprises one or more of a flash tank, a membrane, and an adsorption unit.

10. The system of claim 1, comprising a controller configured to control one or more of the first separator and the second separator based on an operating characteristic of the engine of the vehicle.

11. The system of claim 10, in which the operating characteristic of the engine comprises one or more of an engine load, an engine torque, and engine speed, a fuel vapor-liquid ratio, a fuel vapor lock index, a fuel drivability index, a fuel T90 or T95 property, a fuel lubricity, a fuel viscosity, and an engine speed-torque ratio.

12. The system of claim 10, in which the controller is configured to control one or more of the first separator and the second separator to provide fuel with a target auto-ignition characteristic value to the engine.

13. The system of claim 10, in which the controller is configured to control one or more of a temperature and a pressure of the first separator, the second separator, or both.

14. The system of claim 10, comprising an orifice fluidically coupled between the mixer and the first separator.

15. The system of claim 14, in which the controller is configured to control the orifice

based on the operating characteristic of the engine to vary a volumetric flow rate of the mixed stream.

16. The system of claim 1, comprising:

a first fuel tank coupled to the first separator and configured to store the first fuel fraction; and

a second fuel tank coupled to the second separator and configured to store the second fuel fraction.