Oil Dependency is Dominated by On-Road Vehicles

- Transportation is responsible for 2/3 of U.S. petroleum usage
- On-Road vehicles responsible for 80% of transportation petroleum usage
- Transportation 95% dependent on petroleum

- Economic security, energy security, and environmental stewardship
- Changing energy landscape
  - Natural gas
  - Electrification
  - Fuel Economy Standards
While There is Interest in Methanol as a Transport Fuel, it is not a Pathway Currently Pursued by DOE

- Office of Science does not have any projects that are trying to create methanol as an end fuel;
- EERE does not have methanol-for-transport projects; and
- ARPA-E has projects involving methanol as an intermediate step to produce DME and butanol.
Advantages of Methanol

• Methanol has a high octane rating (115 vs. 91-93 for premium gasoline). This higher octane rating and a high latent heat of vaporization of methanol could be used to increase the energy efficiency of turbocharged, direct-injection engines operating on a super-premium fuel (98+ octane).

• Methanol can be made from multiple feed stocks and is easily synthesized from natural gas, serving as a “natural gas carrier.”

• With low domestic natural gas prices, methanol could be produced at scale for a price less expensive per mile than gasoline. However, this would require large concurrent infrastructure costs necessary to enable widespread methanol use.

• With growing U.S. natural gas production, methanol would be a domestically-produced fuel, reducing U.S. oil imports.
Methanol as a Transportation Fuel also has Disadvantages

• Methanol has one-half the energy content of gasoline.
• Like ethanol, methanol is miscible in water, and cannot be transported through petroleum-product pipelines.
• Methanol is corrosive.
• Methanol has higher evaporative and cold start emissions than gasoline, E10, and E85.
• Methanol-compatible vehicles would increase vehicle production costs by several hundred dollars
• It could take a decade to sell enough methanol-compatible vehicles before a widespread methanol distribution network would be economically feasible
Methanol Competes with a Wide Variety of Alternative Fuel Choices
Fueling Infrastructure: How Can All Succeed?

- Diesel, B5 & B20 Biodiesel
- L1 & L2 Electricity
- Premium, E0-E10-E15
- 5,000 psi H2
- CNG
- Propane
- Methanol
- DC Fast Charge
- E85 Ethanol
- 10,000 psi H2
- LNG
- Liquid H2
Competing Pathways for Natural Gas in Transportation

- CNG/LNG
- GTL Pathways
- The cost advantage of methanol vs GTL gasoline (or other “drop-in” alternatives) is not strong
- Commercial GTL plants do not have a strong financial history

![Diagram showing competing pathways for natural gas in transportation](image-url)
Concluding Remarks

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