The best route to E-SAF: a high-level, qualitative comparison between FTS and MTK*

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	MTK/MTJ	FTS	Notes
Product cost (capex, CO_2 and green hydrogen)	With full process integration, MTK can result in circa 10 % less cost than FTS.		In both cases, the E-SAF cost depends on how much of the operating and feedstock cost is borne by steam export, non-SAF co-products and the e-SAF selectivity.
Overall energy efficiency of fuel production	Circa 10 % less energy is consumed.		In both cases, some LP steam export is possible. These efficiencies rely on good internal process integration. The efficiencies here are declared on the combined energy value of all products, not just the SAF target product.
Pathway is certified?	Not yet. Application in process.	Yes.	MTK likely to achieve certification in 2025.
E-SAF selectivity	Using modern catalysts and fluidised bed reactor for MTK, it is expected that circa 10% more e-SAF(than FTS) can be produced from the same H_2/CO_2 inputs.	E-SAF selectivity is heavily dependant on the FTS catalyst choice and the extent of downstream processing (hydrocracking, hydrotreating).	As a generalisation, the FTS route is likely to yield heavy waxes as the co-products, where the MTK is more likely to yield lighter products such as gasoline.
rWGS required?	No. Direct hydrogenation of CO_2 to methanol is possible and proven.	Yes. Direct CO_2 hydrogenation FTS catalysts are at very low TRL.	Reverse water gas shift at scale is unproven. Risks exist. Reactor coking is possible and undesirable.
Isomerisation required?	Yes, probably.	Yes, probably.	In both cases, catalyst innovation may reduce downstream processing needs in the future.
Blending with aromatics required?	Yes, probably.	Yes, probably.	In both cases, catalyst innovation may reduce downstream processing needs in the future.
Process can be split	Split is at methanol, a chemical intermediate and e-fuel. Centralised MTK (on new assets) would allow decentralised methanol production.	Split at e-crude, or syncrude. Centralised syncrude refining on established refineries may be possible.	Splitting the process allows decentralised e-methanol and syncrude projects close to renewable power. Splitting can also allow a phased approach to capex.
Plot size	Liquid and solid emissions are less than FTS.	A large amount of the plot size will be FTS water treatment. Spent FTS catalyst must also be disposed of and may require large settling ponds.	Includes electrolyser and waste-water treatment, excludes renewable power generation.
Proven at scale	MTG was operated by ExxonMobil in NZ for many years to produce gasoline on fixed bed reactors via DME. For MTK a fluidised bed with a different catalyst may be preferred.	FTS conversion for CTL and GTL has been operated at many sites in the Middle East, SE Asia, China and South Africa for decades.	For decentralised MTK, established technologies must be scaled down. For decentralised FTS, established technologies must be scaled down.

*High level, generic approach, based on sbh4 consulting's qualitative and quantitative experience and expertise. All projects are unique and must be evaluated across safety, environmental, operational, technical, financial, economic and risk aspects according to the project parameters. Concept and model can be adjusted by other experts to refine towards their perceptions and views.