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Abstract	<p>The long-term future of aviation will be largely determined by its ability to serve a growing mobility demand, to minimize its impact on climate change and to substitute its fuel from limited fossil resources by sustainable, renewable alternatives with high supply security. To date, no single alternative solution is in sight that presents a promising perspective pertaining to all of the criteria of suitability, sustainability and scalability. Therefore, an objective, reproducible and transparent approach is needed in order to assess and prioritize existing and future jet fuel alternatives. In this work an assessment method is described, which is based on a set of seven criteria: fuel readiness level, drop-in capability, production costs, substitution potential, well-to-wake greenhouse gas emissions, local air-quality emissions and habitat requirements. To each criterion a metric is assigned to translate the fuel information into a characteristic score. A third decision level, independent of the metric, is the weighting of the criteria by a scenario-dependent factor in order to allow context-specific assessments.</p>