



Integrating alternative fuels into the airport setting

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THE SCIENCE OF HARMONIZING AIR TRAFFIC

Airports play key role in alternative fuels



- **Airports are nodes of multi-modal demand for fuel**
 - Airports attract a diverse group of fuel users:
 - Aircraft
 - Ground transportation (land side, ground side)
 - Other (e.g. rail, marine, military)
- **Airports can support alternative fuels by**
 - Including alternative fuel as part of their sustainability strategy
 - Bringing together local stakeholders – airlines, fuel producers, feedstock providers, government entities, other
 - Helping stakeholders understand project risks and develop the business case
 - Championing projects during planning stages
 - Making land and infrastructure available

ACRP and Alternative Fuels research



- **ACRP has produced a number of resources on alternative fuels and related topics:**

Greenhouse gases at airports (GHG)

GHG Inventories
(Report 11)

GSE emissions
(Report 78)

Reduction strategies
(Report 56)

Construction emissions
(02-33)

Alternative fuels

Costs and benefits
(Report 46)

PM2.5 reductions
(Web-only Document 13)

Report 60: Guidelines for Integrating Alternative Jet Fuels into the Airport Setting

02-36: Assessing Opportunities for Alternative Fuel Distribution Programs

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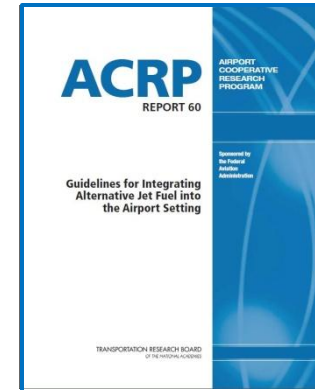
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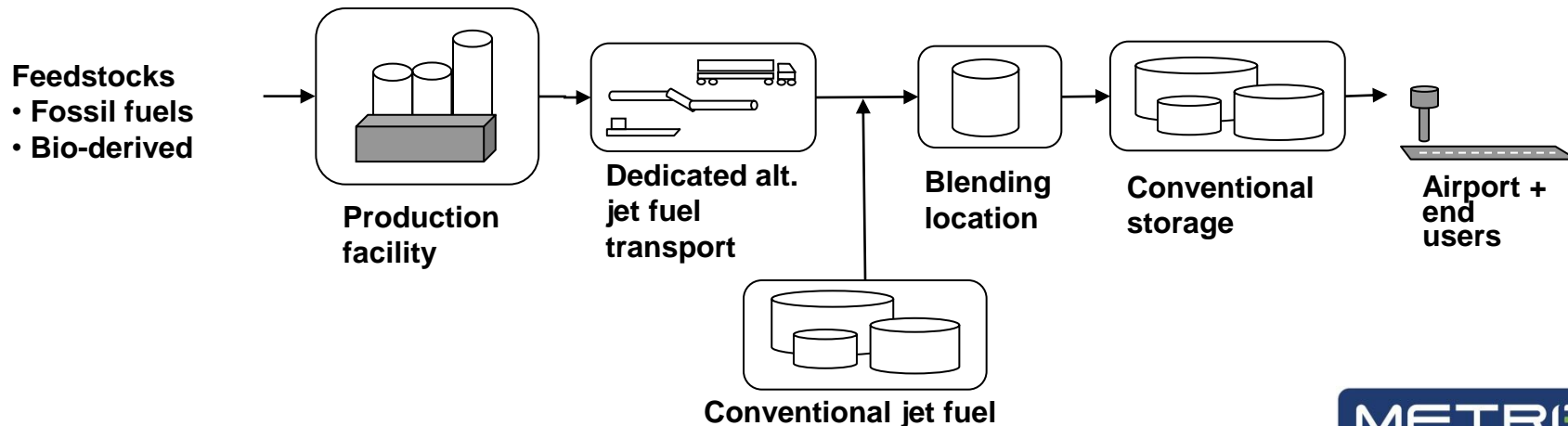
Report 60: Guidelines for Integrating Alternative Jet Fuels into the Airport Setting



- **Focus on introducing alternative jet fuel to airports**
 - Considers entire supply chain from feedstock to aircraft
 - All links in the chain need to be successful for projects to occur
 - Emphasis on understanding main factors for project success:
 - Regulatory
 - Environmental
 - Logistical
 - Financial and business case



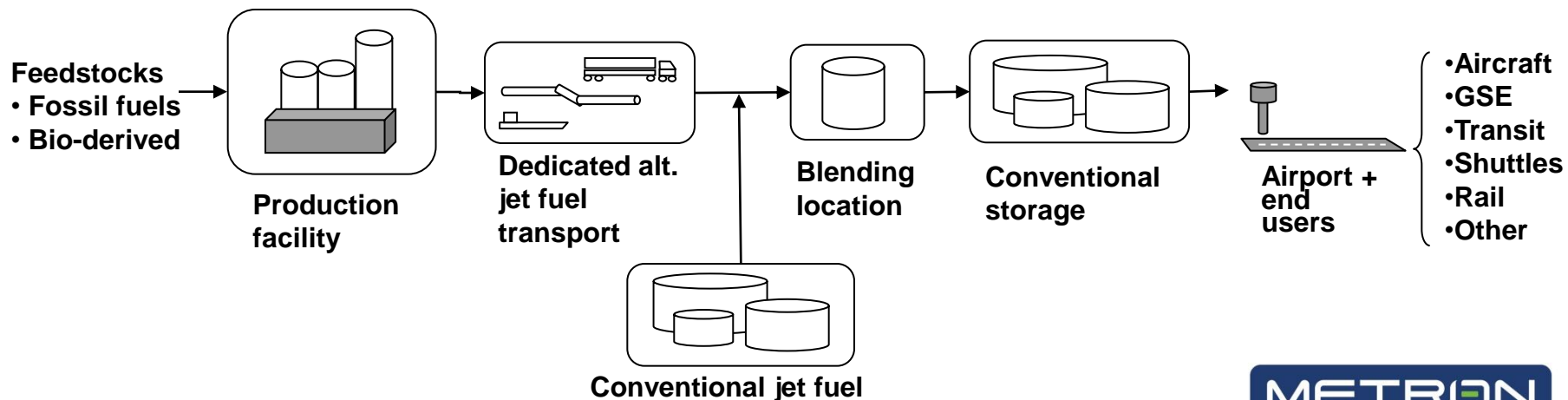
<http://www.trb.org/ACRP/ACRP.aspx>



ACRP 02-36: Assessing Opportunities for Alternative Fuel Distribution Programs



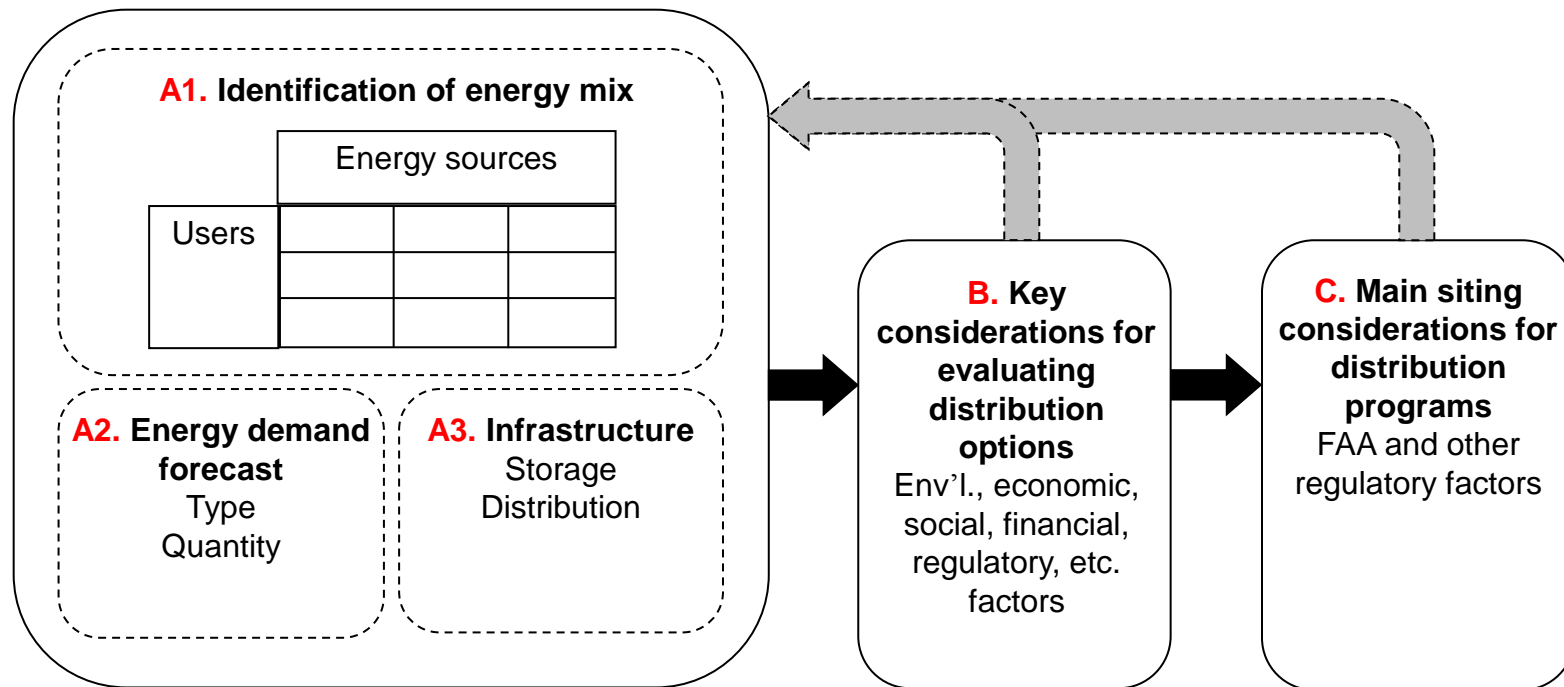
- **Focus on introducing multiple types of alternative fuels**
 - Follow-on to ACRP 02-18 project
 - Focus on airports as distribution hubs for multiple products of alternative fuel facilities
 - Develops evaluation tool of alternative fuels for multi-modal use:
 - Alternative jet fuel → airlines
 - Green diesel, CNG, electric, etc. → rental cars, transit, airport vehicles, back-up generators, other ground users



ACRP 02-36: Overview of evaluation framework



- **Framework is based on understanding current energy use at the airport and projecting possible future uses**
- Process divided in three main parts:
 - A. Understanding energy use (current and projected)
 - B. Evaluation of distribution options
 - C. Analysis of siting considerations



ACRP 02-36: Energy matrix



- **Energy matrix captures energy use at airport**
 - “Current” sheet: existing demand
 - “Future” sheet: projected energy use and “what-if” scenarios

		Energy demand	Conventional jet	Alternative jet	AVGAS	Gasoline	E85	Diesel	Green diesel	Biodiesel B20	CNG	LPG	Electricity	Custom 1	Custom 2	Custom 3	Total Mix		
Aircraft		* Passenger jet aircraft																	
		* Cargo jet aircraft																	
Vehicles	Airside	GSE																	
		Airport Vehicles																	
	Groundside	Private Vehicle	* Passenger																
		Passenger Light-Duty (Fleet)	* Rental Cars																
			* Taxis																
			* On-Demand (Limos)																
		Scheduled Bus/Van	* Passenger																
		Courtesy Vans	* Passenger																
		Rail	Passenger																
			Employee																
Buildings / Other	Off-airport	Freight																	
	Airport Buildings	Systems																	
		Custom																	

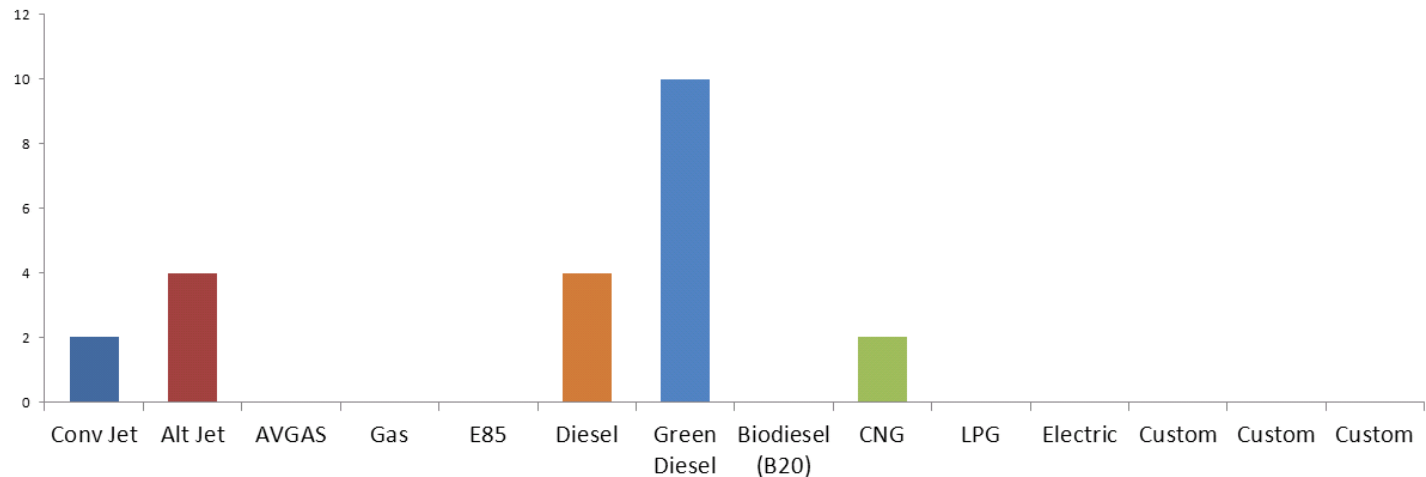
* Calculated field

ACRP 02-36: Evaluation matrix



- Enables comparison of fuels along several categories

Workbooks	Weight	Conv Jet	Alt Jet	AVGAS	Gas	E85	Diesel	Green	Biodiesel	CNG	LPG	Electric	Custom	Custom	Custom
								Diesel	(B20)						
Benefits	1	0	6	0	0	0	2	6	0	2	0	0	0	0	0
Costs	1	2	-2	0	0	0	2	4	0	0	0	0	0	0	0
Financial	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Legal	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Community	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Siting	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAND TOTAL:		2	4	0	0	0	4	10	0	2	0	0	0	0	0



Case study: Charleston, SC (CHS)



- **CHS interested in understanding the energy demand of its main users and exploring alternative fuel options**
- **Obtained 2011 fuel data:**
 - Aircraft (air carriers, GA)
 - Passenger GSE
 - Airport vehicles

User		Fuel type	Fuel use in 2011 (000 gal)
Aircraft	Passenger jet aircraft	Jet A	17,300
	GA jet aircraft	Jet A	2,800
	GA piston aircraft	Av Gas	152
Airside vehicles	Passenger GSE	Unleaded gasoline	8
		Diesel	49
	Airport vehicles	Unleaded gasoline	24
		Diesel	3

- **Considered three scenarios for alternative fuel introduction by 2015:**
 - Baseline – energy-mix unchanged from 2011
 - Moderate switch to alternative fuels
 - Aggressive switch to alternative fuels

Case study: Charleston, SC (CHS) (cont'd)



- **Sample results for 2015 scenarios:**

Scenario	Conv. Jet A (000 gal)	Alternative jet fuel (000 gal)	AvGas (000 gal)	Gas (000 gal)	Diesel (000 gal)	Green diesel (000 gal)	Biodiesel (000 gal)	CNG (000 gal)	Electricity (kWh)
Baseline	22,512	--	157	38	58	--	--	--	--
Moderate	22,120	392	157	23	3	38	11	81	--
Aggressive	20,261	2,251	157	6	3	19	11	81	1,282

- **General observations from switch to alternative fuels:**

- Total jet fuel consumption projected to increase 13% from 2011 - no additional infrastructure required for alternative jet fuel
- Gasoline and diesel use projected to decrease significantly; handling facilities could be re-purposed
- New facilities for biodiesel and CNG would be required

Conclusion



- **Alternative fuels for both air and surface transportation use of increasing interest to airports**
- **Recent ACRP reports offer practical guidance for airports interested in understanding their potential and implementation:**
 - **Report 60:** *Guidelines for Integrating Alternative Jet Fuels into the Airport Setting*
 - analysis of alternative jet fuel projects
 - **ACRP 02-36:** 02-36: Assessing Opportunities for Alternative Fuel Distribution Programs
 - considers entire energy mix at airports



Thank you

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