

Biofuel Standards & Quality Needs

2nd International Conference on Biofuels Standards *Brussels, March 19-20, 2009*

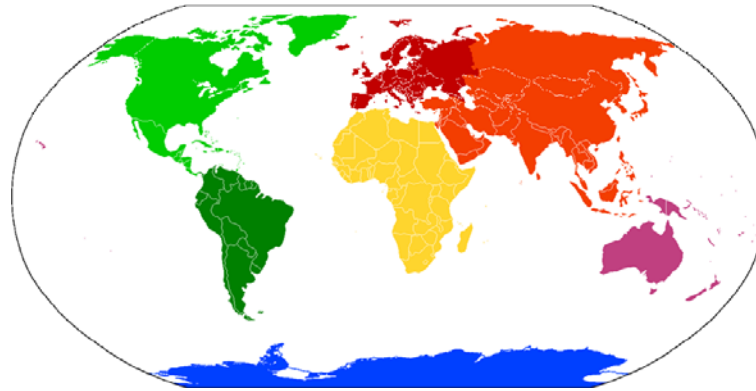
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Presentation Overview

- ❑ IFQC – who are we?
- ❑ Biofuels quality context
- ❑ Biofuels limits and standards
- ❑ Conclusions: Quality remains an issue!





Biofuels Quality Context



Biofuels Quality in Context

Biofuel drivers:

- ✓ Agriculture
- ✓ Energy security & diversification
- ✓ Climate Change



Biofuels use:

- ✓ Distribution and infrastructure
- ✓ Systems approach
- ✓ Vehicle performance
- ✓ Emission Limits
- ✓ Consumer Acceptability



Biofuels production:

- ✓ Feedstock
- ✓ Process Technology
- ✓ GHG LCA
- ✓ Social & Env. Sustainability





Typical Feedstock for Biofuel Production



Source: Global Biofuel Center, 2008

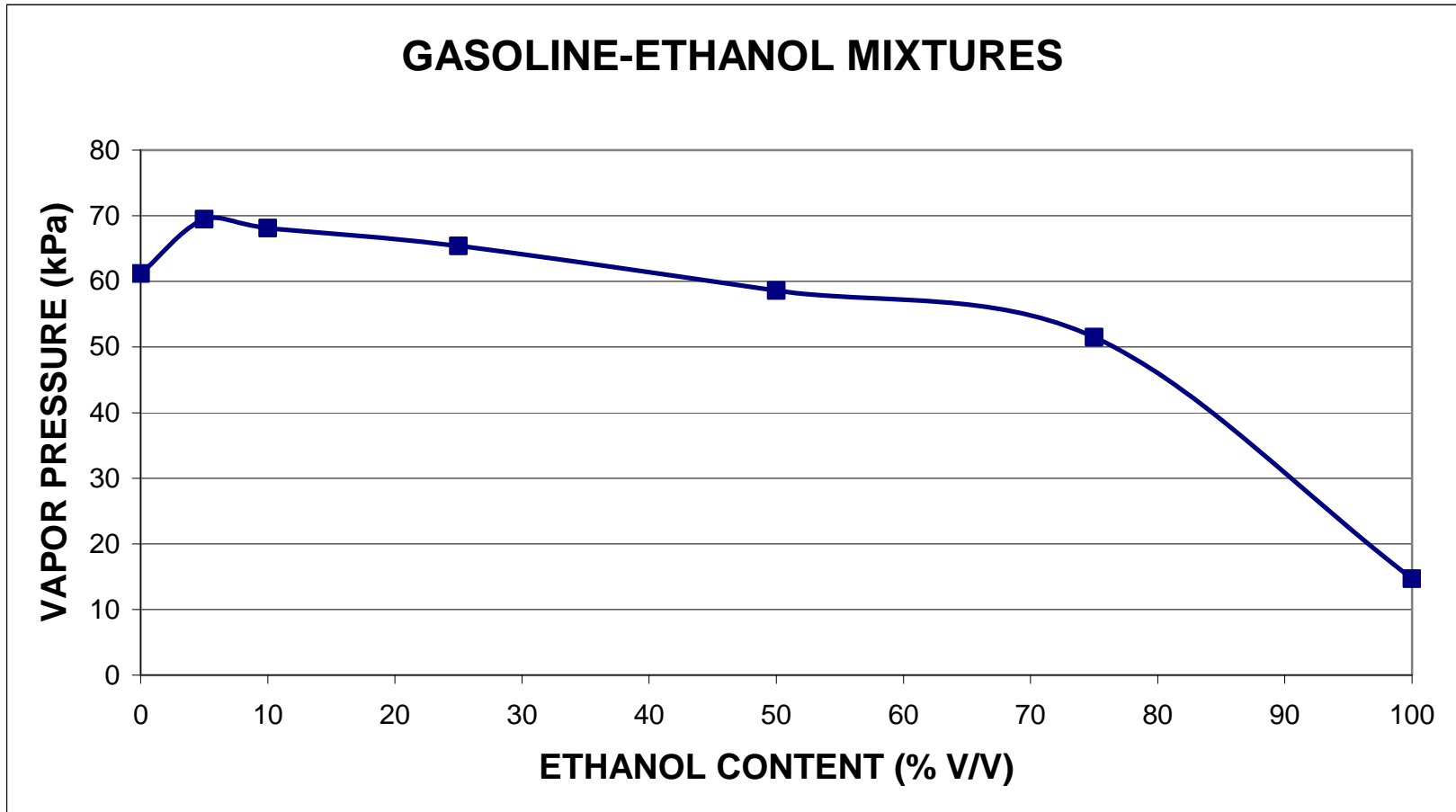


Biodiesel Quality Issues

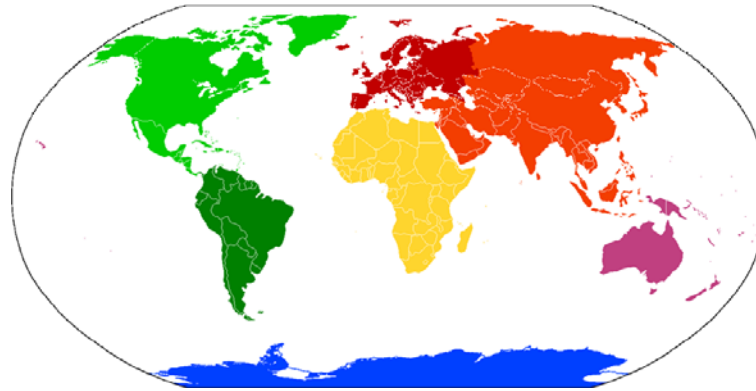
Property	Problem
Cold Filter Plugging Point (CFPP)	Precipitation (winter, sometimes even autumn)
Water	Corrosion, fungus
Total contamination	Filter plugging
Oxidation stability (induction time)	Filter plugging



Ethanol Quality Issues



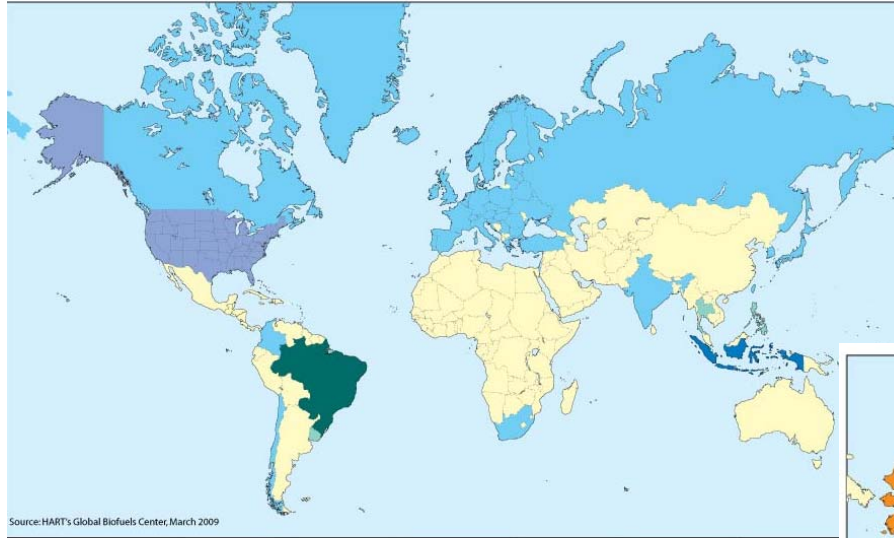
Source: Ford Motor Company, 2007



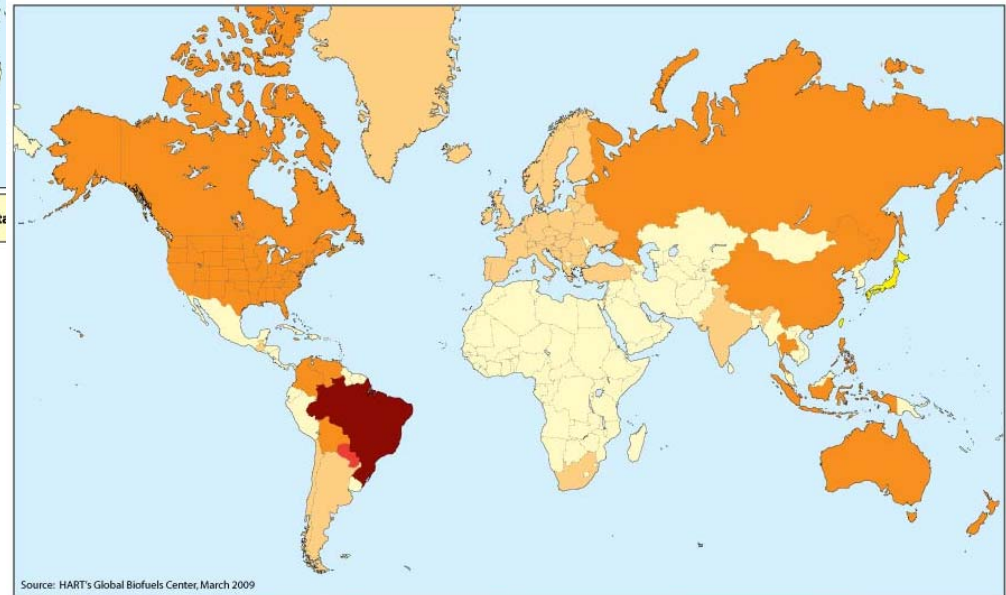
Biofuels Quality & Standards Regional Overview



Blending Limits



Ethanol blend limits established by law and/or standards

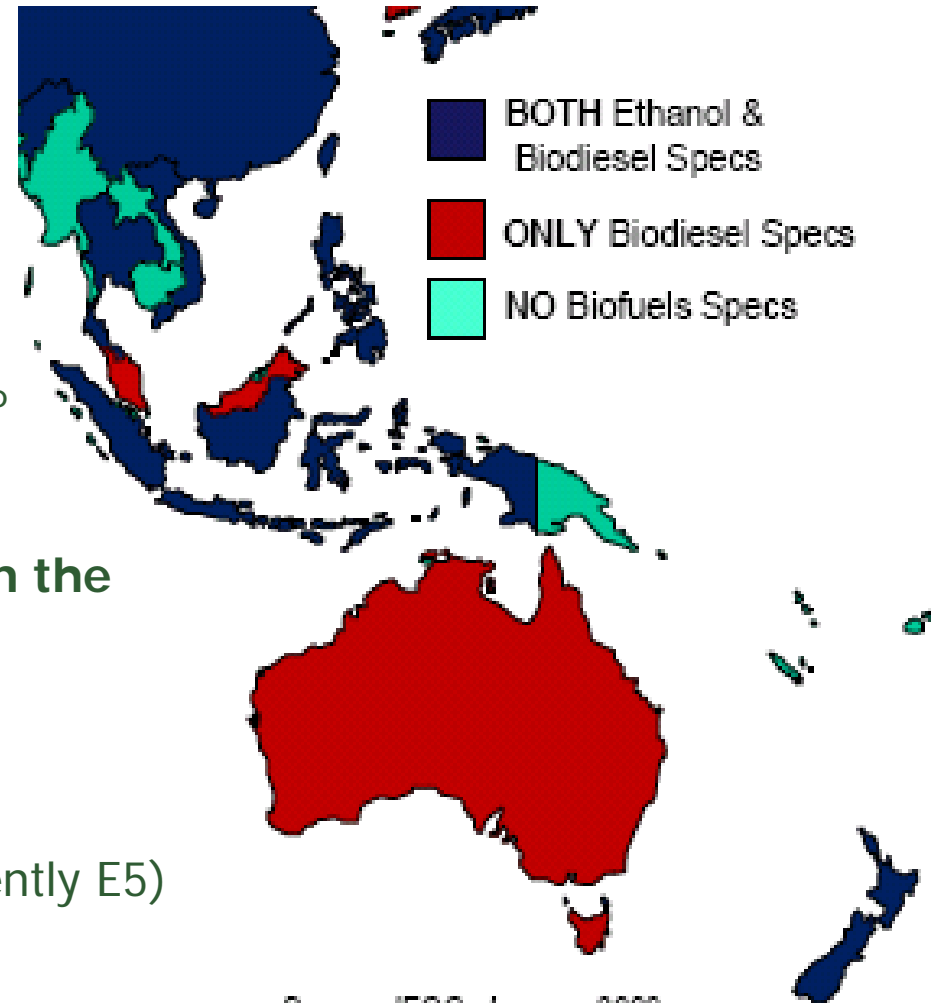


Biodiesel blend limits established by law and/or standards



Asia Pacific

- ❑ Most countries have set ethanol and biodiesel standards, some separate blend specs
- ❑ Common ethanol and biodiesel blending limits at 10 vol% and 5 vol%



Source: IFQC, January 2009

Few ethanol and biodiesel blends in the market:

- ✓ lack of infrastructure
- ✓ old vehicles
- ✓ many different feedstocs
- ✓ India: car industry against E10 (currently E5)



CIS

- ❑ Limited biofuels market
- ❑ Ethanol and Biodiesel blends specs follow EU specifications



Middle East

- ❑ No biofuels limits, no standards

Africa

- ❑ Various feedstocks (sugar cane, jatropha, also cassava and palm oil) – quality issues
- ❑ Biofuels projects in 24 countries (mainly Southern East and West)
- ❑ South Africa: Ethanol and biodiesel specs and legislation on blending limits





Europe (1)



	Targets for biofuels or other renewable fuels in transport	ethanol	biodiesel
Current situation in the EU	5.75% by 2010	E5	B5
	Dir. 2003/30/EC	<ul style="list-style-type: none"> • Fuel Quality Directive • EN 228 	EN 590
Current situation in Member States (MS)	<ul style="list-style-type: none"> • below national targets • in some MS - 5.75% in 2008/9 	E 85	B7, B20, B30
	national legislation	National legislation and/or standards	National legislation and/or standards
Future situation in the EU	10% in 2020	E10	B7 (or more)
	Directive on the promotion of energy from renewable sources (RES Directive)	<ul style="list-style-type: none"> • Directive on fuel quality and GHG emission reduction • EN 228 	<ul style="list-style-type: none"> • Directive on fuel quality and GHG emission reduction • EN 590



Europe (2) Gasoline



ethanol

- E10 (max 10%v/v ethanol, max 3.7%m/m oxygen)
- E5 (max 5%v/v ethanol, max 2.7%m/m oxygen) obligatory until 2013, possible after 2013 (MS decision)

RVP

MS with low ambient summer temperatures may permit RVP max 70kPa, if:	MS with RVP max 60kPa may permit RVP waiver for gasoline containing ethanol, if:
<ul style="list-style-type: none">• Notification to the European Commission (EC) with all relevant information;• EC assessment: socioeconomic problems avoided, environmental or health consequences;• No objections from EC.	
	Ethanol is a biofuel



Parameter	Unit	Current Specifications 2008		FQD Final compromise text	
		Limits		Limits	
		Minimum	Maximum	Minimum	Maximum
Research octane number		95		95	—
Motor octane number		85		85	—
Vapour pressure, summer period	kPa	—	60/70	—	60+waiver/70
Distillation:					
— percentage evaporated at 100 °C	% v/v	46,0	—	46,0	—
— percentage evaporated at 150 °C	% v/v	75,0	—	75,0	—
Hydrocarbon analysis:					
— olefins	% v/v	—	18,0	—	18,0
— aromatics	% v/v	—	35,0	—	35,0
— benzene	% v/v	—	1,0	—	1,0
Oxygen content	% m/m	—	2,7		3,7
Oxygenates					
— Methanol		—	3		3
— Ethanol (stabilising agents may be necessary)	% v/v	—	5		10
— Iso-propyl alcohol	% v/v	—	10	—	12
— Tert-butyl alcohol	% v/v	—	10	—	15
— Iso-butyl alcohol	% v/v	—	7	—	15
— Ethers containing five or more carbon atoms per molecule	% v/v	—	15	—	22
— Other oxygenates ⁽⁶⁾	% v/v	—	10	—	15
Sulfur content	mg/kg	—	50/10	—	10
Lead content	g/l	—	0,005	—	0,005



Europe (4) Diesel



FAME

- Up to 7%v/v
- higher level if Member State decides
- No limit for other biofuel components (e.g. hydro-treated vegetable oil)



Europe (5)



Parameter	Unit	Current Specifications 2008		FQD Final compromise text	
		Limits		Limits	
		Minimum	Maximum	Minimum	Maximum
Cetane number		51,0	—	51,0	—
Density at 15 °C	Kg/m ³	—	845	—	845
Distillation:					
— 95% recovered at:	°C	—	360	—	360
Polycyclic aromatic hydrocarbons	%m/m	—	11	—	8
Sulfur content	mg/kg	—	50/10	—	10
FAME content- EN 14078	%	—	—	—	7



North America

Canada

- nationwide standards for E10 and B5
- nationwide strategy announced by the government:
 - ✓ at least 5 vol% - average renewable fuel content in gasoline pool as of 2010, and
 - ✓ at least 2 vol% - average renewable fuel content in diesel and heating oil as of 2012 (under conditions)



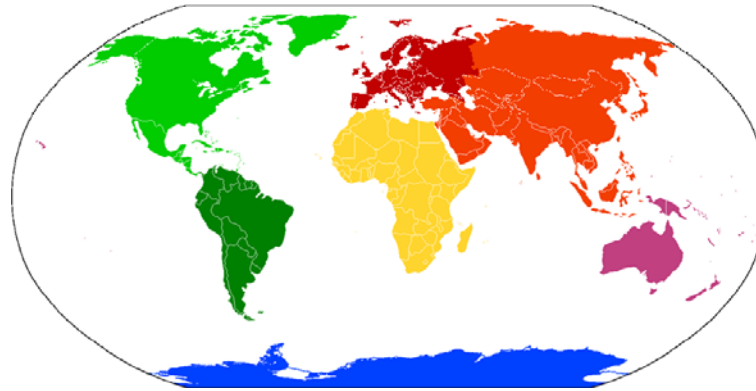
United States

- "Renewable Volume Obligation" for each operator
- up to 10 vol% ethanol in gasoline (E10) allowed by federal gasoline regulations
- nationwide standards for E85, B5, B6-B20

Latin America & Caribbean

- most countries have set ethanol and biodiesel specs
- some countries have separate blend specs (e.g. Brazil, Columbia, Paraguay)





Biofuels Quality & Standards Conclusions



Ensuring Biofuel Product Quality

- United States: B20 and B5 standards before ASTM
- Japanese METI finds **neither ASTM nor CEN standards are acceptable** for Japan because of oxidation stability, corrosion and acid value.
- EU: EN14214 iodine issue, stability issues reported by refiners, AGQM founded to survey quality. New EU EBB system
- B7 introduced in EU as B10 problem for many car companies regarding clogging and cold flow issues
- B5 decrease to B2 in Sweden (B2 kept in South only)
- Biodiesel not used in Italy Alpine
- Water and fungal development major issue and reason for stopping marine applications in Sweden
- E10 suitable for new vehicles only
- Problems with RVP even with E5



Biofuel Product Quality Issues

❑ Standardization: Biodiesel & Ethanol



❑ Must enable vehicles to meet emission rules



❑ Market product must meet quality requirements





Thank you

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