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Middle East Fuel Quality Overview

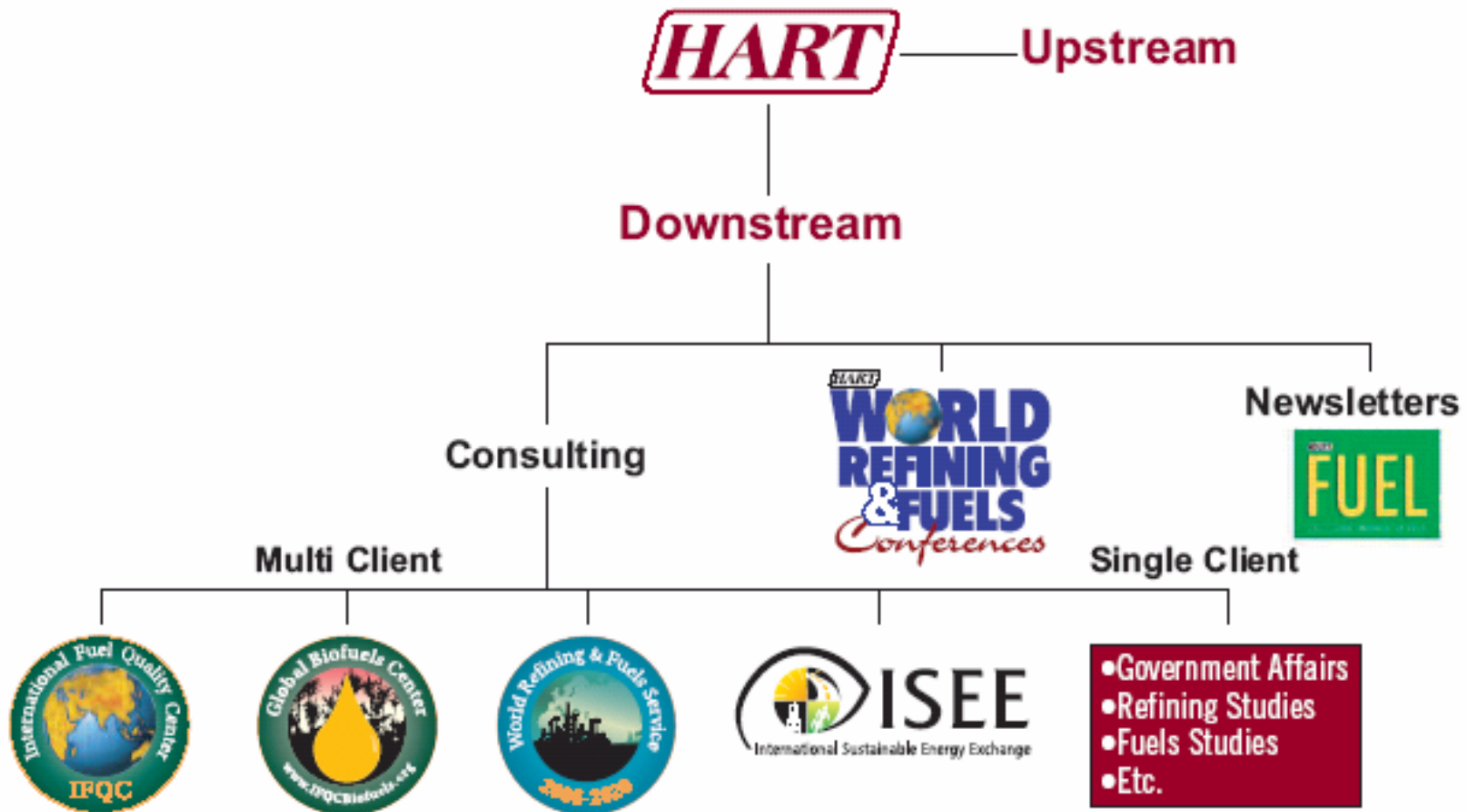


***Presented to UNEP Jordan
National Post Lead Workshop***

***July 24, 2008
Amman, Jordan***



Hart Organizational Chart





IFQC Members





Presentation Overview

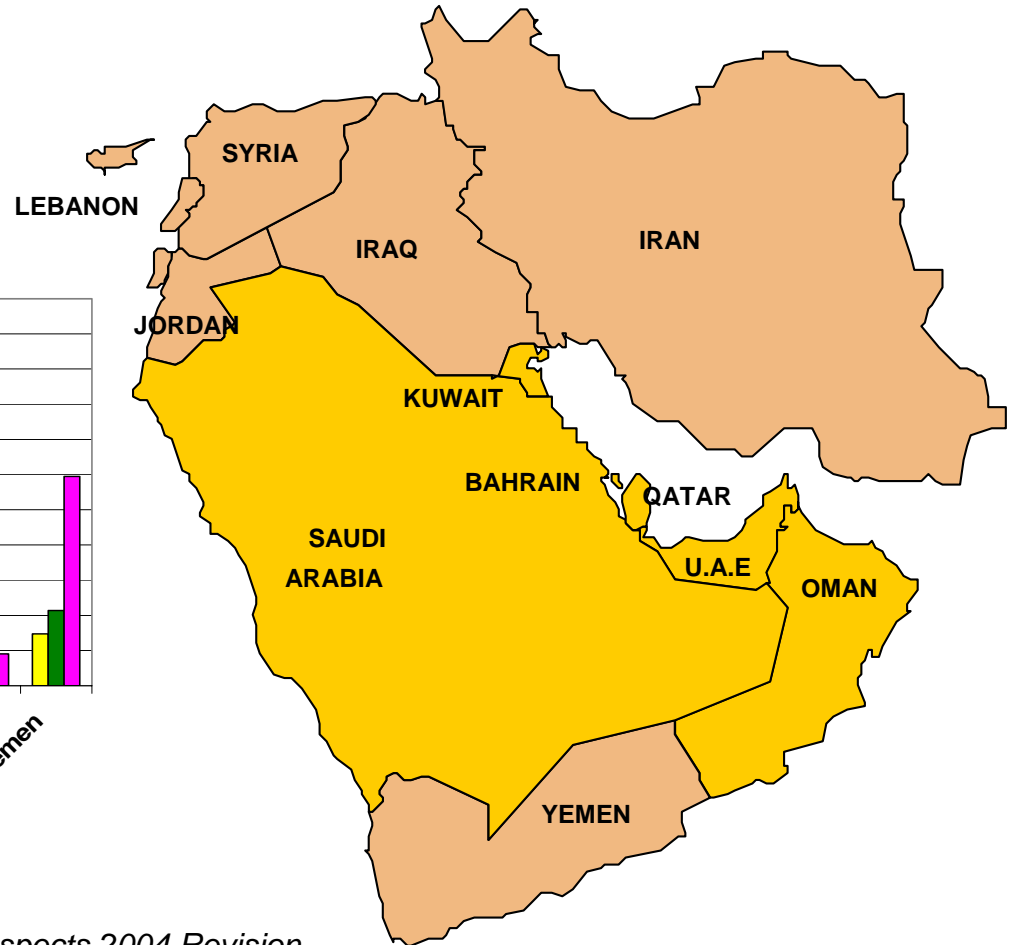
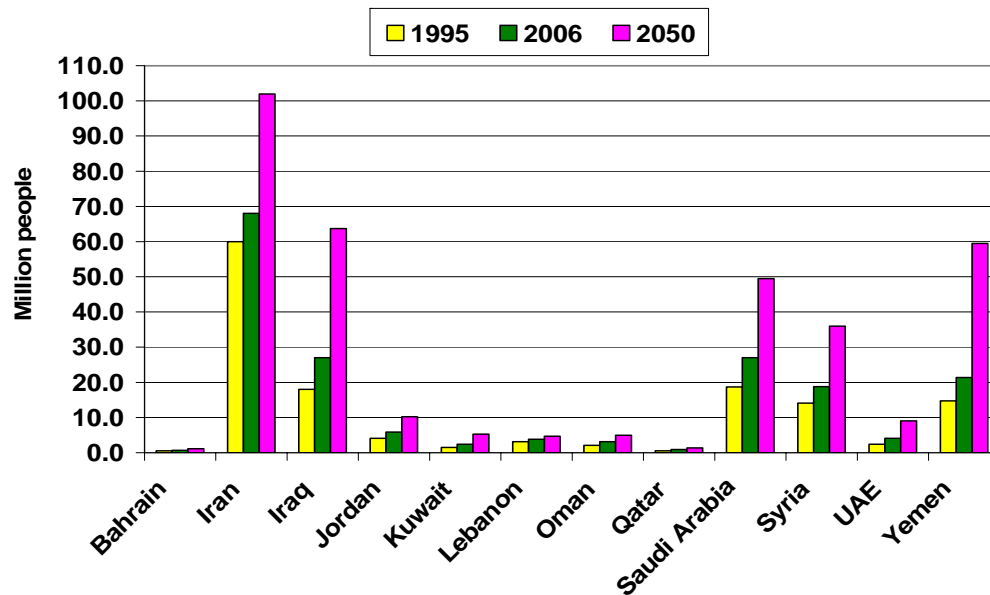
- ✓ **Current Fuel Quality Specifications in the Middle East**
- ✓ **Regional Fuel Quality Issues**
- ✓ **What Will Happen by 2010 and beyond?**
- ✓ **Jordan's Fuel Quality Specifications**





Middle East is not a “one policy” region yet— Generally Aiming to Harmonize Fuel and Emissions Regulations with EU

Gulf Countries Population Growth 1995 - 2050



Source: www.geohive.com / EIA / UN World Population Prospects 2004 Revision



Petroleum exports a significant share of GDP in most countries

✓ **The Co-operation Council for The Arab states of the Gulf (GCC)**

- Formed in 1981 to coordinate cooperation between its member states on economic, politic, culture and security policy across a wide variety of industries to foster economic growth and prosperity;
- Consists of: Saudi Arabia, Kuwait, Qatar, Bahrain, U.A.E and Oman;
- Aims to produce clean fuels (Euro IV/V equivalent specifications) by 2015.

✓ **The Gulf Standards Organization (GSO)**

- Produce mandatory emissions standards for **new** vehicles in the GCC member countries;

Euro II – gasoline engine passenger car

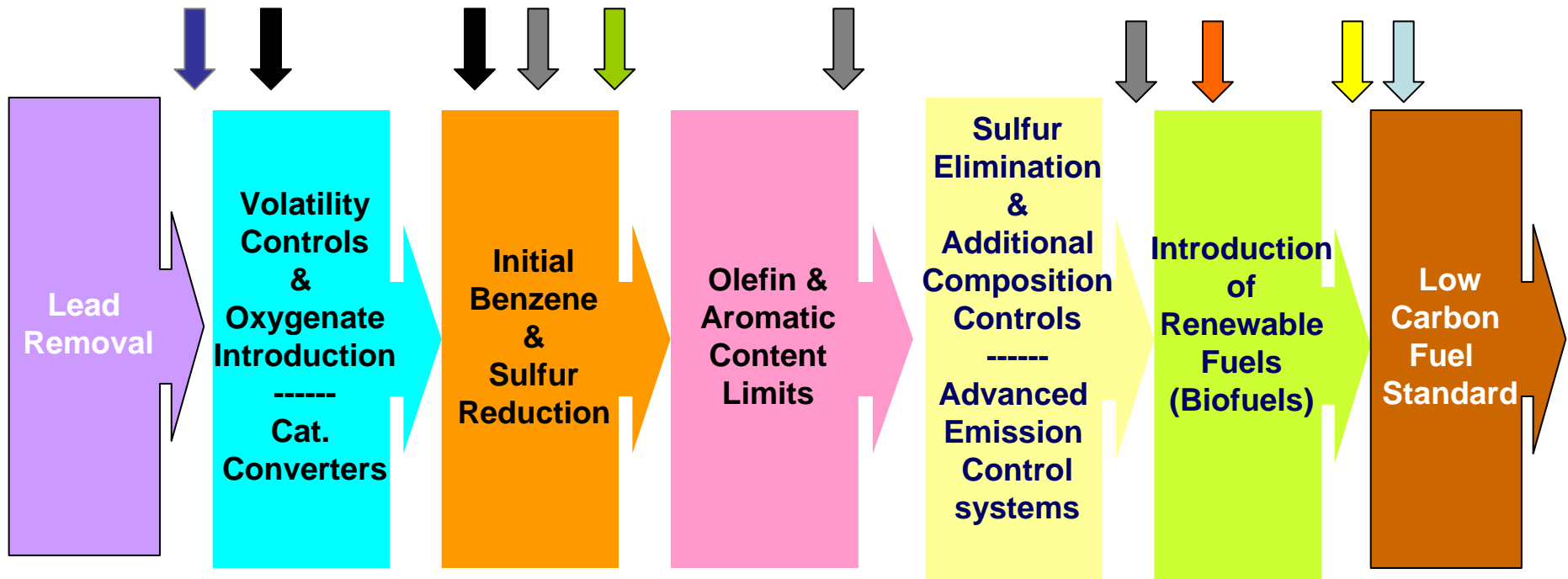
Euro I – gasoline LDV commercial, diesel passenger cars

Pre-Euro – diesel HDV

- Recommended voluntary fuel quality standards for the GCC member countries of Euro III by 2010



Global Fuel Quality Developments



Objective:
Control Emissions of Traditional Air Pollutants

Objective: Energy Security & CO₂ Reduction

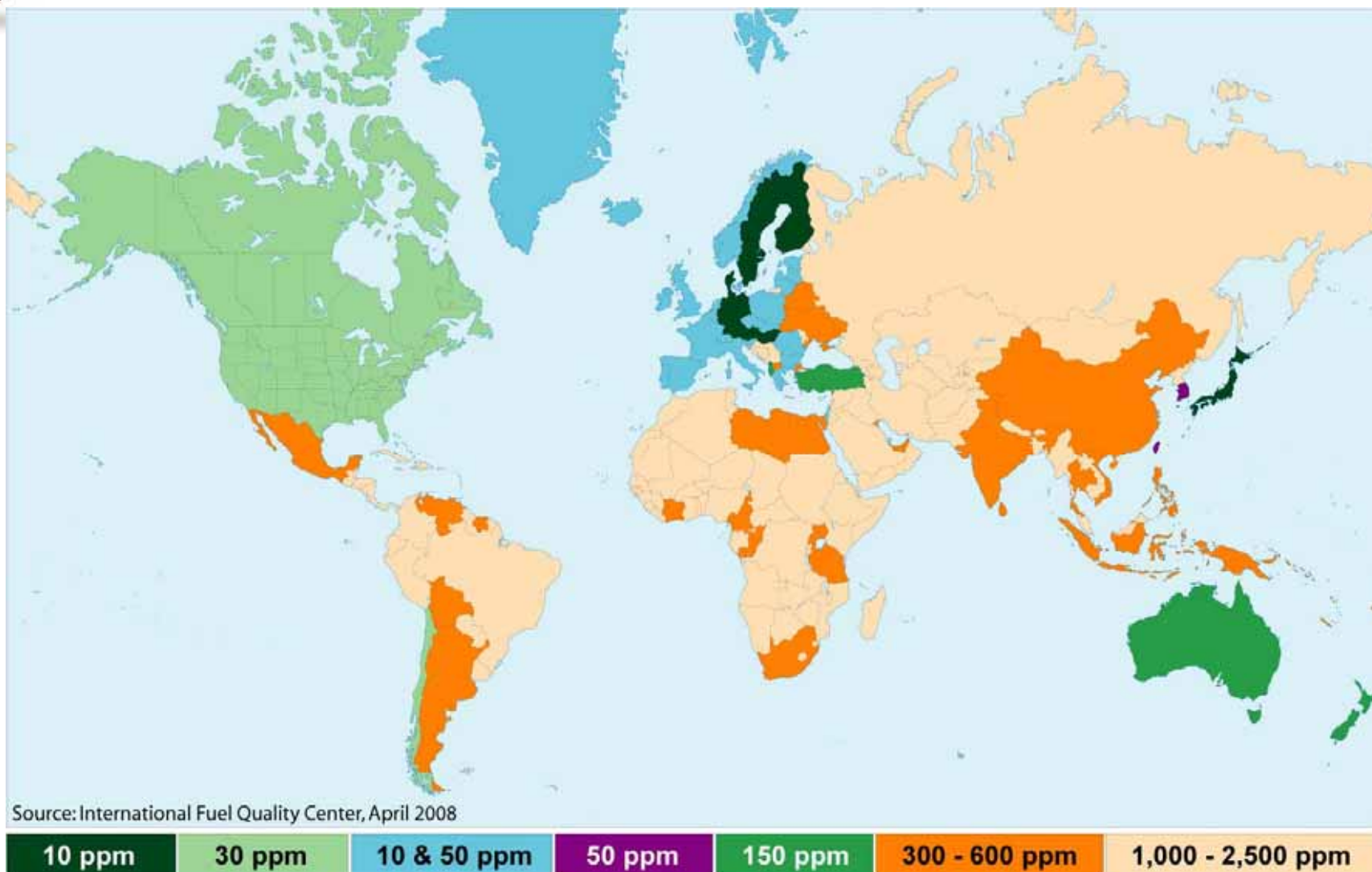
Current Status



Source: International Fuel Quality Center 2008



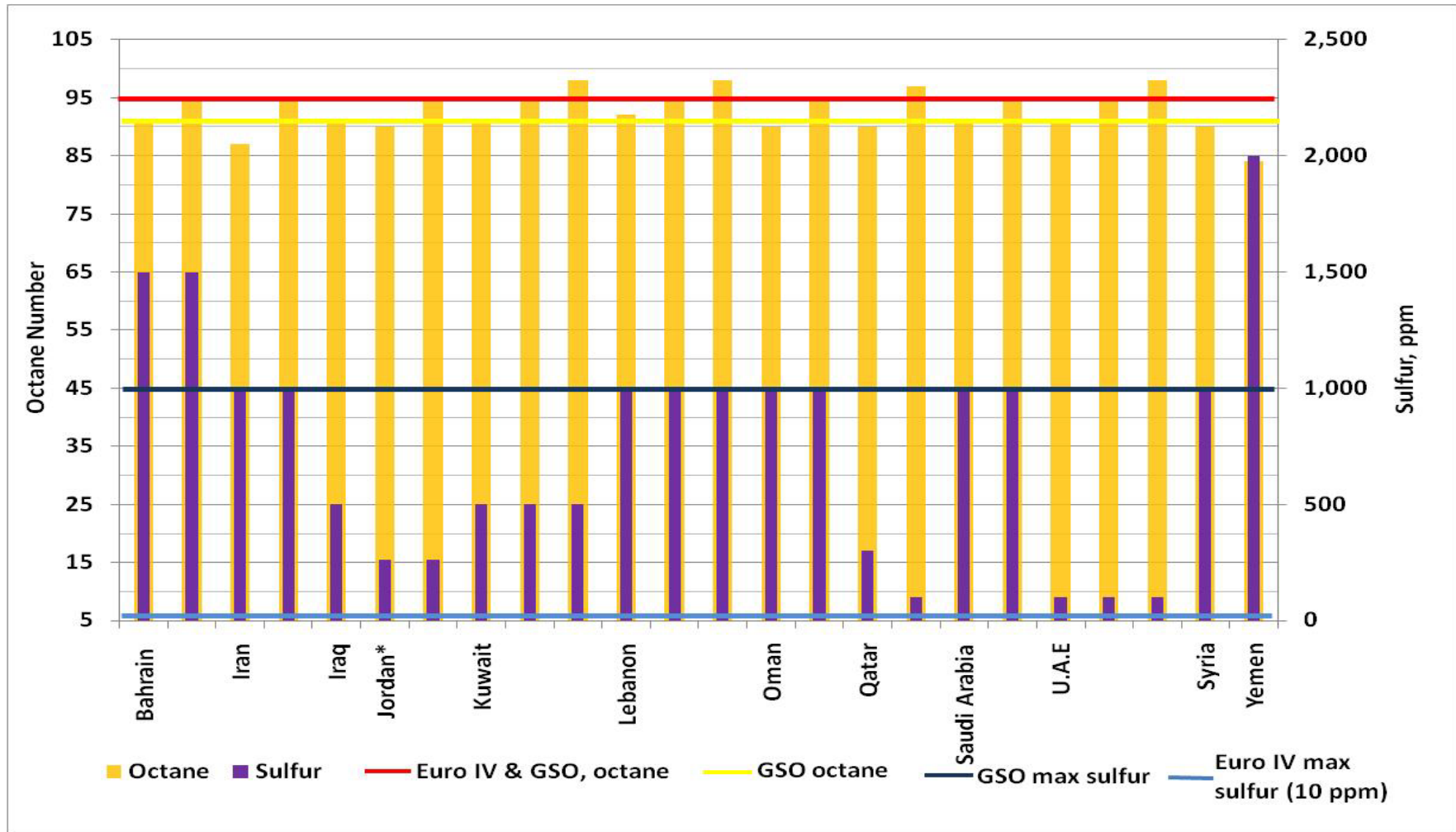
Gasoline Max Sulfur Limits



Note: Where available/applicable, sulfur levels are based on early implementation of lower sulfur gasoline.



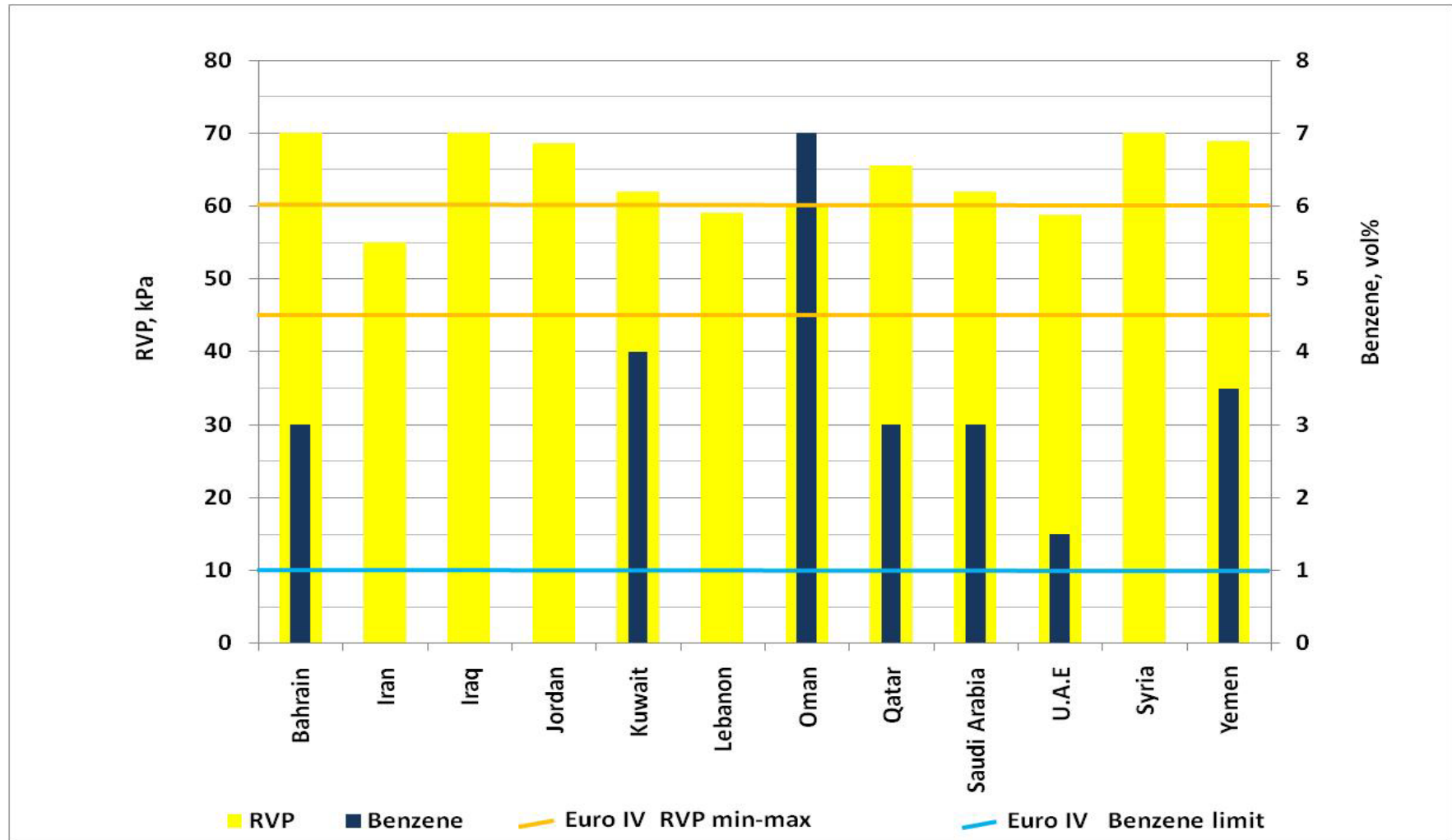
Comparison of Sulfur and Octane in Gasoline



Source: International Fuel Quality Center, 2008



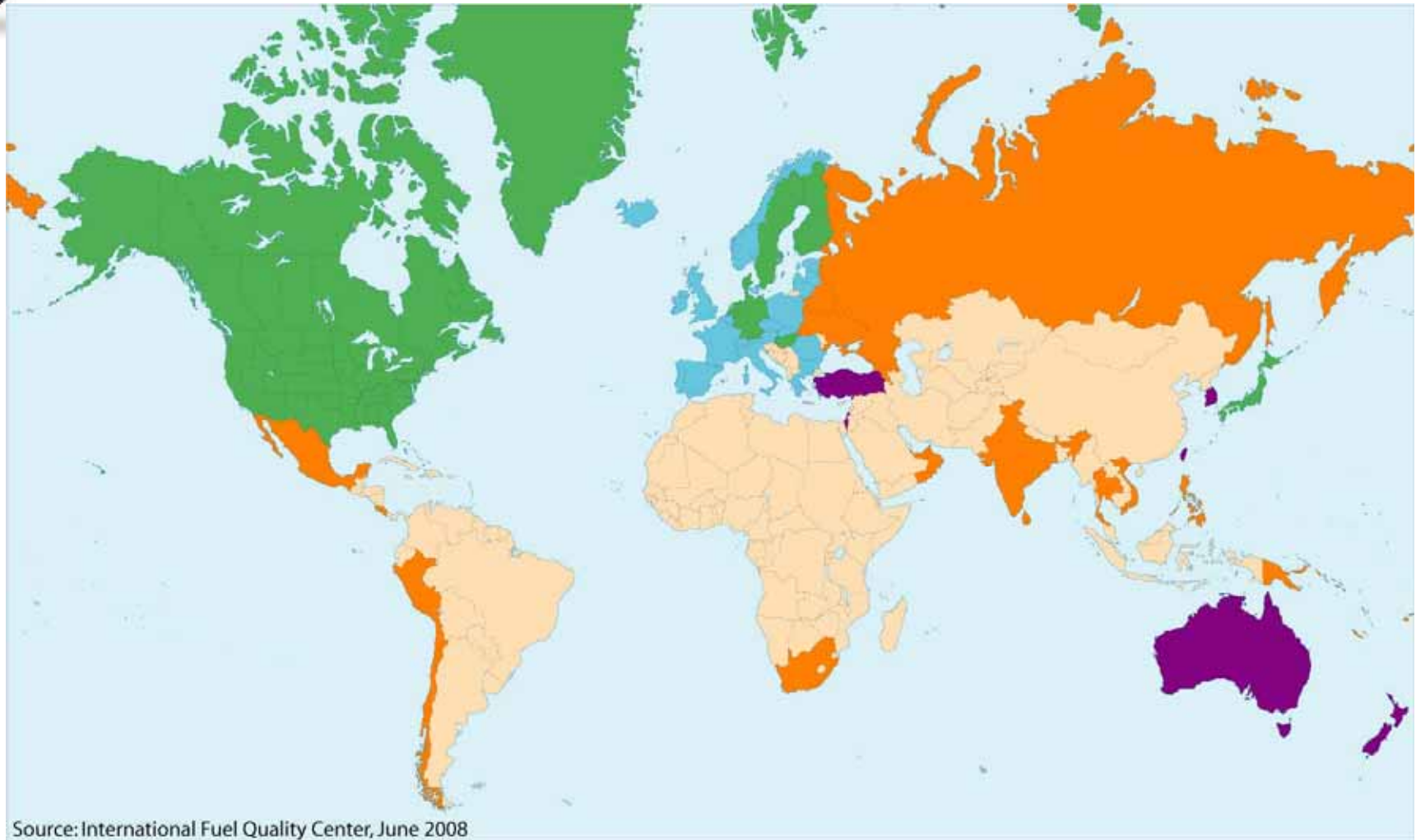
Comparison of RVP and Benzene in Gasoline



Source: International Fuel Quality Center July 2008



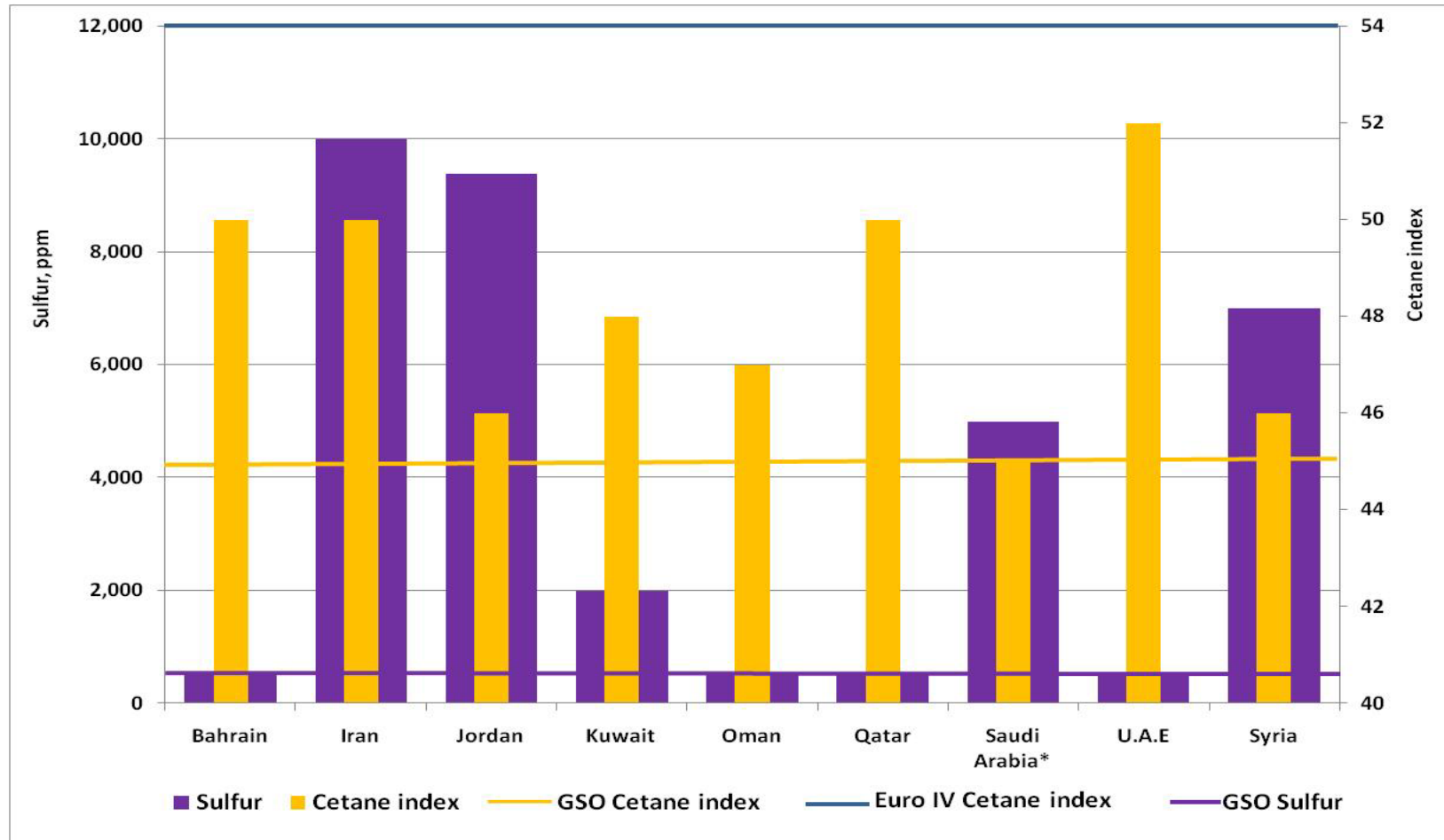
Diesel Max Sulfur Limits



Note: Where available/applicable, sulfur levels are based on early implementation of lower sulfur diesel.



Comparison of Cetane Index and Sulfur in Diesel



Note: Saudi Arabia 5,000 ppm the whole Kingdom and 800 ppm for big cities; Iran 500 ppm or less in cities

Source: International Fuel Quality Center, 2008

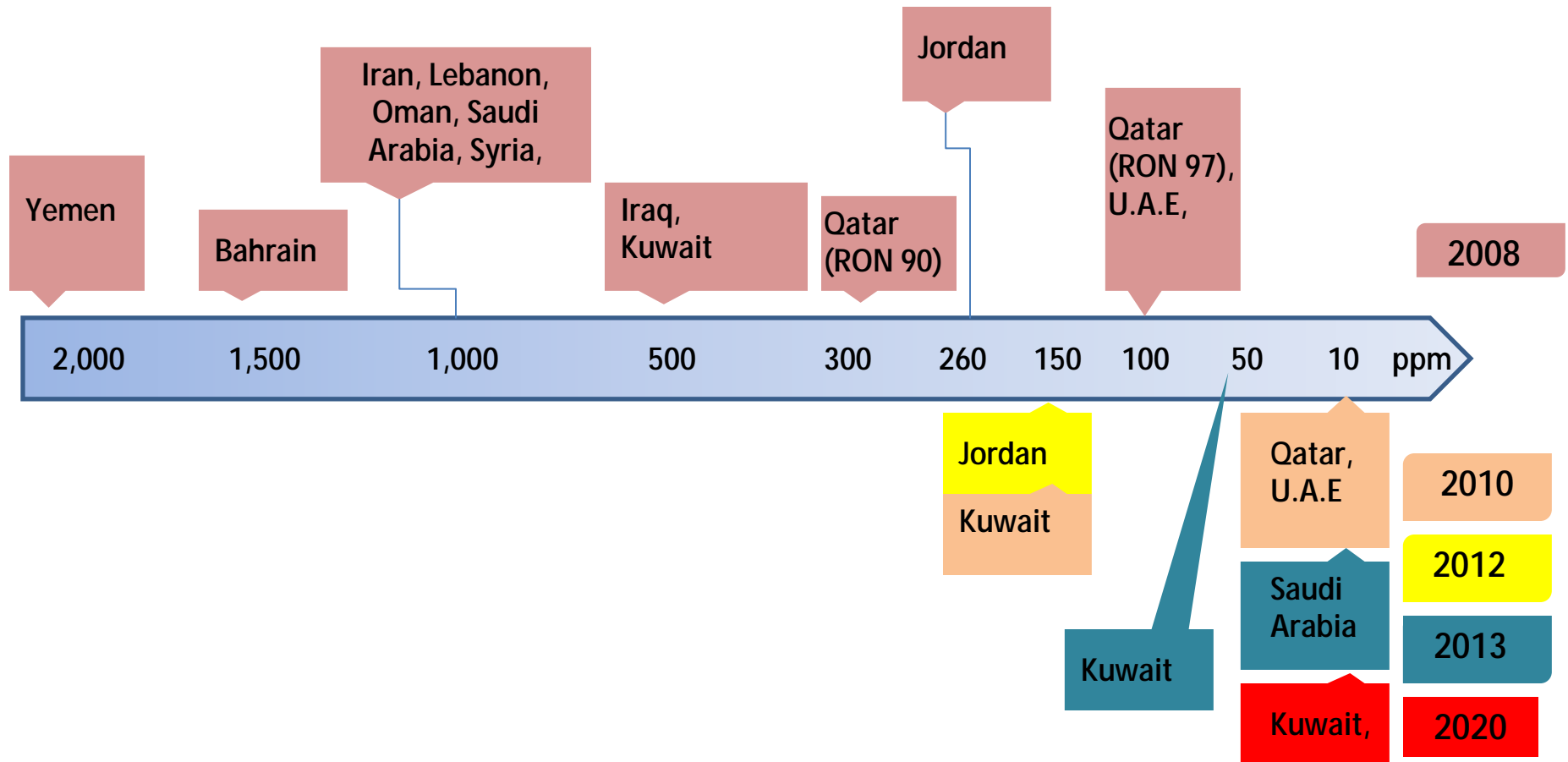


Regional Fuel Quality Issues

- ✓ **NOC's dominate; lack of government mandates to improve fuel quality**
- ✓ **GSO sets vehicle emissions standards for new vehicle imports but has no mandate for 2nd hand vehicle imports**
- ✓ **GCC fuel quality largely diesel export driven; diesel quality addressed first, but gasoline is the major vehicle fuel in use**
- ✓ **Region's refiners struggling to meet rapidly growing gasoline demand**
 - *measures such as octane reduction in opposite direction to auto oil program findings*
- ✓ **Lack of published health statistics to use to justify the high refinery costs of producing clean fuels**
- ✓ **Source Apportionment not yet fully developed**



Gasoline Sulfur Roadmap, 2008-20



Source: International Fuel Quality Center, July 2008



Jordan's Gasoline Specs

Note: Abridged version

GASOLINE	Previous		Current	Actual Quality Average in February 2008 (JPRC)
Year of Implementation		2004	2008	
Spec Name		JS 164/2004	JS 164/2008	
Property				
RON, min	88/96/95	90/95	90/95	90.17/95.3
Sulfur, ppm, max	2000	150 ⁽¹⁾	150 ⁽¹⁾	260 ⁽²⁾
Lead, g/l, max	0.83/0.83/0.013	0.83/0.013	0.005	0.003
Benzene, vol%, max		1	1	-
Aromatics, vol%, max		42	42	-
Olefins, vol%, max		18	18	-
RVP, kPa, max	-	45-70 (s) / 70-100 (w)	45-70 (s) / 70-100 (w)	54.86/56.68
FBP, °C, max	225	210	210	189/186

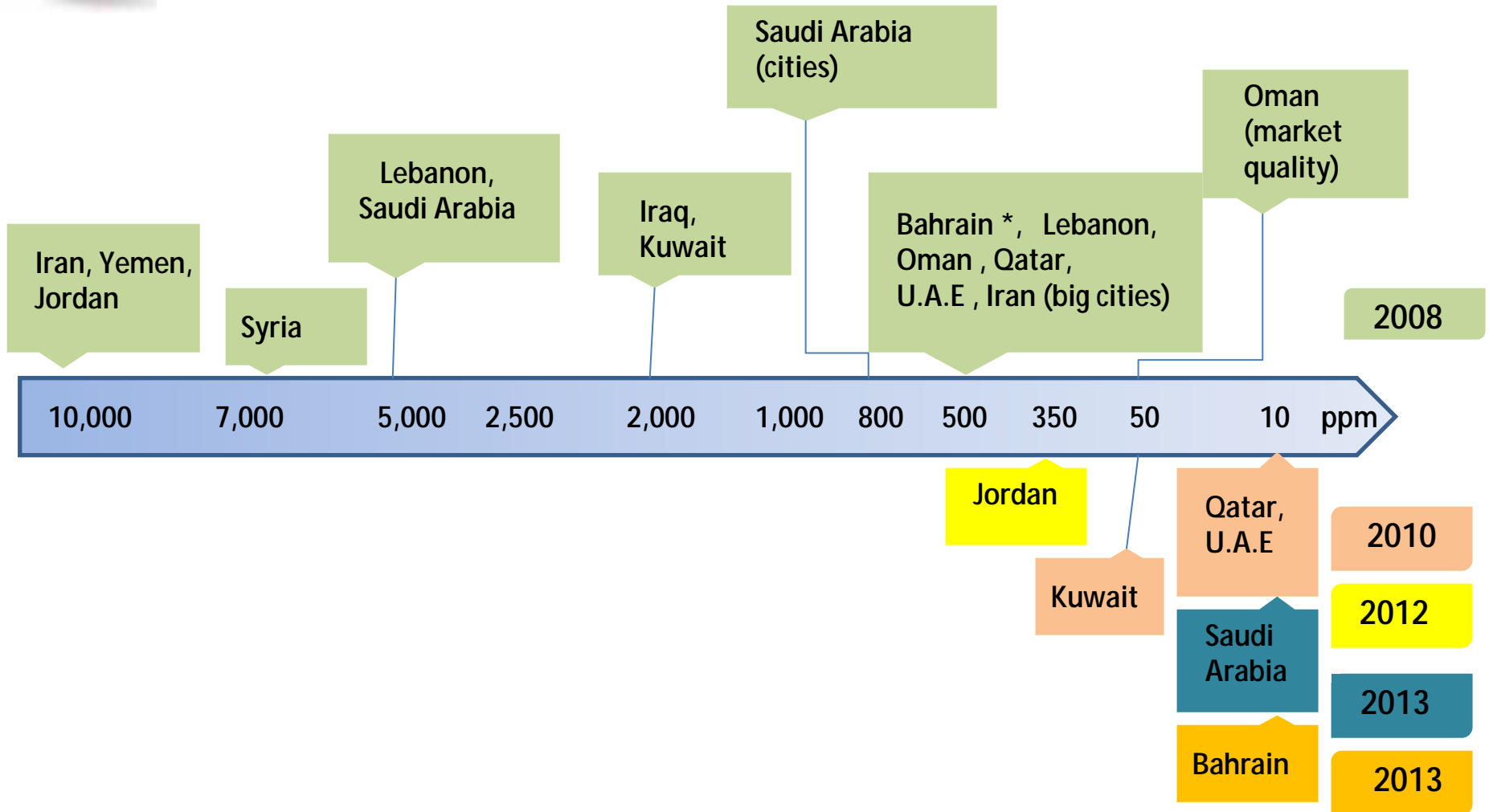
Notes

- (1) The government waived sulfur content until the refinery expansion project completed.
 (2) JPRC's internal max sulfur limit is 400 ppm

Source: IFQC Industry contacts



Diesel Sulfur Roadmap, 2008-15



Source: International Fuel Quality Center, July 2008



Jordan's Diesel Specs

DIESEL	Previous	Current	Actual Quality Average on February 2008 (JPRC)
Year of Implementation		2004	
Spec Name		JS 195/2004	
Property			
Cetane index, min	46	46	54
Cetane number, min	-	51	-
Sulfur, ppm, max	10,000	350 ⁽¹⁾	9,400 ⁽²⁾
Density, @ 15°C, kg/m³, min-max	820-870	820-845	840
Viscosity @ 40°C, cSt, min-max	1.9-5.5	2.0-4.5	3.3
Distillation			
T90, °C, max	357	360	361
Notes	(1) The government waived sulfur content (2) JPRC's internal max sulfur limit is 12,000 ppm		

Source: IFQC Industry contacts



Conclusions

- ✓ **Highly subsidized fuel prices remove incentives for fuel economy**
- ✓ **Potential for partial dieselization of passenger fleet**
- ✓ **Biofuels and other alternative fuels – threat or opportunity?**
- ✓ **Sustainability concerns: Issue will continue to grow in importance in coming years**



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<http://www.ifqc.org>



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<http://www.hartwrfs.com>



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THANK YOU !

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