



***What drives ammonia in the Middle East?***

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# What is the Middle East?



-  Bahrain
-  Cyprus
-  Egypt
-  Iran
-  Iraq
-  Israel
-  Jordan
-  Kuwait
-  Lebanon
-  Northern Cyprus
-  Oman
-  Palestine
-  Qatar
-  Saudi Arabia
-  Syria
-  Turkey<sup>[19]</sup>
-  United Arab Emirates
-  Yemen

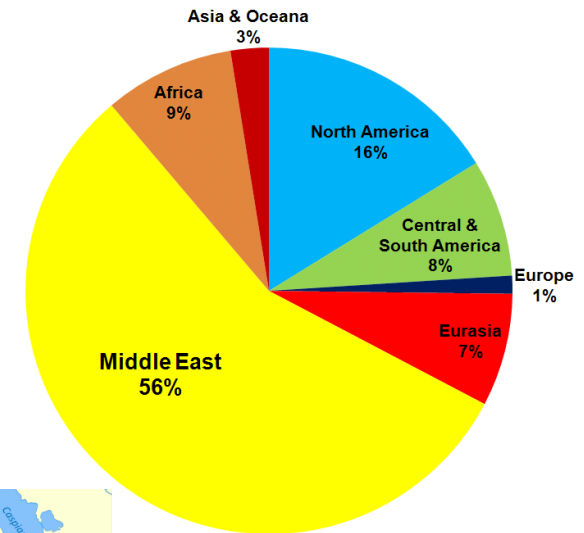
**Turkey is considered as an Asian ME country by United Nations.**

# Middle East main markets

## Industrial refrigeration is stimulated by:

- Large population
- Political stability
- Money (oil, trading, tourism)
- Fertile land and sweet water
- Local Food production
- Energy availability, reliability & cost

World Oil Reserves by Region



data source: US Energy Information Administration from Oil and Gas Journal (2007)  
Oil includes crude oil and condensate



# Middle East main markets



## Egypt:

- Population: over 80,000,000
- Political stability: Variable
- Money from western donations, trading and tourism
- Fertile land, Nile delta
- Food production plants – Abundant but significant imports
- Energy costs – 40% as compared to Europe  
(increasing with 60% in next few years)
- Market trend – large plants with NH<sub>3</sub>, small plants with Freon's

# Middle East main markets



## Iran:

- Population: over 74,000,000
- Political stability: Unstable
- Money from trading and Oil
- Fertile land
- Food production plants – Abundant, little imports
- Energy costs – 15% as compared to Europe
- Market trend – large plants with  $\text{NH}_3$ , small plants with Freon's

# Middle East main markets



## Jordan:

- Population: over 6,000,000
- Political stability: Stable
- Money from western donations, trading and tourism
- Fertile land
- Food production plants – Abundant but significant imports
- Energy costs – 70% as compared to Europe
- Market trend – large plants with  $\text{NH}_3$ , small plants with Freon's

# Middle East main markets



## Saudi Arabia:

- Population: over 27,000,000
- Political stability: Stable
- Money from mainly trading, religious tourism & huge oil income
- Fertile land: only little in the North
- Food production plants – Abundant with significant imports
- Energy costs – 30% as compared to Europe
- Market trend – large plants with NH<sub>3</sub>, small plants with Freon's

# Middle East main markets



## UAE:

- Population: over 7,500,000
- Political stability: Stable & reliable
- Money from oil, trading, tourism & wealthy foreigners
- Fertile land: very little
- Food production plants – Abundant with significant imports
- Energy costs – 27-90% as compared to Europe  
(huge difference in the country)
- Market trend – large plants with  $\text{NH}_3$ , small plants with Freon's





## IRAQ – Largest future potential

- Population: over 32,000,000
- Political stability: high unstable
- Money from western donations & oil
- Fertile land & sweet water
- Food production plants – little with significant imports
- Energy costs – 18% as compared to Europe
- Market trend – Most plants with Freon's

## Market trends

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- 1970's      Only small commercial plant with CFC's
- 1980's      Commercial and semi commercial plants with CFC's and HCFC's
- 1990's      Commercial and semi commercial plants with HCFC's and NH<sub>3</sub> from European refrigeration companies (mainly dairy and slaughterhouses)
- 2000+      Commercial and semi commercial plants with HCFC's & HFC's **and NH<sub>3</sub> local contractors**

# Challenges

- Low evaporating temperature and high ambient conditions (ambient temperatures of 50°C and wet bulb of 32°C)
- Scarcity of water (and electricity)
- Variable costs of energy
- Workmanship
- Variable legislation  
(little cross border coordination between authorities)
- Difficult political environment

# Costs of electricity?

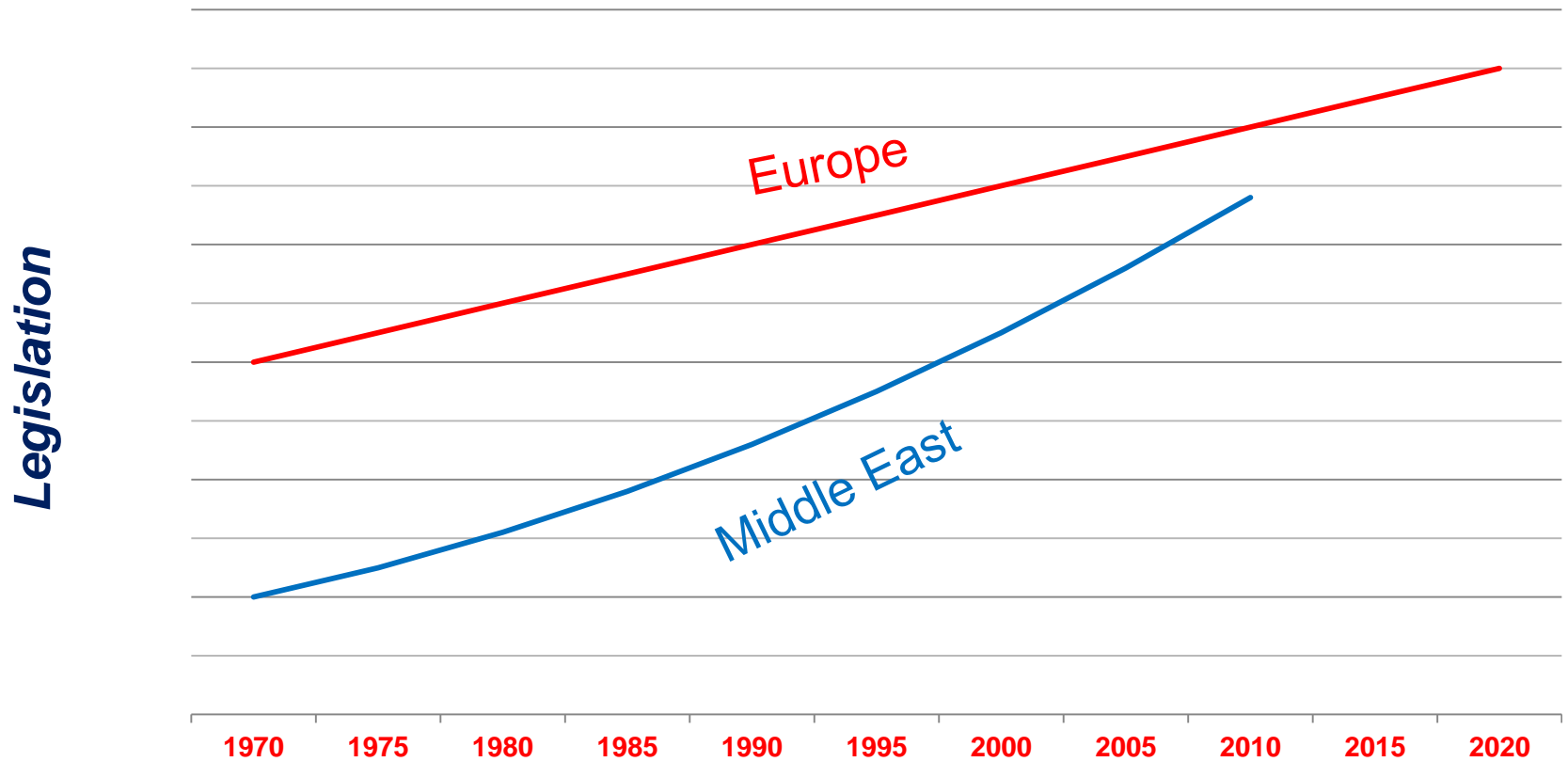
In most of the Middle East countries electricity is heavily subsidised. The subsidy is reducing year by year and rates to the consumers is going up.

Electricity sales price for the industry in the Middle East				Average [EUR/kWh]	Percentage	
Western Europe				average about	0.100	100%
	Industrial min	Industrial max				
UAE-Dubai	0.084	0.095		0.090	90%	
UAE-Abu Dhabi	0.025	0.030		0.027	27%	
	<1000kWh	<2000kWh	<4000kWh	>4000kWh		
Iraq	0.007	0.013	0.020	0.033	0.018	18%
	oct-april	may-sept				
Saudi Arabia	0.029	0.054		0.030	30%	
	23.00-07.00	07.00-19.00	19.00-23.00			
Iran winter	0.006	0.012	0.024		0.014	14%
Iran summer	0.007	0.014	0.029		0.017	17%
	Agricultural	Small industry	medium industry	Large industry		
Jordan day	0.0645	0.0820	0.0908	0.1356	0.077	77%
Jordan night	0.0536	0.0722	0.0766	0.1105	0.065	65%
Egypt	0.040	(increasing with 60% in next few years)		0.040	40%	
Kuwait	0.006			0.006	6%	

It is much easier to convince clients in Dubai to use power saving ammonia

# Legislation trends

Legislation is going up rapidly except for refrigeration!



# Variable legislation

**There is a wide difference in legislation between the different countries. The UAE leads the trend but is still below European expectations.**

## **Trends:**

- HSE-audits (health, safety and environment)
- Define (minimum) building and machinery efficiencies

There is no visible government enforced legislation to use ODP & GWP friendly refrigerants. Enforceability of signed protocols is not visible

## **Variable legislation / selection of refrigerants**

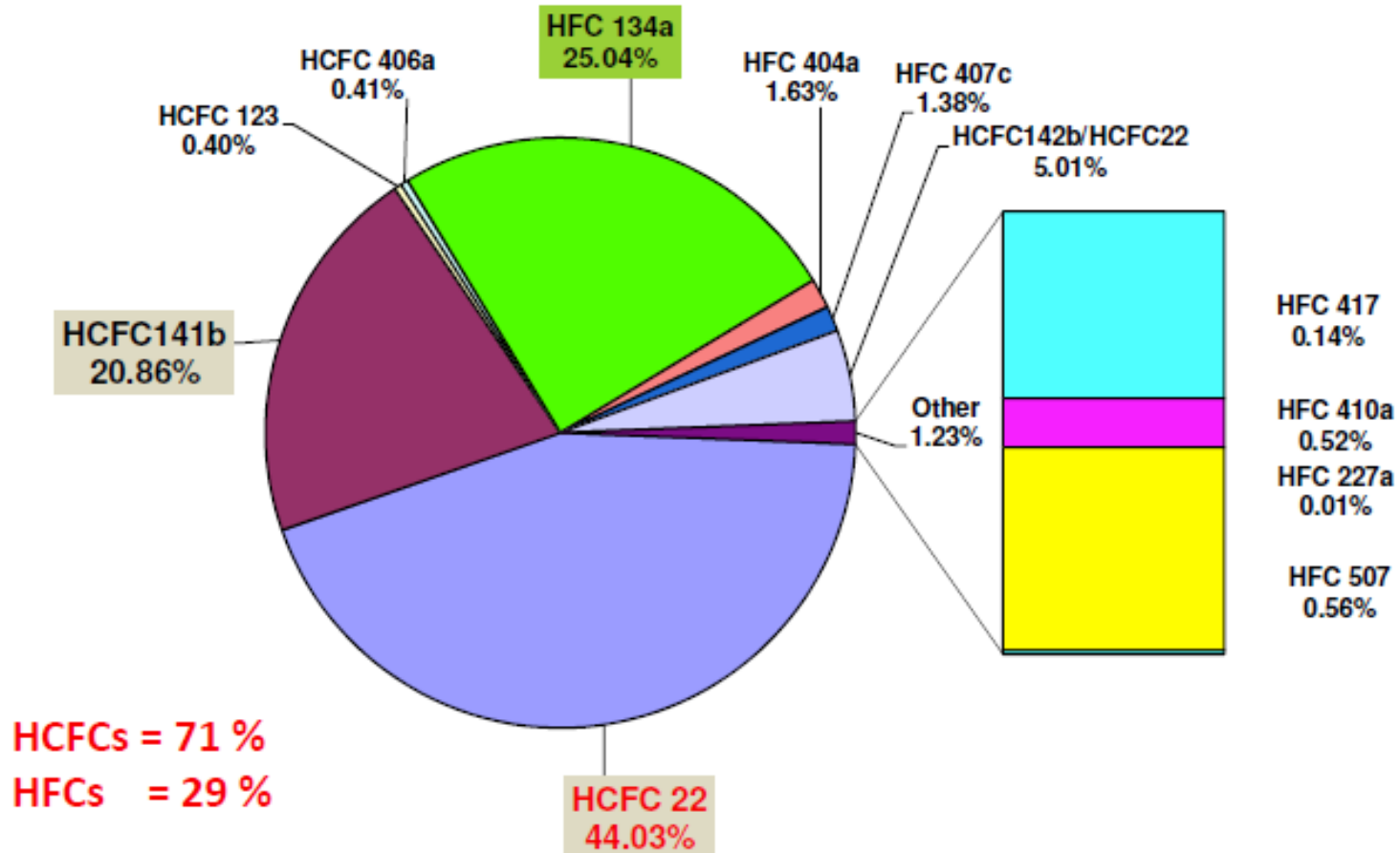
*Due to variation in legislations the markets fall well behind Europe. HCFC & HFC's are still widely used.*

*During a seminar about the refrigerants, below statement was made by a representative from the government:*

*“We invested in systems from where we were told: **This is good for you**, now they are telling us not to use it anymore.  
Let the same suppliers come with the right alternatives, before we start investing again...”*

# Selection of refrigerant?

## HCFCs and HFCs Imports in Dubai in 2011, %





## What drives NH<sub>3</sub> in the ME: Multi-nationals



**Year 2000+ the Multinationals moved to produce in the ME market.**

- Multinationals are obliged to show consistency to their shareholders and have no option but to build in the ME with high European standards and GO-GREEN solutions
- Result is that standards and expectations move upwards
- Small to medium local players are influenced by the multinationals actions and decisions and follow..... but not all

# What drives NH<sub>3</sub> in the ME: National companies (1)

## National companies attitude:

- Concerned about premature failure of system components
- Operating costs.. Labour, material, consumables etc.
- Energy and costs of water (not in all countries)
- Service & backup support
- Availability of qualified operators
- Less worried about ammonia smell inside the plant room...
- ... and all this, sadly, with little legislation...

## What drives NH<sub>3</sub> in the ME: National companies (2)

### National companies general approach:

- National companies are interested in improving on what their competitors are doing
- Mostly are not too concerned with the environment due to costs and low legislation level
- Will follow market trends as stimulated by the multinationals
- Private owners will overbuild for market status
- Private owners are concerned about (limited) skills of engineers  
New expensive, synthetic and sensitive refrigerants are more difficult to service and to maintain and are looked upon as having some serious risks
- **In general a fragmented and varied approach.....**

# Market forecast

- Legislation will eventually drive the market, but we are 5 to 10 years away
- Environmental awareness by education and force
- Increasing electricity and water costs will stimulated a stronger move to  $\text{NH}_3$
- People will continue to build with  $\text{NH}_3$  for cost reasons as well as the other reasons in the previous slide