



Dr. Phil Gray

Heat Pump – Thermal Transfer Fluids

Key Environmental Considerations

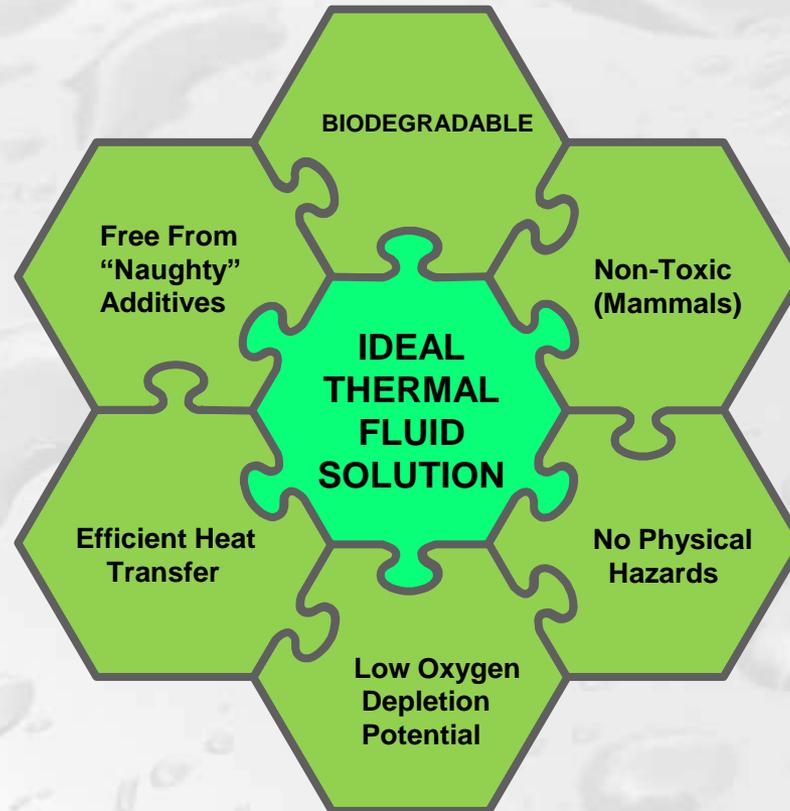


## Environmental Impact – The Forgotten Parameter?

- The thermal fluid is the lifeblood of a heat pump installation – delivering the energy from the source to the heat pump itself
- Large volumes of Heat Pump Thermal Fluid are being installed across Europe
- It is vital that the environmental impact of a fluid is a key consideration on selection

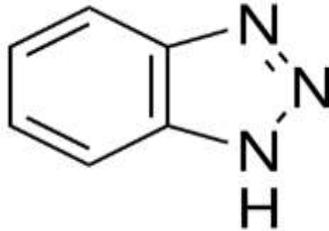
**Its is vital that the industry has the facts and figures required to make informed and responsible choices**

# The Ideal Thermal Fluid

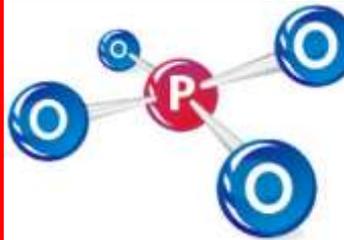


# “Naughty” Additives

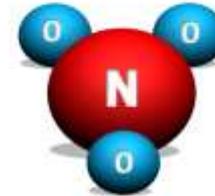
“Naughty”  
Additives



Triazoles – Persist in the Environment!



Phosphates – Harmful to aquatic systems

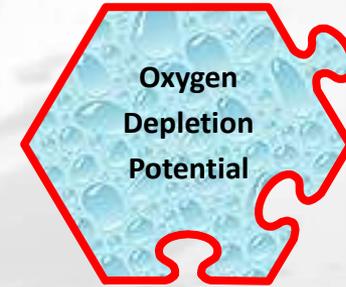


Nitrates/Nitrites – Harmful to aquatic systems

## Why Are They “Naughty Additives”?

- According to CLP regulations – they can be present in a product below a threshold concentration without the supplier having to declare their presence
- Often the inhibitors used in the fluid pose a much greater risk to the environment than the base fluids themselves
- Its possible to formulate products without any quantity of these harmful additives

# Oxygen Depletion



Thermal Fluid Base	Chemical Oxygen Demand (BOD – mg/L)
MEG	~700,000
Ethanol	~1,250,000
MPG	~1,600,000

Oxygen depletion is a result of naturally occurring microorganisms scavenging on organic-biodegradable matter within aquatic environments

**The lower the oxygen depleting potential of a thermal fluid the better**

**Is MPG really an environmental friendly fluid?**

## Mammalian Toxicity



- Thermal Fluids that are marked with any of the above CLP symbols are toxic to mammals
- Any product based on ethylene glycol should bare the warning symbol – Regardless of the presence of other additives – **According to European Law**
- Something that is classed as toxic to mammals does not mean it is environmentally harmful
- It is the wider implications of accidental spillage, clean up and general perception that makes their use unadvisable for our industry

## Ethanol, MEG & MPG – Standard Thermal Fluid Technology

	Biodegradability	Toxicity to Animals	Oxygen Depletion Potential Aquatic Systems	Physical Hazards	Overall Efficiency	Overall Score
<b>MEG</b>	Fully Biodegradable	Toxic	Lowest	Low	Highest	★ ★ ★
<b>Ethanol</b>	Fully Biodegradable	Toxic		High		★ ★
<b>MPG</b>	Fully Biodegradable	Non-Toxic	Highest	Low	Lowest	★ ★

## Thermal Fluids: Why Have The Options Been So Limited?



- The industry has suffered from a 'products repackaged approach'
- Existing products in alternative markets are being used widely in our industry
- There has been a lack of knowledge on the requirements for our industry
- There has been a lack of development activities
- This industry does require a product formulated specifically for the application

# The Ideal Thermal Fluid

## GeoPro is...



## Current Thermal Fluid Technology

	Biodegradability	Toxicity to Animals	Oxygen Depletion Potential - Aquatic Systems	Physical Hazards	Overall Efficiency	Overall Score	
<b>GeoPro</b>	Fully Biodegradable	Non-Toxic	Lowest	Low	Highest	★★★★★★	
<b>MEG</b>	Fully Biodegradable	Toxic		Low		★★★★★	
<b>Ethanol</b>	Fully Biodegradable	Toxic		High		★★	
<b>MPG</b>	Fully Biodegradable	Non-Toxic		Highest		Low	★★★



Thank You for Listening

# Any Questions

Dr. Phil Gray & John Westerman

Available in the Exhibitors Area

