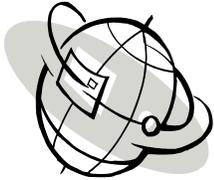


Energy Issues

IEP Newsletter

Refrigerant Update

Thomas D. Mull, PE, PEM, CEM



INSIDE THIS ISSUE:

Refrigerant Update..... 1

Around the World..... 2

Lower Energy Cost ≠ Increased Retail Sales 3

Freon – Dupont
Genetron – Honeywell



R-134a

CFCs
HCFCs
HFCs
HFOs

Refrigerants by Generation

Historically, the refrigerants utilized in air conditioning and refrigeration equipment were chosen by the manufacturer. Their decisions were based upon a number of considerations including its efficiency in heat transfer, stability, flammability, toxicity, cost, etc. The best known name in refrigerants for years was Freon, a registered trade name by DuPont used to describe a series of chlorofluorocarbon (CFC) and hydro chlorofluorocarbon (HCFC) refrigerants.

However, the choice of refrigerants changed beginning with the Montreal Protocol in 1989. Since then there have been a series of multinational initiatives to eliminate refrigerants that are believed to have a *high global warming potential* (GWP). Whether current refrigerants pose a significant threat to the environment is the topic for another article. This article highlights some of the major changes that have occurred and proposed changes with respect to refrigerant utilization and availability.

The timing of when specific equipment and refrigerants were, or will, be impacted by these new requirements varies by location (Europe, Australia, U.S. etc.), and also by whether a country is classified as *Developed* or *Developing*. For example, in *Developed Countries* production of most refrigerant equipment utilizing CFCs ended in the mid-1990s. Shortly thereafter, production of R-11 and R-12 (both CFCs) also ended.

However, *Developing Countries* were allowed to produce R-11 and R-12 until 2010.

In 2010 production of R-22 (HCFC) equipment was stopped in *Developed Countries*, with no new R-22 to be produced after 2020. However, production of HCFC equipment is allowed in *Developing Countries* until 2030 and the refrigerants until 2040.

It should be noted that continued use of both recycled CFCs and R-22 is allowed. However, having been designated as high GWP refrigerants, owners of these systems can expect to pay a premium for the refrigerants.

A major refrigerant change on the horizon that will impact some larger equipment is the phasing-out of R-123. In *Developed Countries* production of equipment using this refrigerant is scheduled to end in 2020, with no new refrigerant production after 2030. To replace R-123 manufacturers are looking at hydrofluoroolefin (HFO) refrigerants. These fourth generation refrigerants are olefin-based (vs. alkane-based) and purported to have a lower GWP. The jury is still out on how these refrigerants will perform overall and as replacements in existing equipment.

Based upon their lower GWP one would think that HFO refrigerants would be endorsed by environmentalists. However, HFOs have at least one detractor. Greenpeace issued a position paper in 2009 that listed four main objections to HFOs including “an unnecessary risk to the environment and human life”.

Refrigerant Update (continued)

Refrigerant changes have also impacted mobile air conditioning systems and will require a change in the foam insulation industry as well. Following are a few examples from the European Union (EU) and the United States.

EU Refrigerant Bans:

R-134a

2013 - motor vehicles AC

2023 – Blowing of foam insulation

R-404A

2020 – Stationary refrigeration

2020 – Centralized refrigeration >40 kW

R-410A

2025 – Single split AC (<3kg)

U.S. (proposed) Bans

R134a

2016 – Aerosol propellants and commercial stand-alone retail food refrigeration and vending machines

2017 – Blowing of foam insulation
2021 (model year) motor vehicle AC

R-404A

2016 – Commercial refrigeration

In summary, the selection and use of refrigerants in space cooling, refrigeration and other applications will continue to undergo significant changes. The ultimate impact of these new refrigerants on energy efficiency, consumer cost, and the environment has yet to be determined. Regardless, it is our responsibility to stay abreast of these changes to advise our associates and clientele appropriately, to insure that they are making appropriate decisions about equipment selection.

For more information about pending changes that may impact your systems check with your equipment manufacturer.



R-410a

HFO-1234 ze

R-448A (blend)

Current HFO Refrigerants

Around the World

By: IEP Staff Writer

Power Outages Impacting South Africa

Source: WSJ (5/9-10/15)

Eskom Holdings, Ltd., the state-operated power provider, is struggling to meet its electrical requirements. Generating all of the power in South Africa and approaching half of the electricity for the continent, the utility has been plagued by management issues and a lack of maintenance/investment in new plants and infrastructure.

Unscheduled interruptions and lack of generating capacity have resulted in power outages of 12 hours and longer being a constant concern. Management acknowledges that there is “no quick fix” to the problems.

Royal Dutch Shell Closer to Drilling in Arctic Ocean

Source: (WSJ 5/12/15)

In a rare move supporting the energy industry, the U.S. has given conditional approval for Shell to drill in their controlled portions of the Arctic Ocean.

There are environmental challenges/litigation that have to be addressed before drilling can actually begin. However, with an estimated 22 billion barrels of recoverable oil and 93 trillion cubic feet of natural gas, Shell plans to move forward with drilling in this remote area. It may take a decade or more for deposits to make their way to the market once drilling begins, according to Shell officials.



*Koeberg Nuclear Power Plant
South African*



Typical Oil Drilling Ship

Lower Cost Energy ≠ Increased Retail Sales

By: Thomas D. Mull, PE, PEM, CEM

IEP

Institute of Energy Professionals



Lower Pump Prices Do Not Translate Into Increased Consumer Spending

PEM

Professional Energy Manager

IEP News: IEP will be conducting its three-week PEM Training Program in Virginia this fall.

There is no shortage of pundits making projections on how consumers will react to changes in the availability/price of oil and natural gas. Each can cite statistical trends and historical circumstances that back their projections. However, there is a tendency to view projections as isolated events using static analysis techniques.

A favorite saying of economist for years has been “*other things equal*”. This simplified approach is often applied to scenarios to explain or project changes in economic conditions or consumer behavior. For example, the lower cost of energy at the pump that has been experienced by U.S. consumers since last fall has resulted in an estimated \$100 billion in annual savings. *Other things equal*, one would expect that this saving would result in a significant increase in retail sales, i.e. more disposable income equals more spending.

Retail sales data for the period December (2014) through February (2015), however, did not reflect the increase in sales that had been forecasted. While sales were up, actual results were much less than projected, leaving many forecasters wondering why. The consensus is that there were two (2) probable reasons:

1. The colder than average winter resulted in increased heating costs, thereby taking up some of the savings and

2. Consumers are cautious and slow to change spending habits

Sales numbers released on May 13th reflected continued reluctance by consumers. Retail sales barely increased in April. This reflected a flat or downward trend in four (4) of the past five (5) months.

While it is projected that spending will eventually increase as a result of the savings at the pump, it may not catch up until consumers see some stability in the price of oil, and the overall economy.

Even though recent surveys have indicated that U.S. consumer confidence is increasing, their confidence is likely tempered by other economic indicators that reflect a weak struggling global economy. Under such economic conditions consumers have historically exercised caution by cutting back on non-essential expenditures, paying down debt, and saving more. This is reflected in the nation’s latest personal savings statics. For the first quarter of 2015 consumer savings is at its highest level since 2012.

At least for the foreseeable future, the availability of oil and natural gas should remain strong. The uncertainty of geopolitical events will continue to keep the price of oil volatile worldwide. Consequently, consumers will continue to react to changes in energy availability and pricing in a cautious manner defying the pundits, reinforcing that *other things are never equal*, especially as it relates to energy today.

IEP Contact Information:

Phone (USA): 1-919-280-3480

E-mail: danmull@theiep.org

Website: <http://www.theiep.org>