Leading Retailers in EU & N.America & HFC Tax update

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Leading Retailers in Europe & North America

Food retail brands using CO_2 (Sept 2013)

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Food retail brands using CO_2 in Japan

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Food retail brands using CO_2 in Japan

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Number of CO_2 stores worldwide (est.)

CO_2 TC stores in Europe 2013

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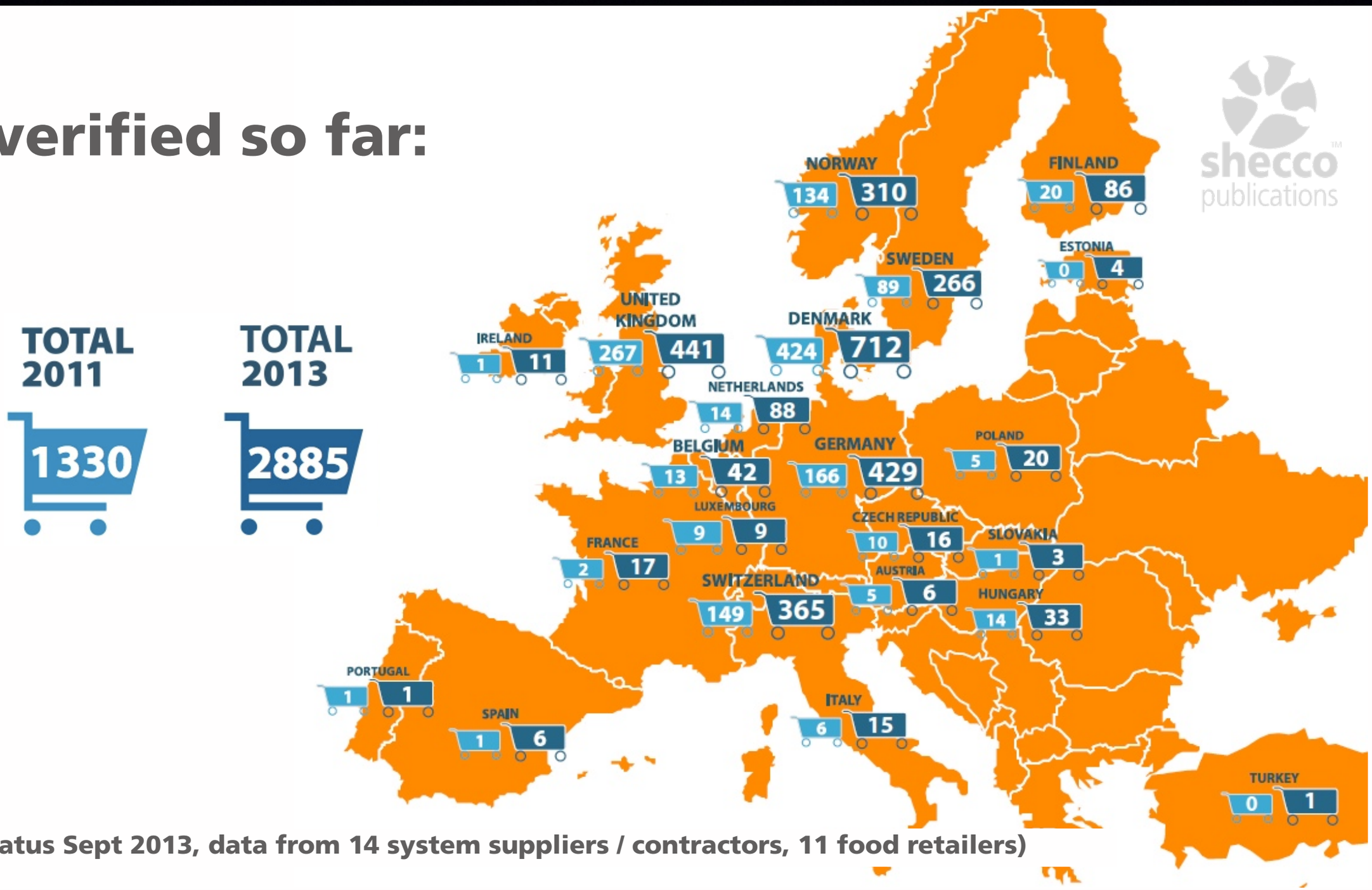
verified so far:



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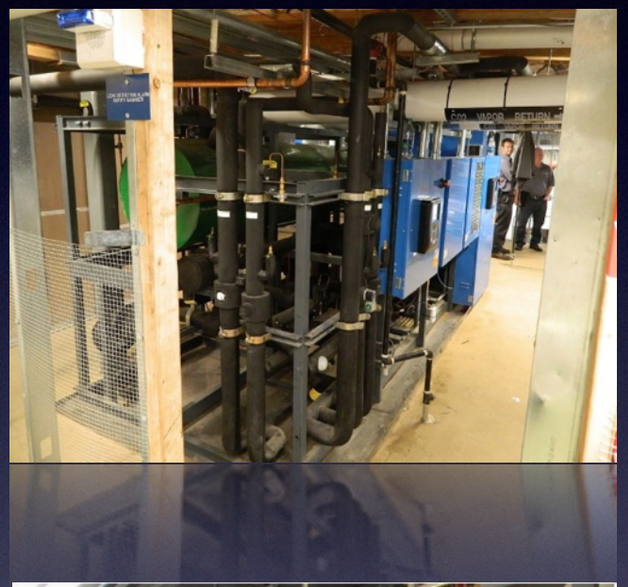
(status Sept 2013, data from 14 system suppliers / contractors, 11 food retailers)

CO_2 supermarket stores: Europe 2011-13 (est.)

	2011	2013	Increase in 2 years
Denmark	424	712	+68%
United Kingdom	267	441	+65%
Germany	166	429	+158%
Switzerland	149	365	+145%
Norway	134	310	+131%
EU	1331	2881	+116%

First all natural refrigerant store in US



Location: Carpinteria, California, USA
Suppliers: Source Refrigeration, CTA Architects/Engineers, Hill PHOENIX, Mayekawa Manufacturing Company, Danfoss, and Eleven Western Builders, Inc.

Type:
- Ammonia primary system with approximately 113 kg of ammonia located in an outdoor enclosure that condenses CO2;
- Water cooled system that allows for a reduction in refrigerant charge;
- "Combined" CO2 refrigeration system with one vessel that contains liquid pumped to the low and medium temperature display cases and walk-in cabinets;
- R290 spot display case.

"The key success factor was working with an industry development partner like SUPERVALU who is willing to pioneer environmentally friendly refrigeration solutions in the supermarket industry. This process is also a learning experience to all the partners since this has never been done before. Since the process of change can be difficult, a committed development partner like SUPERVALU is required to pull the industry in a new and exciting direction." Mark Tomooka, Mayekawa

http://www.r744.com/news/view/3443

Delhaize first 100% CO2 store in US

Location: : Turner, Maine, US
Suppliers: Carnot Refrigeration (rack), Parker Micro-Thermo control Systems, Bitzer compressors
System: CO2 transcritical booster system for low and medium temperatures, supplemented with a glycol heat reclaim system and a warm gas defrost system

- LT capacity of 259,800 Btu/hr, generated by 3 Bitzer 2DSL-5K compressors
- MT capacity of 898,200 Btu/hr, generated by 6 x Bitzer 4 FTC-20K compressors

"Carnot is proud of this ambitious project with Hannaford. Being the first mover is not always easy and Hannaford managed to raise this very exciting challenge. To work with Hannaford was a great pleasure and we now hope that this success will inspire all those wanting to cross over into natural refrigerants," Simon Bérubé, Vice-President of Strategic Development at Carnot.

"We spent a lot of 2012 telling our story to industry organizations. We realised we had a lot of information that we hadn't shared with our colleagues before. We are excited to continue the natural refrigerant discussion across the Group." Harrison Horning, Hannaford's Director of Energy and Facilities

http://www.r744.com/news/view/4377

Sobeys makes CO2 TC standard

Location:: Montreal, Canada
Supplier: Carnot Refrigeration
System: transcritical CO2 refrigeration system plus heat recovery system and intensive reclaiming of waste heat from the refrigeration units

- 85 MT cases
- 40 BT cases

Energy savings: Decrease of the total energy consumption by 10%

According to Rod Peterson Procurement Manager - National Procurement, Sobeys originally started piloting natural refrigerant projects in 2008, and after piloting the different systems in 2009 the Canadian retailer opted for CO2 transcritical as their preferred system. In 2012 Sobeys made CO2 transcritical a national standard, meaning that all new stores will be transcritical CO2.

In addition, Peterson says the added cost of a CO2 transcritical system, which have been calculated to be about 11% more per system, are recouped through the savings on installation, such as using less copper for piping for example, lower cost of the refrigerant, lower maintenance costs, and lower electricity costs. Overall, Peterson estimates the payback on a CO2 transcritical system to be 3 years.

http://www.r744.com/news/view/4345

Switch to Natural Refrigerants by 2015

Location: Netherlands: 257 hybrid R134a/CO2 systems
3 Transcritical pilot stores
Czech Republic: 10 hybrid R134a/CO2 systems
USA: piloting CO2 hybrid systems

System: Heavy reliance on HFC hybrids: needs more testing of HFC-free systems. CO2 used for freezing and R134a for cooling.

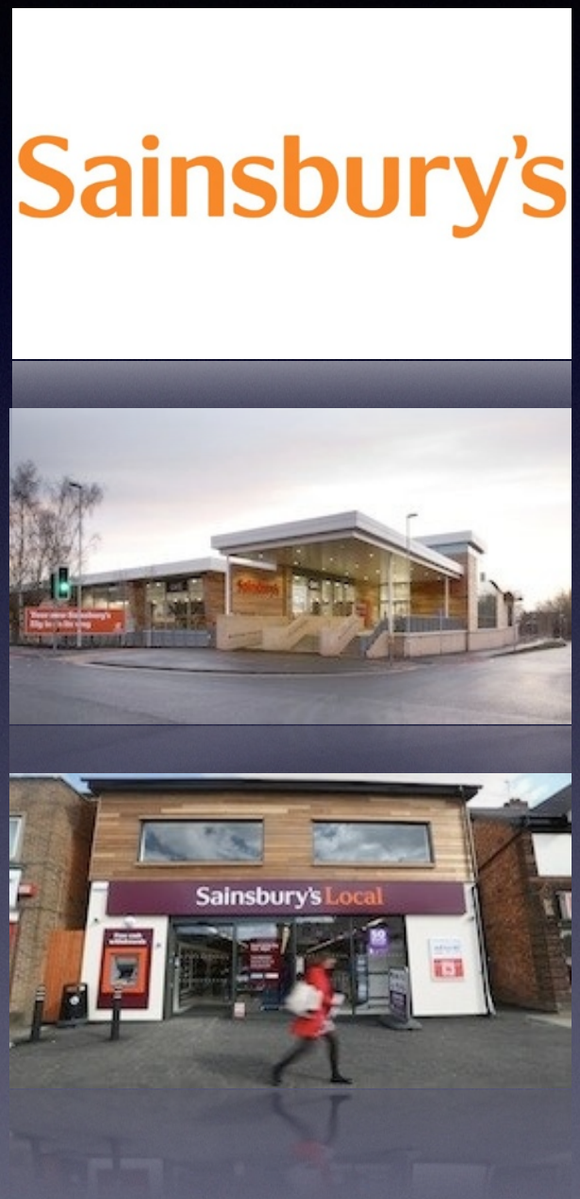
Study of energy and CO2 flows has enabled Ahold Europe to obtain all their heating from the cooling system, enabling them to end natural gas consumption.

"If the CO2 pilots that we are operating right now are successful in 3 months time, we will put them in the roll-out and in five years time, we should have reached half our stores and in ten years time they will probably be in almost all our stores." Emma Coles, ice President Corporate Responsibility at the Royal Ahold Group.

http://www.r744.com/news/view/4655

http://www.r744.com/news/view/4231

Sainsbury's first small CO2 transcritical refrigeration system



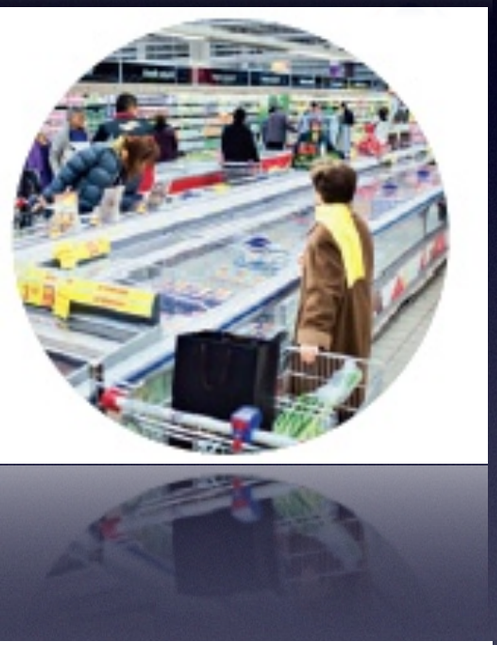
Location: Haslucks Green, Solihull, UK
Supplier: Epta
System: Small transcritical CO2 system

UK's most environmentally friendly convenience store in Haslucks Green, Solihull, is testing Epta's ECO2-Small CO2 system. It is the first small transcritical CO2 system used in a Sainsbury's store, reducing carbon emissions by 33% and minimising energy use for refrigeration. The new refrigeration system is helping Sainsbury's to achieve its carbon emissions reduction target of 30% absolute by 2020.

Sainsbury's now has 530 convenience stores in the UK. Recently Sainsbury's renewed its target to convert 250 stores of all sizes to natural refrigerant by 2014. Today Sainsbury's has converted 157 stores to CO2, and uses ammonia refrigeration in its regional distribution centres. As a result of this investment the costs of CO2 have been greatly reduced and are now competitive with HFC system costs.

http://www.r744.com/news/view/4320

Carrefour first CO2 transcritical in Turkey



Location: Kurtköy-Millennium, Istanbul, Turkey
Type: CO2 transcritical system for both refrigeration units (fridges and freezer)
- Capacity of the positive rack compressors: 40 KW
- Capacity negative rack compressors: 4 KW

Energy savings:
- Reduction of overall energy bills by 7%
- Quantity of CO2 needed for refrigeration units is approximately one third less than the refrigerant charge required by a conventional system
- The CO2 solution improves the energy efficiency of refrigeration units by around 15%.

http://www.r744.com/news/view/3261

Location: Barcelona, Spain
Supplier: Tewis
System: R134a to refrigeration services and cool rooms (DX electronic expansion valves).
- CO2 refrigerant to frozen services and coolrooms (DX electronic expansion valves).
- The R134a is also used to condense the CO2 through a plate heat exchanger ALFA-LAVAL (cascade), using DX electronic expansion valves.

16% reduction in energy consumption with hybrid CO2 refrigeration

http://www.r744.com/news/view/3418

Tesco opens CO2 stores in China & Thailand

Location: Ningbo, China
Type: CO2 Cascade Refrigeration System
Supplier: Carrier

Thanks to CO2 cascade system and other measures, the store can save up to 25% of its energy use, with an annual reduction of 9.7 million kilowatt hours in power and saving 1560,9 tons in carbon emissions.

More and more food retailers are attracted by the benefits of CO2 refrigeration and are introducing CO2 refrigeration into their business in China. Mr. Wei Qian from Tesco China informed participants that from today's five stores using CO2 as a refrigerant in cascade solutions, "in the near future, let's say 3-5 years, all new Tesco stores will adopt natural refrigerants."

http://www.r744.com/news/view/4422

Location: Salaya, Tailand
System: CO2 Cascade Refrigeration System
Supplier: Frigrite

Frigrite designed and built the CO2 plant in Melbourne, then shipped the plant and associated equipment to Thailand ready for installation. Carrier supplied the local installation labor and Frigrite provided an experienced project manager to supervise the installation also carrying out training and plant commissioning.

http://www.ammonia21.com/web/assets/link/gcc_presentation.pdf

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HFC taxes & fiscal incentives for Natural Refrigerants

Norway: HFC tax & refund scheme

Quebèc: considers HFC limits for certain sectors

France: considering HFC tax

Netherlands: tax deductions for users installing naturals

N. America: Montreal Protocol HFC amendment proposal

Switzerland: HFC bans

Denmark: HFC tax + HFC bans

Japan: proposed HFC reduction measures

Spain: HFC tax as of 2014

Germany: grants for natural refrigerant installations

California: Stationary Equipment Refrigerant Management Program

EU: F-Gas Regulation & proposed additional measures (phase-down, bans, training on alternatives)

Slovenia: HFC tax

Micronesia: Montreal Protocol HFC amendment proposal

Australia: HFC levy

New Zealand: HFC levy

Growing momentum towards HFC taxation & other measures

sources:

1. shecco (2013, forthcoming), GUIDE+ on HFC taxes & fiscal incentives for Natural Refrigerants in Europe
2. R744.com industry platform on CO2 refrigerant, www.R744.com

Growing appetite for HFC taxation - France

- **December 2012** - French government public consultation on HFC tax. Different tax rate options consulted with stakeholders:
  - ➡ Uniform tax rates between € 20 - 60/tCO2eq for HFCs with GWP > 150
  - ➡ Tax rate varying between € 2.5 - 20 /tCO2eq depending on GWP level
- **Spring 2013** - Environmental Taxation Committee recommends the French government to propose HFC tax
- **November 2013** - Ministry of Environment states that France reserves the right to propose HFC tax after the completion of the EU F-Gas Regulation review

Growing appetite for HFC taxation - Spain

- **July 2013 -** Spain proposes f-gas tax at level comparable to Danish tax (about €20/tCO2eq)
- **October 2013 -** Spain adopts HFC tax that:
  - ➡ will be phased in gradually from 2014 to reach eventually a level of €20/tCO2eq in 2016
  - ➡ will apply to gases with GWP > 150 and
  - ➡ will not apply to the 1st refrigerant charge of new equipment
  - ➡ has differentiated rate for "virgin" versus "recycled" HFCs

Tax per 1kg of refrigerant

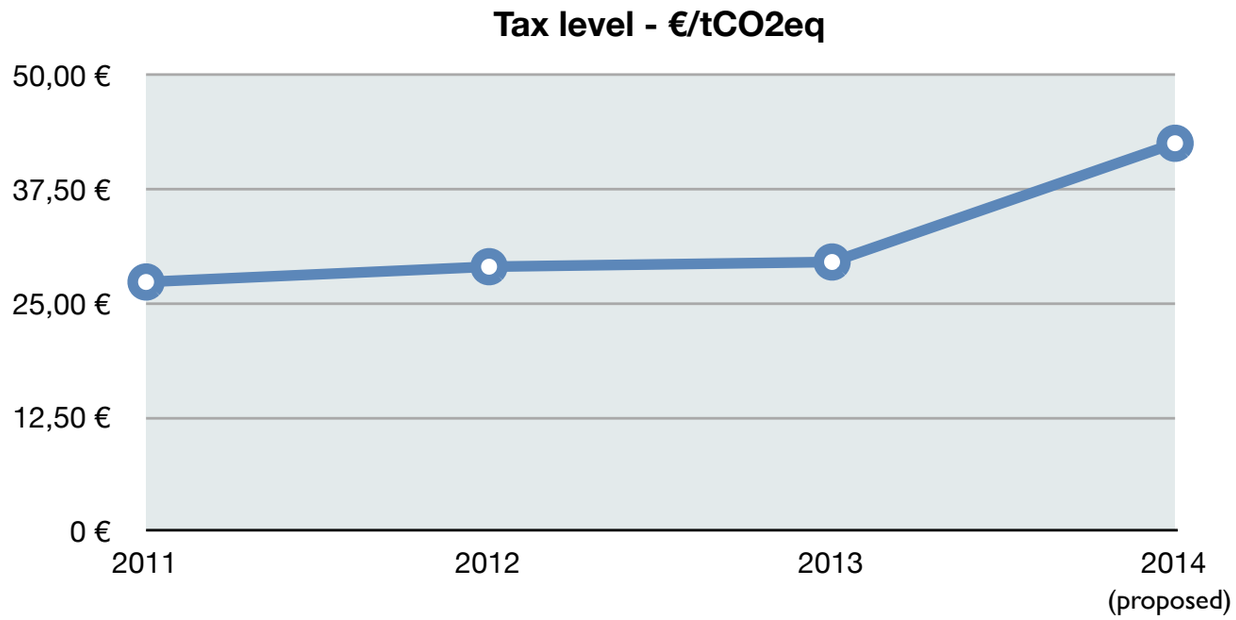
	2014		2015		2016	
Refrigerant	Virgin HFCs	Recycled HFCs	Virgin HFCs	Recycled HFCs	Virgin HFCs	Recycled HFCs
R134a	8,58 €	7,29 €	17,16 €	14,59 €	26,00 €	22,10 €
R410A	13,04 €	11,08 €	26,07 €	22,16 €	39,50 €	33,58 €

Growing appetite for HFC taxation - Norway

- **2003** - HFC tax introduction
- **January 2012** - tax level adjusted to match CO2 tax level
- **October 2013** - Norway's state budget proposal raises HFC tax from €30/tCO2eq to €42/tCO2eq

Tax per 1kg of refrigerant

Refrigerant	2013	2014 (proposed)
R134a	38,40 €	55,34 €
R410A	50,96 €	84,08 €



GUIDE+ HFC taxes & fiscal incentives for Natural Refrigerants in Europe

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- HFC taxes, HFC deposit & refund schemes, fiscal incentives for natural refrigerants ...
- Tax levels and trends, comparative analysis of incentives, forward looking (expectations) ...
- Geographical scope: key European countries (e.g. Denmark, France, Germany, Norway, Poland, Slovenia, Spain ...)

Launch - December 2013
€500 / copy
Available at:
www.publications.shecco.com

Fiscal incentives for Natural Refrigerants in Japan

先進技術を利用した省エネ型自然冷媒機器等普及促進事業
（一部国土交通省・経済産業省連携事業）

平成26年度要求額
6,246百万円（新規）
（うち要望額1,200百万円）

背景・目的

- 現在、冷凍空調機器の冷媒としては、主に温室効果の高いHFC（ハイドロフルオロカーボン）が使用されており、排出が急増。
- このため、近年技術開発が進んでいる自然冷媒を使用し、かつエネルギー効率の高い機器を普及させることが重要。
- 平成25年6月に成立した「フロン回収・破壊法」の改正において、指定製品に使用されるフロン類の環境影響度の低減に関する制度が導入されることを踏まえ、省エネ型自然冷媒機器の普及を急ぐ必要。

事業スキーム

（1）委託対象：民間団体
　　実施機関：平成26年度～平成28年度

（2）補助対象：①補助金の交付事業を行う民間団体等
　　②①の法人を経由して省エネ自然冷媒の冷凍冷蔵倉庫及びｼｮｰｹｰｽを導入しようとする民間団体等
　　補助割合：①国から法人への補助　　定額
　　②法人から事業実施者への補助　1/2又は1/3

事業概要

（1）省エネ型自然冷媒等に係る普及啓発（経済産業省連携）(0.5億円)
省エネ型自然冷媒機器等導入マニュアルの策定、説明会の開催

（2）先進技術を利用した省エネ型自然冷媒機器普及のための補助
（62億円（うち要望額12億円））
改正フロン類法で指定製品となる可能性が高く、本事業により高い効果が期待できる機器の導入補助

○冷凍冷蔵倉庫（国土交通省連携）
- １台あたりの規模が大きく、効率的に省エネ対策を促進できることに加え、冷媒転換による温室効果ガスの削減効果も大きい。
- 「総合物流施策大綱」にもCO2排出量の削減と冷媒の自然冷媒化が位置づけられており、社会基盤の一つとして重要。

○ショーケース
- ある程度同仕様の機器であるため、生産台数の増加に伴い機器生産の効率化され、価格の低下につながる。

期待される効果

- 事業者への普及啓発や機器製造数の増加による生産の効率化・低価格化の促進により、更なる省エネ型自然冷媒機器の普及を図る。
- 省エネルギー化による二酸化炭素の排出を削減すると同時に、温室効果の高いフロン類冷媒の使用合理化を促進する。

省エネ自然冷媒冷凍等装置導入事例（超低温冷蔵保管庫）

外観

空気冷凍システム

≪省エネルギー効果≫
エネルギー削減量年間：1,115,063 kWh/年
（従来比34％削減）

≪温室効果ガス削減効果≫
５５９ｔ-CO2/年
（内訳）
・エネルギー起源CO2削減量：３８０ｔ/年
　*電気0.３４１ kg- CO2 /kWh
・冷媒漏洩CO2削減量：１７９ｔ/年

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どうも有り難うございました！