Refrigerants Australia: Submission to the Senate Select Committee on Climate Change Policy

8 April 2009

Introduction

Refrigerants Australia has serious concerns about the efficacy of the approach inherent in the Carbon Pollution Reduction Scheme (CPRS) Exposure Draft, as it applies to HFCs.

We are disappointed in the Government's response, or lack thereof, to our earlier submissions to both the Green and White Papers.

As a result, in regard to HFCs- the most common synthetic greenhouse gas- the approach in the exposure draft displays a misunderstanding of the structure and dynamics of our industry, combined with an unsubstantiated faith in inappropriate market-based approaches.

It would appear that interest in genuinely reducing HFC emissions has been subjugated to the mantra that 'maximum coverage equals maximum integrity', even if this will not result in any significant additional HFC emissions reductions.

In the case of HFCs, the CPRS has become an end in itself, to the detriment of the opportunities that exist to further reduce emissions using available and existing regulatory tools.

Our industry strongly supports the objectives of the Carbon Pollution Reduction Scheme, and believes our past experience in ozone protection and, since the early 2000's, reducing HFC emission rates, means we are well placed to continue to make a useful and quantifiable contribution. Indeed, the CPRS objectives- 'to meet Australia's emissions reduction targets in the most flexible and cost-effective way; to support an effective global response to climate change' reflect the past and present activities of our industry.

Working with the Australian Government through the Ozone Protection and Synthetic Greenhouse Gas Management Act we have, for example, achieved a level of HCFC phase-out that is currently sixty per cent in advance of our international obligations. Significant advances have also been made in HFC emission abatement, and we believe that much more can be achieved by working within the existing framework.

Australia's approach to the regulation of fluorocarbons is internationally recognised as being at the forefront of international efforts in this area. It takes an innovative approach by grouping both ozone-depleting fluorocarbons and high-global warming potential (GWP) fluorocarbons in a common regulatory framework, recognising their

common applications.

It is unfortunate that current proposals ignore more than twenty years of experience in this area, and pose the very real risk of dismantling what has been, until now, a highly cost-effective emission reduction tool that has placed Australia well in advance of its international obligations. The inclusion of HFCs in an ETS has the potential to create more problems than it solves. This submission outlines some of those problems.

Executive Summary

Refrigerants Australia believes that the proposed market-based measures to reduce carbon emissions are inappropriate for synthetic greenhouse gases used in the traditional Montreal Protocol industries (HFCs), and that a targeted sectoral approach has much greater potential to achieve the objectives of the CPRS in 'meeting Australia's emissions targets in the most flexible and cost-effective way...'

HFCs and the CPRS- a Basic Disconnect

The CPRS is a cap-and trade system, and has at its centre the assumption that once a cap has been set on emissions, those emissions will then be allocated across the economy using market mechanisms.

HFCs cannot fully play a role in this Scheme, as their preventable emission is, and will remain, an offence under the Ozone Protection and Synthetic Greenhouse Gas Management Act 1989.

Refrigerants Australia contends that a more effective approach to reducing HFC emissions would involve further development of the existing regulatory framework – Ozone Protection and Synthetic Greenhouse Gas Management Act 1989.

In addition there are a number of significant concerns with the approach laid out in the Exposure Draft. These include:

• We are not aware of any other national ETS that includes HFCs. The EU for example, relies on a comprehensive suite of end use controls, similar to those already in existence in Australia.

• HFCs are not waste products, as are the vast majority of greenhouse gases. They are purposely-manufactured products, for which there are no more practicable, environmentally acceptable substitutes over a wide range of important applications. As it stands, we believe the work behind the Government's approach has significant shortcomings in the methodology for estimating HFC emissions, and the dynamics of the transition from HCFCs to HFCs.

• The carbon intensity of HFCs presents particular problems. With probable price increases of up to 300% due to the impact of permit prices (based on current EU prices), there will be enormous financial stress generated throughout the industry.

• While this will be felt at all levels of the industry, it will fall particularly hardly on

small to medium enterprises (SMEs), which make up a substantial portion of the industry. For example, small independent contractors will have to carry stock holding charges, which could increase by tens of thousands of dollars, which they may not be able to recover for considerable periods.

• While this financial burden will fall heavily on the distribution chain, perversely it is likely to have very limited effects on the consumer. Consumers do not purchase refrigerant, they purchase equipment, which incidentally contains refrigerant. The cost of refrigerant, even allowing for the outlined increases, still represents a minor part of the cost of a piece of equipment.

• The vast majority of bulk refrigerant imported into Australia is used to service the existing bank of equipment, which cannot be converted to use alternative refrigerants.

• The existing CPRS proposal has the potential to undermine the existing highly successful industry product stewardship scheme, Refrigerant Reclaim Australia.

Australia going it alone with HFCs in an ETS

We are unaware of any operating national emissions trading scheme that incorporates HFCs anywhere in the world.

The largest and longest-operating ETS system, the EU program, considered the inclusion of HFCs, but rejected this approach in favour of a comprehensive set of end-use controls, known as the F-Gas regulations.

The only other possible example is in the Clean Development Mechanism, where the inclusion of HFCs has been fraught with unintended consequences, initially compromising the operations of the Montreal Protocol by providing a financial incentive for the construction of new HCFC-22 production facilities.

The White Paper studiously ignored this fact, noting somewhat disingenuously that 'Market-based approaches have been used successfully to reduce emissions of synthetic greenhouse gases, in Scandinavia, for example…'

This statement refers to experience in Norway, where a significant tax (not an emissions trading system) was introduced. The results of this approach are unclear, having been distorted by stockpiling, and where relevance to Australia, with our significant use of both commercial and residential airconditioning is dubious.

What's Different about HFCs?

HFCs are the major synthetic greenhouse gas, and differ from the major greenhouse gases- carbon dioxide, methane and nitrous oxide (and to some extent PFCs) in that they are deliberately manufactured products, with specific uses, rather than being part of a waste stream.

HFCs were developed to replace HCFCs, which as well as damaging the earth's ozone layer, generally have significantly higher global warming potential (GWP) than HFCs. Actions that could hinder this process, and encourage continued reliance on HCFCs,

should be avoided. Efforts are underway to introduce very low GWP replacements for the current generation of high GWP HFCs- but this will take some years.

Baseline Calculations and Transition Provisions

The term "Synthetic Greenhouse Gases (SGGs) used in the traditional Montreal Protocol industries" has been coined to refer to a specific group of industries (sub-source categories) including airconditioning, refrigeration, foams, fire protection, aerosols and solvents. Within these industries the use of SGGs specifically including hydrofluorocarbons (HFC) and to a much lesser extent perfluorocarbons (PFC) has increased rapidly since 1990 due to the requirement under the Montreal Protocol to phase out the consumption of ozone depleting substances (ODS) such as chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC) and halons.

The *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* describes two methods for estimating emissions of these substances, Tier 1 (Basic or Potential Method) and Tier 2 (Advanced or Actual Method). It states that while the Tier 1 method requires less data, it may produce very inaccurate estimates over the short term and is likely to overstate emissions. Good practice is to use the Tier 2 method for all sub-source categories within this source category.

The Tier 2 methodology is more advanced than Tier 1 and provides more accurate estimates and time profiles of emissions. The Tier 2 methodology takes into account equipment characteristics relevant to emissions such as charges, losses on charging, losses in operation, losses on servicing, servicing practices, recovery of substances, residual charges on disposal and fate of substances on disposal, number of products, product lives and most importantly acknowledges that the bank is growing.

The Government's *White Paper* made several references to a HFC emissions baseline of less than 1% of Australia's total net national emissions (5.2 Mt CO_2e out of a total of 576 Mt CO_2e). All emissions profiling of HFC used in the traditional Montreal Protocol industries to date has relied on a bottom up modelling of the bank of HFC gas stored in existing equipment. The *White Paper* uses the simplest and least accurate Tier 1 approach and assumes that in the absence of domestic production, end of life capture and destruction, or exports, that emissions equal imports. This is clearly inaccurate and not best practice methodology.

Adding to this uncertainty is the lack of provision to account for the transition of the market from ODS to SGG. The *Department of Climate Change, Industrial Processes Sector, Greenhouse Gas Emissions Projections Paper 2007*, acknowledges that due to this above mentioned transition HFC consumption is expected to increase significantly as a result of replacement of ODS and continuing economic growth. The uptake of HFC is dependent largely on the timing and the nature of the transition from ODS. Moreover the paper states that, "Due to the substantial uncertainties relating to the size of the HFC market and the rate of leaked emissions both in Australia and overseas, projected emissions from this sub sector should be considered as indicative 'best estimates' based on current information."

The uncertainty of the *White Paper's* baseline values for the CPRS cap remains a major concern for our industry. A snap shot of imports for SGG used within the traditional Montreal Protocol industries shows that in 2006 total imports of HCFC and HFC products in both bulk and pre-charged equipment was some 9.8 Mt CO_2e. When transitional factors are applied allowing for growth in HFC as HCFCs are phased out this figure will grow to 14 Mt CO2e by 2015 (see Appendix I). These figures are greater by a factor of some 200% than the baseline data supplied by the Government in either the *White Paper* or the *Projections Paper 2007*.

In summary, the current baseline measure is inaccurate, does not adhere to IPCC Good Practice Guidelines or make provisions for the impact of the planned transition of ODS under the Montreal Protocol.

The Refrigerant Bank, Consumption Analysis and Review of Alternatives

The current bank of refrigerant and working equipment is greater than 31,000 mt of ODS and SGG (F-gas) and will continue to grow and evolve with or without CPRS regulation.

Industry analyses of fluorocarbon imports used in the traditional Montreal Protocol industries reveal that in 2006 there were approx 4900 mt of bulk imports and some 2400 mt imported in pre-charged equipment (refer Appendix I). Of this total it can be assumed that all of the pre-charged imports will increase the size of the bank, whilst of the 4900 mt of bulk imports all but 750mt (250mt of R141b used in foam applications and 500mt HFC used in Original Equipment Manufacturer production) goes towards servicing the existing bank and rounding off pre-charged equipment.

Refrigerants Australia undertook an independent technical review of alternative technologies; firstly in the supermarket industry then developed an Application Matrix to predict the future market penetration of alternative technologies over the next decade. The review dissected the refrigerant bank into major application segments (stationary airconditioning, stationary refrigeration, mobile airconditioning and transport refrigeration) then divided each segment into equipment categories. The analysis predicted the future growth of alternative technologies (primarily CO_2, ammonia and hydrocarbons) to achieve between 7% (lower limit) and 14% (upper limit) market penetration of the bank by 2018.

The review highlighted that the bank will continue to grow and evolve towards more sustainable technologies with natural refrigerants only playing a minor role (see Appendix II for a detailed illustration of the refrigerant bank, 2006 to 2018). The HCFC bank (estimated to be 12,000 mt) will decline due to old equipment reaching end of life and substitution of HCFC with HFC drop-in replacements and cap reductions under the Montreal Protocol program. Low GWP refrigerants are anticipated to emerge in commercial volumes on the 5 to 10 year horizon with the potential to rapidly transform the emissions profile of the bank, as replacement will not incur capital expense.

The Application Matrix evaluated the cost of capital equipment replacement versus refrigerant expense under a CPRS with refrigerant prices increasing by up to 300%. As set out in the White Paper, one of the intended impacts of imposing a cost on carbon is to provide businesses and consumers with incentives to adjust behaviour,

or invest in low emissions technologies. In the large majority of applications (excluding supermarket, dairy and fishing industry), the cost of refrigerant was insignificant compared to capital equipment replacement cost. Thus in most applications the price signal would not create the desired effect of accelerating the transition towards lower carbon emission technologies, but merely place an increased financial burden on operating expenses.
Stationary airconditioning is a major application segment (47% of bank) with significant growth and limited alternatives. Cold Hard Facts, 2006 estimated over 1,000,000 split systems are installed every year with evaporative coolers the only substantial alternative. Evaporative cooler sales (60,000 p.a. in 2006) have been in decline over the past decade and even an increase in refrigerant cost of up to 300% will have minimal impact on the desired effect of changing consumer behaviour or accelerating the transition towards lower carbon emission technologies. The lack of alternative technologies on offer in the commercial airconditioning sector is even more alarming; in this sector the primary alternative is absorption chillers, which are equally unlikely to achieve significant carbon abatement.

There are a limited number of applications where alternative technologies are showing promise. In particular, CO_2/HFC and CO_2/Ammonia cascade systems or CO_2 only systems are being trialled in the supermarket industry (6% of bank). However, as it stands today there are some 3600 supermarkets nationally currently using fluorocarbon technology with only 11 operations/stores trialling these alternative technologies. These alternative technology systems use a high pressure-operating platform and require significant capital investment. It needs to be emphasised that these alternative technologies cannot service the existing bank and that the decision to strip out existing commercial equipment and replace it with alternative technology across the remaining 99% of supermarkets would require a long development period, major business interruption and massive capital investment. These alternatives potentially provide a good solution for new stores in some areas but have very limited application to existing supermarkets. The current CPRS proposal would involve an expense of tens of thousands of dollars per store, which may still not be enough to justify the costs in introducing alternative technology.

The mobile airconditioning segment (27% of bank) is more encouraging, with a low GWP SGG refrigerant, HFO1234yf, currently under development. It will be some time before this refrigerant is available in Australia. The future direction of vehicle airconditioning rests with global equipment and vehicle manufacturers, and is unlikely to respond to Australian refrigerant prices.

There is concern that the use of hydrocarbons as refrigerants in existing equipment could be an unintended consequence of the introduction of the CPRS. The introduction of permits dramatically increasing the prices of HFCs will create strong motivation to promote hydrocarbon use. While hydrocarbon refrigerants have a thermodynamic profile suitable for use and are efficient refrigerants, they are highly flammable and explosive and pose a real safety threat when used in existing equipment. This was tragically demonstrated in a fatal explosion in a New Zealand cold store last year

The fluorocarbon refrigerant bank will continue to grow, and play a critical role in the economy by delivering essential services. This bank of equipment needs to be serviced to optimise equipment performance, which has an effect on indirect emissions, and managed and maintained effectively to minimise direct emissions.

The current CPRS proposal has the potential to negatively impact on service behaviour and place an unfair financial burden on SMEs that service the bank, running to tens of thousands dollars per technician. The greatest environmental benefits will be achieved from behavioural changes associated with improved product/system designs, better refrigerant handling practices and procedures and refrigerant recovery and destruction, rather than capital replacement with natural refrigerant technologies.

Emissions Intensity & Financial and Market Distortions

The emissions intensive nature of the products and financial distortions created by the auctioning of permits places the industry at grave risk. The figures below in Table 1 show the cost of permits by product at various permit prices. As can be seen, the value of the permit clearly outstrips the value of the product. Add to this financing costs, risk and insurance premiums and the cost of these products will increase by more than 300%.

		Indicative Bulk price	**Permit price per CO2e**				
Product	**GWP**		**$40**	**$35**	**$30**	**$25**	**$20**
R134a	1410	$10.00/kg	$56.40	$49.35	$42.30	$35.25	$28.20
R404a	3862.4	$11.00/kg	$154.50	$135.18	$115.87	$96.56	$77.25
R507	3925	$12.00/kg	$157.00	$137.38	$117.75	$98.13	$78.50
R407c	1749.8	$18.00/kg	$69.99	$61.24	$52.49	$43.75	$35.00
R410A	2060	$18.00/kg	$82.40	$72.10	$61.80	$51.50	$41.20

Table 1. Effect of permit price variation on Product cost

Under the CPRS permits are to be auctioned and will be defined as “financial instruments”. Whilst the ultimate permit price is not known at this stage, a review of the permit prices from the EU market (see Table 2) reveals fluctuations in price over time. This fact will add another degree of uncertainty and risk to the industry. Based on the emissions intensive nature of HFC based products and the potential for price fluctuations in permit prices, it can be noted that a movement in permit price of A$5/$CO_2$e will increase the cost of some products in excess of the HFC product itself. This clearly represents an unacceptable and unmanageable business risk.

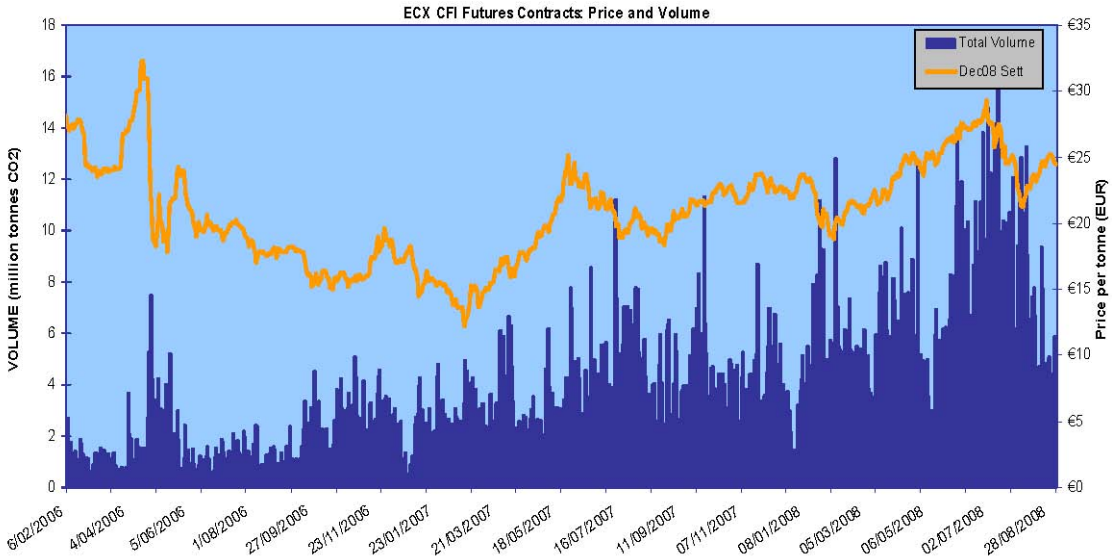


Table 2. EXC CFI Futures Contracts: Price and Volume

These above points i.e. the emissions intensity of HFC base products in combination with the auctioning of permits as "financial instruments" has the unintended consequence on the industry of effectively changing the very nature of the industry from that of import and distribution of HFC based products to that of an industry trying to manage and finance the trading in emissions permits far more valuable than the underlying products. From a business perspective this is not a viable model.

Montreal Protocol/Kyoto Protocol Linkages: The Ozone Protection and Synthetic Greenhouse Gas Management Act 1989 (OPSGGMA)

As set out in our submissions to the Green and White Papers, we believe that the best tool for minimising and reducing HFC emissions is the OPSGGMA. This legislation has proved extremely effective in managing the phase-out of ozone-depleting substances, and at the instigation of industry, was revised to include HFCs in 2003. Industry-instigated abatement measures include regulations under the Customs Act in 2000 and banning the import of disposable containers of HFC refrigerants. Other improvements developed within the framework of the Act include:

• **Improved containment** – leakage rates have been significantly reduced across all sectors and will improve further with improved performance standards.

• **The introduction of higher industry standards** – the national licensing and authorisation program for fluorocarbon refrigerants has increased the quality of installations and maintenance, and reduced both direct and indirect emissions.

• **Increased use of low GWP alternatives** – low or no GWP products are used extensively in the foam and aerosol sectors, and are being developed for airconditioning applications.

• **End of life recovery and destruction** – The industry funded product stewardship program Refrigerants Reclaim Australia (RRA) is recognised globally as a leading example of its type.

The success of the OPSGGMA lies in its ability to effectively monitor the import and

control the end use of all fluorocarbon refrigerants. From the perspective of the technician in the field, who is in the most critical position to prevent emissions, the issue is to take all practical steps to prevent the emissions of fluorocarbon refrigerants, be they HFCs, HCFCs or indeed CFCs, which can still be found in a significant amount of equipment.

To handle a fluorocarbon refrigerant it is necessary to hold a Commonwealth licence, requiring appropriate training and observance of specific work practices, with an overarching emphasis on emission minimisation.

By breaking this nexus, the current CPRS proposal will have the following negative impacts on a system which to date has been acknowledged as one of the most effective in the world:

• There may be an incentive to stay with HCFC equipment, rather than convert to HFCs. In addition to having significant ozone depleting potential, HCFCs (mainly HCFC-22) have significant GWPs, with HCFC-22 having a GWP of 1700, as opposed to a GWP of 1300 for the most common HFC, HFC-134a. The Government has recognised this weakness, and now proposes to 'develop other measures to minimise competitive distortions that might otherwise arise…' This is presumably code for further significant increases in Government fees and charges to bring the cost of HCFCs up to the post CPRS price of HFCs.

This process of cobbling up policy afterthoughts to counter distortions introduced by Government policy is unwieldy and inefficient. It is not clear at this stage to what extent the Government intends to dismantle the existing control framework in favour of the 'market-based approach' outlined in the CPRS, and what further inefficiencies and distortions this will introduce into the system.

• At present the import of HCFC equipment is not subject to any limit- there would be an incentive to import more of this equipment, to both the detriment of the climate and the ozone layer. The Government has announced that it will introduce a ban on the import or manufacture of equipment using HCFCs from Scheme implementation.

• The viability of Refrigerant Reclaim Australia would be seriously threatened, with the organisation left without a source of funding to collect and destroy the considerable bank of both HCFCs and CFCs still stored in equipment across Australia.

Appendix I
Australian Industry CO_2-e Imports of HCFC & HFC

Cost implications to supply chain and consumer under CPRS Green paper

Component		**IPCC 1996 GWP**	**IPCC 2001 GWP**
R22		1500	1780
R134a		1300	1410
R125		2800	3450
R143a		3800	4400
R32		650	670
R141b		713	713
R123		90	76
Product	**Composition**		
R22	R22	1500	1780
R134a	R134a	1300	1410
R404a	R125/143a/134a (44/52/4)	3260	3862.4
R507	R125/143a (50/50)	3300	3925
R407C	R32/125/134a (23/25/52)	1525.5	1749.8
R410A	R32/125 (50/50)	1725	2060

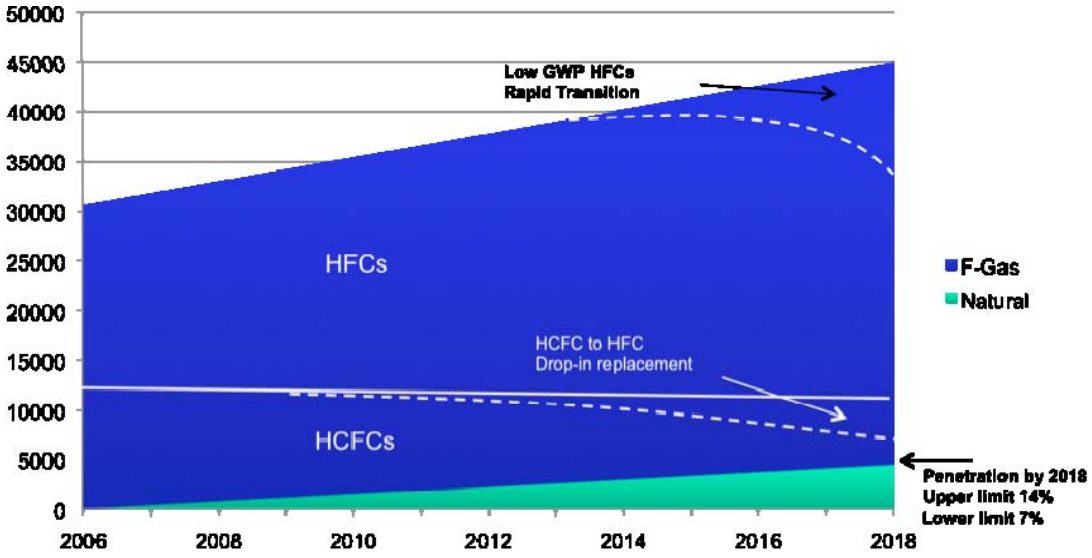
Based on ABS & Industry figures approx 4900 mt of bulk imports pa			
Product	**Volume mt**	**CO2te**	**CO2te**
R141b (HCFC)	250	178250	178250
R22 (HCFC)/R-Mix	1850	2775000	3293000
R134a	1750	2275000	2467500
R404a	600	1956000	2317440
R507	200	660000	785000
R407c	100	152550	174980
R410A	150	258750	309000
Total	**4900**	**8255550**	**9525170**

Based on ABS & Industry figures approx 2400 mt of precharged imports pa			
Product	**Volume mt**	**CO2te**	**CO2te**
R22	345	517500	614100
R123	40	3600	3040
R134a	1042	1354600	1469220
R407C	66	100683	115486.8
R404A	232	756320	896076.8
R410A	648	1117800	1334880
Total	**2373**	**3850503**	**4432803.6**

Total Industry Imports Bulk & Pre charged		**12106053**	**13957973.6**
CO2 Price @ A$			
A$	**20**	**$242,121,060.00**	**$279,159,472.00**
A$	**30**	**$363,181,590.00**	**$418,739,208.00**
A$	**40**	**$484,242,120.00**	**$558,318,944.00**

Appendix II

Refrigerant Bank, 2006 to 2018



Note further details on the calculation methodology, application matrix and assumptions made to predict the penetration of alternative technologies is available on request.

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