Hydrocarbon Conspiracy

(and other stuff they don't want you to have)

Independently produced by Andrew Gardiner. February 9, 2024.

You wouldn't use halogen or fluorescent lights because they're too expensive to run.
Why would you continue using obsolete synthetic gas in your air conditioners?
The problem is political, not technical.
This document provides an introduction for consumers and a free crash course for technicians.

If you're a technician, it is in your best interests to be aware of safety risks you may not know about.

The use of hydrocarbon refrigerant gases is restricted in some jurisdictions because they are flammable.
R32 is the gas that comes with air conditioners sold in the shops.
Ironically, R32 refrigerant gas is flammable too, and so are HFO refrigerants.
Someone is lying.

The truth is told, and conversion resources are now freely available for anyone to download.
There's a simple disclaimer, like any other material.
No email or registration for spam is required, just download and enjoy.
A single zip file containing all of the resources is even provided for your convenience!

I've spent more time researching and dealing with other issues, than writing this.
Forgive my bad writing and layout, I'll improve it in time.

Facebook **Website**

Consumers

Introduction:

You wouldn't use halogen or fluorescent lights because they're too expensive to run.
Why would you continue using obsolete synthetic gas in your air conditioners?
You would replace the gas in your air conditioner with a gas that can do the job more efficiently.
Like light fittings, there's little to no physical difference between an air conditioner or fridge that's designed explicitly for use with hydrocarbon refrigerant, and one that isn't. The air conditioner will have a longer life span from using hydrocarbon gas in it instead of the manufacturer specified gas. Hydrocarbon gas operates at a lower pressure and offers superior lubrication of the compressor compared to synthetic refrigerant gases. The manufacturers usually want their stuff to fail sooner so they can sell you another system!

Talking about making stuff to fail, I'll talk about surge arrestors and modification of domestic fridge / freezers too. This is another way to help prolong the lifespan of junk equipment these days.

Share this document with your local air conditioning technician if you want them to work on your air conditioner!

Queensland (And possibly some other worldwide jurisdictions):
Retrofitting your air conditioner with hydrocarbon refrigerant is legal in every state of Australia except Queensland.
The Australian Standards outline the safety requirements for the use of flammable refrigerants.
I suspect there are some technicians in Queensland offering retrofits but don't offer paperwork explicitly stating it.

Imagine if it was illegal to use LED light bulbs in household light fittings.
You know that using an LED light bulb is cheaper to run and offers comparable performance.
LED lights run cooler than fluorescent or halogen lights.
Less heat from the light bulb means the plastic in the light fitting won't deteriorate as easily.
It also means less heat that your air conditioner has to keep up with.

Are LED light bulbs safe? Yes.
Are there any rules saying you can't use an LED light bulb in an old light fitting? No.
Is your old light fitting going to catch fire if you use an LED light bulb? No.

Why wouldn't you replace the gas in your air conditioner with a gas that can do the job more efficiently?

The government, energy companies, and the synthetic refrigerant industry are apparently working collaboratively as a cartel to keep you paying more than you should for electricity, and reduce stability of the electricity grid. Even many air conditioner manufacturers are in on the hoax, using sensors in the system that reduce the system output (but can be circumvented) when it detects anything other than the specified gas in the system. Corrupt politicians receive money from the energy companies and the synthetic refrigerant industry in exchange for writing legislation which deems this practice illegal. And we pay for our enslavement through increased power bills. They say it's in the name of safety.

There's some basic safety rules to follow when using hydrocarbon gas in air conditioners.
Air conditioners can and do leak gas, so those flare joins either need to be welded instead, or located outside of the building or in an area which can be ventilated (such as in a cover duct outside, or, for ducted air conditioners - a whirlybird on the roof). More on that in its own chapter.

The Queensland government (and possibly some other jurisdictions) restrict the use of hydrocarbon refrigerant gas in equipment not explicitly approved for use of hydrocarbon refrigerant. The red tape and prohibitive certification costs basically render it illegal to use hydrocarbon refrigerant gas in air conditioners and older fridges. This legislation means that systems go unlabelled, putting the next technician at risk who works on the system. Of course, fridges and portable air conditioners are now available with hydrocarbon refrigerant out of the factory. Pioneer Air conditioners (based in Sydney) come factory charged with hydrocarbon refrigerant and offer superior energy efficiency. The certification technicality essentially means the Pioneer branded air conditioners are illegal in QLD.

Share this material with your Member of Parliarment (spelling intended) and ask what are they going to do about it.

Summary of Tests

The old propane car air conditioner tale:

You may have heard rumours that using propane as the gas for your car air conditioning seemed to offer exceptional performance. Some conversion attempts failed miserably, resulting in damaged compressors or fires. Long story short, the bozos that blew themselves up had absolutely no idea of what they were doing and no regard for basic safety. You fix the leak before putting gas in the system. You also need to pay attention to the different gas charge weight densities (which this document outlines).

Those who know what they're doing (like myself) have no problems. I have run Hychill Minus 30EC in my van since 2020 with heavy use (as per Hydrocarbon Conspiracy charge weight charts), and hydrocarbon in our household air conditioners (one which was brutally modified around the same time), and to this day, haven't had any problems.

Performance and modifications - Cutting to the point:

I've done a whole assortment of tests and have picked out what's relevant to today.

Some earlier tests were weird and consisted of brutal hack methods. One involved welding a copper tube across the regulator "expansion valve" in the outdoor unit – and it's been working well since 2019!

For most modern air conditioners (R410A and R32 inverter), the simplest method is to mix R32 (20% to 50%, depending on how critical the performance requirements are) with the new Hychill HC32 product. Better still, is to chuck an extra 2 or 3% of R32 over the specified charge to kick things along.

Daikin ducted air conditioners use pressure sensors, but I got word that someone has made an emulator board which fools the system into thinking it has the correct gas and charge. I hear it works well with M50 / Minus 50 products.

A test rig of three identical split air conditioners for comparing different gas blends against the factory R32 gas.

Performance and modifications summary (in a little more detail):

Inverter air conditioners that run R410A or R32 (pretty much anything you'll encounter these days) are much more difficult to work with. You can't just put propane in them and expect them to operate at capacity.

The coil in the indoor unit is sized to suit the low boiling temperature of R32 gas, and the units usually have temperature sensors on the evaporator coil (Indoor or outdoor, depending whether it's cooling or heating). If the temperature sensor reading is slightly off (usually from low charge or the wrong gas), the system will slow down the compressor.

R32 has an atmospheric boiling temperature of -52.6°C

R410A has 50% R32 in it and has an overall atmospheric boiling temperature of -51.4°C

R1270 (Hydrocarbon) has an atmospheric boiling temperature of -47.8°C

HC32 is a mixture of mostly R1270 and some R170. The R170 component is ignored because it has a low critical temperature, and performance becomes unstable above 30°C. It is great for heating in winter. For cooling, it expands in volume, reducing the system efficiency slightly. A mix of 20 – 50% R32 (depending on how critical performance is) and the rest as HC32 seems to offer satisfactory comparable performance.

R600A seems to just sit idle in the condenser side, reducing system performance after a period of time.

Is it safe!?

Absolutely. There's a few simple rules to follow.
R32 gas (the gas that comes with the air conditioners in the shops) is flammable.
HFO refrigerant gases (newer gases which pollute the lower atmosphere!) are flammable.
Hydrocarbon refrigerants are flammable.
Ammonia and Carbon Dioxide refrigerants are not flammable, but displace oxygen (and so do other refrigerant gases).

Are the flare joins located outside of the building, or are they welded / press clamped instead?
Flare joins inside the building need ventilation. For example, a ducted air conditioner means you need at least one whirlybird on the roof, and a vent or two in the eaves. Wall mount split air conditioners with flares inside the wall will also need a whirlybird on the roof, or some other sort of ventilation.

When an air conditioner leaks gas, it will either leak very slowly, or all at once. The flammability range of propane and R1270 is approximately 2 – 10% in air. That video filmed in 1995 where VASA blew up that car would have likely had acetylene in the cabin – acetylene is about the only gas that will ignite at such a high proportion of fuel to air.

The synthetic refrigerant cartel:

There's been an ongoing battle of natural vs synthetic refrigerant gases.
Basically the synthetic refrigerant industry have been running propaganda campaigns to discredit natural refrigerants.
The synthetic refrigerant industry also hide behind dodgy charities (more in the political section).
R32 gas is found in many synthetic refrigerants or on its own. R32 gas when mixed with air and compressed, explodes like a bomb (R32 diesel effect).
All refrigerant gases have their pros and cons.
Consumers naturally want a choice as to what they want.

Hydrocarbon refrigerant external documents:

Quick reference: https://www.dmp.wa.gov.au/Documents/Safety/MSH_SB_100.pdf
Hychill have a collection of documents: https://hychill.com.au/info

Hydrocarbon refrigerant safety incidents:

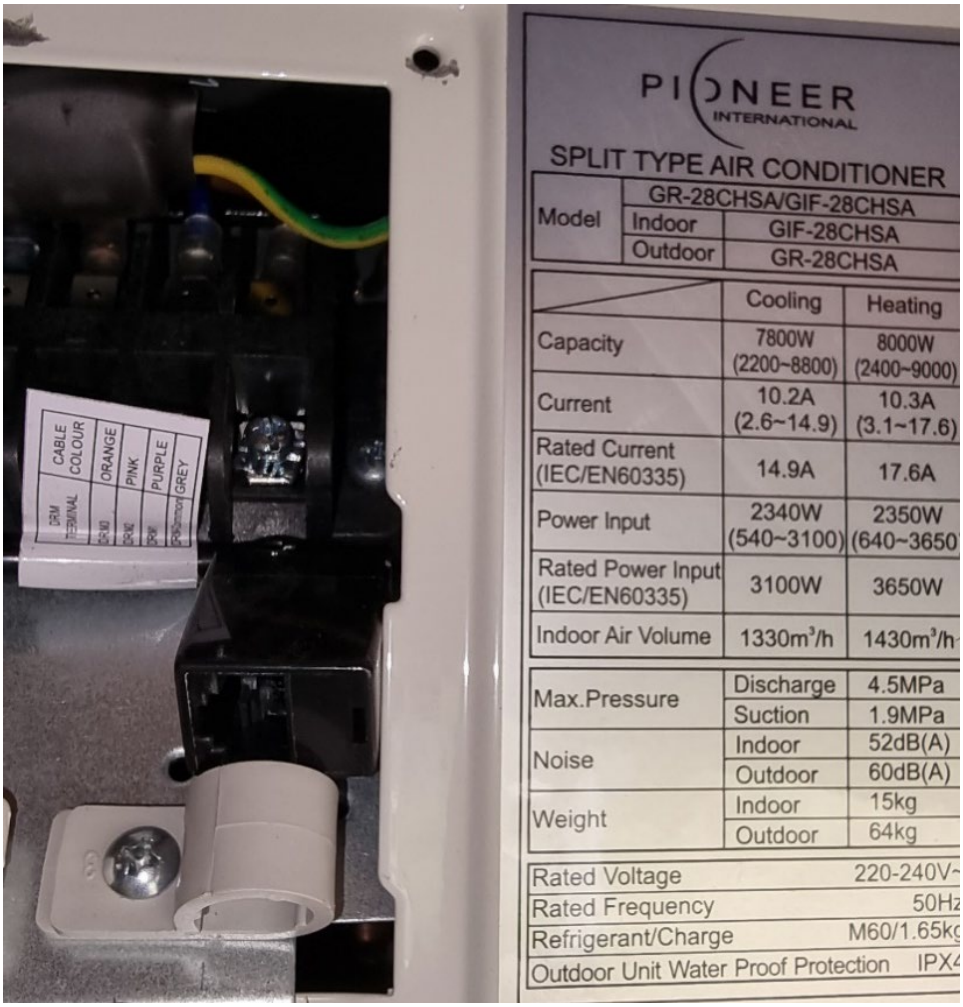
"Investigations are ongoing". Translate: There's more to the story and we won't tell you:
https://www.rshq.qld.gov.au/safety-notices/mines/explosion-in-truck-cabin-from-air-conditioning-system
I think they got the gas bottle (The article suggests they used Minus 30) and just filled the system with gas until it stopped filling. The correct way to charge a system is to weigh it in. Due to the densities, a charge of Minus 30 is about 45% of the R134A charge weight.

This story waffles on and blames hydrocarbon refrigerant:
https://www.coolingpost.com/world-news/singapore-issues-hc-refrigerant-warning/
These clowns discharged hydrocarbon gas in an enclosed room, then switched on a vacuum cleaner (which uses a brushed motor, which generates sparks as part of normal operation)

Remember that flyer that came in the mail? You probably don't. And I edited it too, to make it a little more truthful. Some $550 bonus towards your power bills. Truth is nothing is free. You're paying it back in the form of higher power bills, which are only expected to continue to rise.

Using hydrocarbon refrigerant can save around 30% off the running costs of your air conditioning, and prolong the equipment lifespan (less strain on the compressor, improved compressor lubrication, and inverter board)!
It works for fridges too.

Pioneer – the brand you've probably never heard of (In QLD at least):



This brand of air conditioner is illegal to install in QLD. This one was installed in Northern NSW. Ironically, it has the DRED connector port which is required in QLD.

https://www.pioneerairinternational.com/

Political:

First and foremost, the political embargo on the use of hydrocarbon refrigerants is putting technicians at risk of harm. Secondly, consumers are missing out in that they have to pay significantly more for energy usage.

Safety concerns:

It is possible that there are people in Queensland charging systems with hydrocarbon refrigerant, and not labelling the systems accordingly. The issue isn't as much of a concern if the system is intended to take R32 gas as there is already a flammable refrigerant warning label on the system.

• There is a possible safety concern present to technicians who recover gas from a system in to a gas bottle. For example, a gas bottle may safely hold 18Kg of fluorocarbon refrigerant, but due to the densities (Kg/m3) may only safely hold 9Kg of hydrocarbon refrigerant. Unaware of the fact that the refrigerant gas being recovered is actually hydrocarbon (due to the lack of system labelling), the technician may attempt to recover more than the gas cylinder may safely hold.

• Other safety concerns may arise from the lack of training and awareness in the safe use of hydrocarbon refrigerants. Stuff like volume densities and ventilation to ensure safety in the event of a gas leak (usually from the flare joins or within the outdoor unit)

• Flammable refrigerant gases are illegal in QLD because they're flammable.

• Ironically, R32 and HFO refrigerant gases are flammable, and even carry warning labels on the equipment.

• R32 makes 50% of the mixture of R410A (and a percentage of other fluorocarbon blends), which is otherwise regarded as a non-flammable refrigerant gas.

• Other "non-flammable" refrigerant gases are classed as such, because their ignition temperature and energy is higher than flammable refrigerants. When refrigerant oil is mixed with them and the system develops a gas leak, the mixture becomes flammable.

Getting official approval under the current system:

• State government approval is required before hydrocarbon refrigerant can be added to any system (unless it is on the list of pre-approved devices register).

• Such approval is expected to cost around $30K, as the system requires electrical safety approval from an organization such as SAA Approvals (for example) and the system and its installation area being assessed by an inspector authorised by the QLD hydrocarbon refrigerant licensing body (Department of Natural Resources Mines and Energy, now known as Resources Safety Health Queensland).

• There are only two inspectors. One is retired. The other (Lindsay Pelser) isn't much help with giving information about the process and has previously mentioned interests in his own hydrocarbon refrigerant equipment company, which doesn't appear to be actually selling anything. Lindsay also had a fall out with George Haydock from Pioneer Air, a Sydney based company that manufactures hydrocarbon air conditioners out of the box ready to go.

• Charging a system with hydrocarbon refrigerant without the above said approvals (like you can in other states of Australia) may attract fines of $50K upwards.

• I was advised by the hydrocarbon refrigerant licensing board (when they visited my house unexpectedly) that they couldn't confirm or deny that they had financial interests / influences with the synthetic refrigerant industry.

• A quick search of the ACNC website for the word "refrigerant" in the charity name search bar reveals the following:

- Refrigerant Reclaim Australia Limited 75061197206
- Refrigerant Reclaim Australia Trust 12359831914
- Australian Refrigeration Council Ltd 69097952657
- The Australian Institute Of Refrigeration; Air Conditioning And Heating (Incorporated) 81004082928
- PEER Education Employment & Training Ltd 83414133153

• I was paid a visit from a couple of the inspectors from the hydrocarbon refrigerant licensing board, wanting to test my systems. I told them what was in the systems and I refused entry to them as their taking a gas sample would compromise the refrigerant gas blend. They left and I have heard nothing more from them since.

• One opinion I received was that this sort of activity may breach Section 45 of the Competition and Consumer Act 2010.

Debunking the response from QLD Parliament:

Petition: https://www.parliament.qld.gov.au/Work-of-the-Assembly/Petitions/Petition-Details?id=3394

Response: https://apps.parliament.qld.gov.au/E-Petitions/Home/DownloadResponse/956ed1af-8f11-469d-b1e7-997527155f26

• The approach taken by the Queensland Government does not appear to be consistent with the safety standards of the

rest of Australia, and appears to “add additional impost” not already covered by the Australian Standards. No further detail was given in their response.
• Other states regulate the use of hydrocarbon refrigerant, but in ways that are more accessible for competent technicians to comply with.
• Misuse of any product will likely result in injury of death. The injuries / deaths associated with the use of hydrocarbon refrigerants would have been associated with sheer stupidity, not general safe working practices.
• Of the 2800 models of refrigeration devices, none of them are comprised of air conditioners that are split system type or larger.
• Articles on the New South Wales shopping centre of concern in the example can be found by searching Google for “Marketfair Campbelltown hydrocarbon refrigerant”.
• Initial indications show improvements in energy efficiency, especially on the heating cycle, and can further be improved upon for cooling applications.
• VASA produced a document in support of debunking the petition to lift the ban on hydrocarbon refrigerants in QLD.

Readily legal in every other state:
Essentially, the hydrocarbon gas conversions are legal in every state of Australia (backed by Australian Standards), except for Queensland. The Queensland Government remain difficult to this day concerning the legality of the use of hydrocarbon refrigerant gases. They say it’s for safety reasons but don’t seem to cite any credible evidence.

A petition and Parliamentary enquiry was launched in 2020 and their response essentially was that they are in line with the rules of the rest of Australia, and no further information was given or is available.
• Engas, Hychill, and Oz-Chill are based in Australia, and produce hydrocarbon refrigerant gases.
• Pioneer Air and Polaris Air are based in Australia, and produce air conditioners endorsed for use with hydrocarbon gas.
• The restrictions contravene Section 45D of the Trade Practices Act 1974 (replaced with The Competition and Consumer Act 2010).

Industry corruption - VASA automotive propaganda debunked:
• VASA produced a video in 1995 where they release a gas (presumably Acetylene) in to the cabin of a car and ignite is, causing it to explode. VASA claims that the explosion from hydrocarbon refrigerants. Hychill Minus 30 or Engas M30 is a suitable replacement for automotive refrigerant, and has a narrow air / fuel ignition range.
• M30 and Minus 30 products comprise of mostly Isobutane (flammable between 1.6% and 8.4%) and Propane (which leaks out first in the event of a gas leak, flammable between 2% - 10%). Too much gas in the air and the gas won’t ignite.
• The joins are usually in the engine bay, not in the cabin.
• Acetylene is flammable between 2.4% and 83%.
• Opening and closing the car doors (as part of normal use) would see that any slow leaks of gas leaked in to the cabin would escape out in to the open air.
• A sudden and total loss of gas charge in to the car cabin would be noticeable, with the refrigerant giving off an odour comparable to BBQ gas. Hydrocarbon refrigerant and LPG producers are required by law to include an odorant which helps a person readily detect the presence of a gas leak.
• There have been a few incidents including damaged compressors and explosions. These would likely be the result of an incorrect gas charge, as I have tested Minus 30 in my van for the last 4 years without any problems.
• The correct gas charge is roughly 45% of the R134A charge weight. For example, a typical passenger car takes 600g of R134A to fully charge it. Give or take a few grams, Engas M30, and Hychill Minus 30 or Minus 30 EC, takes about 270g to fully charge it. An incorrect gas charge will result in poor performance and / or pose serious safety concerns. Those unaware of the difference will likely try and charge the system with 600g of hydrocarbon and cause an explosion.
• Hychill responds to Safety Alert: Introduction: https://hychill.com.au/info/response-to-safety-alert and PDF article: https://hychill.com.au/media/pages/info/response-to-safety-alert/7f1f431a86-1578467763/aaen-hychill-gm-responds.pdf

Technicians

Disclaimer:
This document is intended to help promote safety when working on air conditioning and refrigeration equipment. Technical resources are also provided to help you select a suitable alternative refrigerant gas and use the right amount.

The works and technical resources are based on my own research and are provided on an as-is basis.
Periodic updates are provided if I find there's something better.
Care is taken in preparation and I take no responsibility for your use of it.
If you misread it and blow yourself up or damage equipment, that's on you.

Engas (based in Perth) sell hydrocarbon refrigerant.
Hychill (based in Melbourne) sell hydrocarbon refrigerant.
Pioneer Air (based in Sydney) sell hydrocarbon air conditioners.
These companies don't endorse my research at this stage. They may even disagree with my methods, but the results speak for themselves. I've compiled my resources from researching publicly available data, trialing numbers on the computer, and backyard testing of the results.

Flammable refrigerants:
Flammable refrigerants are becoming increasingly common in the industry and safety precautions need to be taken.
Superheat and subcooling are no reliable indicators for how much gas is in a system.
Small fridges already come with hydrocarbon refrigerant these days.
HFO refrigerants and R32 are also flammable.
Some technicians have been slipping hydrocarbon refrigerants in to systems for decades, and you wouldn't even know it.

There are safety considerations you need to be aware of, if you aren't already:
Don't rely on the weight of a reclaim cylinder as an indication of how full it is.
If any gas escapes in to the air for whatever reason, treat it as flammable.
Flammable substances may still be present in a system where the gas has been reclaimed and vacuumed and you're brazing pipework.

General safety:
• The simplest way to ensure safety with flammable refrigerant gases is to ensure that any pipework joins are either done so in the cover duct on the exterior of the building, or such joins are press-clamped or brazed.
• Some joins may be in areas inside the building (including in the roof space). Ventilation (such as a whirlybird and even eave vents) will suffice.
• Walk in fridges and freezers should have a hydrocarbon refrigerant alarm (like a smoke alarm, but to detect the presence of flammable gases, in the event of a gas leak). Spray the evaporator with lacquer to help protect it against corrosion from acidic food products which would otherwise corrode the coil (or use an evaporator made from different material such as stainless steel).
• Equipment repairs may inadvertently require some sort of modification to get them to operate. Changing the gas in an air conditioner is no different.
• Adding a small portion of hydrocarbon refrigerant can help in retrofitting an R22 system to safely use R407C (if you insist on using fluorocarbon refrigerants), in which would otherwise damage the system without the assistance of the hydrocarbon refrigerant in circulating mineral refrigerant oil within the system.
• The hydrocarbon gas charge weight will be substantially different to the charge weight specified on the system. Failure to observe this will likely damage the system and put consumers at risk of explosion.
When topping up the gas, observe the performance of the system. If the system is performing reasonably well but the gas pressure is lower, it may be a different gas. Adding more gas may result in overcharging the system which could result in poor performance or damage to the system. Reclaim the charge and weigh in the correct gas charge.

Why my methods are different:
Hydrocarbon refrigerant manufacturers offer little to no information on how to use their products. In other cases, I'm of the opinion that their suggested charge weights are off.
I'm of the opinion that the total gas charge depends on the relationships between gas density and volume (Kg/m3) for each refrigerant gas as part of the blend, and the overall gas charge. The hydrocarbon refrigerant gas manufacturers

seem to use different methods and can't seem to offer an exact specific conversion ratio like I have.
Due to the compression ratio and tolerance for error, it's possible the manufacturer charge weight may be slightly under what's actually needed. You may need to check superheat and add a small amount of R32 when commissioning a system with hydrocarbon in it.

Gas densities:
The system label says so many grams of X amount of refrigerant in a Y based system. How much hydrocarbon gas do you use?

Clearly, if the label of an R32 air conditioner says it takes 1Kg of R32, you would cause considerable damage to the system by putting 1Kg of HC32 (or any other hydrocarbon gas) in it. Also be aware when reclaiming refrigerant – someone had a gas cylinder explode on them, thinking their gas cylinder was only half full. This is because the densities (Kg/m3) are vastly different.

Density information:
R32 refrigerant gas has a density of 960Kg/m3.
R600A refrigerant gas has a density of 550Kg/m3.
R1270 refrigerant gas has a density of 504.3Kg/m3.
R170 refrigerant gas has a density of 314.9Kg/m3.

R32 system charge (g):		1000
Refrigerant:	Volumetric %:	Resulting Weight (g):
R32	25	250
HC32	78	404.3479375
Minus 50	0	0
Minus 60	0	0
R600A	0	0
System total equivalent charge (g):	103	654.3479375

R410A system charge (g):		1000
Refrigerant:	Volumetric %:	Resulting Weight (g):
R32	25	226.7145286
HC32	78	366.6862082
Minus 50	0	0
Minus 60	0	0
R600A	0	0
System total equivalent charge (g):	103	593.4007368

R134A system charge (g):	1000
Refrigerant:	Resulting Weight (g):
Minus 30	446.5923593
Minus 30 EC	452.5557305
Engas M30	459.006381

R1234YF system charge (g):	1000
Refrigerant:	Resulting Weight (g):
Minus 30	492.5987203
Minus 30 EC	499.1764168
Engas M30	506.2915905

R1234ZE system charge (g):	1000
Refrigerant:	Resulting Weight (g):
Minus 30	460.6008547
Minus 30 EC	466.7512821
Engas M30	473.4042735

This is an example of adhering to gas densities when charging a system with hydrocarbon.

Cylinder safety and unlabelled systems:
Density plays a significant part in ascertaining how far to fill a gas cylinder when recovering refrigerant. If you know it's hydrocarbon gas, you can safely burn it off or vent it to atmosphere. If the system isn't labelled and you go to recover the refrigerant for disposal, you could run in to serious safety issues. As an example, a gas cylinder intended to carry about 22Kg of fluorocarbon refrigerant may only safely carry about 9Kg of hydrocarbon refrigerant. Attempting to fill the bottle any further will most likely present a significant safety risk.

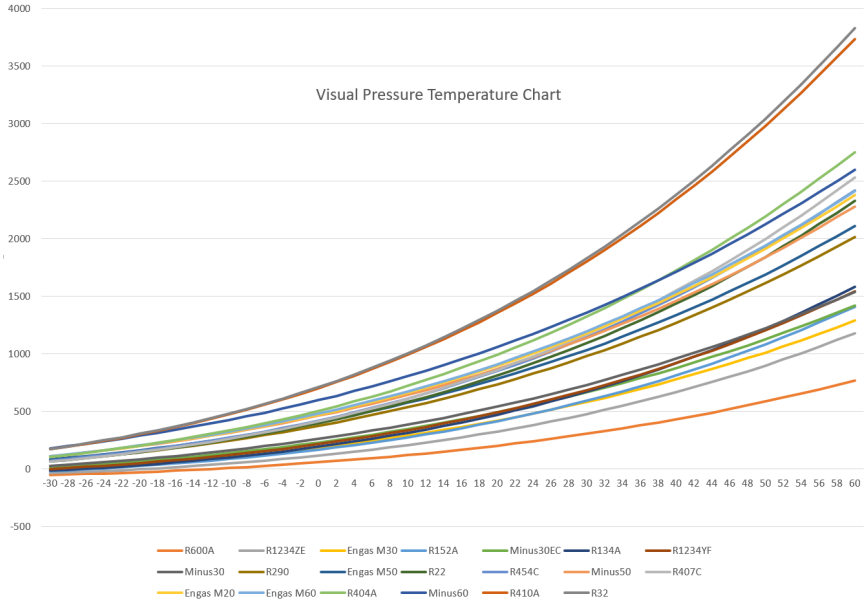
If you can't grasp this concept by now, you shouldn't be attempting to use the technical resources I've compiled.

Top up or regas?
Top up at your own risk. Superheat and subcooling are no reliable indicators for how much gas is in a system.
The resources I've compiled mainly rely on charging by weight. Unless you roughly charge the system by using temperature and superheat (though I haven't published Pressure Temperature charts – I might work on those down the track.

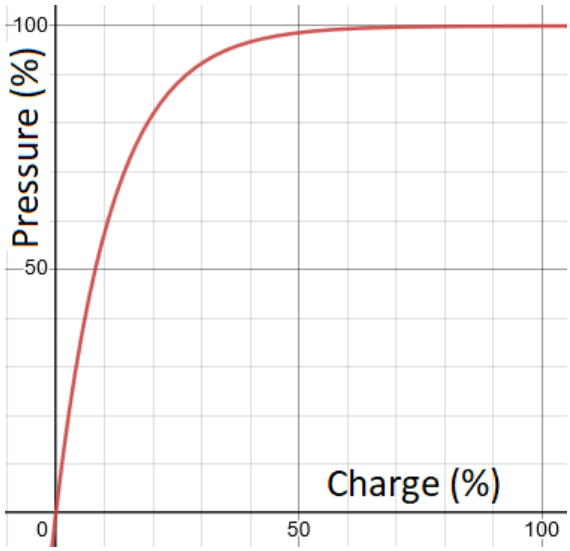
Gas blends fractionate when there's a leak. If the blend has fractionated, find the leak and fix it. If the leak can't be found (systems may lose a miniscule gas over several years), top it up with R32. Better still, regas it.

Where to obtain these resources:

Other free technical resources including capillary calculators, blend calculators, and pressure / temperature chart calculators are available at www.hydrocarbonconspiracy.info where you can also find this document.



Visual pressure temperature chart



Correlation between charge % and gas pressure

Tools of the trade

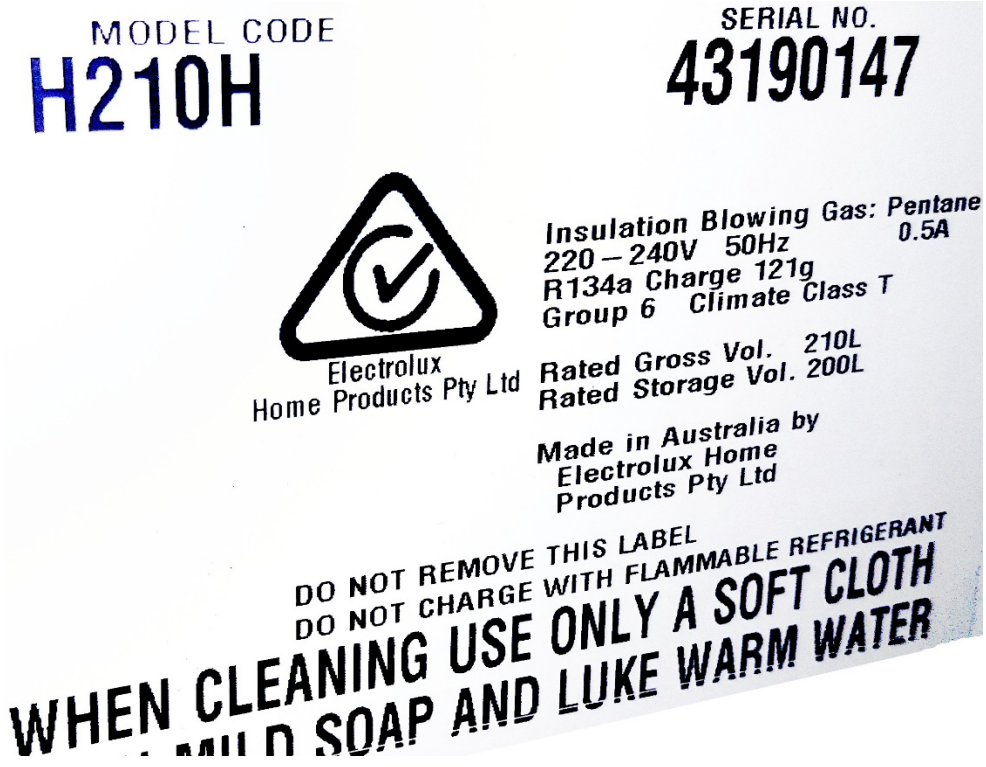
Density and volume.xlsx - Excel

	A	B	C	D	E	F
1	**Refrigerant:**	**Liquid Density:**	**Calculation purposes only:**		**Refrigerant charge (g):**	**Volume (cubic cm):**
2	R22	1190.7Kg/m3	1190700		1000	839.8421097
3	R32	960Kg/m3	960000		1000	1041.666667
4	R134A	1206.7Kg/m3	1206700		1000	828.7063893
5	R152A	900Kg/m3	900000		1000	1111.111111
6	R170	314.9Kg/m3	314900		1000	3175.611305
7	R290	580Kg/m3	580000		1000	1724.137931
8	R404A	1044.1Kg/m3	1044100		1000	957.7626664
9	R407C	1137.5Kg/m3	1137500		1000	879.1208791
10	R410A	1058.6Kg/m3	1058600		1000	944.6438693
11	R600A	550Kg/m3	550000		1000	1818.181818
12	R744	243Kg/m3	243000		1000	4115.226337
13	R1270	504.3Kg/m3	504300		1000	1982.946659
14	R1234YF	1094Kg/m3	1094000		1000	914.0767824
15	R1234ZE	1170Kg/m3	1170000		1000	854.7008547
16	R454C	984Kg/m3	984000		1000	1016.260163
17	R600 (Estimated)	543.426Kg/m3	543426		1000	1840.176951
18						
19	**Engas special blends:**					
20	M20	Estimated 528.966Kg/m3	528966		1000	1890.480674
21	M30	552.956Kg/m3	552956		1000	1808.462156
22	M50	572.579Kg/m3	572579		1000	1746.483891
23	M60	Estimated 533.080Kg/m3	533080		1000	1875.891048
24						
25	**Hychill special blends:**					
26	Hychill Minus 30 (R290 + R600A)	554.651Kg/m3	554651		1000	1802.93554
27	Hychill Minus 30EC (R290 + R600A)	553.836Kg/m3	553836		1000	1805.588658
28	Hychill Minus 50 (R290 + R170)	571.648Kg/m3	571648		1000	1749.328258
29	Hychill Minus 60 (R290 + R170)	569.447Kg/m3	569447		1000	1756.08968
30	Hychill HC32 (R1270 + R170)	497.659Kg/m3	497659		1000	2009.408048
31						
32	**Info & Disclaimer:**					
33	www.fundamentalenergy.com.au/hydrocarbonpack/					
34	Facebook: "Hydrocarbon Conspiracy"					
35	Please check the main PDF document and other resources!					
36	My technical research is based on much analysis of publicly available data, but isn't endorsed by any of the hydrocarbon gas manufacturers.					
37	Not endorsed by the hydrocarbon refrigerant manufacturers.					
38	All refrigerant densities are 25°C					

Systems not designed for hydrocarbon refrigerant:

The difference between a compressor designed for hydrocarbon refrigerant and one that isn't, apparently has to do with how well the seals prevent the gas flowing from the output stage of the compressor to the input stage of the compressor. Hydrocarbon specified compressors have slightly better seals, but the actual difference in performance is marginal.

I picked this fridge up off the side of the road in February 2019, checked the compressor, pressure tested it to make sure it wasn't leaking, then regassed it. As the label says, it takes 121g of R134A, but I put 55g of Hychill Minus 30 in it instead. It has been serving us well ever since.



Do not charge with flammable refrigerant! Yeah wonder why.

Earlier tests (Welding a capillary across the expansion valve and charging with straight R290):

In 2019, I made a calculator spreadsheet which you can weld a capillary across an expansion valve in order to test making an R410A or R32 system compatible with alternative refrigerant gases. In this instance, I modified our R410A loungeroom air conditioning system to run straight R290.

After modification, the system started up and ran as normal. It has been working well with heavy use ever since then.

It was a hot summer day, the doors and windows were all open, and the unit was set to its coldest (18°C). The return gas pipe temperature was around 8°C. The clamp meter shows the electrical power consumption measured about 6.9A: 27% less than the power consumption it said (9.5A) it normally takes to operate. Promising results!

Inside the outdoor unit is usually an electronic controlled motorised regulator expansion valve (there's no adjustment spring), which controls the flow of refrigerant. It is rated for the refrigerant gas that the system is designed to run, and too restrictive for refrigerant gases that operate at a lower pressure. My spreadsheet works out the approximate capacity of the expansion valve based on the lower pressure refrigerant gas, and works out how much additional capacity is required (in which you weld a capillary tube across the expansion device). This reduces the operating range of the expansion valve but it seems to work.

I welded the capillary tube (as shown), then calculated and weighed in the gas charge.
This system takes 1.8Kg of R410A, which equates to 985g of R290.

From theory to modification to operation, all in one fell swoop, performing well with heavy usage ever since!
The maximum power consumption at full load was about 6.9A, 27% lower than the normal nominal run current (9.5A).
Superheat indication readings were done using the R290 scale instead of the R410A scale, due to system modifications.

Earlier tests – In further detail:

Safety against gas leaks:

In terms of safety, a blend refrigerant that leaks will mean a loss of system performance sooner, and less of the gas to leak due to the shorter time frame, and require the attention of a technician to fix the leak and regas it. Using a blend refrigerant means you don't have to weld any capillary across the expansion valve. The risks should be assessed whether the capillary method is suitable for you. The cheapest and easiest option is to use the gas blend method.

Capillary or gas blend method?

Welding a capillary across the expansion valve has its pros and cons. If the labelling falls apart or there is no labelling, the next poor bugger to work on the system won't know that it won't work any more with the original intended gas. The sensors will pick up that something is wrong and throttle back the compressor performance, or the compressor will slug out with liquid and fail. Done correctly, the system will likely have a longer lifespan, as the old air conditioners outlast the newer air conditioners, and the old air conditioners also used a gas that operated at a lower pressure. I used a refrigerant tube piercing clamp to put the holes in the gas piping (never drill the holes!).

I produced two versions of the capillary calculator spreadsheet:

The calculator spreadsheet uses known capillary sizes and a formula was devised with some playing around with by extracting and mapping several values from the software. A track record was plotted in order to devise a formula.

• One simply derates the metering device and calls for additional capillary to compensate. This worked quite well, as shown in the above example, and another air conditioner in Sydney which was also modified using the same formula around the same time, in operation to this day.

• The second version does the same, but also taking in to consideration the temperatures of the source and target refrigerants at atmospheric pressure (0KPAG). This theory didn't seem to work as well on other tests I conducted.

The system superheat can be verified on the R290 scale and is found to be within an acceptable range.

Screenshots from the capillary spreadsheet:

Derating the expansion valve and working out what size capillary to weld across it.

Convert R410A system to R290	
R410A System capacity (Kw):	7
TX Valve capacity (R290) (Kw):	3.819528323
Capillary capacity required (R290) (Kw):	3.180471677
Length (mm) of 1.2mm capillary needed:	106.3521497

Convert R32 system to R290	
R32 System capacity (Kw):	7
TX Valve capacity (R290) (Kw):	3.761656681
Capillary capacity required (R290) (Kw):	3.238343319
Length (mm) of 1.2mm capillary needed:	104.4515565

Capillary resizer:	
Original length (mm):	106.3521497
Original Inner Diameter (mm):	1.2
New Inner Diameter (mm):	1.4
New length of capillary (mm):	229.8689017

Capillary Diameters Chart:		
Part #	ID (mm)	OD (mm)
SP-0	0.6	1.8
SP-1	0.66	1.72
SP-1.5	0.7	1.8
SP-2	0.8	2.06
SP-3	0.9	2.18
SP-4	1.1	2.16
SP-4.5	1.2	2.26
SP-5	1.3	2.58
SP-6	1.4	2.7
SP-6.5	1.5	2.82
SP-7	1.62	2.94
SP-8	1.78	3.1
SP-9	1.9	3.06
SP-10	2.04	3.44
SP-11	2.24	3.54
www.kte.com.au/tube/service-packs/		

Tools and hacks:

Something else they won't teach you in technical college: A spoon bent on to a MAPP Gas torch head, to use as a heat shield when welding pipe work. Also use a fiberglass mat as a backup! Pictured to the right is a refrigerant tube piercing clamp which you can use to install a capillary across an expansion valve. The piercing clamp normally gives you schrader valve access to the system for gas recovery or charging.

Hot water on the cheap: An ordinary air conditioner, with a concentric pipe heat exchanger on the high side of the compressor, before the pipework returns to the system as normal. Connect your hot water system to the heat exchanger and add a pump, and you have cheap hot water! It is possible to use the system without it, but why would you?

Final information:

Professional Services Disclaimer (legal): ** I do not claim to offer hydrocarbon gas conversions in Queensland, unless you're prepared to endure the expensive state approval process (unless they remove that barrier). **

Opposing commercial interests: such as the synthetic refrigerant industry and QLD Government are only welcome to contact me only if they can provide concise credible evidence concerning the safety to justify their legislation. To date, I have seen none. No visits without appointment. My registrations are available publicly only for customer quality assurance and indication that I know what I'm talking about. No mainstream media coverage without approval.

Donations would be much appreciated.

Contact: www.hydrocarbonconspiracy.info Email / Paypal: andrewg4305@gmail.com Ipswich QLD
Financial interests: Hopeful of some sort of financial return or deal (now believed to be unlikely), but no big deal if nothing comes of it. Personal use energy savings of home and automotive air conditioners, since January 2019.

Why am I releasing this information for free?
My business is worth about as much as toilet paper due to government embargo. I may as well make a dent in the synthetic refrigerant industry.

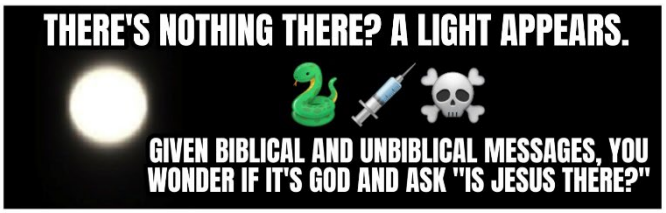
There's also something else I want you to know:
The world has gone wacky. Censorship is rampant and the dumbest content gets distributed the most, distracting you from what you really need. This technical information will be worthless soon. I've come to the conclusion that normal isn't returning, Jesus is. The idea we could be in end times as the Bible describes seems to be about the only reason that makes sense why the world is so wacky. The calendar year is currently 2024. 2024 years from what? When you die, where do you go?

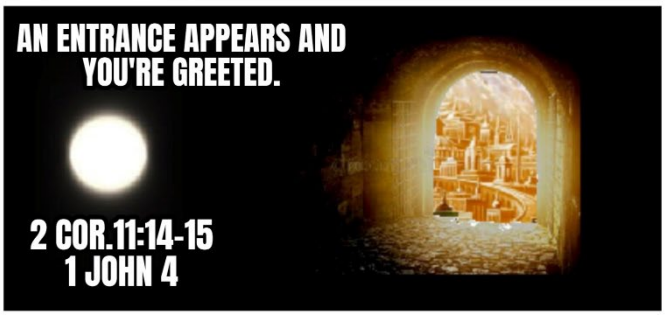
Jesus is real but false preachers have made Him look bad. Satan won't heavily target anything that isn't valuable. Thieves don't break in to empty houses. No one blasphemes the names of other religious founders, and you can go and visit their grave sites. Jesus is the only one to have defeated death (and is verified by sources outside of the Bible confirming He is as the Bible describes). False preachers are silent on end times, teach only half of the gospel (Galatians 1, 2 Corinthians 11, and more), suppress the promotion of other ministries (especially apologetics ministries), talk about money all the time (1 Timothy 6 as opposed to 2 Corinthians 9), or even have ties to the Masonic Lodge (where they're obliged to keep secrets or end up murdered) (Ephesians 5:11).

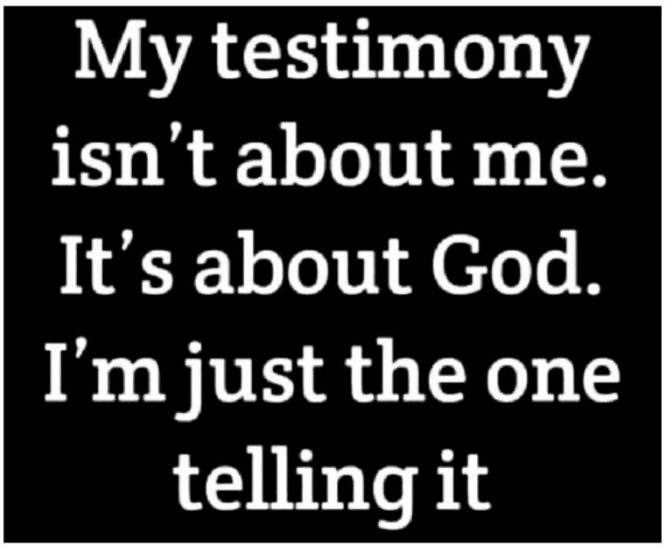
The world is only going to get wackier. Apparently Jesus died and rose in 30AD. Add 2000 years (2 Peter 3:8 and the account of Creation) and you have 2030. Have you heard of the Agenda 2030 conspiracy theory? Subtract 7 years for the Great Tribulation and you get 2023. Now the rapture hasn't happened in 2023 (unless the calendar is wrong). Noah and his family built the ark and were saved through the worldwide flood, likewise I believe Jesus will come to save us (1 Thessalonians 4 & 5) when Planet X (Isaiah 24, Revelation 6 & 12) passes by next time. I believe Planet X is causing climate change, not carbon dioxide (watch the movie "2012" if you haven't seen it already). Mainstream and alternative media will dismiss the rapture as an alien invasion (and Project Bluebeam will be added to the light show to really confuse those who aren't raptured. Not all who profess Jesus will be raptured (Matthew 7) – either trying to earn their salvation under their own efforts, or living in wilful sin (which negatively impacts others!).

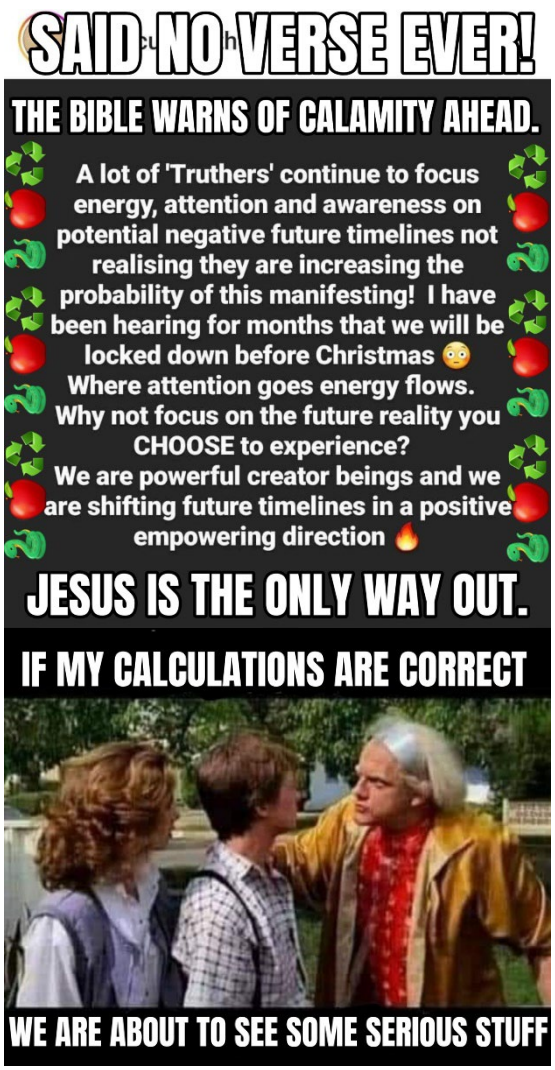
If you miss the rapture, times will be incredibly difficult (Matthew 24:21) and a loaf of bread will cost a day's wages. A certain item will be required in order to continue buying and selling – refuse to accept it.

I've been in to conspiracies since 2005. Work was giving out free flu shots and I decided to get one. I left my body a few nights later. At first there was nothing, I knew that wasn't right, then a light (2 Corinthians 11:14) appeared and I talked to it. The messages from it were mixed, some aligned with the Bible and others didn't. It seemed like it was the end of me and I knew that wasn't like God. I got a favourable response when I simply asked it "Is Jesus there" (I believed in Jesus in life prior to that, but knew something was off). An entrance appeared and I was greeted, thrown back to my body, and told to look in to conspiracies (world evils and end times). I don't seek fame and fortune from this story, only to know Jesus and make Him known.









Other research of mine you may be interested in:

I've worked with fuel savers and free energy systems.

I think the Stan Meyer patents leave out information needed to make it work.

Most free energy demonstration videos are fake – they use a hidden battery and / or wireless transfer of power. That said, I have actually operated a free energy system (Chas Campbell Snooker Ball Gravity Wheel, 2007) but it slipped into oblivion while a bogus system from the same inventor was promoted and still is to this day. Another system which has slipped through the cracks is called "Hidro+", of which I attended a demonstration in 2009.

Water / Hydrogen fuel savers – A system topology not published elsewhere. Think a modified version of Stan Meyer's Water Fuel Cell or the XOGen system. Think a modified boost switch mode power supply based on a gated pulse timer instead of voltage feedback, using PNP mosfets (instead of NPN mosfets) and a freewheel diode. Electrolysis happens around 2 volts, dielectric breakdown of water occurs at 1KV/mm. Oxygen sensor is resistance, not a voltage source. This setup should offer reduced maintenance and superior gas output / fuel savings on petrol / gas / diesel engines.

Using a hot water system as a battery – Peltier devices strapped to a heatsink / fan on one side, and a water chamber on the other. Use solar and heat pump during the day to heat the water, use a water pump and solar inverter of a night time to produce power from the difference in temperature. It sounds good in theory, and the efficiency is unknown.

Quackery – Natural health remedies (such as turmeric / black pepper mixture) and my own design of a pulsed energy (capacitor discharge) "zapper" machine. 2 – 8Hz, charge ~80%, discharge ~20%, pulse capacitors dumping energy in to a coil of a few turns which you hold over you.

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