AIRAH
THE FUTURE
OF HVAC 2018
SEPTEMBER 12–13 • MELBOURNE
#FutureOfHVAC

Beyond Net Zero

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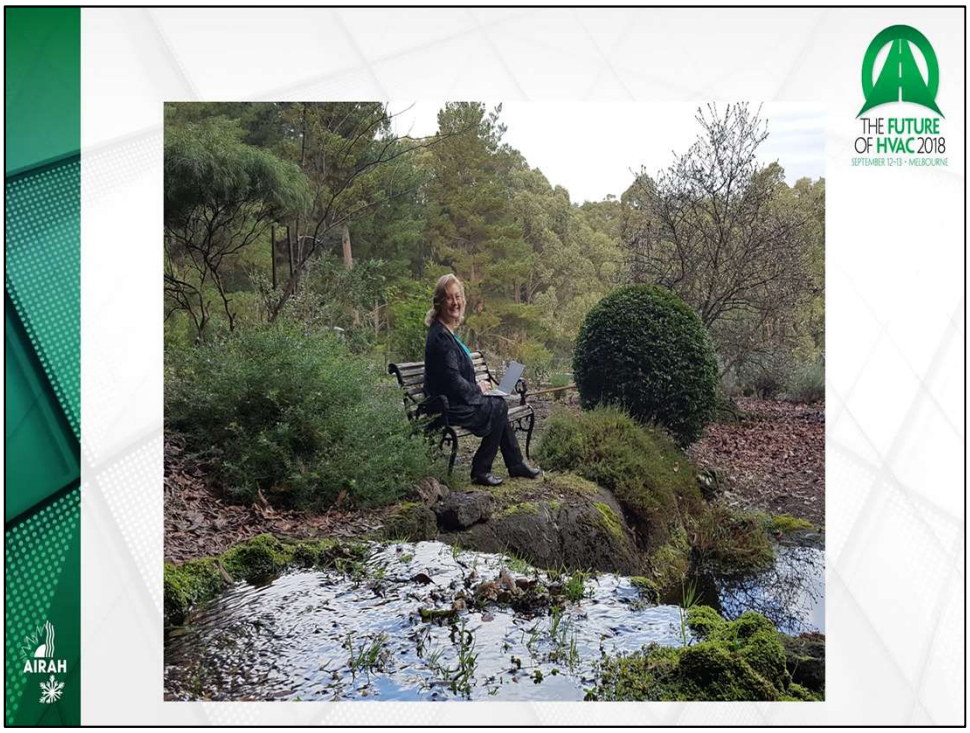
SEPTEMBER 12-13 · MELBOURNE

From the Plant Room to the Plan(e)t Room

Leigh Baker & Phil Wilkinson

AIRAH



LEIGH BAKER: “Leigh, you’re a GEEK, but you’re a GOOD GEEK”

- IT systems engineer turned writer
- 20+ years in IT inside Australian Manufacturing
- When you look at sustainability from the factory floor, “good consumer” + “government action” is (laughably) INSUFFICIENT
- Caught the solutions bug in 2002 with Natural Capitalism, and have been learning/integrating ever since
- Blogging at www.balance3.com.au/blog
- Wrote Deep Green Profit Handbook in 2009, currently working on DGP 2.0 www.deepgreenprofit.com
- Hosting “Greenhouse Drawdown in the Yarra Ranges” www.deepgreenprofit.com/drawdown-dandenongs

We can all be climate ‘Avengers’ – and it’s important to take care of ourselves and our mental health along the way.

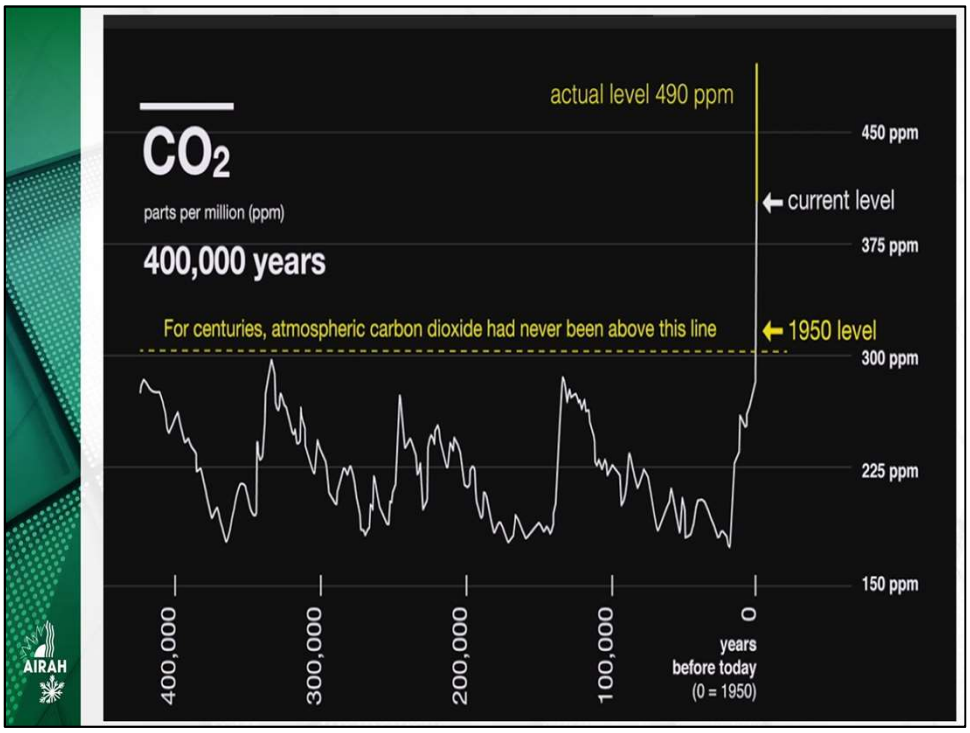
I’m in the refrigeration game, so it’s not surprising that I’ve taken on the Silver Surfer as my Avenger.

THE GLOBAL WARMING GOAL POSTS ARE MOVING

What we thought about timeframes, responsibilities, costs, benefits and solutions is changing rapidly - along with the rate of climate change.

Traditional approaches have moved from harm reduction, then to net zero - and they've moved again...

Image source: https://www.geograph.ie/stamp.php?id=2327374



THE GOAL OF ZERO IS OUT OF DATE

https://www.youtube.com/watch?v=v1DwrrylsrI at 8:30

We're so far into unknown territory that "reducing emissions" is unlikely to be adequate.

Graph of CO2 levels in ice cores.

Circle - last "warm period", hippos on the banks of the Thames

Current level in white - current CO2 levels

Yellow extension - includes all the other GHGs from methane to man-made refrigerants.

In the built environment, leading edge isn't about "number of stars" any more - it's about LIVING BUILDINGS…

Globally, the win/win/win answers are circulating under a range of names - so maybe we'll end up talking about LIVING BUSINESS sooner rather than later.

Living Buildings quotes from: https://living-future.org/lbc/basics/

"the ideal built environment should function as cleanly and efficiently **as a flower**"

"Living buildings give more than they take, creating a positive impact on the human and natural systems that interact with them."

- "Regenerative spaces that connect occupants to light, air, food, nature, and community.
- Self-sufficient and remain within the resource limits of their site. Living Buildings produce more energy than they use and collect and treat all water on site.
- Healthy and beautiful."

“Cities as carbon sinks” - PH

“designing cities to have the same or greater levels of ecosystem services than the natural systems they displace. It comes down to this question: Can we build cities that are equal to forests in their biological impact? ”
https://www.architectmagazine.com/technology/aia-cote-in-conversation-with-paul-hawken_o

https://living-future.org.au/living-building-challenge/

Living Buildings that make all their own energy - and extra to support their communities.
Living Buildings that collect all their own water - and extra to support their local ecosystems.

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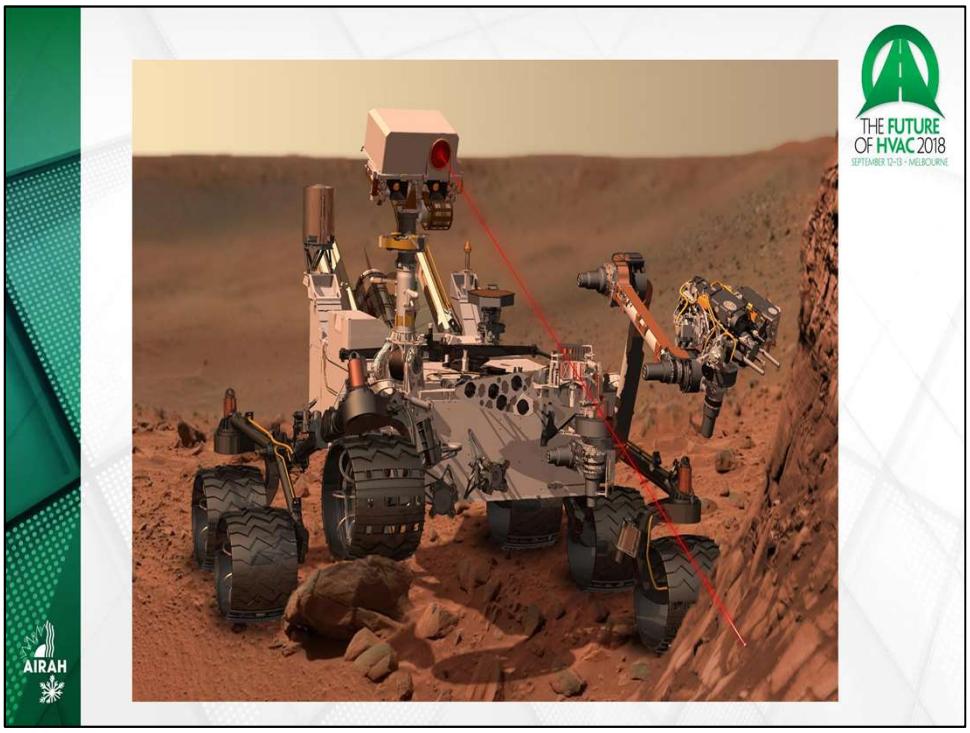
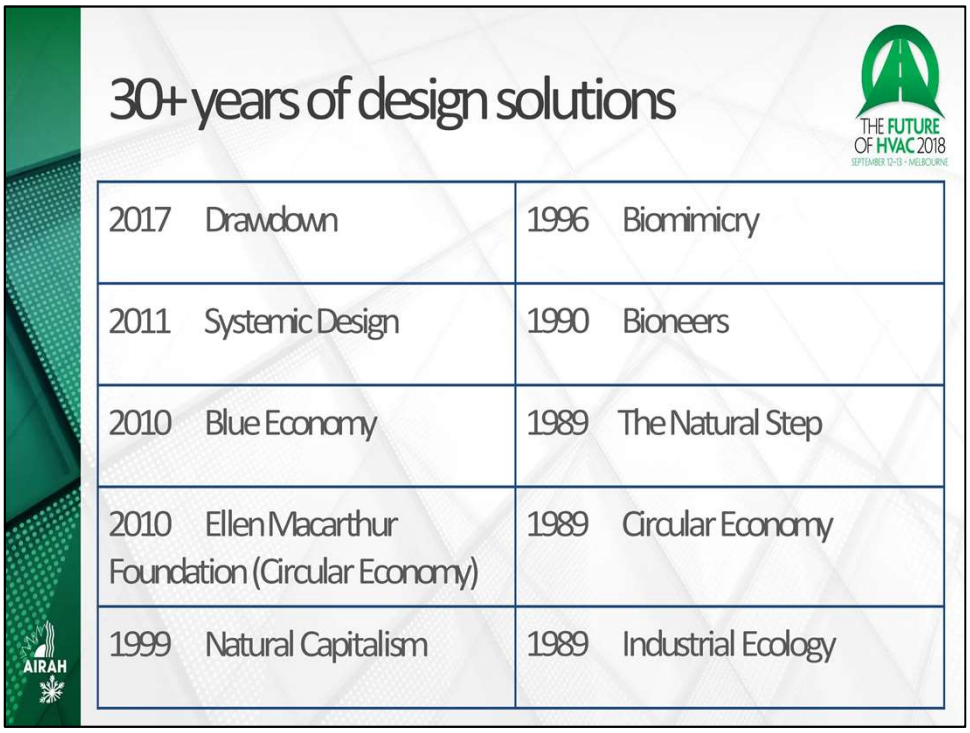
https://living-future.org.au/symposium-2018/program/ - October 2018 in Melbourne - Abbotsford.



We can drive robots around Mars, we can scan the human brain to find out how it works - and we have all the technology we need to reverse climate change.

Image source:

https://commons.wikimedia.org/wiki/File:Martian_rover_Curiosity_using_ChemCam_Msl20111115_PIA14760_MSL_PIcture-3-br2.jpg



You could be forgiven if you think “we don’t have the answer” - but you’d be mis-informed…

The human population is composed of:

- 2.5% inventors/innovatos
- 12.5% early adopters
- 34% early majority
- 34% late majority
- 16% laggards

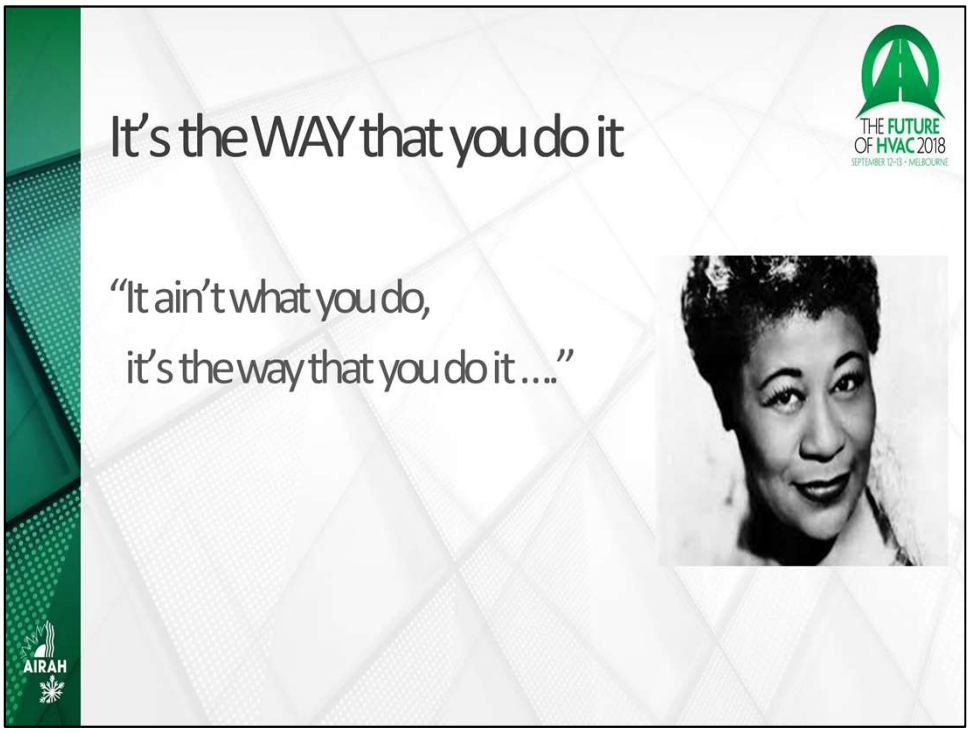
While “the majority” has been waiting around for “proof”, the innovators and early adopters have been busy inventing since the thinktank “The Club of Rome” was formed in 1968.

Back in 2010, The Blue Economy collected over 3,000 solutions and shortlisted a top 100 innovations worth exploring. www.theblueeconomy.org/innovations

In 2017, Project Drawdown published the results of 4 years of analysis and ranking. They identified 80 current, commercially scalable solutions plus 20 high potential “Coming Attractions” -

AND they’re sitting on a database of around 200 additional solutions that they didn’t have accepted datasets to apply analysis to. www.drawdown.org/solutions

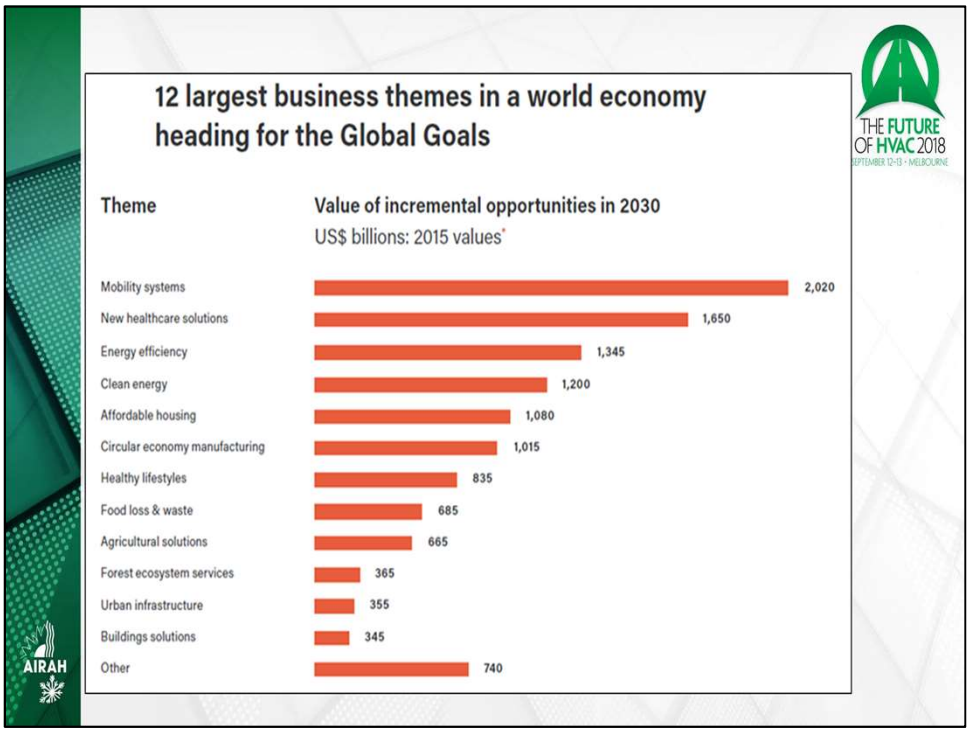
My short summary of the solutions thinking is here: http://balance3.com.au/key-concepts-driving-the-regenerative-business-space/



The problem with plastic isn't the waterproof, tough packaging that it provides - it's

Solutions that MAKE money

- UN Sustainable Development Goals: **$12 trillion** in private sector opportunity by 2030.
- Circular Economy: **€1.8 trillion** in resource efficiency by 2030 - just in Europe.
- Interface Corporation: **$393 million** bottom line savings in 13 years.
- Drawdown: **$74 trillion** of savings globally in 30 years.



http://report.businesscommission.org/uploads/BetterBiz-BetterWorld_170215_012417.pdf

In 2017, Apple joined The Circular Economy, committing to 100% recycled inputs.

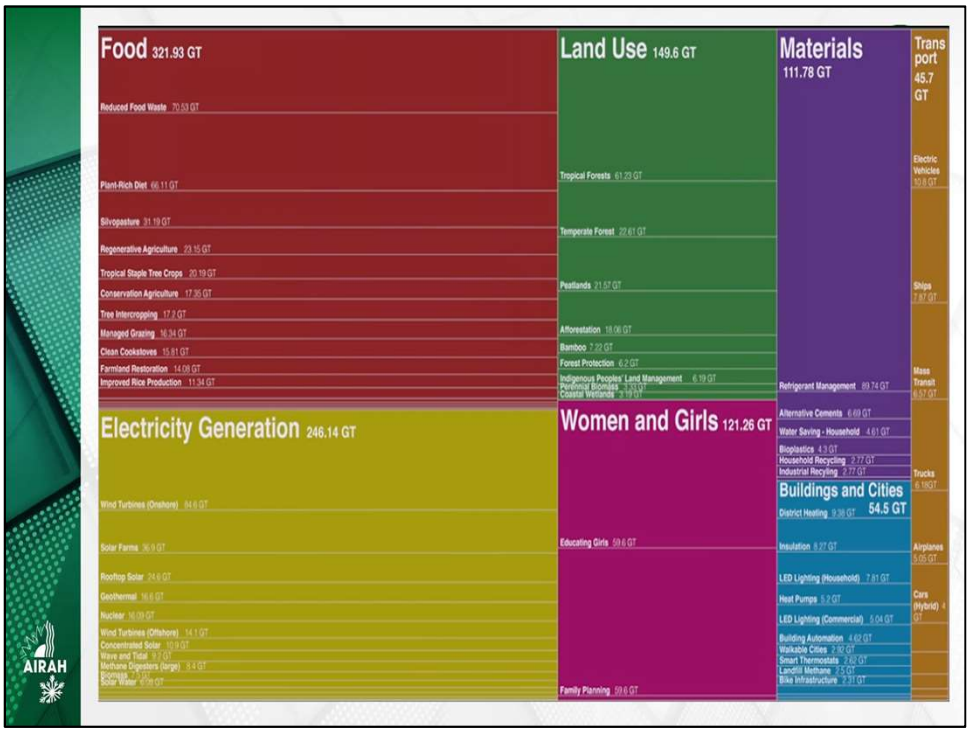
In 2017, Dell and General Motors announced a collaboration for an Ocean Plastics Supply Chain.

In 2017, Alphabet (Google's parent) announced startups in:

- domestic geothermal heating and cooling
- Smart Cities infrastructure

In August 2018, Facebook committed to 100% renewables ***within 2 years (by 2020***)
https://reneweconomy.com.au/facebook-vows-to-be-100-renewable-energy-by-2020/

I mentioned design solutions - the #1 Blue Economy innovation (for water efficiency) is out of the lab and in commercial use in Europe and North America - including delivering big water and energy savings in around 30 HVAC implementations.



We increasingly know where to hit…

In 2013, sustainability expert Paul Hawken put together a different sort of global warming research project.

Instead of asking “Is/ how does Global Warming happen?” he asked “What would it take to REVERSE global warming?”

What the Project Drawdown team found was:

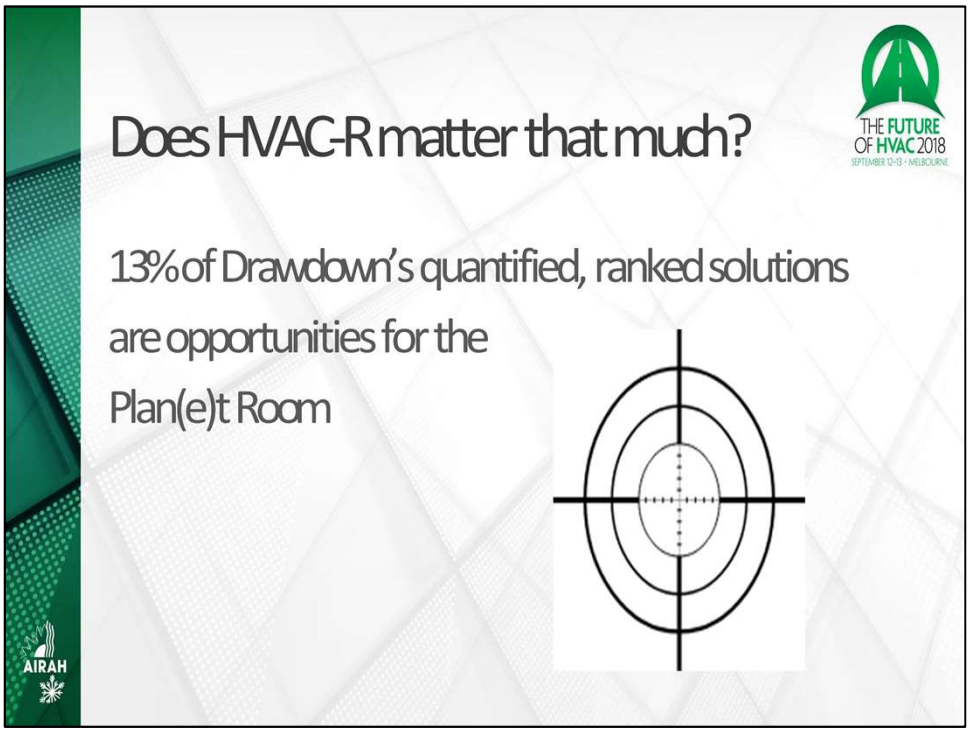
- no single-shot, magic bullets
- 30 years of concentrated effort
- 80 existing commercial scalable solutions
- AND (at least) 20 high potential “Coming Attractions” could speed the process
- plus “database2” of 200+ others

What else they found was:

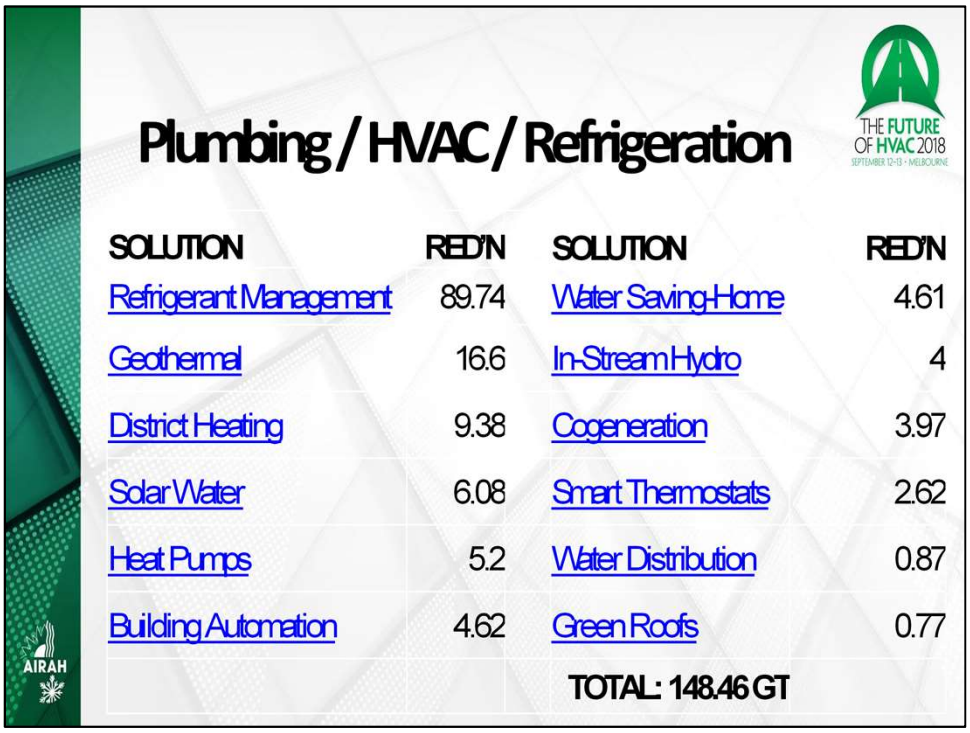
- Global SAVINGS of $74 trillion over the current industrial status quo.
- There are a lot of “who would have thought!!!!” solutions.

Drawdown Top 100: www.drawdown.org/solutions

Drawdown 80 current, scalable, ranked solutions: www.drawdown.org/solutions-summary-by-rank



At least 12 of the Drawdown top 100 solutions are actionable through the built environment, comprising 133.77 GT of GHG savings over 30 years.



Add in also, as-yet unquantified:

- Net Zero Buildings
- Retro-fitting
- Food Waste Reduction - better refrigeration.
- Living Buildings.

“Worldwide, buildings account for 32 percent of energy use and 19 percent of energy-related greenhouse emissions. They pull from the electric grid or natural gas lines to heat, cool, and light the spaces within them and to power appliances and machinery. As much as 80 percent of the energy consumed is wasted” https://www.drawdown.org/solutions/buildings-and-cities/retrofitting

“If net zero buildings are calculated as a single solution, assuming 9.7 percent of new buildings will be net zero by 2050, the integrated opportunity is 7.1 gigatons of carbon dioxide” https://www.drawdown.org/solutions/buildings-and-cities/net-zero-buildings

Southern California Edison - retrofitted client site with a smart combination of Physical Water Treatment technologies:

- Reduced Energy use **3.8%**
- Reduced Water use **42%**
- Reduced Chemical use **33%**

https://www.h2ovortex.com/uploads/1/0/2/0/102042690/etcc_sce_ivg_assesment_r9_final.pdf

Coil cleaning: Richard Fennelley (with permission)

“My own calculation for just fridge/freezer coil cleaning using individual unit data and scaling it up comes in at 11.89 gigatons. We haven't concentrated on the air

conditioning niche and only have a very rough extrapolation figure that appears to be too low ---- I get a total of "only" 20.38 gigatons for the total sector. If only we had a KwH/unit/year figure for an average AC unit we could apply it to the 600 million we think might be running.”

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Image courtesy of AIRAH

The underlying challenge - human systems inertia

Image source: https://www.phrases.org.uk/meanings/elephant-in-the-room.html

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"Successful innovation is
the ADOPTION of a new practice
by a COMMUNITY..."
Denning and Dunham, 2010
www.innovators-way.com
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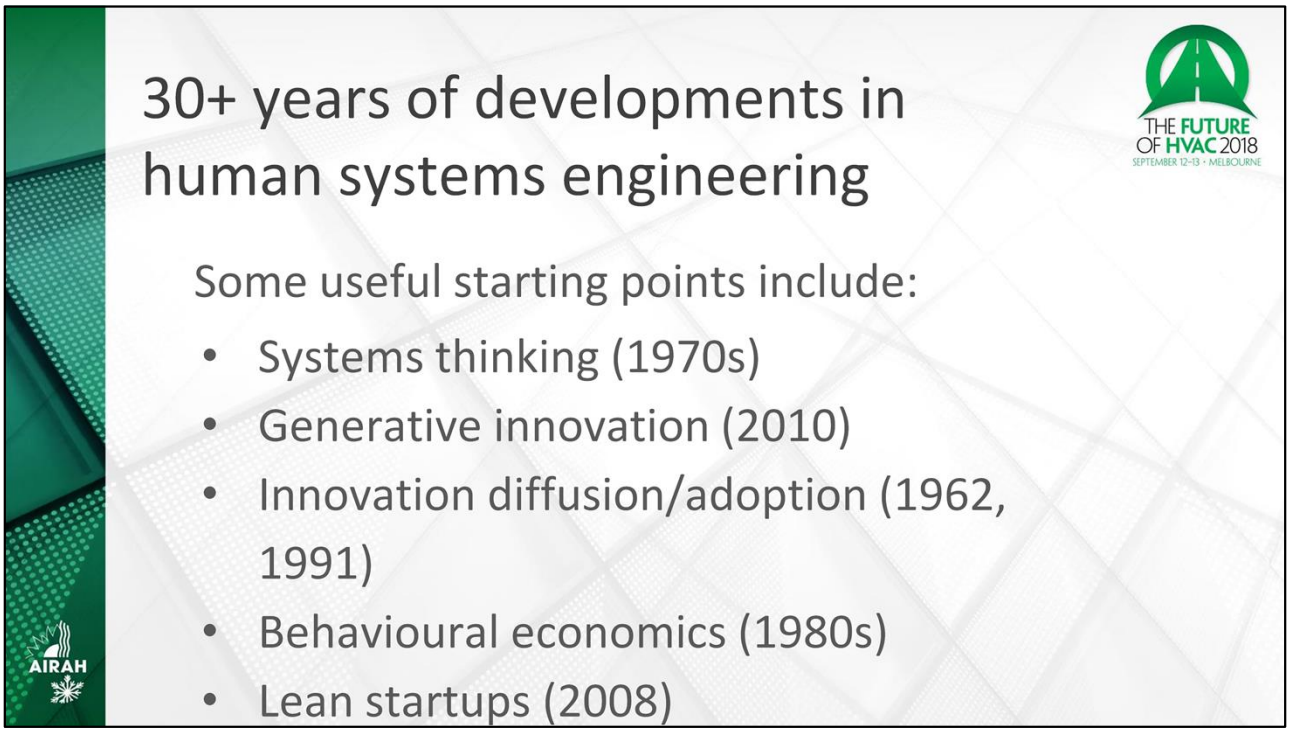


I spent way to long in IT - doing innovation projects into Australian manufacturing companies. In nearly 30 years, I saw very few “computer problems” that had anything to do with the computer.

So I started exploring human systems engineering instead of just systems engineering.

I found out that people have been studying how humans behave since Socrates (at least) - and that it’s ramped up massively since the 70s..

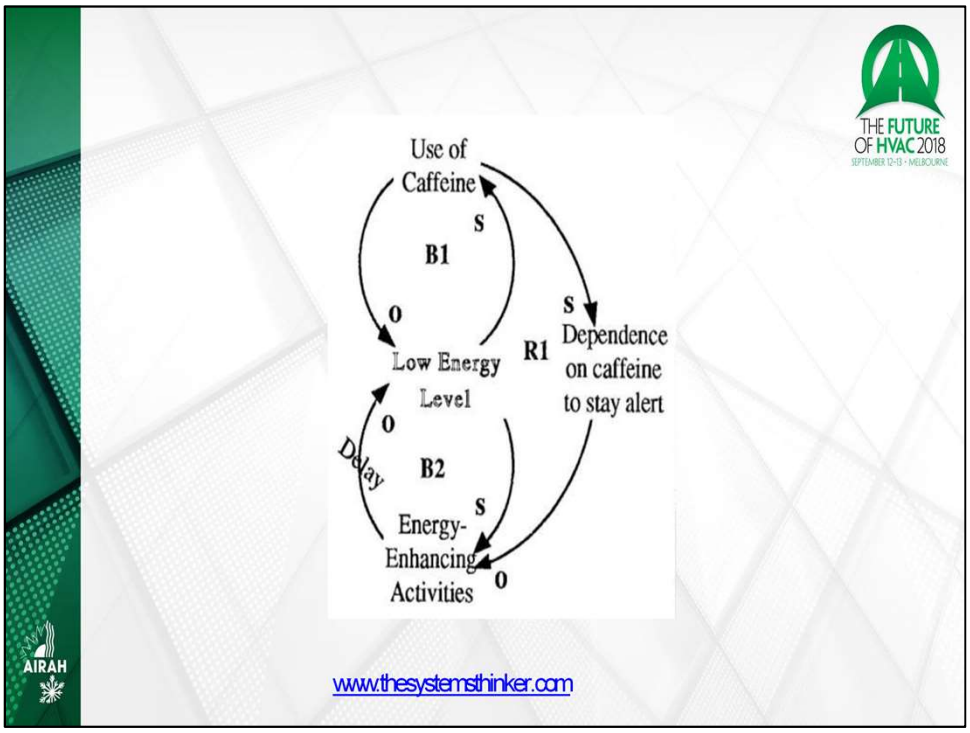
More sustained, evidence-based and organised approaches have been developed and extended, from psychologists and neurobiologists to Internet marketers.

LINKS & REFERENCES:

Systems Thinking: www.thesystemsthinker.com

Generative Innovation: www.innovators-way.com

Leigh’s summary of useful tools: http://balance3.com.au/the-art-and-science-of-change-making/

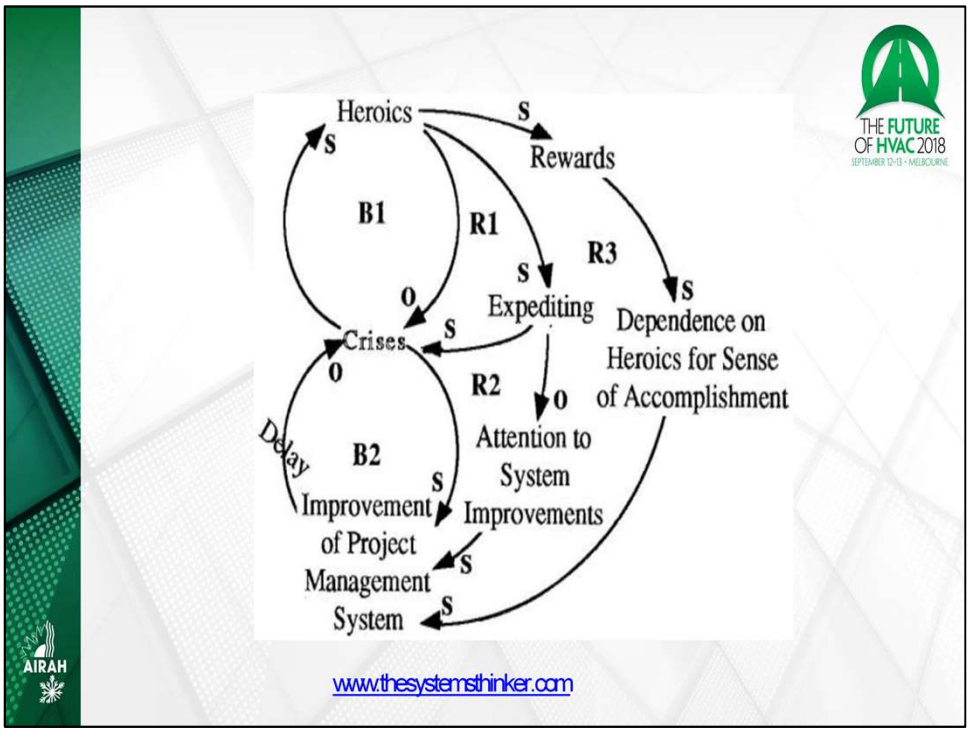


Systems of caffeine addiction…

When you explore “wicked” problems using systems thinking, you identify a small number of long term actions

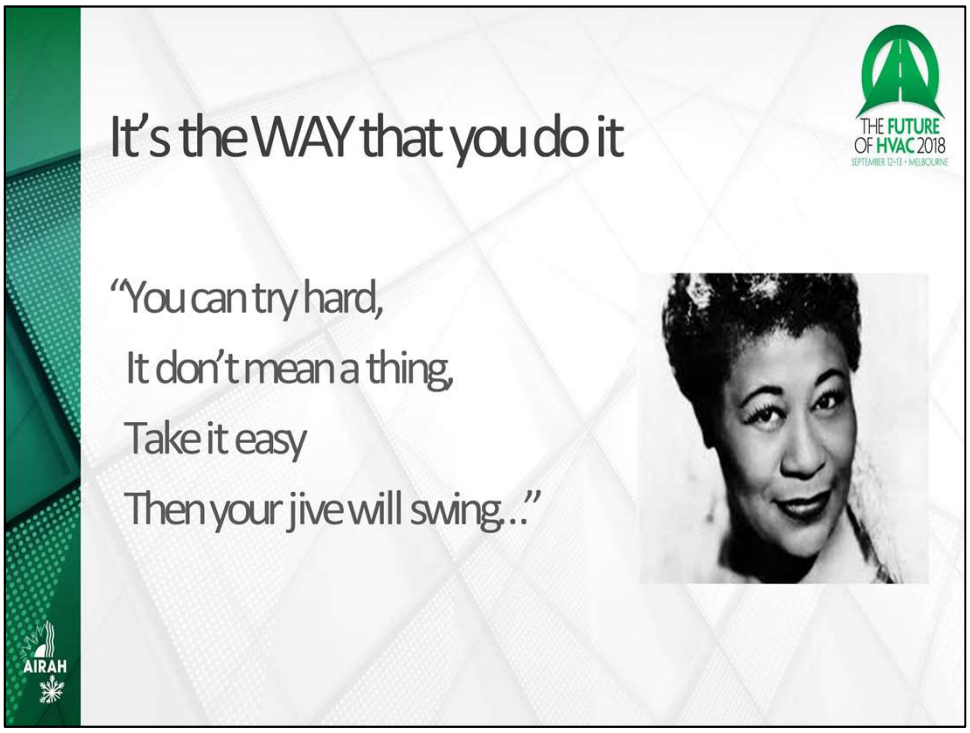
Energy-enhancing activities - sleep hygiene and exercise

Image source: https://thesystemsthinker.com/organizational-addictions-breaking-the-habit/



Systems of addiction to heroics

Image source: https://thesystemsthinker.com/organizational-addictions-breaking-the-habit/



Earnest hard work inside 20th century thinking isn't sufficient - let's bring skill, collaboration and aspiration

In a *post*-zero world….

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1. Shift the focus - beyond zero, towards **draw down**, **sequestration** and **regeneration**…

1. Suspect the status quo - if it "ain't broke", **make it better anyway**…

1. Skill up on **human** systems engineering - it's no-lose career booster…

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Phil - close, Q&A

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