

OPINION

Unaffordable housing revisited

■ Whakatane scientist Dr Victor Luca takes another look at the issues of housing availability and affordability.



IN the *BEACON* in February I wrote a piece entitled "Unaffordable housing".

My piece was motivated by something that should concern all New Zealanders – a housing availability and affordability crisis which in turn generates homelessness, financial stress in families and many other ills. Rising mortgages impacts on incomes and continue to stagnate also raises concerns of a housing bubble akin to that which caused the great recession of 2008.

It will come as no surprise that there has been a dramatic increase in house prices over the past decades, and especially the past half-decade or so. While relatively wealthy New Zealanders with multiple properties may be less concerned about this because the wealth they accumulate will ultimately be passed on to their kids when they die, those with only one property, or no properties at all, should be more concerned (for their kids). Those with massive mortgages relative to income might also have cause for concern, especially now that we are dealing with the Covid-19 aftermath.

My original analysis was, however, a basic one, and it was designed to be framed in terms that folk (like me) without training in economics could understand. I attributed house price increases to the following four main factors that I called government's levers:

- Historically low interest rates
- Sale of New Zealand properties to

foreign non-residents

- A zealous immigration programme
- Lack of available land.

Central and local governments have the levers that control each of these four factors.

Although the above factors may well be some of those driving up house prices, there was another factor influencing house prices that was missing from my list, and it may indeed be one of the most important.

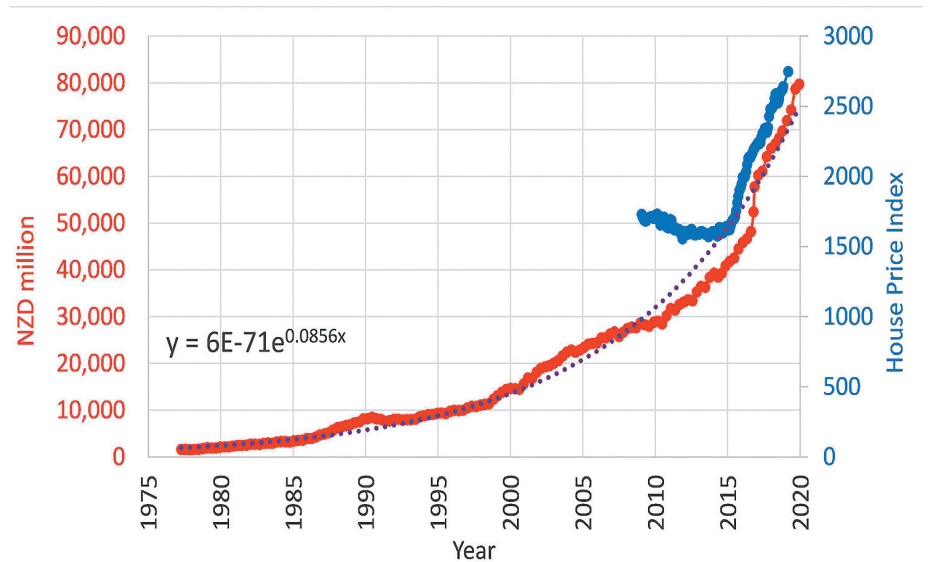
To find the missing lever we need to look at the activities of the Reserve Bank of New Zealand (RBNZ) and the commercial banks that it regulates.

A central bank such as the Reserve Bank, a supposedly independent entity, is given the power by a sovereign state to manage monetary policy, maintain price stability, promote the maintenance of sound and efficient financial systems and supply us with banknotes and coins.

In short, the Reserve Bank is in charge of creating money in its own right or through control of the money creation process by commercial banks. The mechanics of how this money is created "out of thin air", by issuing debt, is a complex subject that is out of scope for the present discussion. Suffice it to say, however, that all fiat money is created out of thin air (*ex nihilo*) by the above-mentioned factors. The word "fiat" is Latin for, "let it be done".

Above right is a graph that contains two lines. The red line is the increase in New Zealand's money supply since 1977. You can see that it follows exponential growth kinetics. i.e. it curves upward dramatically in the shape of a hockey stick. We are seeing a lot of these sorts of hockey stick graphs these days.

Some simple math shows that the money supply has doubled every eight years or so over the period shown. Also, included in the graph is a blue line that represents the House Price Index for Whakatane since about



2009, or post the great recession. The index is basically an average of sale prices for different market groups and is compiled by the Reserve Bank.

From 2009 to 2015 – the post great recession recovery years – the index was relatively stable, or even decreasing slightly. Then from 2015, the index tracks the growth in money supply quite closely, almost doubling in about five years. This increase over such a short period may be terrific for some but it is devastating for many individuals and families. The correlation between house price index and the growth in money supply over the five-year period from 2015 to 2020 has been quite good i.e. they track each other. Although correlation is not necessarily causation, it is quite well known that money is created by banks in the process of making loans. This is what banks do.

Commercial banks can invest in a range of lending activities and what they most like to do is loan at minimum risk. One of their favourite areas to invest in is the housing market because it is safer than loaning money to more risky, but potentially more

productive business activities. If a mortgagee can no longer be paid, the bank simply takes the house. In a rising housing market, they get a real asset after they loaned money they created out of "thin air" and can flog that asset off for more money than they loaned out in the first place. In this way banks have become major actors in driving house price inflation.

Voila, there you have it. Government controls all the housing price levers and one of these is that of the money creation process that has helped create a housing crisis, and maybe eventually, a housing bubble. Recently, I stumbled upon an organisation called PositiveMoneyNZ with roots in the UK and a branch here in New Zealand that has been lobbying Government for a fairer money system.

Since central government has through the levers described created the housing crisis, it will need to step in and fix the damn problem.

■ The views I have expressed here are solely my own and do not express the views or opinions of any organisation I am associated with.



Letters

Cyclists, stay in your lane

IT is a matter of grave community concern that apparently few residents are aware of – the Whakatane District Council's plans for a "Motu Trail" to be constructed from Opotiki through Ohope to Whakatane.

The hitherto relatively undisclosed concept and plan is to enable off-road travel space for pedestrians, cyclists, skateboarders and the likes – a conglomerate phenomenon or more plainly – just a competing crowd.

On Pohutukawa Avenue, cycle lanes are already provided on both sides of the road but, alarmingly, are too often ignored by cyclists who elect to cycle on footpaths and thereby compromise the safety of all pedestrians and the disabled.

This behaviour is nothing short

of arrant arrogance and selfishness. When challenged, offending cyclists are frequently rude, indeed sometimes obscene, despite the patent unlawfulness of their behaviour.

An elderly, in fact, even able-bodied citizen has scant hope of escaping potentially serious injury if he or she is mown down by a cyclist travelling at superior, accelerating speed on a dedicated footpath, where they ought not to be cycling in the first place.

The sheer beauty and enjoyment of walking along Ohope footpaths has been shattered by the invasion of uninvited and illegal cyclists. Time for this seriously errant practice to be stopped in its tracks and for cyclists to "man" and "woman" up – grow up for a novel change and cycle where you know you should – in the cycle lanes provided for you. Cyclists demanded them – let them now use them.

As for the Motu Trail, this is a mission for more messy congress of pedestrians, cyclists, skateboarders and the like. It sounds good – "Motu Trail" but it will be an expensive disaster that we will all pay for.

CT Rogers

Due respect for farmers' Mycoplasma bovis efforts

I AGREE with Cheryl Hammond that the aspirations that the Labour candidate, Kiri Allan, has for East Coast are very pertinent for our area in these uncertain times.

In Wednesday's question time in Parliament, Ms Allan emphasised how proud she was of the success New Zealand has had in fighting *Mycoplasma bovis*.

Much has made of the magnificent

work the Government has done in combating Covid-19. Many accolades have been given to the team of five million, the health professionals, the essential workers, customs, defence forces and the workers in the isolation hotels.

But Ms Allan, through her question, reminded us of the magnificent work our Government, our farmers, our vets and public servants have done in fighting the bacteria threatening our beef and dairy industries.

From 250 infected properties confirmed with the disease, we have now only four active properties left – 246 have been cleared.

Export earnings, jobs and the prosperity of New Zealand owe a lot to our farming sector and Ms Allan has paid due respect to the work they do.

A Collins
Labour East Coast, chair

TO ALL CORRESPONDENTS...

We welcome letters of not more than 350 words from all readers but reserve the right to edit them as appropriate. Letters must include your name, phone number and residential address, not necessarily for publication.

Please write to: The Editor, Whakatane Beacon, 32 Pyne Street, PO Box 243, Whakatane or email: news@thebeacon.co.nz

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TWINKLE POPS PLAYS ROMEO

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SHOOTING FOR GOAL

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Whakatane rate increase set at 3.9 percent

Lone voice against rise

Charlotte Jones

Local democracy reporter

COMMUNITY requests have pushed Whakatane's rate rise from 3.5 to 3.9 percent – far too high for one councillor.

Whakatane district councillor Dr Victor Luca was a lone voice, voting against the rate rise that was endorsed by his fellow councillors last week.

Dr Luca said he might have surprised some people by voting against the rise but had to go with his principles and he felt the rise put too much pressure on a community already under strain.

The Whakatane District Council had originally proposed an average rate rise of 3.5 percent in its annual plan, however, after granting several requests from the community, the rate rise was instead set at an average of 3.9 percent.

The additional requests included sealing the Awakeri Events Centre Carpark, additional funding for economic development group Toi EDA and additional playground

shade sails.

Changes by council staff also contributed to the rise, including additional resources to deliver on its work programme and reprioritising maintenance works such as emergency works on the Seaview Road sewerage pipes.

The added 0.2 percent equates to an additional \$12 a year on a property worth \$300,000.

Dr Luca said he was compelled to vote against the rate increase as he didn't think people's salaries were rising at the same rate.

He also felt it was the wrong time to raise rates when the true economic effects of Covid-19 were yet to be felt. He said he would have preferred rates to rise around 2 to 3 percent.

"We have a medium income in our district of around \$25,000 a year and, while some people are probably happy paying more because of the benefit to the community, others



I think there's a large swathe of the community that find it difficult.

- Dr Victor Luca

struggle.

"I think there's a large swathe of the community that find it difficult," he said.

"A lot of members of our community are pensioners and their pension doesn't go up 4 percent a year."

The council's annual plan, adopted last week, notes that when developing the plan, the increased programme of work due to Covid-19 and other long-term priorities would have resulted in a rating increase of 8.1 percent.

The annual plan says council staff therefore made efforts in the 2020-21 budget to relieve financial pressure while maintaining a strong programme of work.

It also notes that council costs are driven by items such as bitumen, pipelines and construction materials, which increase in price more rapidly than household goods.

Dr Luca said he would have liked more time to look for savings within the council but

there was not much time this year due to the Covid-19 lockdown and legislative deadlines.

"I really think we could have found more savings," he said.

"There are some things we are doing that I don't agree with and I think we need to focus more on the basics. But that's what makes a council, the diversity of views."

During the consultation process, Dr Luca struggled with the lack of feedback from the community and said he had the impression from the community that there was no point in making a submission because the council didn't care what the community thought.

However, he said this was an inaccurate perception and he would have appreciated more responses as it could have informed his decision making, particularly around an issue such as rates.

"If I don't know where people stand, how can I represent them properly?" he said.

"We only got 60 responses

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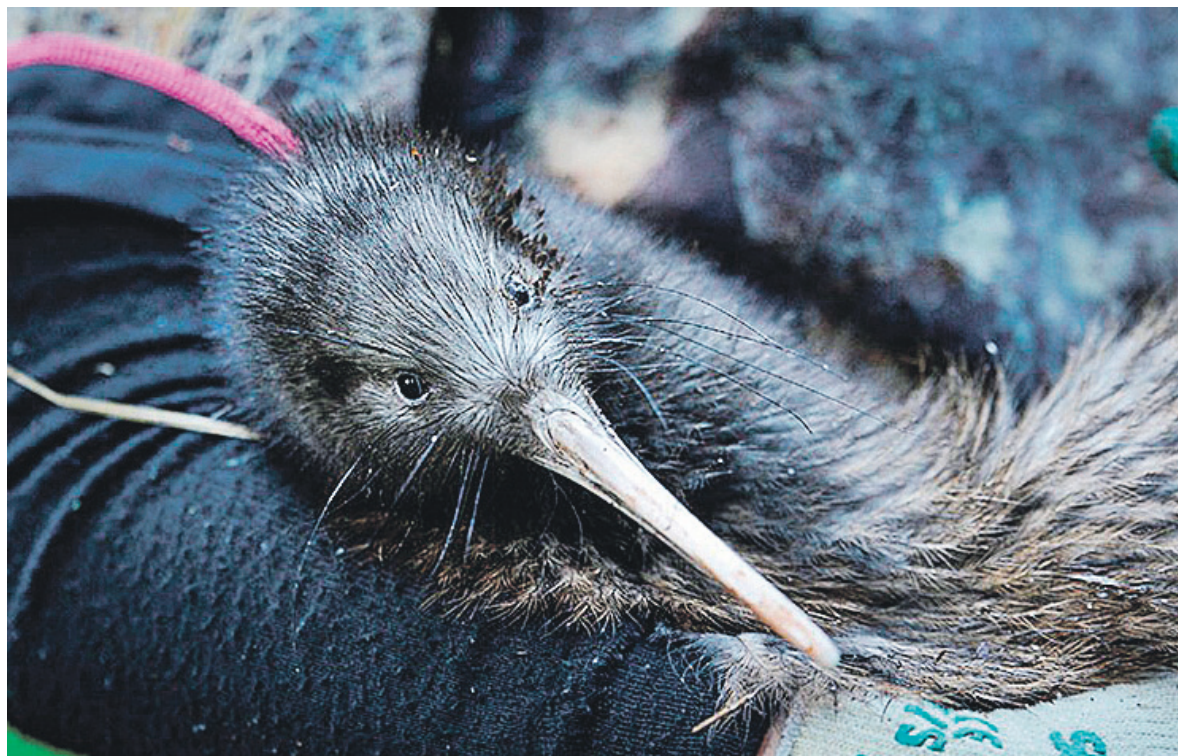
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KILLED: Te Kooti, pictured during a health check in 2016, has been found dead, below, near his burrow in Wainui, most likely killed by a roaming dog.

Photos supplied

Roaming dog kills kiwi in Wainui

THE Whakatane Kiwi Trust and Wainui residents have been devastated by the recent loss of "Te Kooti", an adult kiwi believed to have been killed by a roaming dog last week.

Te Kooti's remains were found by the trust's kiwi management team last Friday after a mortality signal was received from his transmitter.

Kiwi trust operations manager Wayne O'Keefe said the kiwi was found just metres from his burrow near McCoy Road in Wainui, and both the nature of his injuries and the way that his burrow was dug out strongly suggested that a dog was responsible.

Te Kooti was one of three adult male kiwi monitored by the kiwi trust in the Wainui area, and was believed to be at least 15 years old.

He had been monitored by the trust since August 2005, and along with his partner, 'Awhi', had produced 16 chicks over the past 10 years.

Of these chicks, eight had survived to reach the 'stoat proof' weight of 1000 grams.

Te Kooti had been incubating an egg



at the time of his death, so a kiwi chick has also been lost.

Mr O'Keefe said as kiwi had a life expectancy of between 25 to 50 years, it was likely that Te Kooti and Awhi would have raised many more chicks in the years to come.

"It is very disappointing that dog owners are allowing their dogs to roam free when it is well known that kiwi live in the area," he said.

"The loss of Te Kooti has been incred-

ibly tough for our team, who put in so many hours to protect and monitor these precious manu. It is enough of a challenge for our project to protect kiwi from predation by stoats, without having to deal with roaming dogs as well."

He said Te Kooti's death was "entirely avoidable".

In response, the trust has positioned a live capture dog trap in the area, which will be checked daily by volunteers. This is in addition to the 91 stoat traps that trust volunteers check on a fortnightly basis near McCoy and Stanley roads, and on private land in the Wainui area.

Dog owners are strongly encouraged to tie up or contain their dogs when they are not at home to supervise them.

The trust also provides regular kiwi aversion training for dogs, with the next session planned for Sunday, August 16 at Awatapu Lagoon.

For more information on kiwi aversion training or how to become involved with the kiwi trust contact volunteer and events coordinator Lydia Grunwell at volunteer@whakataneikiwi.org.nz.



Rates rise too high - Luca

■ Continued from Page 1

how is that enough for me to make a decision on? People are supposed to participate."

He said other elected members would have appreciated more responses and that what happened in the council was rarely a done deal.

Dr Luca said he instead considered that, in general, nobody asked for a rate rise and that the district was experiencing an economic

downturn due to Covid-19 and the Whakaari eruption.

"I really struggled with it, I stewed over it, but in the end, I went with my conscience," he said.

"At the end of the day you do what you feel is right."

The Whakatane district's first rate take of the new financial year is due in late August.



Whakatane district average rate demand 2020/21

Property type	New rates
Whakatane urban low	\$2852.49
Whakatane urban average	\$3505.56
Whakatane urban high	\$5959.00
Whakatane commercial low	\$4377.14
Whakatane commercial average	\$5950.23
Edgumbe average	\$3261.15
Matata average	\$2767.46
Matata high	\$3890.54
Murupara urban	\$2069.67
Murupara lifestyle	\$1676.08
Te Teko	\$1596.44
Otarawairere	\$4721.42
Ohope low	\$3769.16
Ohope average	\$4225.30
Ohope high	\$5922.91
Taneatua	\$2602.44
Rural horticulture	\$4279.33
Rural pastoral	\$8210.84
District commercial/industrial	\$71,738.04

OPINION

The hydrogen economy

■ Whakatane scientist Dr Victor Luca shares his views on why our addiction to hydrocarbons and petrochemicals has to stop.



SCIENCE has been telling us for decades that a new energy revolution is essential if humanity is to avoid becoming a victim of its own success.

Our addiction to hydrocarbons and petrochemicals has simply got to stop.

Decarbonising the energy system is a very achievable first step with the technology we have today and would be followed by decarbonisation of transport, food production and other sectors.

None of this, of course, works unless we embrace equilibrium rather than growth, and especially exponential growth. Yes, it is all very complex, so where do we start?

In many parts of the world the following expression is used; "How do you eat an elephant?", to which the answer is "one mouthful at a time". So let's concentrate on energy and transport.

By now we are all starting to become familiar with battery electric vehicles (BEV), which we are seeing in increasing numbers on our roads and I am guessing are set to become the future of motorised transport as costs of production decrease, range is extended and charging times are shortened.

None of this development happened overnight. Electric vehicles began to be manufactured commercially more than a century ago.

This initial technological development eventually stalled and was overtaken by the internal combustion engine (ICE), which has become an indispensable part of our daily lives.

The victory of the ICE vehicle over the BEV was propelled by virtually free petrol and the rapid roll-out of refueling infrastructure and the convenience that this brought us.

However, the BEV is now back with a vengeance, and in time, I am certain that this superior tech will eventually displace ICE vehicles.

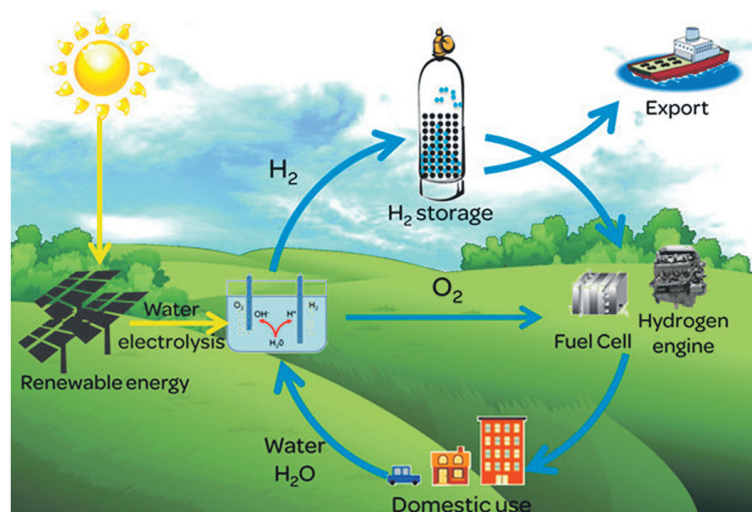
The resurgence of the BEV was due, not just to the recognition of the need to reduce greenhouse gas emissions during use, but also advances in batteries, electric motors and other technology.

As long as the electricity used for BEVs comes from renewable sources, then the life-cycle emissions (LCE) of such vehicles can be as much as half those of ICE cars.

By LCE we mean the sum total of emissions generated during the vehicle's production phase and operational lifetime. A saving of 50 percent on emissions is nothing to be sneezed at, although it would be much better if we could reduce these LCE values closer to zero.

In New Zealand we are very fortunate to have a relatively clean electricity generation system due to the fact that it is dominated by hydro and geothermal power stations that are considered to emit relatively few greenhouse gas emissions.

The Matahina generating station is



FREE ENERGY: An area of just 100x100 square kilometres of solar panes with an efficiency of 10 percent - for example in the Great Sandy Desert of Western Australia - would produce enough energy for 1 billion people with an average consumption of 5kW per person.

an example of the former and Wairaki power station of the latter. These renewable methods of electricity generation account for about 85 percent of our electricity. The remaining 15 percent of electricity generation in New Zealand essentially comes from burning coal and gas - mainly at the Huntly power station - and we should stop this.

Although we are blessed in having a relatively low-emission electricity generation system, we burn a lot of gasoline in our cars and trucks and generate considerable methane emissions through farming. Therefore, as a country we produce significant per capita emissions. While we are a small country, we punch well above our weight in car ownership with almost every single New Zealander owning one vehicle.

BEV development started more than a century ago but it is not the only green tech that got an early start. Unbeknown to many, the development of an electrochemical device known as a fuel cell (FC) also commenced more than a century ago.

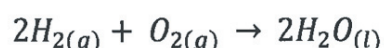
A FC converts fuels such as hydrogen to electricity and they are now very refined devices. Fuel cell cars can use these electrochemical devices to convert hydrogen to electricity which can then be used to power electric motors to propel the car.

In other words, they are called hydrogen cars but in reality the hydrogen is used to make electricity that drives the electric motor just as in a conventional BEV.

The beauty of this tech is that the only thing that comes out of the tailpipe is water. Water is the only thing produced whether you use hydrogen in a fuel cell to generate electricity or burn it directly.

The chemical reaction for burning hydrogen is as follows:

Notice that the only product that is formed is water.



There are currently many hydrogen/fuel cell cars in commercial development by both traditional makers including Toyota (Mirai), Honda (Clarity), Mercedes (LGC F-cell) and Hyundai (Nexo) and others and non-traditional makers such as Nikola (Badger).

The beauty of hydrogen as a transport fuel is that you can refuel in much the same way as you refuel a conventional ICE car.

Unlike a BEV, this operation takes only a few minutes and the range is typically better than that of the average full BEV. According to Toyota, the 2021 Toyota Mirai will be able to travel 640 kilometres before refuelling, enabling one to get from Whakatane to Wellington comfortably without stop-



ping for gas.

The Nikola Badger pickup truck also has impressive specs with a total range of 965km and a 0-100km time of 2.9 seconds. It all sounds quite compelling doesn't it? You would have to conclude that there are some significant advantages of this futuristic tech.

The good news for a hydrogen energy system is not just in the transport area. Hydrogen gas is easy to generate by using the electricity from renewable sources such as solar and wind to electrolyze water.

The hydrogen generated from electrolysis of water can then be readily compressed and stored in high pressure tanks to be used later as required.

Our district has among the highest sunshine hours in the country and we should make greater use of this free energy.

Hydrogen can be used directly as a transportation fuel in the FC vehicles I have just described or it can be used to generate electricity for domestic, industrial and other uses in much the same way as natural gas is used domestically and in a generating station such as Huntly.

The beauty of this form of storing energy as compressed hydrogen is that it couples well to the generation of electricity using renewable sources and is useful for flattening out the electricity load when the renewable sources are not generating.

Remember that renewable electricity sources such as wind and solar-



POWER PLANT: The solar-powered hydrogen facility owned by Toshiba in Namie, Fukushima prefecture, Japan.

Images supplied

only generation only work when the sun shines and the wind blows. One potential scheme for how the system might work in the case of solar energy is shown in the figure above left.

The sun, which is essentially a nuclear fusion reactor, shines its energy on photovoltaic panels that generate electricity at essentially no cost. This electricity can be used directly during the day and any excess then used to produce hydrogen through water electrolysis and the gas stored.

In the early evenings, when demand is highest and the sun goes down, the stored hydrogen gas is then converted back into electricity using a generator similar to those that can be purchased at the hardware store for a few hundred bucks.

These solar hydrogen generating stations are not just figments of my imagination, they are becoming a reality. The image above shows an actual 10MW hydrogen plant in Fukushima, Japan that uses solar energy (note the PV panel arrays) to produce hydrogen that is stored in the large vertical tanks. Of course, in the process of converting solar electricity to hydrogen and then back to electricity, losses will be incurred. But since the electricity was generated for nothing in the first place, who cares? This sort of scheme has been implemented in nuclear-powered submarines for decades.

In this case the fission nuclear reactor generates unlimited electricity, which is then used to electrolyse water to produce hydrogen and oxygen. The oxygen produced is what the crew breathe. This enables these submarines to stay submerged indefinitely, only needing to surface to take on board food.

There are, in fact, many ways of storing renewable energy that I have not addressed here since we are concentrating on hydrogen and what is called the hydrogen economy. They include pumped hydro, fly wheels (mechanical), compressed air energy storage, batteries (and there are many types) and so forth.

All of this may seem fanciful, but so was every technological development that has ever revolutionised our lives.

■ The views expressed here are solely my own and do not express the views or opinions of any organisation with which I am associated.



LABOUR LIST: MP Kiri Allan and her supporters, Sandra Tanuvasa and Philippa Branthwaite, gathered around some chips and a drink on Saturday afternoon.

Photo Sven Carlsson D9985-01

Knocking on Eastern Bay's door

Sven Carlsson
Staff reporter

NINETY days out from the general election, Labour MP Kiri Allan and her team of door knockers took a breather at Rhyley's Bar and Grill in Whakatane to talk issues with the locals.

The Politics at the Pub meeting on Saturday followed a day of networking in the community that included a public meeting in Otarawairere with a group of health care providers, teachers, environmentalists and business people interested in Labour's vision for New Zealand, and door knocking in Kopeopeo.

"We've been out on the streets today and it's been awesome to be able to give people a hug," Ms Allan said. "Especially the older people in the community."

At the pub meeting, Ms Allan, a list MP and Labour's candidate for the East Coast in the upcoming general election, said she had been working hard for the past three years, advocating for the Eastern Bay "down at the big table in Wellington".

Ms Allan said she and her team made 3000 telephone calls during the lockdown.

"These were mainly welfare calls, to see how people were doing," she said.

A variety of topics were discussed during the get-together, including the difficulties in providing good

health systems to rural communities.

One woman said the district health board model was not implemented consistently in different areas and another woman, who said she was a former nurse, said "asset stripping" of health boards had been detrimental.

Ms Allan spoke about re-introducing night school, investments being made to get young people involved in trade training and the opportunity to "greenify our economy".

She said the idea was to align the green image that New Zealand had in the world's mind with actual reality.

For instance, money spent on the kaupapa of trapping and tracing pests in the Raukumara Range had multiple benefits.

"People are holding their heads high as they invest time and money in their own land," Ms Allan said.

"We also want swimmable rivers and we've seen an increase in the number of people who are tidying up their farms."

She said the Covid-19 lockdown period had underlined the necessity for having a good internet connection.

"We are pushing the connection issue, fibre, on the East Coast," she said.

"The shutdown meant many students had to move their learning online. They need to be online-connected."

The fragility of h

■ Whakatane scientist Dr Victor Luca shares his views on how existential risks are a threat to the entire future of humanity.



DOES it matter to anyone reading these lines that after their passing, human life as we know it on this earth could cease to exist? After all, when we are gone, we are gone, and so what happens doesn't matter anymore?

Existential risks are those that threaten the entire future of humanity. Believe it or not, there are teams of academics that think, study and obsess about such things.

Cambridge University's Centre for the Study of Existential Risk (www.cser.ac.uk/) has compiled a list of global existential risks. Oxford University's Future of Humanity Institute and the Global Challenges Foundation have compiled comparable lists. I have condensed these risks down to the following:

- 1) Climate change
- 2) Nuclear war
- 3) Artificial intelligence
- 4) Advanced biotechnologies
- 5) Naturally occurring pandemics
- 6) Super-eruptions or impacts of outer space objects and
- 7) Cosmic radiation

Risks 1-5 in this list are termed endogenous or anthropogenic risks since they are largely due to our activities and 6 and 7 are exogenous risks since they are not within our control.

Exogenous risks have been present since before we, homo sapiens, first walked the earth more than 300,000 years ago. The probability that these risks cause our demise as a species is considered extremely small.

Anthropogenic or endogenous risks are, to a large degree, a result of our breathtakingly rapid (exponential) scientific and technological development and their probability is not negligible.

Citizens and national policy makers are generally not good at understanding, assessing and mitigating global catastrophic risks. Our fee-



UNIVERSAL: The Doomsday Clock reads 100 seconds to midnight, a position made by The Bulletin of Atomic Scientists.

Photo Eva Ham

ble response to climate change is an example in point.

Anthropogenic climate change has been discussed in the realm of science for more than one hundred years and has interested me for the past 30 years.

Yet it is only very recently that climate change is entering into widespread public discussion. Despite the seriousness of this endogenous risk, it fails to rally us into serious action. We posture and we vacillate, but we take no serious action.

As I have said many times, we need to roll out a global Manhattan- or Sputnik-type project response to climate change.

Sadly, virtually nothing is happening. If we can pump trillions of dollars into keeping the global economic ponzi scheme going as happened after the Global Financial Crisis of 2008, then we should be able to create a few trillion dollars to keep the global mean temperature down, ice sheets and glaciers intact, the sea level where it is, storms and droughts at bay, maintain earth's biodiversity and keep our environment pristine.

I would consider declaring the Trump administration, on a global existential risk. It has far rolled back more than environmental regulations in the States and is showing no sign of stopping. Do your own research, please.

Volcanic eruptions are phenomena that our community has had to grips with only very recently. Whakaari, aka White Island, located 50 kilometres from the mouth of the Whakatane river and bubbled away for at least 150,000 years.

Whakaari was in more-or-less continuous eruption from December 1929 to September 2000 (the longest historic eruption episode).

There have also been major eruptive events 2012-2013 (see www.geonet.org.nz/about/whakaari).

The remoteness of Whakaari lulled us into a false sense of security and maybe our attitude to it has been somewhat blasé. Yet a minor eruptive event can have consequences for our community.

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OPINION

Human existence

Imagine what would happen if White Island turned into a super-volcano? Since a super-volcano is one of the two exogenous risks on the list above that we can do little or nothing about, my advice is to focus principally on the endogenous risks that have a much higher probability of taking out much of human civilisation and, which we can do something about. Thus, I ask, how are we prepared for climate change that could wreak havoc on our community or the world for that matter?

Nuclear war has represented a potential threat to our existence since the first atomic bomb leveled Hiroshima.

We have subsequently come close to the breakout of full-out nuclear war on many occasions, either through accident or misunderstanding or competition between superpowers.

I get the impression that we have largely dismissed the risk of nuclear war because, well, it hasn't happened so far, so let's sweep it under the carpet.

The book entitled *The Doomsday Machine – Confessions of a Nuclear War Planner* by Daniel Ellsberg gives a frightening bird's eye view of the machinations of the American Military-Industrial Complex.

Of course, there are many nations with such doomsday machines, although the Americans have by far the most powerful.

The American Military's cut of the last US budget was close to one trillion dollars.

To give an idea of just one of the threats that lurks in the murky depths, take the now obsolete Russian Akula class nuclear submarine (known as typhoon in the west). This deadly weapon could stay submerged for decades if it weren't for the need to surface to replenish food stocks.

An Akula class sub carried 20 R-39 (sturgeon) ballistic missiles each of these in turn carrying 10 independently targetable war heads of 100-200 kilotonnes.

For reference, the Hiroshima bomb was about 15 kilotonnes. The 200 warheads could be launched in less than the time it takes to order a pizza and almost simultaneously knock out



all major US cities.

The Americans have the Ohio class submarines and other super subs which are smaller but more stealthy and capable and they have more of them. I would hate to imagine what they have developed that is not even in the public domain.

If nuclear war were to break out, we in Aotearoa would not be in the main path of any conflict, but that is not to say that we could get away scot-free.

Nuclear war would generate an enormous amount of radioactive fallout which would undoubtedly smother us also and dramatically change the way we live. I will leave this fascinating subject for another time since I am sure we all get the idea.

Suffice it to say for now that on January 23 of this year, the Doomsday Clock was updated to 100 seconds to midnight.

Midnight is essentially the end of organised human life. To find out about the doomsday clock please refer to the following link.

The clock has become a universally recognised indicator of the world's vulnerability to catastrophe from nuclear weapons, climate change, and disruptive technologies in other domains.

Artificial Intelligence (AI) is something that few of us have probably thought too much about in the context of global existential threats.

I have been hearing about AI since I was at university and I now think the time has come to take this technology seriously. The science fiction series of *Terminator* films gave us a taste of what to watch out for.

The films depict a world in which the machines produced by a global corporation try to take over the world of humans. The film's producers adopt an optimistic trajectory to the film's conclusion in which humans always manage to wrest back control of their world.

Since I first heard the term AI, science and technology has moved forward in leaps and bounds. The growth of scientific knowledge has gone exponential. The meaning of the term exponential I tried to explain in a previous article in this paper.

Today, the autonomous driving vehicle is here. Google's self-driving car has clocked well over 1.6 million kilometers on America's roadways without a single accident. Few humans could boast such a record.

The centrepiece of self-driving technology is AI. A silicon brain that receives inputs from a barrage of highly sensitive sensors is able to "think" and take action (drive).

Although cybernetic organisms (cyborgs) such as the Cyberdyne Systems Model 101 or T-800 cyborgs or the liquid metal T-1000 that entertained us so much from 1984 may be a far stretch, the leap from self-driving cars to advanced robots is a relatively small one.

Self-driving vehicles are going to replace an entire workforce and robots of the future could also make many more of us redundant. When robots with super intelligence learn to build more advanced versions of themselves, then why would they need us?

In the *Terminator* films the humans come out on top. American films typically end on a high note. But the risk that AI contributes to terminating human civilisation is not insignificant. And it is not a given that we would beat the machines. We should take all necessary measures not to be hoisted by our own petard.

When I first started writing this article in December of last year, I was not going to mention the threat of

global pandemics. Since that time, the coronavirus has unfortunately started to become a household word.

The coronavirus was subsequently declared a global health emergency by the World Health Organisation (WHO) and the rest is history, although we will deal with the aftermath for a long time to come.

So it would have been remiss of me not to at least make a mention of pandemics.

As a result of Covid-19 we became more acquainted with the exponential growth that I wrote about toward the beginning of the year and the term "flattening the curve" entered into common usage.

In retrospect we were very lucky that we came through relatively unscathed, at least in terms of health, and that our national healthcare system was not tested to any significant degree. However, were the virus to have been slightly more contagious and lethal we may not have been so lucky.

So it is fortunate that we have a reasonably well functioning health system. Of course, I am being sarcastic.

In this era in which truth is losing its meaning, and social media adds more confusion than clarity, we should perhaps heed the adage "believe nothing of what you read and only half of what you see".

We must be sceptical and take a serious interest in what is going on around us and then make decisions based on the science, data and evidence. We must be proactive rather than reactive.

A focus on short-term economic rationalism and political expediency can have devastating consequences for society at large. As a society we must as former Australian democratic leader Don Chipp used to say "keep the bastards honest".

In the face of all of the above, I would still advocate not losing hope. After all, how many times have the All Blacks pulled a game back from the brink?

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OPINION

Plague of infectious diseases

■ Whakatane scientist Victor Luca and microbiologist Sandy Milne look at the infectious disease pandemics that have plagued human civilisations for thousands of years.

THE Covid-19 pandemic has given us a baptism of fire in infectious disease and pandemics and how they can take and upend lives. Yet infectious disease pandemics are nothing new; they have plagued human civilisations for thousands of years. Over the millennia, we have had more than just the odd close shave with infectious diseases.

In New Zealand, thanks to relatively prompt and concerted action by our Government, we have come out of the Covid-19 pandemic relatively unscathed, at least in terms of direct physical health impacts.

We should have been put into lockdown as soon as it became obvious that we were dealing with a pandemic involving a novel influenza virus to which the population, in general, had no immunity. However, the “small window of opportunity” that Jacinda Ardern mentioned when she announced the lockdown, thankfully, has turned out to have been enough.

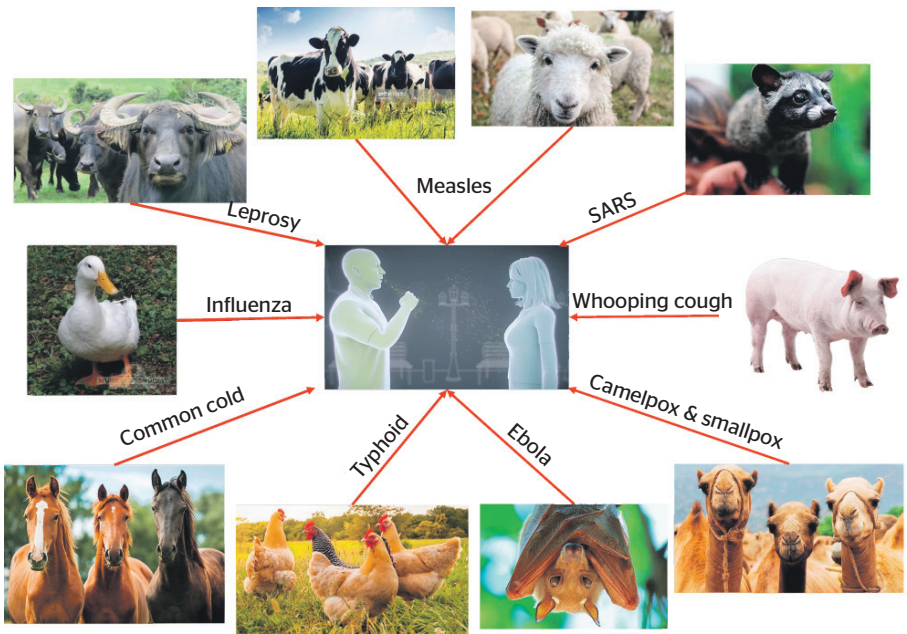
Below is a table of the more important pandemics that we know about.

Most of the pandemics in the table are caused by zoonotic viruses, meaning that they are viruses that are transmitted between animals and humans.

You may be surprised to know that although infectious diseases have been with us for a long time, they weren't always with us. Infectious diseases emerged about 10,000 years ago when there were less than five million humans on the planet. The question arises therefore, from where did infectious diseases emerge?

The main thing to notice from the figure is that most of the animals you see are those that have been domesticated by us humans. When we brought animals into the barnyard, they brought their diseases with them.

If we look at the history of pandemics in the table below, we should also note



DOMESTICATED: Some of the common zoonotic infectious diseases and the animals from which they came.

that they are coming with increasing frequency. As the human population grows exponentially and we increasingly encroach on animal habitats and come into closer contact with them, and as we intensify farming practices, then the chances increase that animal virus reservoirs will cause us increasing problems. Chinese wet markets where live and butchered animals are sold in open settings are not the places to be if you want to avoid zoonotic diseases.

Climate change will also cause increasing problems because as warming occurs vector-borne diseases such as malaria, dengue and Zika that are transmitted by mosquitos will become more prevalent in places that previously never had them.

What has made Covid-19 so problematic? My answer to this question centres on its combination of transmissibility or infectiousness and clinical severity, or the fatality rate. In a previous article, we made the case that in addition to contact and droplet transmission modes, airborne transmission could be an important mode of transmission

of SARS-CoV-2, the virus that causes Covid-19 disease.

It is now well recognised that aerosols produced by coughing, sneezing, breathing or even speaking are important in the transmission of diseases such as influenza, chickenpox, measles, smallpox and tuberculosis. Aerosols are very small liquid droplets carrying virus particles that can float in the air for up to 30 minutes and travel large distances. The virus particles responsible for these diseases are similar in size to the SARS-CoV-2 virus responsible for Covid-19. Simple physical-chemical principles suggest that a similar transmission mechanism would also be important for Covid-19.

Given continued growth of human populations, consumption, waste generation and the intensity of farming practices all over the world, there is a high probability that the Covid-19 pandemic will not be the only pandemic to which the present generation will be subjected. Yes, we in New Zealand came out of Covid-19 relatively unscathed in terms of the loss of life, but we may not be so lucky when the next inevitable pandemic hits.

Although there were plenty of warnings that a global pandemic would hit sooner or later, almost all global healthcare systems were caught unprepared for the Covid-19 pandemic.

Even First World countries with sophisticated public healthcare systems like Italy, France and the UK were unprepared for the ferocity of the spread of Covid-19.

Deficiencies and inequities in the private US healthcare system are still playing out and it remains to be seen where it ends in terms of the ultimate death count. Make no mistake, had strong countermeasures not been mounted by most countries the number of fatalities would have been astronomical.

As far as infectious diseases go, Covid-19 has only moderate lethality and transmissibility and is probably most comparable to the 1957 influenza pandemic that killed upwards of one million people. Countermeasures such as social distancing have done a good job of limiting the numbers of Covid-19 deaths compared to what they might have been in the absence of such draconian measures.

Measles has a far higher transmissibility than Covid-19. It is much more easily spread from human-to-human and smallpox is far more lethal. I dread to think how we would cope were a virus to evolve that had the transmissibility of measles combined with the lethality of smallpox. Had Covid-19 been allowed to propagate unchecked, a more virulent strain might have evolved. We should not therefore be complacent.

When something like a pandemic hits we begin to understand the value of a properly functioning and well prepared healthcare system. That is, one that prioritises health outcomes over economics. In New Zealand we have a public healthcare system and economic rationalisation has caused privatisation of parts of the system. Economic rationalisation provides strong disincentives for redundancies and the stockpiling of equipment such as ventilators and consumables such as PPE. We must change this mentality if we are to be better prepared for what undoubtedly will be coming down the pike in the future.

We know that we can expect more pandemics because as the world population grows, and there is an increasing need to feed more people, farming intensification will increase and animals will come under increasing stress and be more susceptible to disease. Factory farming practices that have been adopted to feed increasing populations are perfect places for viruses to thrive.

In such high-density environments viruses will have bigger reservoirs in which to vary and multiply and certain mutations will be able to better express themselves and reach threshold values.

In addition to pandemics due to viruses and bacteria, we should also keep a close watch on those diseases that are attributed to pathogens known as prions. Unlike a virus which consists of nucleic acid genome enveloped in a protein sheath, a prion is a proteinaceous infectious particle consisting of protein having no genetic material. The term prion was a term first used to describe the mysterious infectious agent supposedly responsible for several neurodegenerative diseases found in mammals, including Creutzfeldt-Jakob disease (CJD), kuru and Gerstmann-Sträussler-Scheinker (GSS) disease in humans.

In animals, prions are thought to be responsible for the condition known as Chronic Wasting Disease (CWD). A common prion disease in cattle is Bovine Spongiform Encephalopathy (BSE), more dramatically known as mad cow disease.

Fortunately, thus far, none of these prion-based diseases have caused pandemics, that we know of.

Get ready folks, this is not the end of pandemics but merely the beginning. And let's not forget climate change which represents perhaps the most important global existential threat of all. In this case, also, we have missed the opportunity to act pre-emptively. But we must act now or forever hold our peace.

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History of pandemics

Name	Date	Estimated deaths	% of population
Antonine Plague	165-180	5 million	5
Plague of Justinian	541-542	30-50 million	50
Japanese smallpox epidemic	735-737	1 million	0.25
Bubonic plague (Black Death)	1347-1351	200 million	43.7
Smallpox	1520	56 million	12.2
17 Century Great Plagues	1600	3 million	0.7
18th Century Great Plagues	1700	600,000	0.088
Cholera 6 Outbreak	1817-1923	1 million	0.079
The Third Plague	1855	12 million	0.951
Yellow Fever	Late 1800s	100-500,000	0.030
Russian Flu	1889-1890	1 million	0.061
Spanish Flu	1918-1919	40-50 million	1.980
Asian Flu	1957-1958	1.1 million	0.040
Hong Kong Flu	1968-1970	1 million	0.030
SARS	2002-2003	770	0.00001
Swine Flu	2009-2010	200,000	0.0030
MERS	2012-present	850	0.00001
Ebola	2014-2016	11,300	0.00002
HIV/Aids	1981-present	25-35 million	0.72
Covid-19	2019-27/03/20	27,000	0.0042

OPINION

Water a critical resource

Scientist Dr Victor Luca shares his views on a precious resource - fresh water



I HAVE yet to bump into anyone who can live without fresh clean water. Contrary to popular belief, fresh water on our planet is not abundant.

Pictured right is an image of the Earth stripped of all its water that is becoming increasingly famous.

The image emphasises that there really isn't all that much total water on and under the Earth's surface. While the oceans appear truly vast to us as we stand on a beach, they really are little more than a thin film covering parts of the earth.

Water, and especially fresh water, is relatively scarce on planet Earth. Fresh water is a precious resource and should not be wasted, used frivolously, polluted or taken for granted.

Water is not a commodity, it is a common resource because we all need it and we should all have a right to it. Access to water is a human right as declared by the United Nations.

In fact it was on July 28, 2010, through Resolution 64/292, that the United Nations General Assembly explicitly recognised the human right to water and sanitation, and acknowledged that clean drinking water and sanitation are essential to the realisation of all human rights.

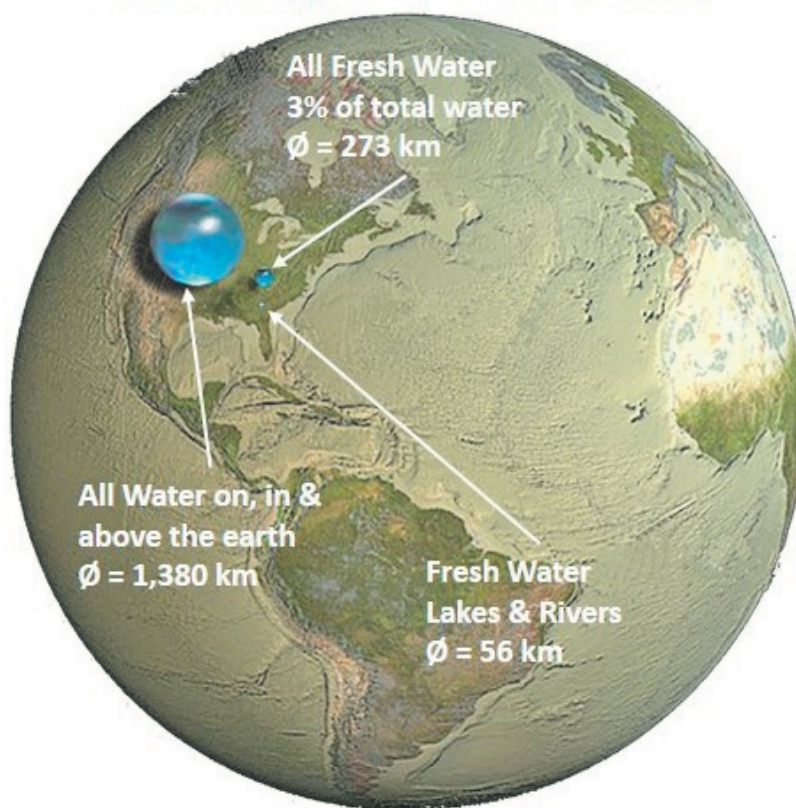
Water is a source of life. Humans could not have evolved without it and we need it to sustain us. Apologies to the creationists.

While Aotearoa ranks number 10 in the world in terms of the amount of fresh water available per person, Australia ranks number 33.

New Zealand has a temperate climate and rain is relatively plentiful, or at least it has been.

New Zealand is truly blessed. Not only is water critical to human survival, it is the lifeblood of the agricultural industries of both countries.

Earth Stripped of Water (USGS)



WATER, WATER, WATER: The Earth stripped of its water. All of the Earth's ocean water (large sphere, 1500-kilometre diameter), fresh water (mid-sized sphere, 273km diameter) and fresh water accessible to humans (small sphere, 55.5km diameter). Graphic: Jack Cook, Woods Hole Oceanographic Institution

It takes 17,195 litres of water to produce one kilogram of chocolate, 15,415L to produce 1kg of beef, 2495L to produce 250g of cotton and 2497 L to produce 1kg of rice.

As I have said many times, fat money is all well and good, but you can't eat or drink the stuff.

Despite the fact that humans have been fighting over water for millennia, today in developed countries we have come to take potable water largely for granted. This is probably due to the fact that modern technology has made potable water available at the turn of a tap.

In fact, in the delivery of water to faucets, we are not directly paying for the water itself, but rather, its purification

which involves relatively costly treatment processes. Even modern water treatment plants require maintenance and the consumption of significant amounts of energy and chemicals.

Prior to the development of techniques for the mass purification of water, large numbers of people used to die of many water-borne diseases including typhoid, cholera and botulism, to name but a few.

Next to modern medicine, it is likely that the availability of clean water has been the single most important factor in greatly extending life expectancy in many countries.

Although we pay for the purification of water, what is seldom, if ever accounted for in the pricing of water are the so-called "externalities" including:

- 1) the cost of pollution or contamination
- 2) environmental impacts
- 3) public health and safety
- 4) social disruption and so on.

As most readers will be aware, the human population of the planet has been increasing exponentially and has already breached seven billion.

Population is expected to increase to a staggering 11 billion before it reaches or overshoots the carrying capacity of our Earth.

That is, our consumption of resources exceeds the resources that are available on Earth, including water. If you haven't read the famous book *The Limits of Growth*, then now might be a good time to catch up.

It should not surprise therefore that mega-banks, global investment firms and billionaires are scrambling to buy up the world's water.

The article entitled *The New Water Barons: Wall Street Mega-Banks are Buying up the World's Water* is worth reading on this topic. Even if half of

what you read in this article is true, then it is a cause for serious concern.

The cost of tap water is about \$1.56 and \$2.50 per 1000 litres in New Zealand and Australia respectively.

Compare that with about \$3 per litre for bottled water and you can see why global corporations would want to dominate this business.

Thus, while the water is plundered essentially for free, the 1000 to 2000-fold increase in the cost the consumer pays for bottled water is due mostly to the production of the bottle and profit.

Not included in the cost of bottled water of course is the cost of pollution, waste management, recycling and the increase in disruption and carbon emissions associated with heavy traffic movements involved in moving these bottles around.

In various districts in Aotearoa, artesian water is practically being given away to Chinese water bottlers despite public outcry and court action.

One argument used to justify water bottling in Aotearoa is that if this water isn't captured then it will be lost to the ocean. However, we have not taken into account that in order to reach the ocean this water has been purified by Aotearoa and nobody pays for that.

When water bottling is being banned in the United States states such as Montana, and the fight is on to stop mega corporations such as Nestle from plundering Californian's fresh water, we are about to give permission to turn water into another resource to be plundered.

Meanwhile in Australia, the battle between water bottlers, farmers and others is well and truly on for young and old.

My recommendation to ensure top quality drinking water is to install and maintain a domestic point-of-use under-sink or bench-top activated carbon filter.

Bench-top activated carbon filter systems can cost as little as \$60 and will last at least a year if you use them exclusively for producing drinking water.

A slightly more sophisticated, yet compact domestic filter system with a reverse osmosis stage, will also take out fluoride and other components and produce water much more pure than most artesian waters.

Recent Life Cycle Assessment studies have shown that in terms of environmental impacts such point-of-use systems represent the best option and they cost eight to 19 times less than bottled water.

Such filters can process thousands of litres of water before they require replacing and will take out sediment, many metals and importantly the chlorine that the water-treatment plant introduces to kill the bugs.

Depending on the degree of sophistication, the quality of the water produced by such systems can greatly exceed anything that comes from underground.

But remember, like any equipment, these systems work only if they are properly maintained.

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RESOURCE: Upper Tarawera River down from the falls.

OPINION

The power of solar

■ Scientist Dr Victor Luca and renewable energy advocate Graeme Weston explore the powers of solar energy including the potential for a community solar farm in the district that could supply power to more than 2000 households and help reduce greenhouse gas emissions

FOR decades now scientists have been telling us that as a result of human activity and the greenhouse gases that these activities generate, the Earth is warming and the climate is changing.

As a result it is likely that we can expect a loss of land and sea ice and an increase in global average sea level, destruction of ecosystems, loss of biodiversity and an increase in the frequency of extreme weather events. It is clear that we humans cannot continue on this trajectory if life on this planet is to be sustained.

To respond to this potentially catastrophic situation, on November 13, 2019 the Climate Change Response (Zero Carbon) Amendment Act became part of the law of our land.

The stated purpose of the "Zero Carbon" bill is to provide a framework by which Aotearoa can develop and implement clear and stable policies to avert and adapt to climate change. More specifically the "Zero Carbon" bill has the following objectives:

1) Contribute to the global effort under the Paris Agreement to limit the global average temperature increase to 1.5 degrees above pre-industrial levels in line with Intergovernmental Panel on Climate Change recommendations.

2) Allow New Zealand to prepare for,

and adapt to, the effects of climate change.

To comply with the first item we must reduce our emissions of greenhouse gas emissions and do it soon. This is the commitment that we have made to the global community. Although we in Aotearoa make only a small contribution to global emissions (less than 0.2 percent), our nation is amongst the highest emitters in per capita terms.

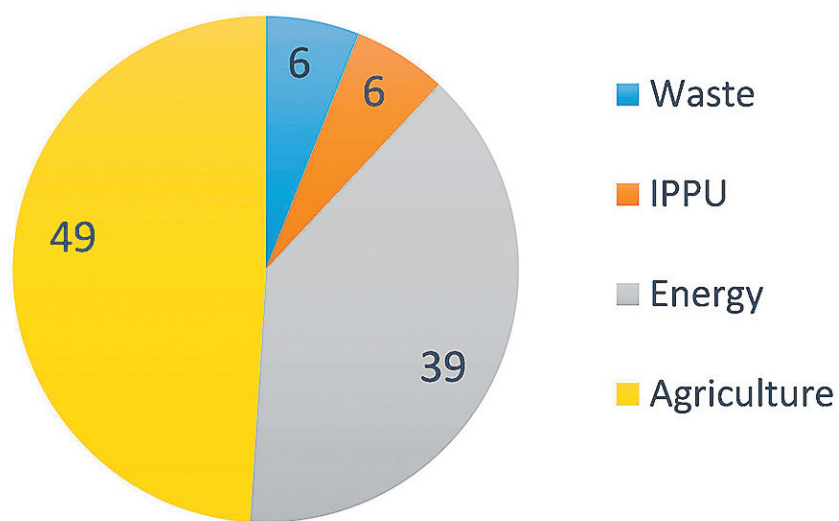
Even if we were to reduce our emissions to zero tomorrow, we would make virtually no difference to the overall global situation. That begs the question of why we should bother to do anything at all?

The answer to this question is simple. We need to reduce our emissions to set an example to the rest of the major emitters.

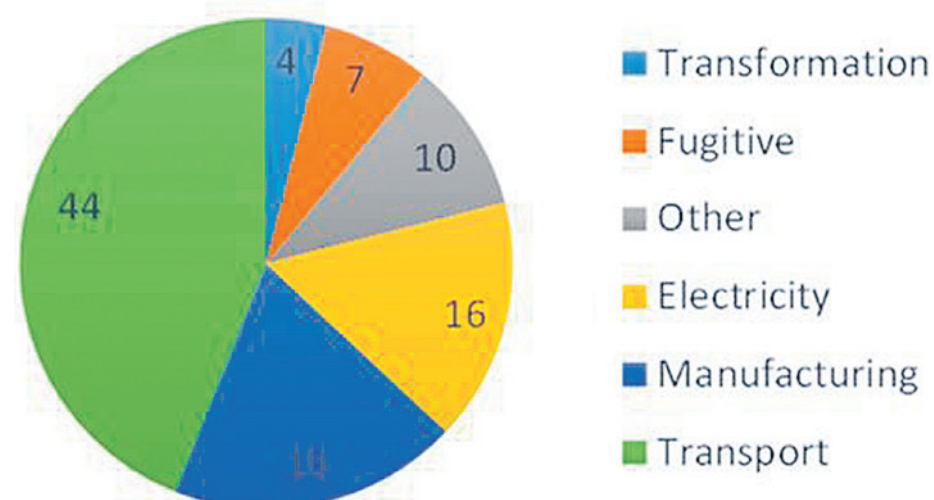
Since we humans inhabit one finite Earth, we are all in this together. In other words, what the major emitters do will affect us all. We are not making a moral argument because the motivations are purely in our own interests.

So let's take a closer look at New Zealand's greenhouse gas emissions. They are broken down by sector in Figure 1a, below.

The lion's share, or about 49 percent of these emissions, result from agricultural



EMISSIONS: New Zealand's GHG emissions by sector in 2013 Figure 1 (a) and breakdown of energy sector emissions (data from [6, 7]). IPPU - Industrial processes and product use.



production while the energy piece of the pie accounts for about 39 percent.

This 39 percent, of the emissions pie can be further broken down by sector (Figure 1b), pictured bottom left, and it can be seen that electricity generation and transport account for about 16 percent and 44 percent respectively.

Electrification of the transport sector could in principle reduce the transport component by half if all vehicles on NZ roads could be converted to battery electric vehicles utilising clean (zero-carbon) electricity. When one inspects the electricity generation below, it can be seen that most of our electricity comes from hydro and geothermal sources. These are generally considered to be renewable and have a relatively small carbon footprint. Thermal base-load power generation using coal and gas as fuels are inherently 'dirty' because of the greenhouse gas emissions.

Thermal electricity generation constitutes about 15 percent of New Zealand electricity generation. Most of this 15 percent results from burning Indonesian coal and New Plymouth gas at the Huntly thermal plant located in the Waikato.

The electricity that is generated basically supplies Auckland. Renewables such as solar and wind constitute a relatively minor but increasing portion of our electricity generation.

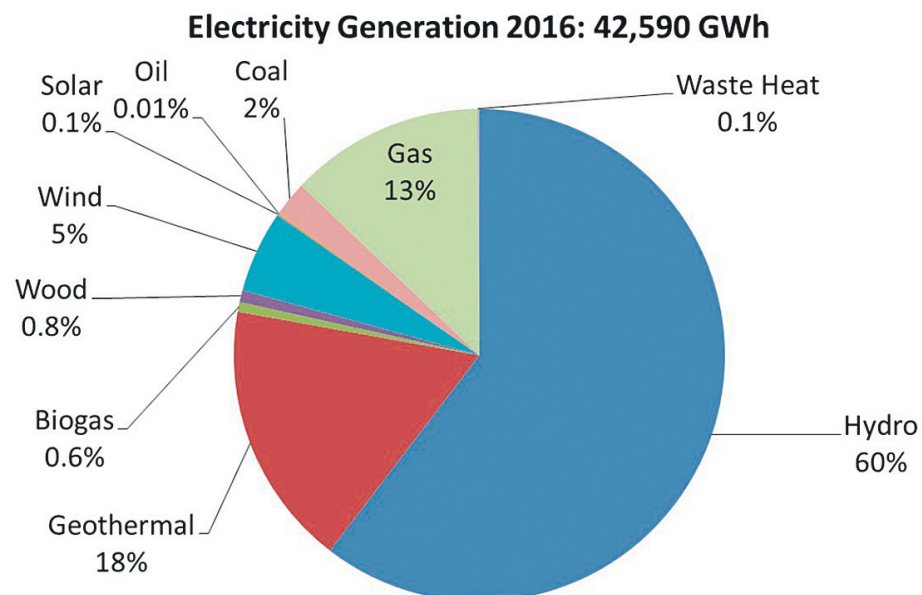
Although our electricity grid is relatively clean, and given that we have good base-load sources (hydro and geothermal), removing the 15 percent contribution from coal and gas and replac-

ing with renewables such as solar and wind, could be particularly advantageous in reducing emissions associated with electricity generation.

Replacement of this 15 percent could be considered low-hanging fruit in our quest to reduce emissions. It would be an easy 15 percent of dirty energy to eliminate, see diagram pictured below.

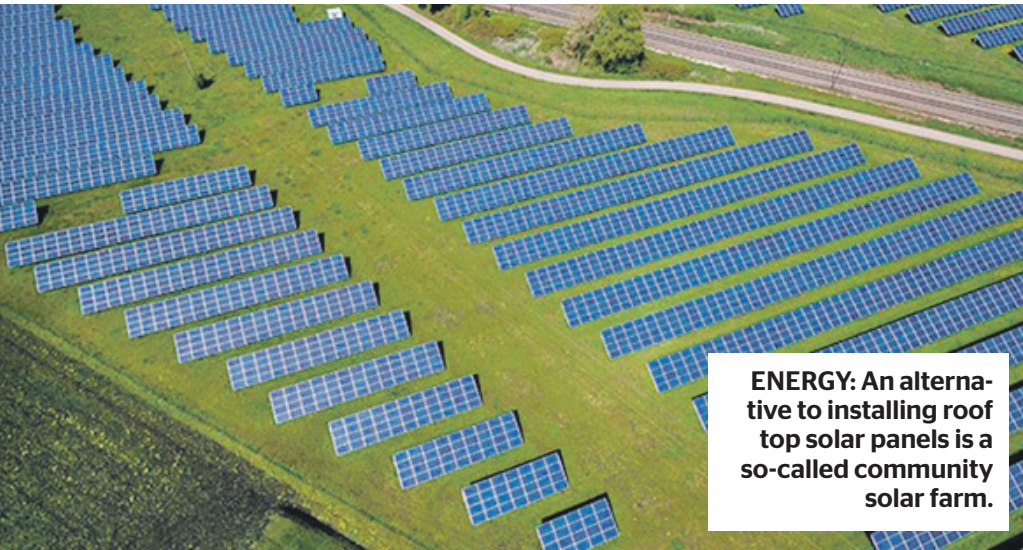
Whether or not the reader believes the incontrovertible scientific evidence on climate change, it is difficult to deny that the nearby nuclear fusion reactor we call the Sun, sustains life on our planet. Without the Sun, our Earth would not be the place it is today and humans would not exist at all. On a typical summer day the amount of sunlight reaching one square metre of ground is quite significant and it would take only two minutes to boil an average kettle. However, modern photovoltaic (PV) panels are only about 15 percent efficient in converting this energy, so that the electricity generated by a one square meter PV panel would actually take 13 minutes to boil our electric kettle. Slice it how you want however, our Sun is free and it is eternal.

Solar energy conversion using modern PV panels used to be quite costly (see Figure 3, pictured above). As shown in the figure it used to cost about US\$77 to generate one watt of electricity in 1977. This cost has been reduced exponentially over time thanks to improvements in PV panel efficiency and manufacturing processes. The cost to generate one watt is now less than 30 cents (50 NZ cents). This is a utility scale price. By the time

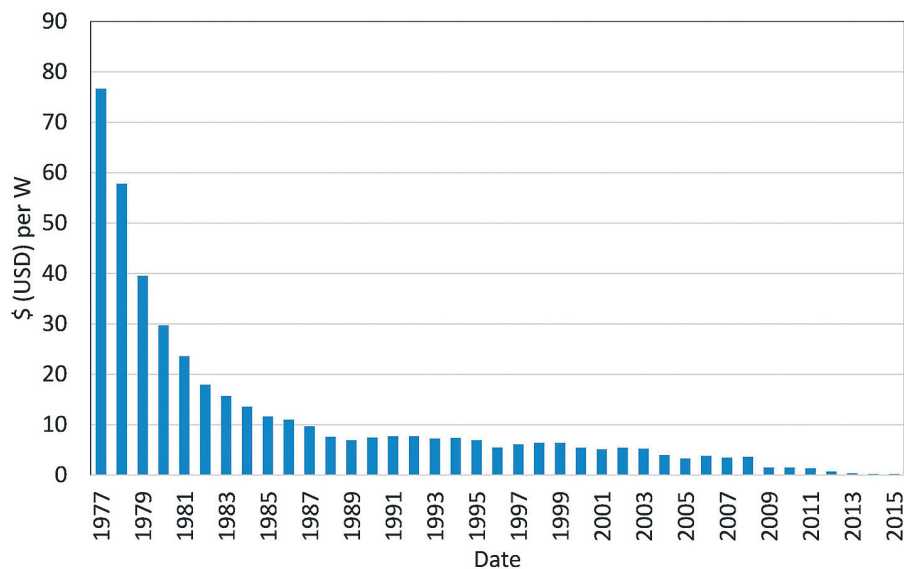


OPINION

energy



ENERGY: An alternative to installing roof top solar panels is a so-called community solar farm.



EFFICIENT: Price history of silicon photovoltaic cells in US \$ per watt.

the costs of importing panels, paying taxes and installing on a Whakatane rooftop, the cost is about NZ\$2 per watt.

We are very fortunate to live in a district with the highest average sunshine hours in New Zealand, in the range 1700-2600 hours. This is relatively ideal in terms of harnessing solar energy. Of the renewable energy alternatives, solar PV has a relatively higher energy density (W/m²) than say wind energy and therefore it makes a good deal of sense to install this technology more proactively. We are truly fortunate.

To have a meaningful effect on emissions in our district, one alternative would be to expand solar generation by equipping as many roof tops as possible with solar panels. Cheap as solar PV panels have become over the years, they are still not free.

Aesthetics aside, the setup would still be relatively expensive and many of us simply would not be able to afford it. A typical four-person household would require about 4kW of generation, more if the family owns a battery electric vehicle. In addition, each installation requires fixtures, an inverter, a special (smart) meter and wiring to be done. The total cost of a 4kW PV system would be about \$10,800. That is, \$2700 per kW.

An interesting alternative to installing panels on your own roof is the so-called community solar farm. Such an installation takes advantage of economies of scale and the cost per kW for a decent size solar farm would be about \$1500, or nearly half per kW compared

to a roof-top installation. The solar farm could be installed on non-productive land owned by the community or private entities. In other words, the panels do not need to be on your roof for you to benefit.

You simply buy a share of the farm and your bill is credited for the energy your share generates. Renters, that don't own the roofs they live under, would also be able to participate. Because of reduced cost per kW generated, and many other reasons, the idea of a community solar farm has really taken off in recent years. Of course, this funding model is only one of many. An alternative would be for a single public or private entity to fund the construction of the solar farm and sell low-cost electricity into the grid benefiting you the consumer.

We have done some simple calculations and concluded that a 10 MW community solar farm in our district could supply sufficient energy to power 2500 two-person households and it would make a big contribution to reducing our emissions and meeting our obligations under the Paris agreement.

Now doesn't that make a shit load of sense?

Anyone interested in such a project please feel free to get in touch with one of us.

victorlucanz@gmail.com
graeme@renewable3d.com

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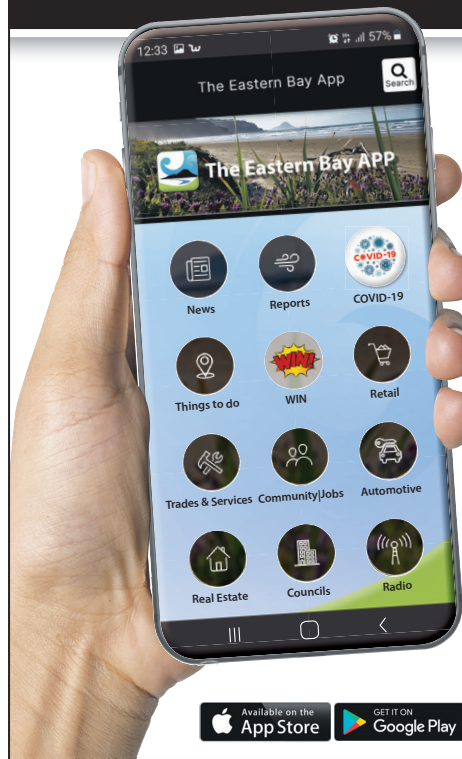


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OPINION

Transmission of Covid-19 compared with influenza

DOCTOR Victor Luca and Sandy Milne try to help readers understand the threat this new virus presents and offer some survival tips.

They compare the Covid-19 virus with the flu virus, a common respiratory virus which is less lethal, in order to assist others in understanding the seriousness of the current situation.



Dr Victor Luca



Sandy Milne

THERE are four types of influenza virus, A, B, C and D.

Human influenza A and B viruses cause seasonal epidemics of disease (commonly known as the flu) almost every winter all over the world.

Influenza A viruses are the only influenza viruses known to cause flu pandemics, ie, global epidemics of flu disease.

We have been fighting influenza for centuries. The battle to protect populations by vaccination is eternal because all viruses change continuously, and as they change, scientists need to modify the vaccine.

Transmission of SARS-CoV-2, the novel virus that causes the Covid-19 disease, came to prominence in Wuhan, China in December of last year. This virus is new, and scientists don't yet know all that much about the virus and the disease, and uncertainty abounds.

However, what should be obvious to anyone by now is that this virus is easily transmitted from one person to another. There is general agreement that the main way that the virus spreads is through contact and droplets.

Contact means that you touch something that an infected person has touched or contaminated and then by touching your mouth, nose or eyes you become infected yourself.

The virus needs to somehow get into the body. Contact transmission is relatively easy to defend against.

Simply don't put your hands anywhere near an entry point to your body and wash, wash, wash your hands.

You should wear gloves also but be careful how you take them off as they should be considered contaminated once used.

There is a right way and a wrong way. Your hands may have cuts and scratches, and these would provide an entry point also, so be careful. Consider your skin a shield.

Droplet transmission is another whole other kettle of fish. A functional definition of a droplet in the present context is a drop of fluid having a diameter in the range 10-100 microns.

When an infected person coughs, sneezes or even breaths and talks they don't just produce droplets that fall

short distances away from the infected individual. Coughs may produce aerosols.

An aerosol is the suspension of a solid or liquid in air. Aerosols such as those listed below, are at the core of environmental problems, such as global warming, photochemical smog, stratospheric ozone depletion and poor air quality.

Examples of aerosols include dust, fume, smoke, fog and mist. Bio-aerosols may include bacteria, fungi, viruses and pollen. For reference, pollen grains can range from 20-100 microns and cause many of us plenty of respiratory grief.

The electron microscope image of a selection of pollen grains is pictured right. Note that the spikes look similar to the SARS-CoV-2 virus particle.

So, an aerosol is a suspension of fine particles or fluid droplets that are a lot less than 10 microns in diameter. Think of fly spray or what your breath looks like on a cold winter's day or the smoke a smoker generates. Aerosols, depending on their size, can remain suspended for more than 30 minutes and travel large distances.

In fact when we cough, sneeze, breath and talk we produce a range of droplet sizes, some relatively large that fall short distances and some very fine that remain suspended in the air.

The scientific community has been arguing for years whether influenza A can be transmitted as an aerosol. The term "airborne" is also used for aerosol.

Our reading of the past and current scientific literature is leading us to the conclusion that there is very good evidence to suggest that influenza A transmission via aerosols could potentially be an important transmission mechanism.

It would certainly explain the infectiousness of the disease and why we have never been able to rid ourselves of it after 100 years or more of battle.

If airborne transmission is viable for influenza A, then why would it not also be viable for SARS-CoV-2, the cause of Covid-19 disease.

The two viruses are in many ways similar viruses. Nevertheless, the United States centres for Disease Control and Prevention and the World



SELECTION: An electron microscope (500x magnification) of pollen grains from a variety of common plants.

Health Organisation have not ruled this mode transmission in. But nor have they ruled it out. And we in New Zealand appear to be waiting from a message from up high before taking action.

Both the influenza A virus and SARS-CoV-2 are corona viruses.

The word corona means "crown" in Latin and refers to the spike proteins that surround the outer membrane shell.

Both viruses carry Ribonucleic Acid (the molecule responsible for replication) and they cannot replicate without a host cell; viruses are parasites.

The influenza A virus has a diameter of around 100 nanometers (0.1 microns). And guess what; so, does the SARS-CoV-2 virus? See the electron microscope images of these two viruses, pictured bottom left. Note that the colours are fake. An electron microscope is a powerful microscope that can achieve magnifications much larger than the optical microscopes most people will be familiar with.

You don't have to know much about viruses to see the similarity in size and general appearance of these two viruses.

Since these virus particles are essentially made up of the same elements including carbon, hydrogen, nitrogen, phosphorus, oxygen, they have approximately the same density, and since the size and density is similar, they should easily be able to become airborne.

If influenza A virus can become airborne as the science suggests, then so can SARS-CoV-2.

Since Covid-19 is a potentially deadly respiratory infection, if the tiny virus particles remain suspended in the air we are breathing, then they can end-up going directly into our lungs, and that is a huge problem.

Confined spaces are not good places to be when there are airborne deadly virus particles present. The best prac-

tical protection that is available at the moment is an appropriate face mask.

By appropriate, we mean a mask that can filter out virus particles with high efficiency.

You may have heard a lot about a mask designated as N95 and/or P2. The masks are made of a material that acts like a sieve. The holes or pores in the mask material have to be about the same size as the virus particles.

The masks are made of a material that acts like a sieve. The holes or pores in the mask material has to be about the same size as the virus particles.

An N95 masks filters out particles larger than 0.6 micron with 95 percent efficiency, hence the 95.

For various reasons that I shall not go into, even though the pores in the mask material are slightly larger than the virus particle, the mask is still effective.

The idea of a mask is not just to protect you, the wearer, from infection, it is also about protecting others in case you yourself are infected. Be considerate.

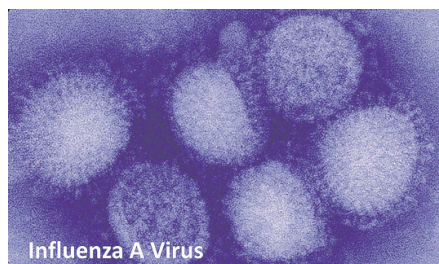
Any protective gear that is used to protect against SARS-CoV-2 infection is only useful if you use it properly.

You must remember that any barrier that you put between yourself and the virus, itself becomes contaminated if you are in an environment where virus is present in high concentration.

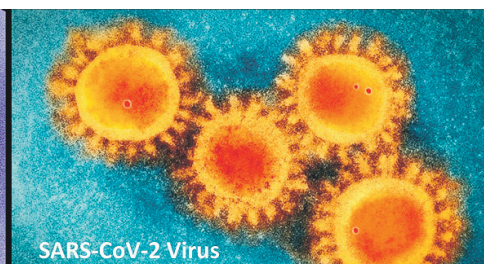
In the meantime, the age-old refrain "discretion is the better part of valour" has never been more applicable and it will cost you nothing.

To any reader that doesn't understand what we have tried to explain here, please feel free to contact us, and further explanation will be provided.

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Influenza A Virus



SARS-CoV-2 Virus

OPINION

The exponential function a



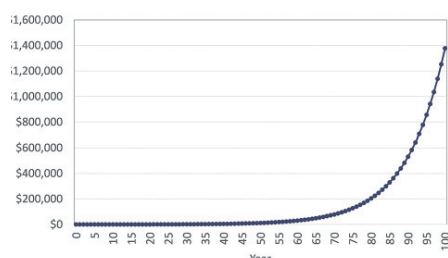
■ Whakatane scientist Victor Luca looks at the future of humanity, taking a mathematical approach to show how growth is the cause of many of our problems, not the solution.

IT may seem strange to some readers that I start this article on the future of humanity with an explanation of compound interest. Please bear with me as I attempt to demonstrate the implications of a quantity that is steadily accumulating at a constant rate.

If I deposit say \$100 in a bank account that returns an interest rate of 10 percent per annum, then after the first year I would have \$110. After the second year I would have \$121, after the third year \$133 and so on until after the seventh year I have approximately doubled my money.

I double my money again by year 14 and every seven years after that. So, the doubling time for a quantity (in our case \$) that is increasing at 10 percent per annum is seven years.

Below is a graph of the amount of money I have versus years from my first deposit. It can be seen that for the first 60 years or so little or nothing seems to be happening. Then all of a sudden, the curve takes off and heads skyward.



Warren Buffet (chief executive of Berkshire Hathaway) is the world's third richest man and he has made most of his fortune by investing in good low-risk companies that grow by making a cash return of roughly 10 percent per annum. From early on he understood the power of the simple math I have described. It is astonishing how quickly someone like Mr Buffet has been able to become enormously rich with a modest initial investment and modest growth rates.

In mathematical parlance the graph shown above is known as an exponential function. It looks a bit like a hockey stick if I go out a long way in time. The amount that is accumulating (the \$) is shooting off into infinity as we go out in time.

The exponential function can be described by the following general equation:

$$N = N_0 e^{kt}$$

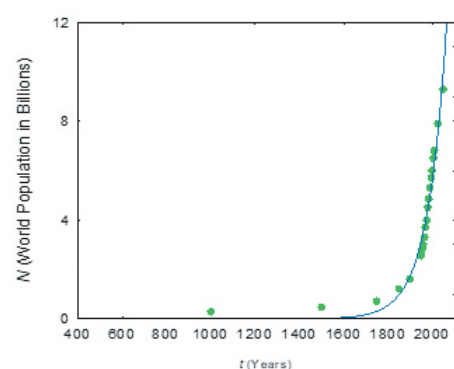
In this equation N is a quantity that is accumulating (the \$) and N_0 is the amount of the initial deposit in dol-

lars, or \$100 in our compound interest example. The symbol k represents a constant value known as the growth rate (in percent). In our case this is the interest rate of 10 percent per annum and it doesn't change year-on-year. t is the time in years and t = 0 is start time. The constant, k, has the value:

$$k = \frac{\ln(2)}{T_2} \quad T_2 = \frac{\ln(2)}{k}$$

Here T_2 is the time required for the quantity to double, the doubling time that I referred to above. Since the natural logarithm of 2 ($\ln(2)$) is approximately 0.693, then if we know the growth rate of the quantity in percent, we can calculate the time for the bank balance or some other quantity to double. We did the basic math above.

The exponential function also approximates the increase in human population with time as shown in the graph below. This is the famous hockey stick curve and is one of the major underlying problems of climate change. Since human population is increasing exponentially, so too does food consumption and the generation of waste etc.

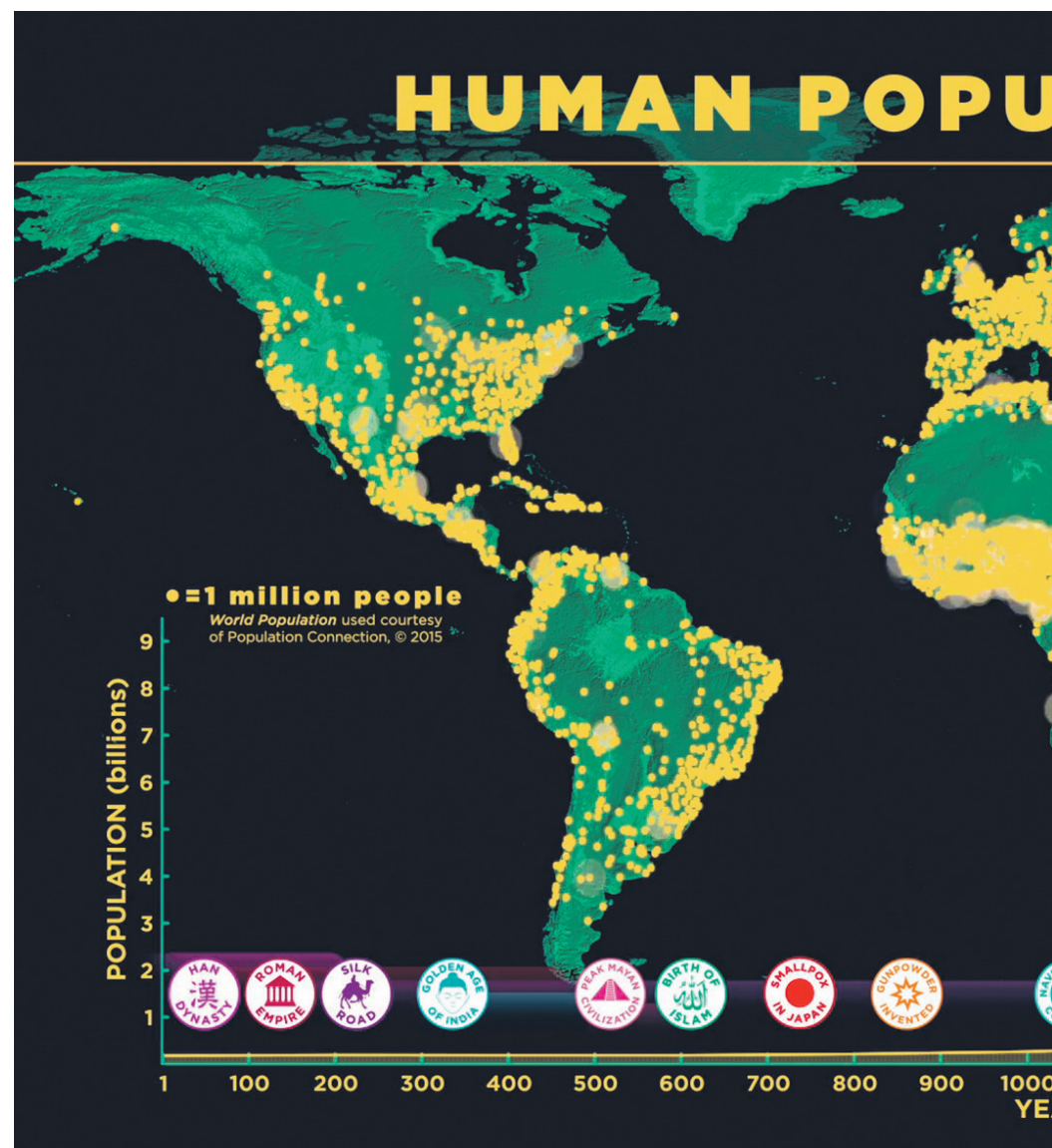


The increase in carbon dioxide (CO₂) and other green-house gas emissions in the atmosphere and global average temperatures are also following a hockey stick curve or exponential function.

Following on from what we said before, but changing the numbers a bit, if the growth rate is 3 percent, then any quantity undergoing exponential growth would double in 23 years. A growth rate of 5 percent would result in doubling every 14 years. I guess you get the idea?

What I am trying to show here is that modest rates of growth can give astonishingly short doubling times.

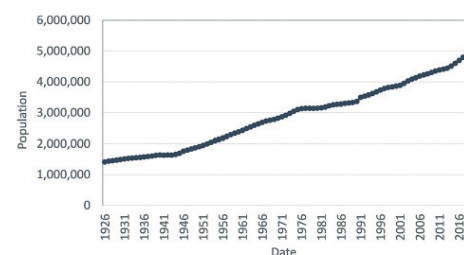
Now let's look at something a bit closer to home. For much of Aotearoa's recent history we have had an average annual population growth rate of about 1.3 percent. As I have already explained a 1.3 percent growth rate



SOURCE: Human Population Through Time, American Museum of Natural History.
https://www.youtube.com/watch?v=PUwmA3QO_OE

in population would give a doubling time of about $70/1.3$, or about 54 years. As you can see from the graph shown below that was compiled from data from StatsNZ, this is about right.

From 1926 to about 1976, the population went from 1.42 million to about 3.1 million which is about as expected. In recent times, mostly due to the government's aggressive migration program, annual population increase has been about 2 percent. This corresponds to a population doubling time of $70/2$ or 35 years. If we continued the graph out further in time it would eventually also look like a hockey stick.



Aotearoa's population growth from 1926 to 2016.

Exponential decline is very similar to exponential growth only instead of it goes the other way, it decreases with time, rapidly at first and then more slowly. Exponential decline could be applied for instance to a fixed resource that is being depleted at a constant

rate. Exponential decay also happens to describe the phenomenon of radioactive decay.

Again, the important point here is that very modest growth or consumption rates can lead to the frighteningly fast explosion in say a population or the exhaustion of a resource.

Let's now take another example of exponential growth that dates back to ancient times.

The game of chess probably originated in India and Persia.

Legend has it that the court mathematician of the king of ancient Persia was very pleased with the inventor of chess, a mathematician, and offered to reward the mathematician anything he wanted because the king wasn't a very smart individual and assumed that all the sly mathematician wanted was money.

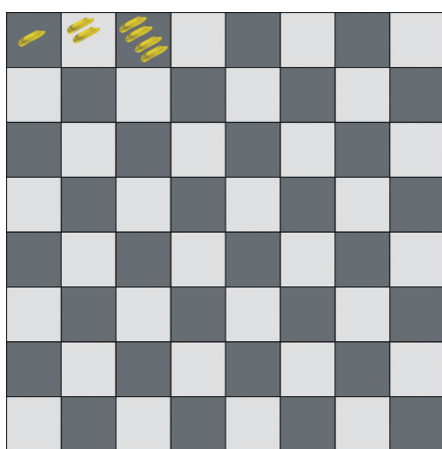
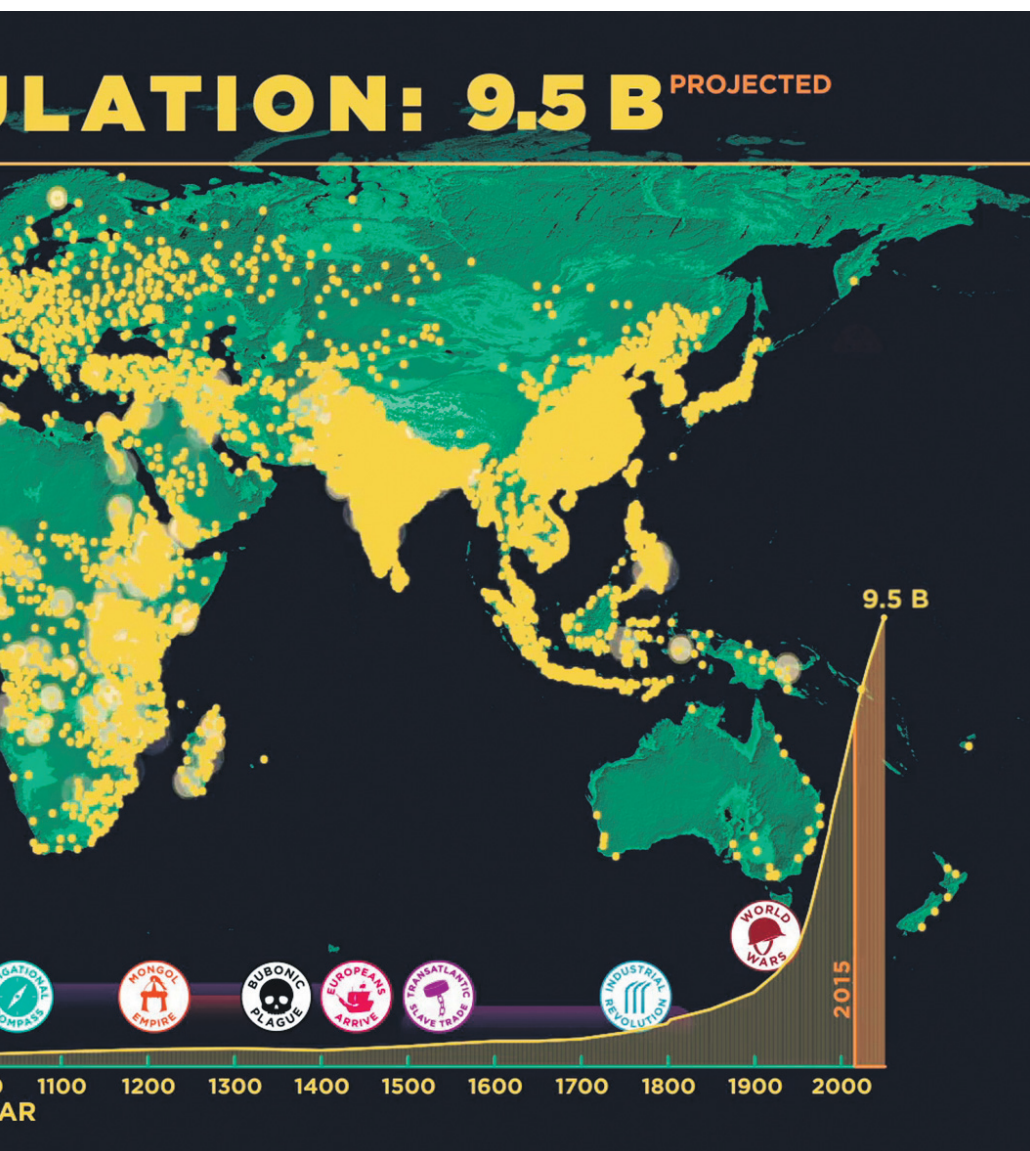
A simplified form of the equation above that describes the situation is given by this simple exponential equation where N is the number of grains of wheat:

$$N = 2^n$$

According to this legend, the reward that the mathematician wanted was for the King to put one grain of wheat on the first square of his chess board, two grains on the second, four on the third, eight on the fourth, and so on.

OPINION

and the future of humanity



That is, a doubling of wheat on each square.

"Very well," the King probably said. He most likely didn't see the consequences of his actions because he was too preoccupied with taxing the peasants and pillaging nearby villages.

Since there are 64 squares on the chess board the total amount of grain evaluates to $N = 264$. That is, $N = 2 \times 2 \times 2 \dots$ repeated 64 times. This is an unimaginably humungous number. As it happened there was not that much grain in the entire world.

A nice little riddle that also demonstrates the exponential function is

that of the lily pond. The pond initially contains one lily pad and that doubles every day.

If it takes 30 days to completely fill the pond, then how long does it take to half fill the pond? The answer is 29 days. It took 29 days to half fill the pond, but on the thirtieth day it went from half full to completely full. Dramatic isn't it?

Professor Albert Bartlett (1923-2013) was Emeritus Professor at the Department of Physics, University of Colorado at Boulder and for many years he taught his undergraduate students about the exponential function (https://en.wikipedia.org/wiki/Albert_Allen_Bartlett). He regularly made the following statement.

"The greatest shortcoming of the human race is our inability to understand the exponential function."

Some of his classes can be viewed on YouTube. Part 1 can be found at the following address:

<https://www.youtube.com/watch?v=F-QA2rkpBSY>

This video has been viewed over five million times. Way less than Taylor Swift's song *Shake it Off* that has been viewed 2.8 billion times. I would argue that Dr Bartlett's math is far, far more important for the future of humanity than Swift's video, entertaining as it might be. I have watched her video several times myself, just as I have watched Dr Bartlett's.

After years of thinking about the exponential function Dr Bartlett came to the conclusions listed below. These conclusions are to be found in his article in the *American Journal of Physics*, September 1978.

It doesn't matter if the reader does not understand the math I presented above, as long as the reader appreciates that the conclusions that are to be reached from an understanding of such a simple mathematical expression are inescapable.

In his article Dr Bartlett makes the following conclusions on what we must do:

(i) Educate all of our people to an understanding of the arithmetic and consequences of growth.

"The promotion of growth is simply

a sophisticated way to steal from our children."

— David Brower
(a famous environmentalist)

(ii) Conserve in the use and consumption of everything. We must outlaw planned obsolescence. We must recognize that, as important as it is to conserve, the arithmetic shows clearly that large savings from conservation will be wiped out in short times by even modest rates of growth.

(iii) Recycle almost everything.

(iv) Invest great sums in research (a) to develop the use of solar, geothermal, wind, tidal, biomass, and alternative energy sources; (b) to reduce the problems of nuclear fission power plants; (c) to explore the possibility that we may be able to harness nuclear fusion.

(v) Recognise that it is exceedingly unscientific to promote ever-increasing rates of consumption of our fuel resources based on complete confidence that science, technology, and the economics of the marketplace will combine to produce vast new energy resources as they are needed.

(vi) Not sit back and deplore the lack of "leadership". We must show leadership ourselves.

More than 40 years have passed since Dr Bartlett penned his article and the advice he gave is more important today than ever before.

I invite readers to think hard about what has been written here because it is critical in understanding the plight that humanity faces.

The math leads you to only one conclusion and that is that growth is no panacea, but rather the cause of many of our problems.

Now go and tell that to your chief executive and the market-based economic system that dominates our lives.

Do the math.

■ The views and opinions expressed in this article are purely my own and not necessarily those of the Whakatane District Council.

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Unaffordable Housing

Dr Victor Luca, Scientist

The views I have expressed here are solely my own and do not express the views or opinions of any organization I am associated with.

Today (20Jan20) I heard a news report on TV (Newshub) that we in Aotearoa have among the least affordable housing in the world. Nothing new here. We have been hearing it for a long time. A few statistics were then given of the ratio of house prices to income in some of our major urban centers. Incidentally, NZ's median income is one of the lowest in the OECD and in our district it is an alarmingly low \$25K/annum. Apart from brief reference to the fact that things are getting worse for first-home buyers, again nothing much new. I doubt many of us learned much listening to this 'news' broadcast that contained not a single word of analysis. Why do we have the situation that we have? Why is it that an entire generation of New Zealanders, will find themselves unable to buy a home? That is, unless they inherit wealth of course.

At the risk of sounding condescending by telling people what they already know, I will venture my own simple-minded hypothesis on the matter. I warn you that I have no background in economics or demography or town planning or any related area.

Let's start the analysis with interest rates that are controlled by our central (RBNZ) and to a lesser extent by our foreign-owned banks. We all surely realize that mortgage interest rates in NZ are at all-time historical lows. Variable mortgage interest rates have in fact been trending south for decades although they declined steeply after the global financial crisis (GFC). Remember the GFC? Following the GFC the need for central banks to apply monetary stimulus to resuscitate flagging economies resulted in a drop in interest rates of about 5% in a matter of months. This in turn was spurred by the creation of massive amounts of new money by banks. In the jargon, this process is called quantitative easing. Cheap money was a significant catalyst for housing speculation. If you already owned a home, or part of a home, you could use the equity, and this cheap money, to buy another. You could then rent it out and use the rental income to finance the loan. Not rocket science as long as you already had the initial equity. It is in financial parlance a sort of legal Ponzi scheme. However, stimulating demand via this mechanism only works if there are sufficient numbers of renters.

Another mechanism for stimulating demand for real estate is to sell houses to a wider market, say the world market. Until the present government got into power, virtually anyone from anywhere on the planet could buy a chunk of Aotearoa. This mechanism is a direct result of government policy. To get a good picture of the situation the reader is referred to the brilliant 2017 documentary by Bryan Bruce entitled "Who owns New Zealand now?". It is available on You Tube at the following address:

<https://www.youtube.com/watch?v=HzSAmOQujU&t=33s>

Fortunately, the present government, has to some extent, put the kybosh on this with its foreign buyer's ban that took effect in about August of 2018.

Yet another means of putting upward pressure on housing that is totally within central government control is the control of immigration. More people entering means more houses are needed to house them. For the years 2014, 2015, 2016 and 2017 New Zealand has allowed 50,922, 64,930, 70,600 and 72,400 immigrants into the country respectively. Most of these new migrants wind up in Auckland. This high annual immigration is responsible for about $\frac{3}{4}$ of NZ's annual population increase of about 2% per annum in the 2014-2017 period. Simple math shows that an annual growth rate of 2% would translate into a population doubling time of 35 years. This growth rate is substantially up on the historical mean of about 1.3%. It follows that if we stopped all immigration, NZ's population would remain almost constant. Our immigration rate is about twice that of Australia's which already has a relatively generous immigration policy. In fact, since 2012, Aotearoa has had one of the highest net inflows of migrants of any OECD country.

It is the previous government that presided over much of this upward trend in immigration. In 2018 the number of immigrants dropped to about 63800 which is still high. By controlling the numbers of immigrants, be they buyers or renters, the government directly exerts control over housing demand.

Finally, one of the levers for control of house prices in which local government can exert some influence is land availability.

Enrico Fermi once famously stated "Never underestimate the joy people derive from hearing something they already know." For those who don't know, Fermi was the famous American-Italian physicist whose work contributed to the development of nuclear energy and atomic bombs. Fermi received the Nobel Prize in physics in 1938.

The Fragility of Human Existence

Dr Victor Luca, Scientist

The views expressed here are solely my own and do not express the views or opinions of any organization with which I am associated.



The [Doomsday Clock](#) reads 100 seconds to midnight, a decision made by The Bulletin of Atomic Scientists. Eva Hambach/Getty

Does it matter to anyone reading these lines that after their passing, human life as we know it on this earth could cease to exist? After all, when we are gone, we are gone, and so what happens doesn't matter anymore?

Existential risks are those that threaten the entire future of humanity. Believe it or not, there are teams of academics that think, study and obsess about such things. Cambridge University's Center for the Study of Existential Risk (<https://www.cser.ac.uk/>) has compiled a list of global existential risks. Oxford University's [Future of Humanity Institute](#) and the [Global Challenges Foundation](#) have compiled comparable lists. I have condensed these risks down to the following:

1) Climate Change, 2) Nuclear War, 3) Artificial Intelligence, 4) Advanced Biotechnologies, 5) Naturally Occurring Pandemics, 6) Super-eruptions or impacts of outer space objects, 7) Cosmic Radiation.

Risks 1-5 in this list are termed endogenous or anthropogenic risks since they are largely due to our activities and 6 & 7 are exogenous risks since they are not within our control. Exogenous risks have been present since before we, homo sapiens, first walked the earth over 300,000 years ago. The

probability that these risks cause our demise as a species is considered extremely small. Anthropogenic or endogenous risks are, to a large degree, a result of our breathtakingly rapid (exponential) scientific and technological development and their probability is not negligible.

Citizens and national policy makers are generally not good at understanding, assessing and mitigating global catastrophic risks. Our feeble response to climate change is an example in point. Anthropogenic climate change has been discussed in the realm of science for more than one hundred years and has interested me for the last thirty years. Yet it is only very recently that climate change is entering into widespread public discussion. Despite the seriousness of this endogenous risk, it fails to rally us into serious action. We posture and we vacillate, but we take no serious action. As I have said many times, we need to roll out a global Manhattan- or Sputnik-type Project response to climate change. Sadly, virtually nothing is happening! If we can pump trillions of dollars into keeping the global economic ponzi scheme going as happened after the Global Financial Crisis of 2008, then we should be able to create a few trillion dollars to keep the global mean temperature down, ice sheets and glaciers intact, the sea level where it is, storms and droughts at bay, maintain earth's biodiversity and keep our environment pristine. I would consider declaring the Trump administration, on its own, a global existential risk. They have so far rolled back more than one hundred environmental regulations in the United States and are showing no signs of stopping. Do your own research on this one please.

Volcanic eruptions are phenomena that our community has had to come to grips with only very recently. Whakaari, *aka* White Island, is located 50 Km from the mouth of the Whakatāne river and it has bubbled away for at least the past 150,000 years. Whakaari was in more-or-less continuous eruption from December 1975 to September 2000 (the longest historic eruption episode). There have also been many other eruptive events 2012-2013 and 2016 (see <https://www.geonet.org.nz/about/volcano/whiteisland>). The remoteness of Whakaari has lulled us into a false sense of security and maybe our attitude to the risks has been somewhat blasé. Yet even a minor eruptive event can have serious consequences for our community. Imagine what would happen if White Island turned into a supervolcano? While a supervolcano is one of the two exogenous risks on the list above that we can do little or nothing about, my advice is to focus principally on the endogenous risks that have a much higher probability of taking out much of human civilization and which we can do something about. Thus, I ask, how are we prepared for climate change that could wreak havoc on our community or the world for that matter?

Nuclear war has represented a potential threat to our existence since the first atomic bomb leveled Hiroshima. We have subsequently come close to the breakout of full out nuclear war on many occasions, either through accident or misunderstanding or competition between superpowers. I get the impression that we have largely dismissed the risk of nuclear war because, well, it hasn't happened so far, so let's sweep it under the carpet. The book entitled "The Doomsday Machine – Confessions of a Nuclear War Planner" by Daniel Ellsberg gives a frightening bird's eye view of the machinations of the American Military-Industrial Complex. Of course, there are many nations with such doomsday machines although the Americans have by far the most powerful. The American Military's cut of the last US budget was close to 1 Trillion dollars.

Healthcare and Health Inequity in Aotearoa

Dr Victor Luca

During the recent local election campaign in our district I was asked at a September 2019 BOPDHB public meeting the question of what I would do about improving Maori health outcomes. Although the media in our country has for many years been reporting poor health outcomes among Tangatawhenua, I have to admit that it was not a question I was prepared for. Although I am a scientist, and was a Mayoral candidate, health is not an area in which I have specific expertise. After a considerable amount of research into possible links between race, ethnicity and social-environmental factors including poverty, health care inequities and racism and health I cannot say that I have all, or indeed many of the answers. I do however have a theory that requires testing.

Thankfully, the hornet's nest that his health policy is a national issue in which Mayors and District Councilors have little or no role to play.

Nevertheless, there are few issues in which we all have more of a stake than health, and therefore, in which we should all attempt to be informed.

Aotearoa's largely publically-funded health care system was initially established in the 1930s and was modeled on the UK's national health system. However, it has evolved over time and it is pertinent to ask if it continues to serve us well and what modifications can be made to improve it?

The graph below shows Life Expectancy at Birth as a function of Total per Capita Expenditure on Health for different OECD countries. Life expectancy is a crude measure of health outcomes but has the virtue of being easily measured with high accuracy. One is either dead or alive. It can be seen from the graph that we in New Zealand (nzl) plot in about the middle of the range in terms of life expectancy but that our costs are relatively modest, especially compared to the USA which I guess we would agree is an outlier. The Americans pay a lot for their healthcare and the outcomes (in terms of Life Expectancy) are poor, at least for the population as a whole. Interestingly, in the last few years Americans have seen a drop in life expectancy for the first time in decades.

Australia scores somewhat better than we do.

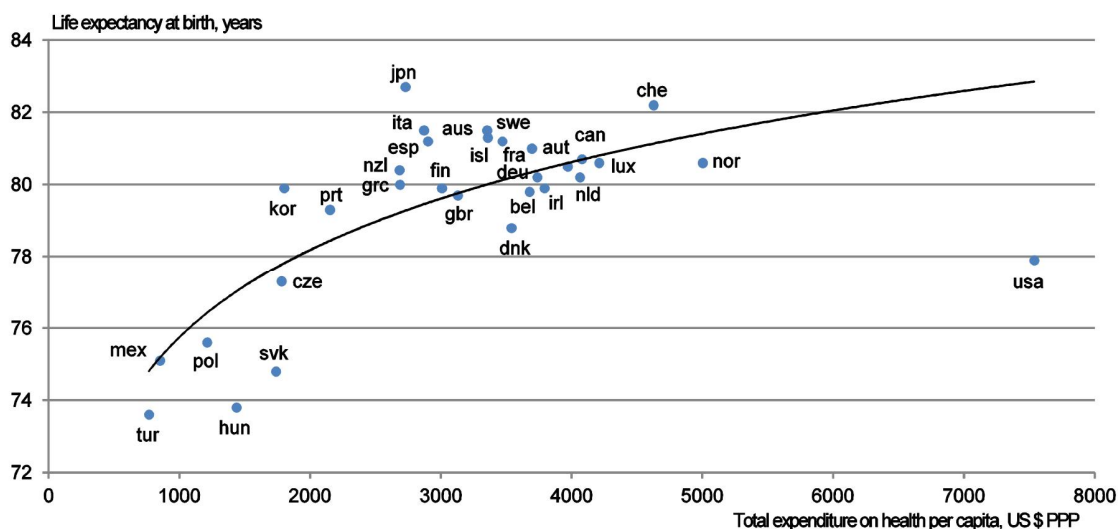


Figure 1. OECD 2010, “Health care systems: Getting more value for money”, *OECD Economics Department Policy Notes*, No. 2. <https://www.oecd.org/eco/growth/46508904.pdf>

Although easy to measure, life-expectancy is a relatively crude indicator of health. Behind this indicator are socio-economic, geographic, life-style, nutritional, genetic and other factors *etc.* These are what we really want to know about. However, to a first approximation it would appear that our healthcare system delivers reasonable overall outcomes, especially relative to the good old USA. I have had some personal experience of the health system in the US and wouldn't want a bar of it here. It is absolutely based on inequity! The more you pay, the better health care you can access. You can have the best healthcare in the world or none at all.

Whilst our public healthcare system may seem reasonable, and there are doubtless arguments suggesting we are not being served badly, it would also be fair to say that it is far from perfect and that there is also undoubtedly room for improvement, especially in so far as the under-privileged are concerned.

As I said before, the data in the above graph is complex. The life expectancy is for the population as a whole and many factors can contribute. I am sure that we all recognize that in a multicultural society like ours different races and ethnic groups may contribute differently to these statistics.

In terms of the health outcomes in Aotearoa, the difference in life expectancy between Tangawhenua and Pakeha is marked. Maori males live about 5 years less than non-Maori males and Maori women about 5 years less than non-Maori women.

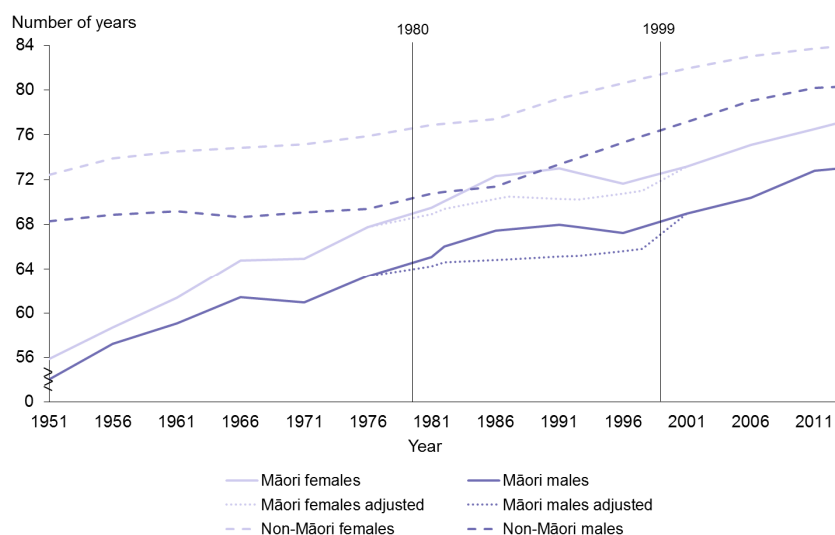


Figure 2: Life expectancy at birth, by gender, Māori and non-Māori, 1951–2013 [1] **Source:** <https://www.health.govt.nz/our-work/populations/maori-health/tatau-kahukura-maori-health-statistics/nga-mana-hauora-tutohu-health-status-indicators/life-expectancy>

There is some suggestion that life expectancy differences have narrowed since 2011 probably due to the best efforts of central government and other entities to address the issue. Nevertheless, it is a sad fact that Maori continue to have a much lower life expectancy than non-Maori and in general worse health outcomes.

The NZ Ministry of Health is the government agency that compiles statistics for various ethnic groups and the data can be viewed at the following address:

https://minhealthnz.shinyapps.io/nz-health-survey-2018-19-annual-data-explorer/_w_131001a5/_w_24ff4d61/#!/download-data-sets

Breaking health down in terms of disease we can clearly see differences between Maori and non-Maori in these statistics (Table 1).

Table 1. Prevalence of certain conditions between Maori and Non-Maori expressed as an Adjusted Rate Ratio. Source: NZ Ministry of Health.

Condition	Adjusted Rate Ratio
Heart failure	1.85
Ischaemic heart disease	1.64
Diabetes	1.95
Type 2 diabetes (proxy)	1.98
Stroke	2.28
Arthritis	1.22
Asthma (medicated)	1.57
Gout	1.55
Osteoarthritis	1
All teeth removed due to decay	1.69

The adjusted rates ratios gives an idea of the prevalence of a particular condition for Maori versus Non-Maori. Thus, in the case of heart failure it can be seen that Maori are about two times more likely to be afflicted by the condition than Pakeha. Moving down the table one can in fact observe that the health outcomes for Maori are usually 1.5 – 2 times worse than for Pakeha.

Such data has given clear acknowledgement in health, political and societal circles that there are inequities in health outcomes between Tangtawhenua and Pakeha and this has been much debated.

The central question to be address here is why it is that Maori have poor health outcomes and what can be done about it?

Let me start by first defining what is meant by the terms race and ethnicity.

Race is [defined](#) as “a category of humankind that shares certain distinctive physical traits.” The term ethnicity is more broadly [defined](#) as “large groups of people classed according to common racial, national, tribal, religious, linguistic, or cultural origin or background.”

The mapping of the human genome has shown that humans share [over 99 percent of their genetic material with one another](#),[{Redon, Ishikawa, et al. 2006 #350}](#) and variation occurs [more between individuals](#) than ethnic groups.

There is strong scientific evidence nowadays that health disparities have relatively little, or at best, only a very blurry connection with genetics (barring exceptions such as Sickle Cell, TaySachs and Crohn disease). Rather, disparities are more likely to derive from differences in culture, diet, socioeconomic status, access to health care, education, environmental exposures, social marginalization, discrimination, stress and other factors.[{Pearce, Foliaki, et al. 2004 #190}](#)[{Sankar, Cho, et al. 2004 #160}](#)[{Collins 2004 #200}](#)

So where do we look for the answers? Let’s start by looking at ourselves and our habits, circumstances and life-style choices. Call me naïve, but I consider my health, in the first instance, be determined by me. That is, I have the initial primary responsibility for my own health by virtue of the choices I make. Why do I say this?

In lectures I give to senior university students on the risks of nuclear technologies I present Table 2 which I compiled from primary data. The numbers in red are the total number of deaths attributable to each of the causes on the left. One can see that the top spot is taken by air pollution which is responsible for a whopping 7 million human deaths per year globally. We are all doubtless aware that this air pollution is due to industry, power generation and motor vehicles. The next most important causes of human death are smoking, alcohol consumption and obesity in that order. My point in compiling this table was to emphasize that despite our fears about nuclear energy, the number of deaths from this form of energy generation is well down the list and comparable with shark attacks. The 4,319 deaths listed in the table include presumed deaths from the Chernobyl accident, which have for the most part, not eventuated. My point is that perception of risk is one thing and the reality is another.

Table 2. Global annual causes of death.

Putting Health Risks in Context

Air pollution (annual)	7,000,000
Smoking (annual)	6,000,000
Alcohol (annual)	2,500,000
Obesity (annual)	2,500,000
Child malnutrition (annual)	3,100,000
Motor Vehicle accidents (annual)	1,240,000
Mosquitos (annual)	725,000
Homicides (annual)	475,000
Sexually transmitted diseases	275,000
Maritime	63,320
Explosions	38,359
Industrial	33,023
Aviation	22,041
Stampedes and panics	19,563
Rail	18,222
Structural fires	5,282
Nuclear*	4,319
Shark attacks	2,881
Sport	2,207
Space	22
Climate change	??

* Assumes all thyroid cancer deaths eventuate

“To live life means to take risks”



When it comes to our health also, the most easily avoided of all of these causes of death are smoking, drinking and over-eating or eating wrongly. When it comes to health outcomes in Aotearoa it would seem to me that the same activities also in large measure determine our health outcomes. In the first instance.

Our very own health statistics bear out the fact that Tangatawhenua are between 1.5 and 2 times more likely to smoke, drink heavily and be obese. Smoking, drinking and obesity are risk factors for diseases such as heart disease, stroke and cancers which are three of the leading causes of mortality in our country. Such activities have a direct negative consequence on our health and yet are totally within our own control. This is why I say that to first order WE exert the most influence on our health outcomes. We have all heard the expression “you are what you eat”. I would modify that to “you are what you eat, drink and smoke”.

The next question to ask is why it is that Tangatawhenua are more disposed to smoking drinking and eating badly. Right off the bat I would dismiss suggestions that racism in our health system is somehow responsible for health disparities. We can look for answers on this issue from data reported in the literature which suggests that of all the ethnic groups in Aotearoa, it is Asians that most perceive that they are discriminated against in our health care system.

Having dismissed racism as a factor I would have to look at socio-economic and cultural factors.

In Aotearoa today, the degree of wealth disparity is at an all-time high. More than 900,000 people live below the poverty line and in excess of 150,000 of those are children. We have become a low wage society with a median income of about \$52,000. In our district this value is about half of this. Housing affordability is at an all-time low and for those that do not escape the rent trap getting stuck is a real possibility. Aside from high poverty rates, we in Aotearoa also have the unenviable distinction of having highest rate of youth suicide in the world.

I contend that for those caught on the bottom rungs of an increasingly stretched socio-economic ladder there is only despair and resignation. It is a sorry fact Tangatawhenua and Pacific Islanders are disproportionately those that inhabit the lower rungs of this ladder. Is it any wonder then that when these folk look up the ladder and see how difficult or impossible the climb up has become, they lose hope and turn to anything that can make their daily existence feel a little more tolerable? Most often that brief boost comes from the use of alcohol, tobacco and other drugs. I would include as drugs, sugar and fat, since they are both addictive and adversely affect our health. With poverty comes psychological trauma and stress. The consequence is all too often relationship and family disruption. Poverty also makes accessing the medical system more difficult once illness sets in.

The longest study of human wellbeing is the Harvard study which commenced in 1937. It has shown that the quality and depth of relationships is as important in determining our health as eating well and not smoking or drinking (see <https://www.adultdevelopmentstudy.org/>).

This study in many ways supports Te Whare Tapa Whā which is a traditional Māori view of health (hauora) that takes a wellness and holistic approach with physical (tinana), mental (hinengaro), spiritual (wairua), and family (whānau) dimensions. So Maori seem to have been ahead of the curve on this one.

There is no excuse for not doing everything possible to improve the equity of health care in our country by taking greater account of culture and life-style specific needs of Tangatawhenua. However, in the end what needs to happen is that as a society we focus on improving the well being of all our people and that involves levelling the playing field so that everyone gets a chance.

In the meantime, anything that drives us toward a healthcare system such as in the US is something to be avoided at all cost. In the good old USA, the Medical-Industrial Complex has ensured that those without financial resources are essentially screwed.

References

The Milko and Re-use Glass Bottles

Victor Luca – Mayoral Candidate

There are about 14,000 households in the Whakatāne district with the average household size of about 2.7 persons-per-household. If each household consumes a one liter bottle of milk per day then that amounts to one hell of a lot of plastic bottles that have to be recycled and/or be disposed of. Do any of us really wonder too much about what happens to those bottles once they are turfed into the recycle bin?

As far as I am aware, the plastic (Type 2, HDPE) milk bottles we recycle are compressed into tubes, tied with wire and shipped back to Asia. Then, hopefully, they get turned into something else.¹ That something else could be a peg or a coat hanger. I don't have full details of the processing the bottles need to be subjected to and the carbon footprint of that process? Nor do I have any specific information on the real cost of the round trip recycling operation i.e. a life cycle analysis?

Back when I was younger, everyone used to pop 4 cents into their glass bottles and leave them at the gate. The Milko would pass by late afternoon, take the empties and leave full bottles. The empties would be cleaned and re-used. It was a system that worked and the bottles could be re-used almost an unlimited number of times.

Aside from re-use, it is also possible to recycle glass milk and beer bottles almost an unlimited number of times. For instance, that Steinlager bottle you may have in your hand could easily be up to 30 years old.

Given the increased environmental pressures resulting from population increase and human development, I believe that it is time that our district evaluates a possible return to the tried and true practices of old. The best way to eliminate waste is not to generate it in the first place! Prevention is better than re-use which is better than recycling. All are better than sending garbage to landfills or the oceans.

Steve and Pip Olds of Eketahuna Country Meats in many are ways trail blazers and their efforts deserve lots of praise. They have been getting a lot of support for their fledgling fresh milk delivery-to-the-gate business that utilizes glass bottles that are re-used. Why couldn't we do it here in Whakatāne and do our bit for the environment. It certainly warrants looking into.

¹ <https://www.stuff.co.nz/dominion-post/news/wellington/78938934/curiouscity-plastic-bags--pongy-milk-bottles-what-really-happens-to-recycling>

Water Aint Free

Dr Victor Luca – Whakatāne Mayoral Candidate

It should come as little news to most readers that without water, plant, animal and human life is not possible. Securing adequate supplies of fresh, clean water is essential to the health of humankind and the functioning of a modern society. Water is a precious resources and we should treat it as such! Maori realized this long ago and Pakeha are getting it now also. We in Aotearoa are truly lucky in regards to water availability, our Australian cousins not so much!

In my travels around Whakatāne township a number of folk have voiced their concern about the price they are paying for water. More than one individual has questioned why the cost is so high when water simply comes “free from the river”.

Such comments make it clear to me that many punters do not quite understand what it takes to get water from a river and deliver water to your tap in such a state of cleanliness that it can be drunk directly without making you sick.

We have abundant supplies of pristine artesian water in our district some of which is being bottled and sold. But let's not get into this here and focus on what comes out of the tap in Whakatāne.

To take water from a river such as the Whakatāne river that may contain pathogens, sediments and nutrients requires the implementation of one or more relatively complex chemical engineering operations including pumping, mixing and flocculation, sedimentation, filtration, advanced oxidation, reverse osmosis, disinfection and periodic chemical testing. The treated water is then stored in tanks which also implies a cost. These processes are energy intensive and can use relatively expensive chemicals and other consumables. Plants must be operated and maintained by people that need to be paid. Pipework needs to be installed and maintained and leaks repaired. The water that comes out of your tap is not free! Many folk will be aware that the Three Waters plant to the South of Whakatāne township deals with the processing of drinking water. Concerned citizens should ask to see what happens there. They may reconsider their views on water being free.

The Future of Transport and Lithium-Ion Batteries

Dr Victor Luca – Mayoral Candidate



With the transport sector accounting for about 15% of global green-house gas emissions, it seems clear to me that the future of transport will be the battery electric vehicle (BEV) and perhaps eventually hydrogen fuel-cell vehicles also. One day we may look upon the ICE as we now look upon the old practice of bloodletting as a means of curing disease. Quaint but ridiculous! BEVs are just better technology.

In fact, BEVs have been around since at least as long as ICE vehicles. One of the first mass-produced BEVs was the Baker Electric (1899-1915). The first Baker Electric could travel at speeds of up to 40 km/h and had a range of about 80 km. The Baker Electric performance was easily competitive with the ICE vehicles of the era. Alkaline batteries were used in the Baker Electric.

An entire catalogue of 80 different electric vehicle makes and models dating from around 1907 can be found at this address:

<http://www.lowtechmagazine.com/overview-of-early-electric-cars.html>

Today, electric motors are improving, and battery performance is increasing by about 6% per annum and costs are dropping. Battery capacity improvement of around 6% per annum is not exactly Moore's Law where the number of transistors on an integrated circuit doubles every two years. Rather, Li-ion battery development is a case of steady progress with a 6% annual capacity increase translating to a doubling of performance about every 10 years. Car companies the world over are scrambling to make the transition from ICE vehicles to BEVs. The UK government is aiming for all new cars and vans to be BEVs by 2040. We are starting to see these low emissions vehicles in numbers on our roads now. Of course life-cycle emissions depend on many factors including how the electricity used is generated. In New Zealand we are fortunate to have a relatively clean grid (85% hydro), so the use of BEVs can have a significant impact on emissions.

The performance of modern Li-ion batteries drops off slowly with time and after about 8-10 years they become unviable and need to be replaced. The question of what to do with all the spent batteries is not minor and recycling is one of the options. It was being discussed on talk-back radio this morning and a number of callers clearly have little understanding of the tech. Most callers did however understand that since BEV growth is becoming exponential, we are going to see a lot of dead Li-ion batteries generated, just as waste tire piles grow.

During the period 1995-2004 I conducted a significant amount of research on the development of novel electrode materials for Li-ion batteries. My goal was to replace the graphite anode with non-combustible and more efficient materials. That chemistry has now been commercialized by Toshiba. I write to point out that it is in theory relatively straight-forward to recycle Li-ion batteries using a variety of hydrometallurgical processes.

The current world recycling rate for lithium-ion batteries is around 50%. Last year, it has been reported that China recycled 69% of all stock available for recycling worldwide. This recycling rate is likely to increase with companies such as Fortum, a Nordic clean energy company with which I have had dealings, is developing technology that makes over 80% of electric vehicle batteries recyclable, returning nickel, cobalt and lithium back into circulation with consequent reduction in mining intensity. Many other companies are also working in the recycling space and I am confident that with a little more R & D recovery rates can improve further. Isn't this better than burning petrol, producing carbon dioxide and other gases that contaminate our air and cause the planet to warm?

Once again, sometimes it is necessary to go backward a little in order to go forward.

The Emerging Climate Emergency?

Dr Victor Luca, Scientist

Disclaimer: the opinions and views expressed here are purely my own.

In a previous article in this publication I loudly proclaimed my accord with one of the greatest philosophers of science of the modern age, Carl Popper (28-Jul-1902 - 17-Sep-94), who stated that scientific knowledge is the best knowledge we have. We have so far harnessed the power of the atom to provide electricity to entire cities and used that same power to make the most horrific weapons. We have made global communication virtually instantaneous. Medical science has resulted in a significant increase in life expectancy at least in the developed world and has evolved to the point where we have figured how to fix people once they are broken. We have managed to map the human genome and tamper with it through gene editing technology such as CRISPR which allows existing genes to be removed and/or new ones added at will. We are developing artificial intelligence, and are on the verge of producing 'thinking' machines of which self-driving cars are just the start. We have figured out how to mass produce food and synthetic meat will reach our plates sometime soon. We can build sophisticated tools and quantum computers look set to overtake the speed of conventional computers. I could go on.

Scientific knowledge is accumulating at an ever increasing rate and it may be outstripping our ability to fully adapt to the pace of change. You get the idea. Powerful forces are reshaping our lives and our planet in some cases for the better but I fear mostly for the worse.

As a result of scientific advancement many of us today live lives that the Kings and Queens of the previous century or two could only have dreamed of. We humans, with our large brains, have become highly successful animals. We have dominated every niche of our planet, the only planet that we currently know of that supports human life. But are we smart enough to avert our own destruction?

Today, scientists, and in particular scientists that have dedicated their lives to the study of physical, biological, and natural sciences are in unanimous agreement that we humans are mostly responsible for changing the climate of the earth in the post-industrial age. Yes, I know the climate has changed over periods of tens and hundreds of thousands of years and so does every climate scientist. Among climate scientists the degree of unanimity that it is mostly us that are changing the climate in the post-industrial era is greater than 97%. The unanimity among scientists is not a number I have just plucked from the air. This number is the result of careful analysis of the scientific literature. For instance, to arrive at this number, Cook and colleagues in an article entitled "Quantifying the consensus on anthropogenic global warming in the scientific literature" analyzed the abstracts of 11,944 articles matching the topics 'global climate change' or 'global warming' and published in peer-reviewed scientific journals over the period 1991 - 2011. Cook and colleagues found that of the articles taking a position on the subject of climate change, 97.1% endorsed the consensus position of anthropogenic global warming *i.e.* human-induced global warming. Many other researchers have also investigated this consensus and come up with a similar number. It has been clearly established that as the level of expertise of a surveyed group of people increases, so too does the degree of consensus on climate change. That is, if one surveys the general public, support for the consensus view drops to about 60%. For scientists that are non-publishing, non-climatologists the consensus value is about 75%. Finally, for publishing climate scientists the consensus is >97%. Now, the value of 97% is not 100% but it is pretty damn close. Therefore, of the many thousands of scientists that accept the evidence on anthropogenic climate change, 3% might be deniers. That means that although it may be difficult to find deniers, whilst the consensus is not 100%, it is always possible to

find the odd scientist with some expertise in the field, who will take a contrarian view. Some of these deniers even seem to make a habit of being contrarians or deniers. In fact, I would argue that knowledgeable contrarians can actually play a valuable role and they are not to be despised. While it is the job of a scientist to be skeptical, out and out deniers play a role because they challenge the rest. The important point that I am trying to make is that the number of outliers or deniers is very small and in fact decreasing as evidence continues to pile up. There was a time in human history when the theory that the earth was flat had some validity. Today, most of us have accepted the preponderance of evidence that the world is spherical. Having said that, there are flat earth societies in the United States and other places.

The other important point I have been trying to make here is that of the relevance of expertise in helping us decide on the actions that we take. When I need my car fixed, I reach out to a mechanic, and I don't start to tell the mechanic how he/she should do their job or how they should think. When we get sick and want help to get well to whom do we reach out? We go to a doctor or directly to a hospital and there we rely on the knowledge accumulated through decades, if not centuries, of painstaking medical research, much of it funded by the public sector. When we need a road or bridge built we go to an engineer. When we need specialist knowledge we go to see an expert! So when we need to know what the climate or ecosystem is doing we should listen to scientists who are experts in the relevant branch of science.

The consensus view at present is that we are not just wreaking terrible destruction on the climate but also the biological support systems of the earth that support our very existence. The scientific community is warning us that the preponderance of evidence suggests that we are overstepping the mark. The warnings from the science community have been flowing thick and fast for decades. A stark warning was issued by the Union of Concerned Scientists in a letter published 1992 and entitled "World Scientists' Warning to Humanity". This letter was signed by 17,000 of the best minds in the business of climate science and almost all of the living Nobel Laureates at the time. That first warning was followed by the warning from Ripple and colleagues in an article published in 2017 in the journal *Bioscience* and entitled "World Scientists' Warning to Humanity: A Second Notice". This publication had 15,364 scientist signatories from 184 countries. Most recently, the authors of the second warning have issued a third warning again published in the journal *BioScience* and entitled "World Scientists' Warning of a Climate Emergency". This latest warning has 11,000 signatories from some of the world's most prestigious research institutions. Scientists are usually timid, self-effacing creatures that inhabit laboratories and offices. They are creatures that seldom inhabit the limelight. They are usually very careful in the words they use and their writings don't often enter the realm of the 'average punter'. Today they are singing with one voice and we would all do well to listen if we care about what happens to mother earth and consequently the well-being of our children and the most vulnerable of the global citizenry. Even the US Pentagon has been taking climate change seriously for more than a decade. That alone should be a wakeup call.

As those of us with a consciences become increasingly concerned and even frightened, climate deniers and the proponents of the business-as-usual paradigm are using their resources to provide deniers with disproportionately large megaphones as emphasized in the article by Petersen and company entitled "Discrepancy in scientific authority and media visibility of climate change scientists and contrarians" and published in the prestigious science journal *Nature Communications*.

Here I caution to listen to the scientists not the pseudo-scientists and arm-chair scientists that tend to proliferate on social networks and in certain right-wing media. Nor should anyone of course listen to the likes of Donald Trump, who as far as I am aware is no scientist.

I would urge readers to obtain a copy of the articles I have cited here, especially the most recent warning by Ripple and colleagues entitled "World Scientists' Warning of a Climate Emergency". Please read this short

article carefully and do not despair, because while there is life there is hope. Until we find another earth somewhere, this is the only one we have so let's get cracking and change the paradigm because the existing one is not working.

All the articles I have cited here are freely available on the internet. The warnings to humanity are written in language that anyone should be able to comprehend. If you can't find them, please do not hesitate to contact me on victorlucanz@gmail.com and I will be happy to supply them.

Bringing Climate Change Down to Earth

Dr Victor Luca

The views expressed here are solely my own and do not express the views or opinions of any organization with which I am associated.



Source: NASA – Black Marble composite image of the earth at night. The lights you see covering much of the land mass have been turned on mostly over the past century.

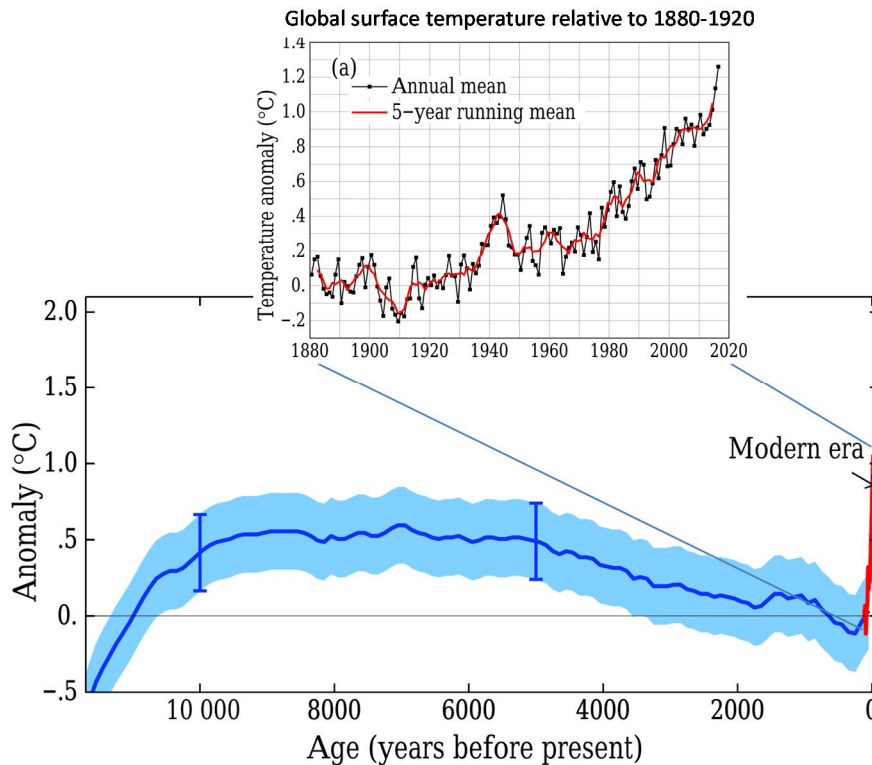
I am a scientist and like the great philosopher of science, Karl Popper, I believe that scientific knowledge is the best and most important knowledge we have. The high standard of living and prolonged life expectancies we all enjoy relative to past generations is in large measure due to the scientific and technological achievements of dedicated people. This scientific development is however a double edge sword.

The best science we have is telling us that climate change is real and that it is primarily instigated by humans. Science is also telling us that we are making things worse not better, and maybe faster than we at first thought. The Intergovernmental Panel on Climate Change (IPCC) has indicated that we have 12 years to limit warming to below 1.5 °C in order to avert potentially catastrophic consequences for humanity. Unfortunately, we are far from being on track in bringing the situation under control.

The composite image of earth at night produced by NASA speaks volumes about the extent and speed of human development.

The data given below is taken from a publication by one of the world's leading climate scientists Dr James Hansen and his collaborators. The main graph shows the warming that has occurred over the

past 11,700 years or the holocene period. The blue line shows that the temperature has been 0.5 °C warmer relative to the 1880-1920 period. Whilst these graphs are ostensibly simple, obtaining reliable data has been an extremely complex process that is out of the scope of this article. The steep increase in temperature occurring during modern times is extremely perturbing. The upward moving temperature curve over the 1880-2018 period has the same shape as the CO₂ concentration in the atmosphere over time which can be well measured. That is, CO₂ concentration correlates well with the temperature increase.



Source: Hansen et al., *Young people's burden: requirement of negative CO₂ emissions*. *Earth System Dynamics* **2017**, 8, 577.

Looking back in time one can find assertions that CO₂ produced by fossil fuel burning by we humans is affecting the climate are not new. Among the first to make the connection between emissions from fossil fuel burning and climate was the Nobel prize-winning chemist Svante Arrhenius, who received the Nobel Prize for Chemistry in 1903 for his work on chemical reaction kinetics. More than 100 years ago Arrhenius attempted to quantify the contribution of CO₂ in the atmosphere to the green-house effect. Whoever penned the article published in *The Rodney and Otamatea Times*, as long ago as August 14, 1912, also clearly recognized that CO₂ from coal burning was going to cause warming. So nothing new under the sun!

In 1992 the Union of Concerned Scientists published an article with the ominous title *“World Scientists’ Warning to Humanity”*. Some 1700 leading scientists put their signatures to this ominous warning including the majority of the Nobel laureates in the sciences who were alive at the time. In November 2017, 15,364 scientists signed a follow-up article entitled *“World Scientists’ Warning to Humanity: A Second Notice”*. In this article the authors pointed out that we have made little progress in mitigating the situation and in fact we are making it worse.

If we admit that climate change is real then the obvious follow-on question is what can we New Zealanders do to contribute positively? Since NZ’s emissions contribute only about 0.2% to total global emissions, our contribution to the problem is next-to-nothing. Our efforts to fix things are therefore going to have next-to-no impact. By contrast, China overtook the United States as the largest global emitter only in 2005 (about 30% a piece). Unfortunately, although we as a country have not caused climate change, we will nonetheless also suffer its wrath. So my answer to the question that was posed, is that we can do almost nothing. But almost nothing is not nothing at all.

Rather, we should not criticize the lack of leadership but instead show leadership ourselves so that the major emitters will feel compelled to act. We must set an example!

Our best science is indicating that anthropogenic climate change is real, and since we cannot escape the consequences, the best that we can do is be prepared. We should protect our environment, since it sustains us, and we should do our best to protect ourselves from the environment when the predicted extreme weather hits. In our region we have seen many times the impacts that flooding can have and the lives it ruins. Water scarcity will also severely test us, if we don’t think ahead and prepare. We must be proactive not reactive!

We would all do well to heed the traditions of the tangata whenua and prioritize and care for our resources of fertile land and clean water. Such resources are priceless and should be cherished and preserved for future generations and not be used to make a quick buck. Allowing foreigners, who don’t even live here, to buy bolt-holes does nothing for the people who call Aotearoa home, or help in any way to ameliorate the environmental or climate situation.

Providing inducements via subsidies for the well-heeled to buy a few expensive electric cars might satisfy some but will do nothing to improve the situation when the contribution that transportation makes to NZ’s already insignificant emissions is only about 17%. The majority of the remaining 85% of emissions come from industry and agriculture.

Whilst there are many good reasons for planting millions of trees, and whilst it might also make for good optics, and make us feel better, this action will do next-to-nothing, especially if those trees are mostly pines. Over many decades we humans have been putting 40 billion tonnes of CO₂ into the atmosphere every year. Since the average tree can absorb about one tonne of CO₂ over its lifetime of about 40 years we would need to plant 40 billion trees per year just to counter the CO₂ being pumped into the atmosphere every year. With this amount of tree planting we would not be eliminating CO₂ already up there. Yet the IPCC tells us that we have 12 years to get things under control.

Symbolic declarations of climate emergencies that are not backed by significant deeds might make us feel good but alone they are futile. We need global scale Manhattan or Moon Shot projects rolled out globally if we are going to make any impact at all.

But as I said before, doing next-to-nothing is not doing nothing. Taking care of our own back yard by building in climate resilience and protecting our environment is just common sense given climate predictions and the declining health of our environment. Setting good examples in an attempt to influence the major emitters is the second action we can and must take!

Inequality in Aotearoa and Youth Suicide

We pride ourselves in Aotearoa on being a clean, green, prosperous and safe country and use that image to market ourselves to the world.

However, according to the book by Max Rashbrooke (The Inequality Debate), there are 880,000 of us living below the poverty line and about 265,000 of these poor are kids. That amounts to about 1 in 5 Kiwis in poverty. Maori are disproportionately represented in these figures. Rashbrooke's book is a well researched and a very worthwhile read. While shocking, our poverty rate ranking is well and truly eclipsed by our youth suicide rate where we are the highest in the world. Males are disproportionately represented in these statistics also. The state of poverty is truly a national disgrace and should have us asking some serious question. Before a problem can be solved however, there needs to be acceptance of it rather than denial and there needs to be an understanding of the underlying causes.

Starting from the time of the Lange government and Rogernomics, HMS Aotearoa departed course assisted by the prevailing right-wing winds of the time. These winds of change started blowing during Ronald Reagan's tenure as US president and we used the Harvard Business School manual to direct that change. Thatcher, whose hand was on the tiller in the UK at about this time, guided that country in a similar direction and other countries followed too. This new course came on the back of 50 years of prosperity in the US post the great depression of the 1930s and then WWII. Subsequent prosperity was driven by the New Deal of Franklin D. Roosevelt, a Democrat.

It is my opinion that many of society's problems such as crime, family violence and suicide are linked in one way or other to wealth disparity and social disconnectedness. Hungry people are angry people and poor people are disposed to be resentful when they see wealth around them. I lived in the United States from 1989-1991 and while it is an amazing country in many regards, I saw firsthand the abject poverty in which many of that country's citizens lived. In those years Aotearoa was a far fairer and superior country. While Maori and Pakeha alike would have agreed that not all was perfect, I do not recall thinking of a person in terms of what class or ethnic group they belong to.

In my first year in the US I lived in Houston, a city of 4.5 million people. Despite being the richest country in the history of the world, wealth disparity was everywhere to be seen. I live in Houston in 1990 and in that year there were about 550 homicides. A parent had to worry about delivering their kids to school and nobody walked anywhere. I determined that the United States was not a good country and got the hell out of there. Aotearoa was a better place in those days.

Today we have an added problem here in Aotearoa for those of modest means. It is the astronomical price of housing which is upwards of ten times median household income. As far as I can figure, house price inflation has been driven by several major factors. One is the lowest interest rates in modern history. This has been caused by a need to stimulate modern economies since the GFC. Another factor are the very high net migration rates we have experienced over the past five or so years. Until recently, the ability for anyone on the planet to buy a chunk of Aotearoa is yet another factor contributing to high house prices. The documentary by Bryan Bruce available on YouTube ([Who owns New Zealand](#)

[now?](#)) is certainly an eye opener. Those that have done well out of steep house price increases and have managed to pay their mortgage have something to pass onto their children. Those that have not managed to buy and pay for their roof, they will be consigned to the rental market which is thin to say the least. Again in we have in many ways emulated the great nation mentioned previously.

It would be a tragedy if Aotearoa ended up walking in the footsteps of a country that clearly has let down most of its population. Come on folks we can do better than this, we are better than this!