Fracking in Aotearoa

the Basics and the Myths

Frack Free Meeting

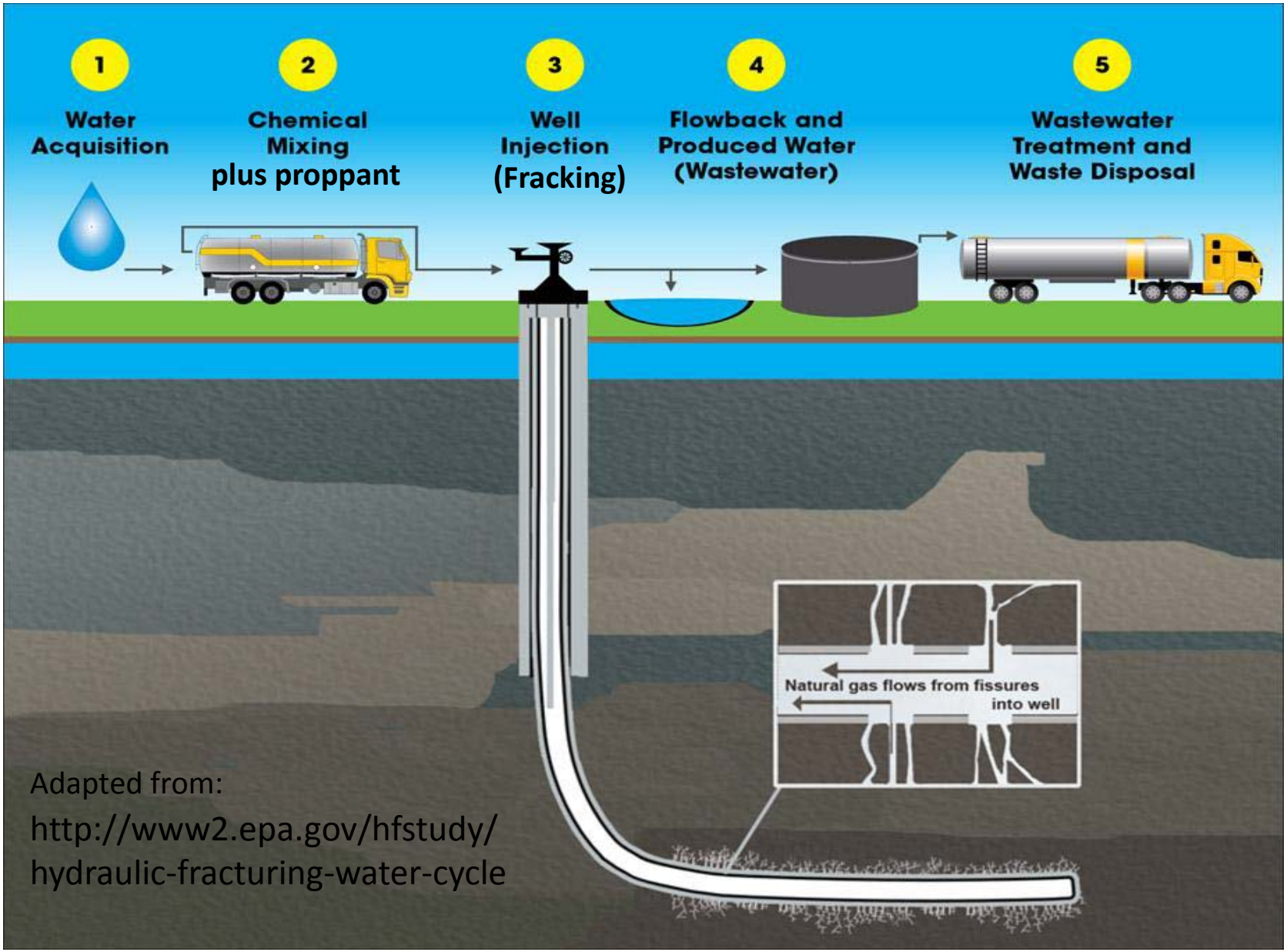
26 July 2015, Palmerston North

www.ClimateJusticeTaranaki.info

LOCK THE GATE AUKATI
www.lockthegate.org.nz

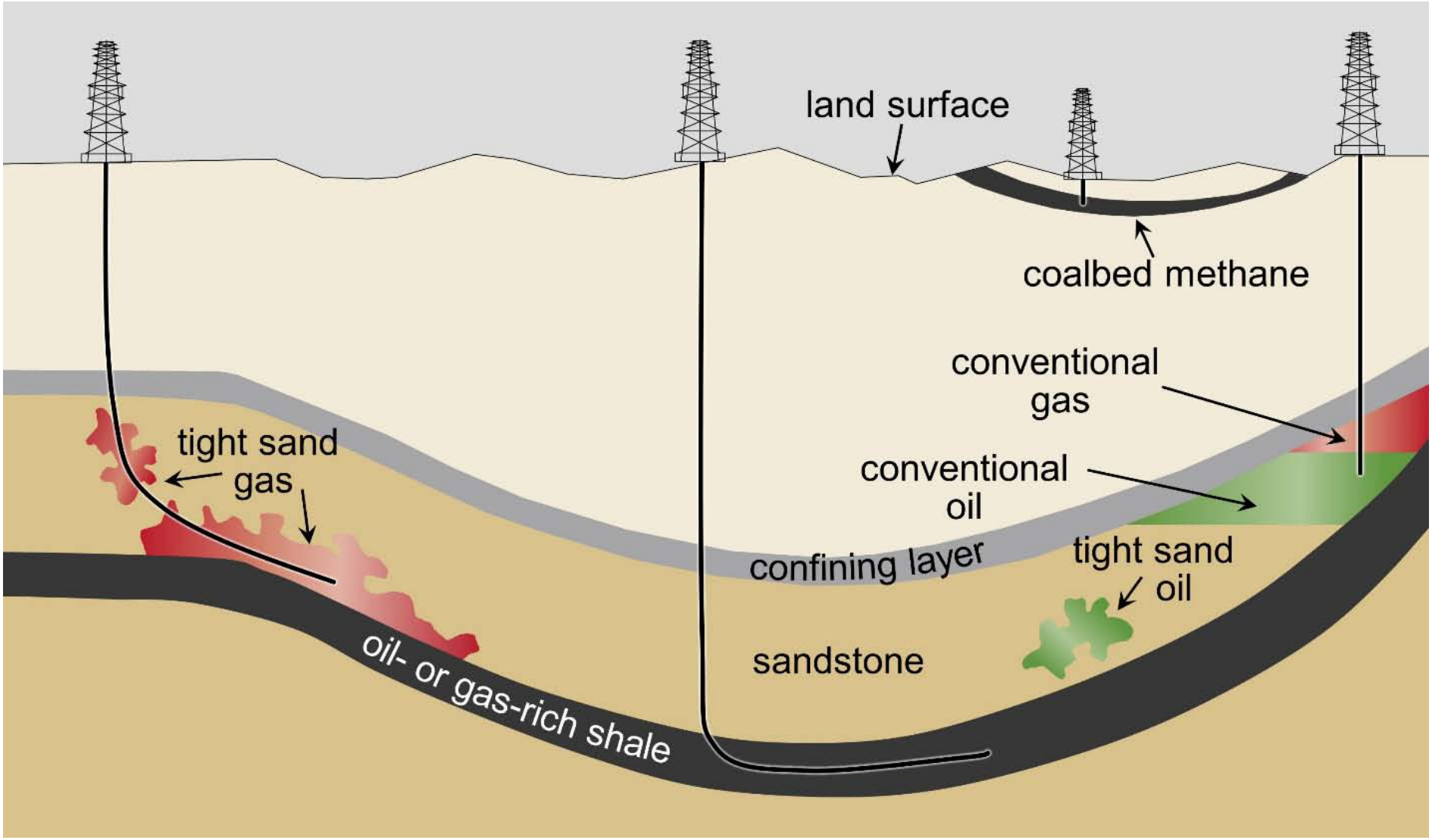
www.LockTheGate.org.nz

Fracking Water Cycle

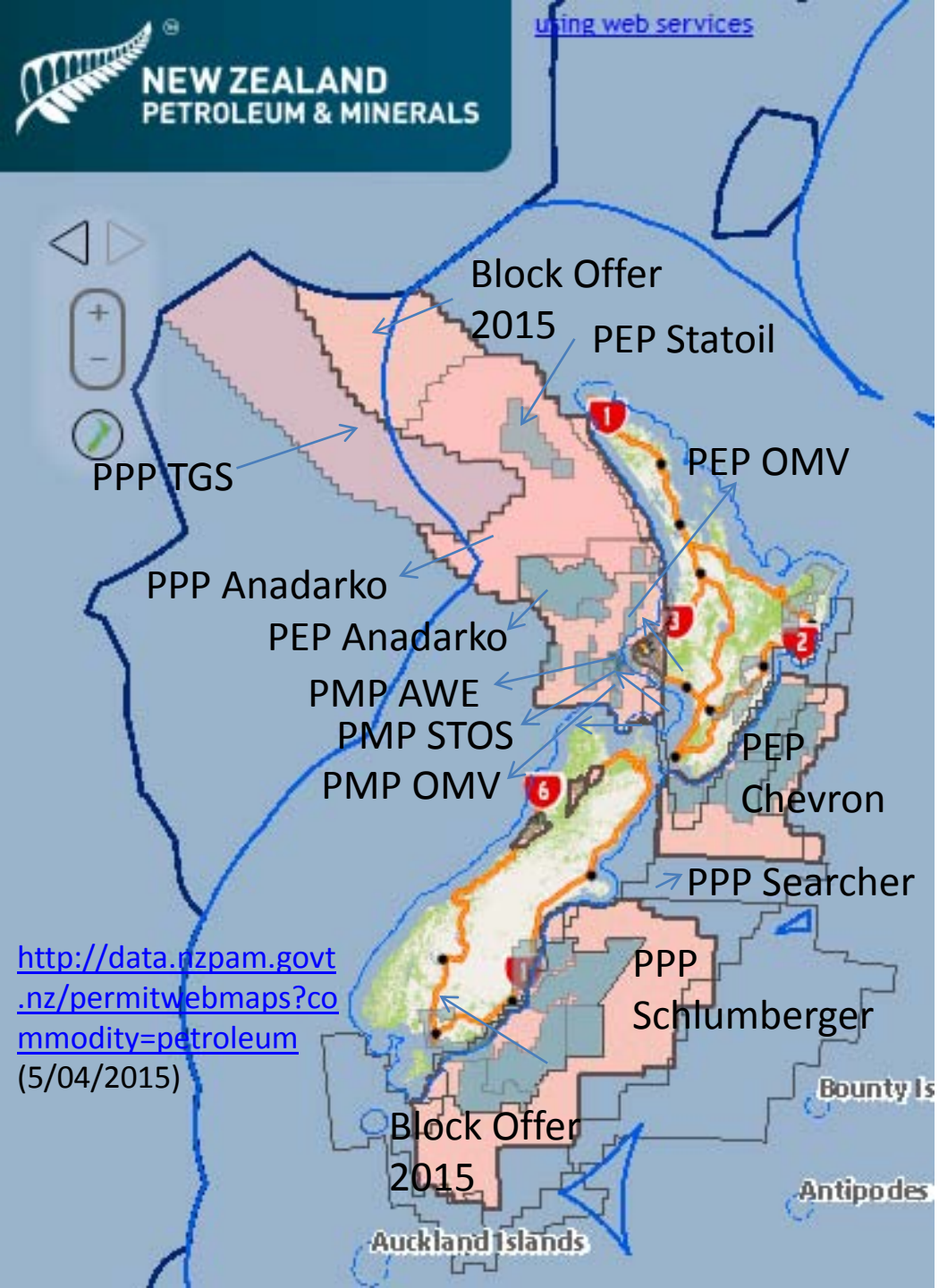


Adapted from:
http://www2.epa.gov/hfstudy/hydraulic-fracturing-water-cycle

Unconventional vs. Conventional



Source: http://www2.epa.gov/sites/production/files/2015-06/documents/hf_es_erd_jun2015.pdf



http://data.nzpam.govt.nz/permitwebmaps?commodity=petroleum (5/04/2015)

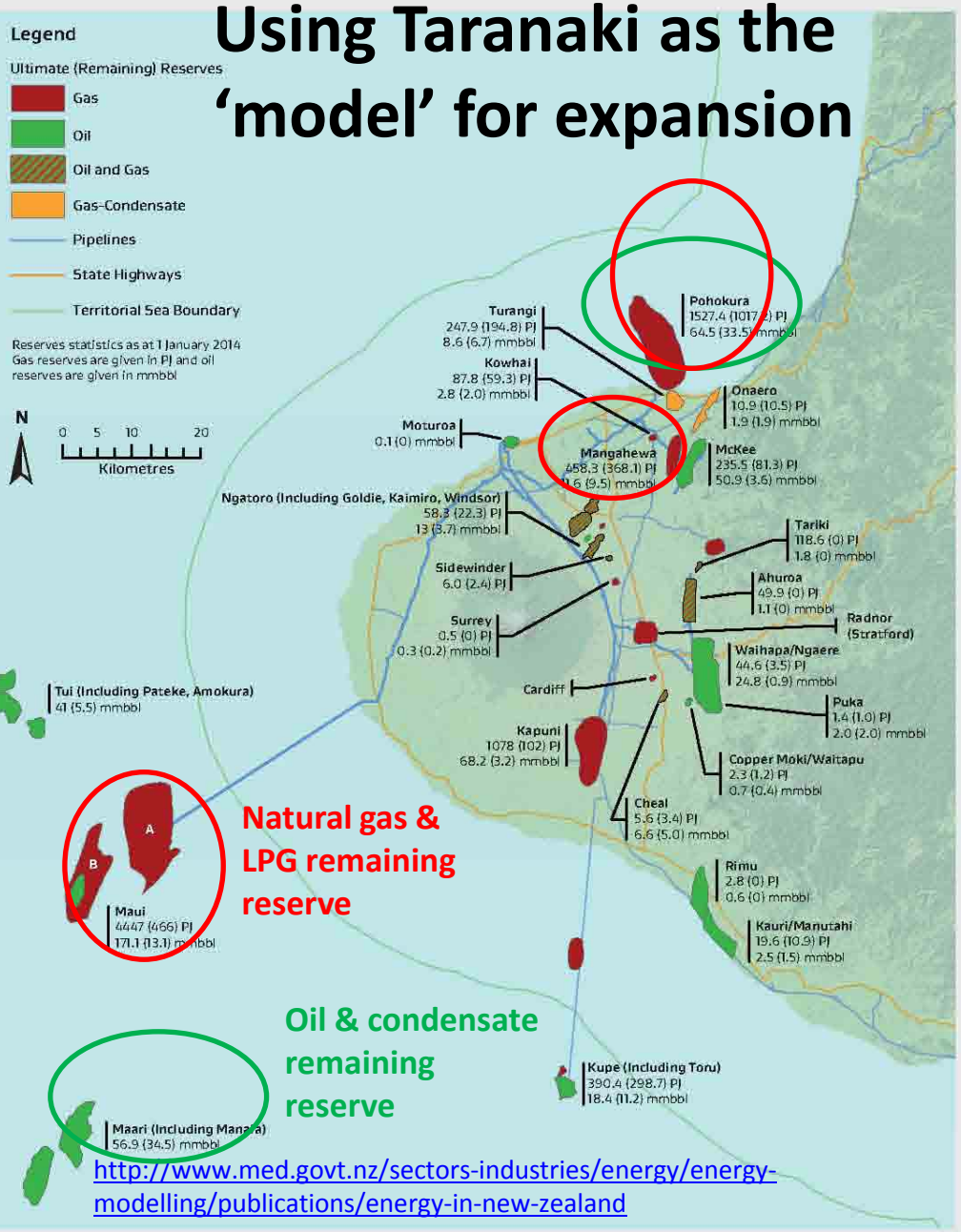
Government wishes:

"New Zealand's oil and gas production could be substantially increased – potentially to the point where New Zealand becomes a net exporter of oil by 2030."

NZ Energy Strategy 2011-2021, Ministry of Economic Development (now MBIE)
http://www.med.govt.nz/sectors-industries/energy/strategies

Figure D.1: Taranaki Oil and Gas Fields

Using Taranaki as the 'model' for expansion

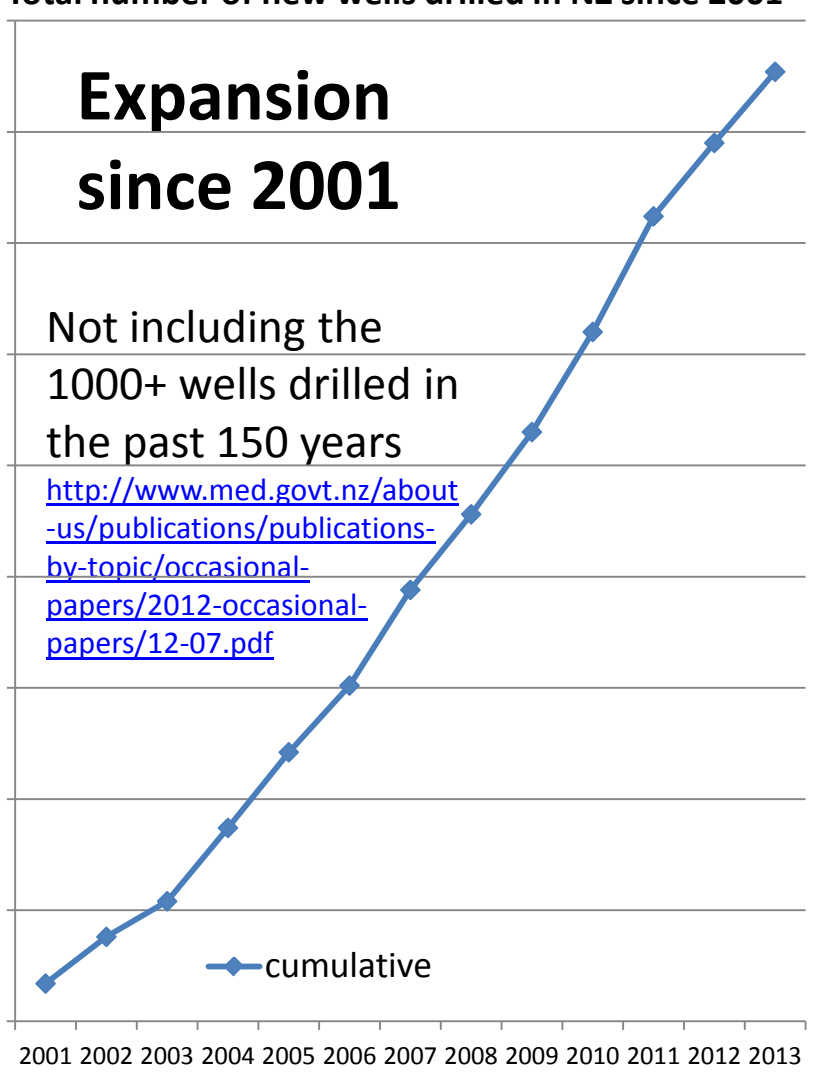


Natural gas & LPG remaining reserve

Oil & condensate remaining reserve

http://www.med.govt.nz/sectors-industries/energy/energy-modelling/publications/energy-in-new-zealand

Total number of new wells drilled in NZ since 2001



Myth 1:

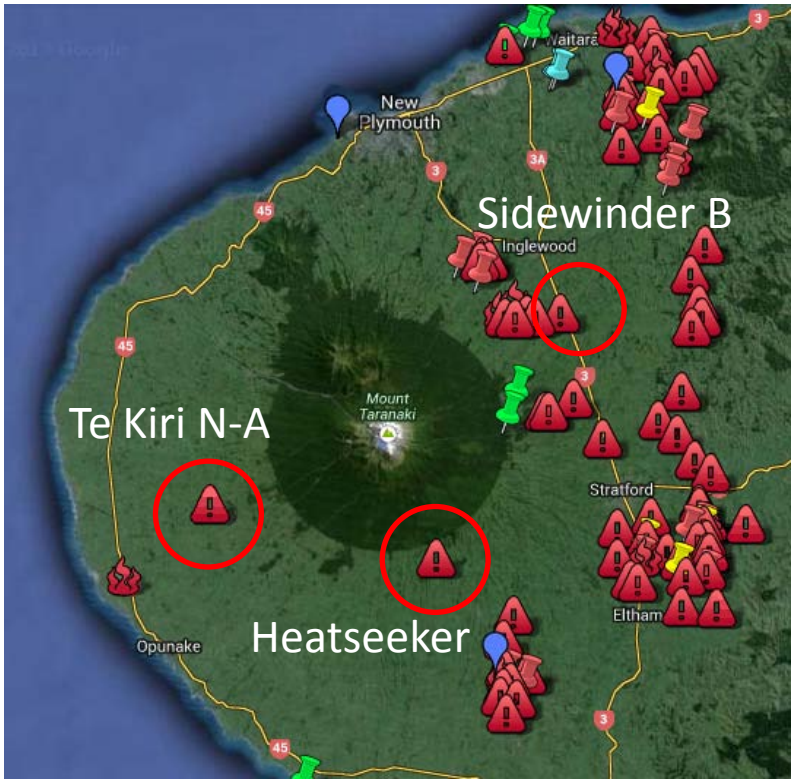
The oil and gas industry in NZ follows world-class best practice and is well regulated

Fact:

Parliamentary Commissioner for the Environment: *"clearly out of step with international 'best practice'… regulators scrambling to catch up… councils unprepared… rules in plans…inadequate… extraordinarily permissive… not acceptable… "*

http://www.pce.parliament.nz/publications/all-publications/drilling-for-oil-and-gas-in-new-zealand-environmental-oversight-and-regulation/

"...it is the cumulative effect of many wells on the landscape, on the risk to groundwater, and so on, that matters most. The Resource Management Act has never been well-suited to managing cumulative effects because of the way precedents are created" PCE, June 2014.



http://climatejusticetaranaki.wordpress.com/resources/fact-sheets-presentations

Aerial view of Jonah Field, Wyoming, by Bruce Gordon, EcoFlight Sky Truth 2006

Issued Date	Company	Wellsite	Depth (m)
9/09/2011	Todd	Mangahewa-D	3325
14/09/2011	Greymouth	Onaera-1R	3000
8/11/2011	Greymouth	Turangi-B	3410
20/01/2012	Todd	Mangahewa-C	3425
28/03/2012	Shell Todd	KA-1/7/19/20	3000
28/03/2012	Shell Todd	KA-4/15	3000
5/04/2012	Shell Todd	KA-8/12/15/18	3000
5/04/2012	Shell Todd	KA-6/11/17	3000
29/03/2012	Greymouth	Ohanga-A	3000
29/03/2012	Greymouth	Kowhai-B	3000
18/04/2012	Greymouth	Eipha-A	3000
16/04/2012	Todd	Mangahewa-A	3200
11/05/2012	Greymouth	Ohanga-B	3300
25/02/2013	Greymouth	Kaimiro-A	3140
25/02/2013	Greymouth	Turangi-C	3390
26/02/2013	Todd	Mangahewa-E	3200
25/02/2013	Greymouth	Ngatoro-A	3600
22/02/2013	Greymouth	Kowhai-C	3400
22/02/2013	Greymouth	York-A	3600
19/03/2013	Greymouth	Dettling	3600
12/09/2013	Origin	Kauri-E	2400
19/09/2013	Cheal/Tag Oil	Cheal-C Cardiff-3	3700
12/09/2013	Origin	Kauri-E	2400
24/09/2013	Greymouth	Urenui-1	3000
17/12/2013	Greymouth	Kaimiro-C	3565
19/12/2013	Greymouth	Kaimiro-J	3525
1/05/2014	Shell Todd	KA-2	3000
1/05/2014	Shell Todd	KA-3	3000
1/05/2014	Shell Todd	KA-5	3000
1/05/2014	Shell Todd	KA-9/16/KW-2	3000
1/05/2014	Shell Todd	KA-13	3000
30/06/2014	Todd	Mangahewa-D	3325
30/06/2014	Todd	Mangahewa-A	3200
30/06/2014	Todd	Mangahewa-C	3290
30/10/2014	Greymouth	Turangi-A	3350
30/10/2014	Greymouth	Turangi-D	3384
21/01/2015	Greymouth	Ohanga-A	2700
3/03/2015	Todd	Mangahewa-G	3200
13/05/2015	Todd	Mangahewa-E	3200

"…during the period 1989 to mid-2011 a total of 65 hydraulic fracturing events were undertaken in 39 wells accessing oil and gas reservoirs…" Taranaki Regional Council (TRC), May 2012

http://www.trc.govt.nz/assets/Publications/guidelines-procedures-and-publications/hydraulic-fracturing/hf-may2012-graph-p19.pdf

Before July 2011, no consents required for fracking; since then, at least 39 consents have been granted by TRC

Fact: Incidents increase with drilling intensity

130 Petroleum Incidents and Dangerous Occurrences recorded by the High Hazards Unit (06/2013 – 03/2015):

Included fires, uncontrolled releases of hydrocarbons, serious harm, emergency response plans activated & incidents with potential to cause a major accident.

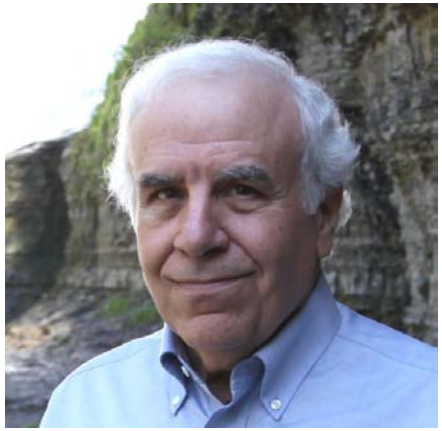
http://www.3news.co.nz/Report-shows-61-dangerous-petroleum-incidents/tabid/423/articleID/339150/Default.aspx

https://climatejusticetaranaki.files.wordpress.com/2015/02/eez000010_sarah_roberts_statement_of_evidence_climate_justice_taranaki_subexwitness.pdf

Todd Taranaki Mangahewa-C wellsite. Photo by Fiona Clark, 11/04/2013

Myth 2:

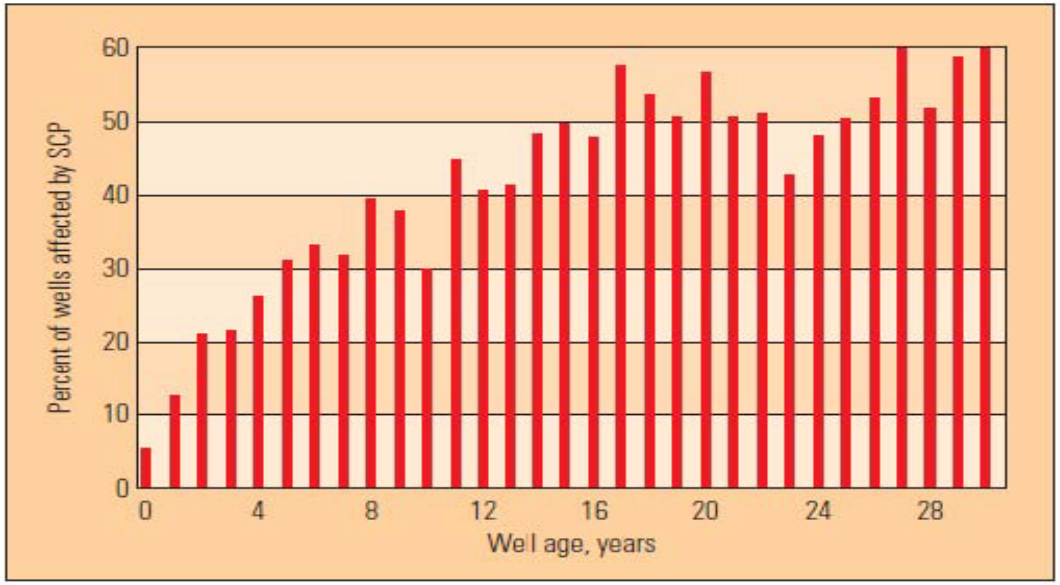
Technological advance means that oil and gas wells are fail-safe



Prof Anthony Ingraffea's TEDx Albany talk, 2013. https://www.youtube.com/watch?v=Dxis-vYGM_M

Fact:

All well casing leaks. Even new wells can leak. In <20 years, over half of the wells will leak.



^ Wells with SCP by age. Statistics from the United States Mineral Management Service (MMS) show the percentage of wells with SCP for wells in the outer continental shelf (OCS) area of the Gulf of Mexico, grouped by age of the wells. These data do not include wells in state waters or land locations.

Bruffato, et al. 2003. *From mud to cement-building gas wells*, Schlumberger. Oil Field Review, 62-76, Autumn, 2003. https://www.slb.com/~/media/Files/resources/oilfield_review/ors03/aut03/p62_76.ashx

Well integrity issues from Taranaki

Wells Cheal 1, 2, 3 & 4 at Cheal A wellsite.

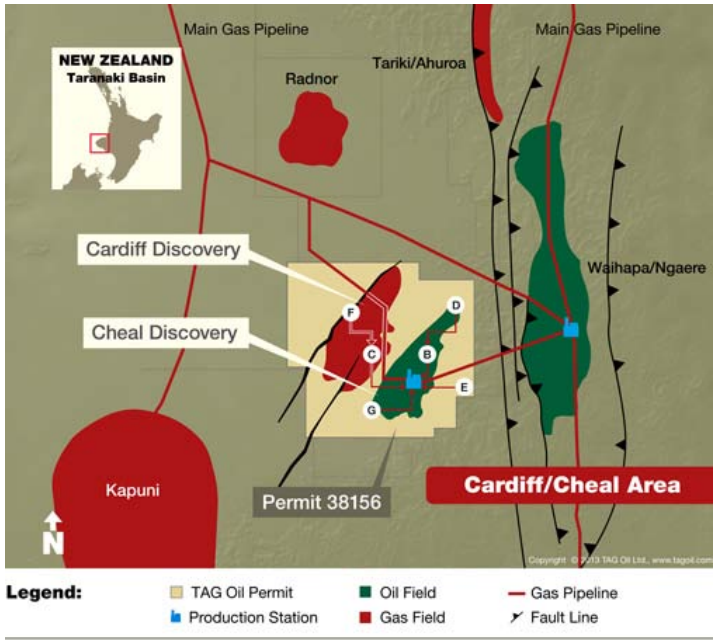
Two **Cheal-A production wells** have been losing power fluids since 2007 but only notified TRC in Sept 2009. *"The discharge to the Urenui Formation was …due to integrity issues with casing patch seals within the wells".* Consent was then changed to allow for the discharge and provide *"a regulatory response to the reported well leakages."*

http://www.trc.govt.nz/assets/Publications/technical-reports/oil-and-gas-compliance-monitoring-reports/717351.pdf

Power fluid release from Cheal-A12 wellhead was reported to High Hazard Unit on 23 Sept 2014.

https://climatejusticetaranaki.files.wordpress.com/2015/02/eez000010_sarah_roberts_statement_of_evidence_climate_justice_taranaki_subexwitness.pdf

Well integrity issues from Taranaki



"Well integrity issue" at **Tag Oil Cardiff-3 well, Cheal-C** wellsite, was reported to High Hazard Unit on 25 Oct 2013.

https://climatejusticetaranaki.files.wordpress.com/2015/02/eez000010_sarah_roberts_statement_of_evidence_climate_justice_taranaki_subexwitness.pdf

Cardiff-3 well was drilled, cased and fracked, but *"…either the fracture stimulation was affected by a poor cement bond … or skin damage must exist … restricting flow. … TAG is now planning to move uphole and initiate testing on the second of the three identified potential zones, where there is a competent cement bond in place…"*
Tag Oil, May 2014

http://www.tagoil.com/operations/

http://www.stuff.co.nz/taranaki-daily-news/news/10405544/Oil-wellsite-probe-news-to-explorers

http://www.tagoil.com/20140507-TAG-Announces-FY2015-Drilling-Program-Operations-Update.asp

Well integrity issues from Taranaki

Mangahewa-C wellsite. Photo by Fiona Clark, 11 April 2013.

In late 2014, at least 2 wells at **Todd Energy's Mangahewa-C wellsite**, Tikorangi, were damaged.

"… Attempted repair to the well in early 2015 was partially successful. Subsequently the well has returned to no production. As a result, we need to complete a more substantial repair. The repair requires plugging the bottom section of the well and re-drilling the bottom section using the Bentec rig. A second well at C site has a similar completion and this will be remediated at the same time to minimise future repairs and maintenance," Todd's letter to a Tikorangi resident.

Fact: *"The likelihood of an abandoned well leaking increases with its age. … once a well has been abandoned and 'signed off' by the High Hazards Unit and the councils, any leaks from the well become the responsibility of the owner or occupier of the land."* PCE, June 2014

Myth 3:
Effects on the environment are minor or 'less than minor'

Fact: Water contamination

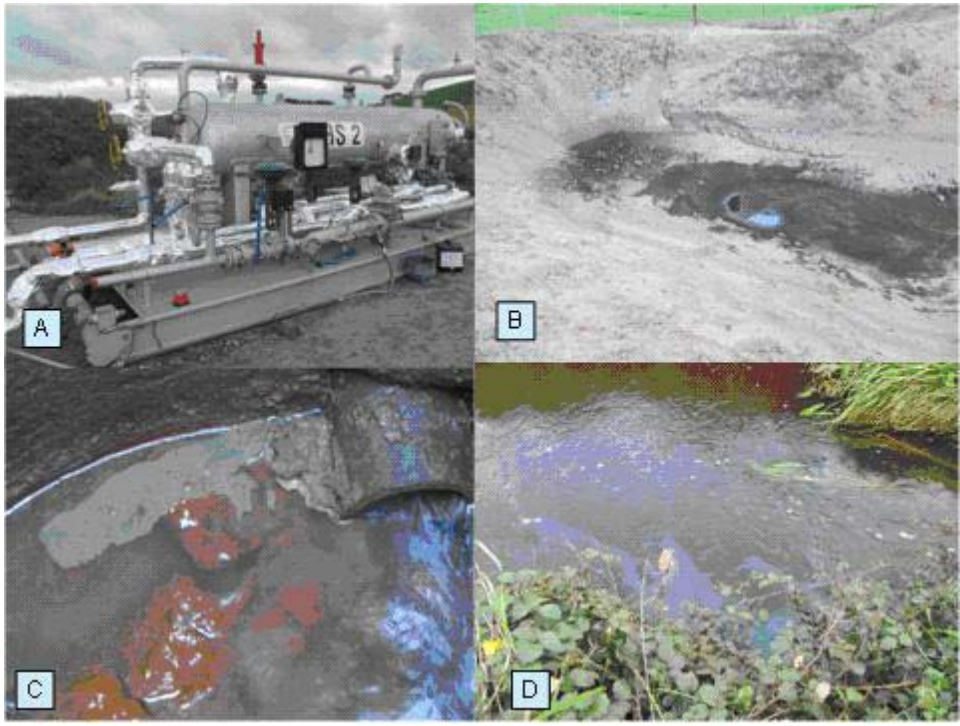
"In a recent incident at an exploration well site in Taranaki, equipment failure led to oil collecting in a flare pit, leaching into a tile drain, through a manhole, and into a stream…In another… hundreds of litres of oil and produced water leaked from a pipeline into a stream and was detected when noticed by a local Farmer." PCE, June 2014.

http://www.pce.parliament.nz/publications/all-publications/drilling-for-oil-and-gas-in-new-zealand-environmental-oversight-and-regulation/

Stream contamination by Copper Moki wellsite, 2012

"Taranaki Ventures Limited's contractor caused liquid hydrocarbon (oil) to discharge into the flare pit in circumstances where the pit was not fully contained. Most of the oil caught alight, leading to a discharge of contaminants to air. The remaining oil (estimated at <50 litres) soaked into the base of the flare pit and eventually discharged into a tributary of the Ngaere Stream. … Company was fined $20,000".

http://www.trc.govt.nz/assets/Publications/technical-reports/oil-and-gas-compliance-monitoring-reports/896942w2.pdf



Top photo: A) Malfunctioning separator, B) Flare pit, C) Crude oil in tile drain manhole, D) Discharge point with waxy solids & oil sheen. Photo of 17 April 2012, in TRC report.

Bottom photo: Copper Moki wellsite after heavy rain. Photo by Sarah Roberts, 19 June 2015.

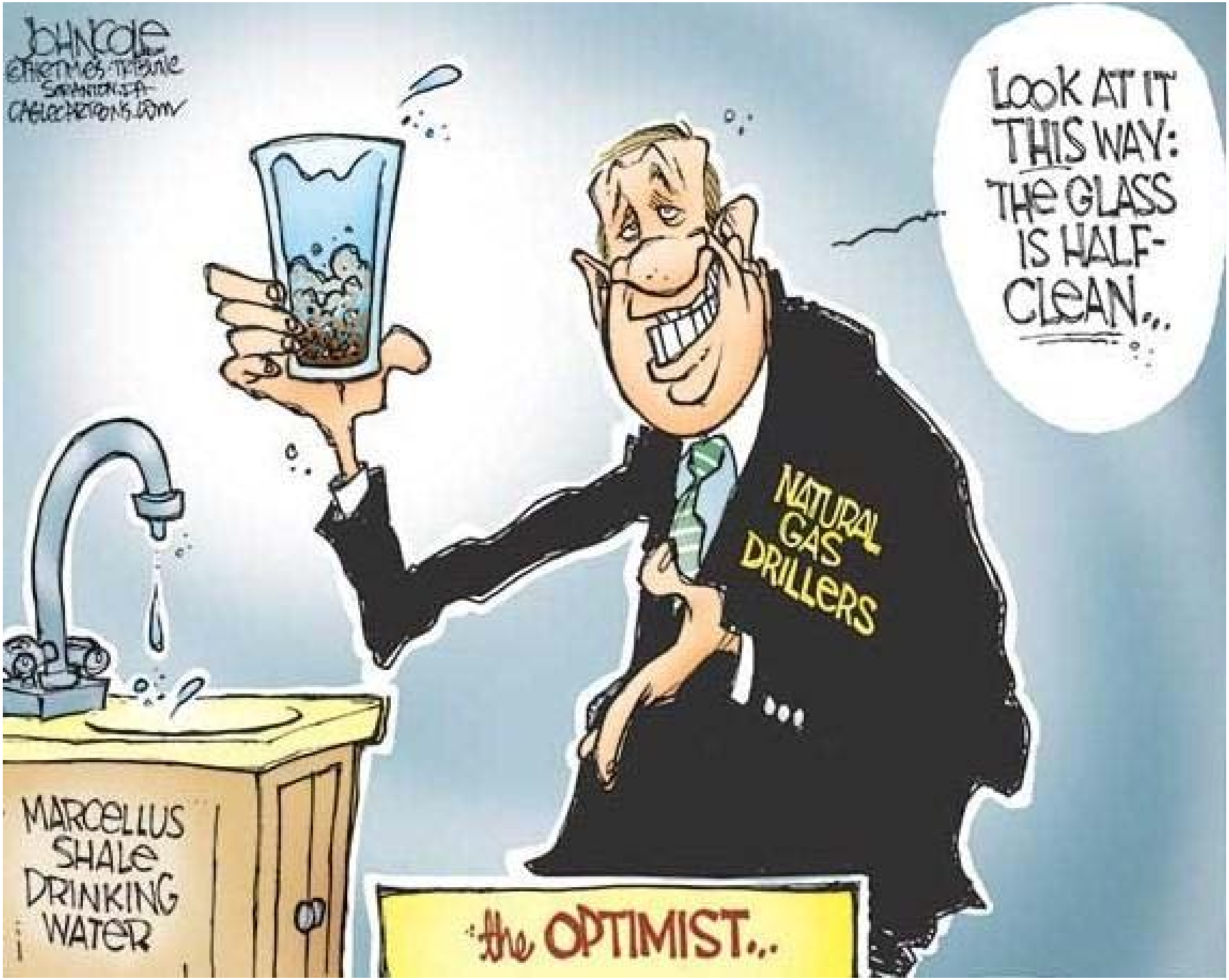
Fact: Shallow groundwater below five STOS Kapuni wellsites is not fit for potable or stock water use. Two sites do not meet the criteria for irrigation.

Table 26 Summary of blow-down pit groundwater monitoring result exceedences

Wellsite	Monitoring well	No. of times sampled	Year last sampled	Compounds exceeding MfE criteria		
				Potable	Irrigation	Stock water
KA-1/7	PDP2	4	2004	B, X	-	N
KA-4/14	MWH1	1	2007	B, X	-	N
	MWH3			B, X	-	N
KA-5/10	-	1	2007	-	-	-
KA-6/11	MWH1	2	2007	B, X	-	N
	MWH2			B	-	N
	MWH3			-	-	N
	MWH4			B	-	N
KA-8/12/15	MWH1	2	2008	C7-C9, B, E, X, BAP	B, X, N, BAP	X, N, BAP
KA-13	PDP2	5	2008	B, E, X	B, N	N
	PDP3			B, E, X	-	N

B=benzene
E=ethylbenzene
X=total xylenes
N=naphthalene
BAP=benzo(a)pyrene
C7-C9=petroleum hydrocarbons

http://www.trc.govt.nz/assets/Publications/technical-reports/oil-and-gas-compliance-monitoring-reports/854309.pdf (June 2011)


LOOK AT IT THIS WAY: THE GLASS IS HALF-CLEAN...
NATURAL GAS DRILLERS
MARCELLUS SHALE DRINKING WATER
the OPTIMIST..

Fact: Soil contamination

Four flare/blowdown pits at STOS Kapuni wellsites have heavily contaminated soil. From KA2, >350 tonnes sent to BTW Brown Road landfarm and >100 tonnes sent to Wellington for treatment, then landfill. From KA3 & KA13, 2,688 & 1,500 tonnes of impacted soil were removed.

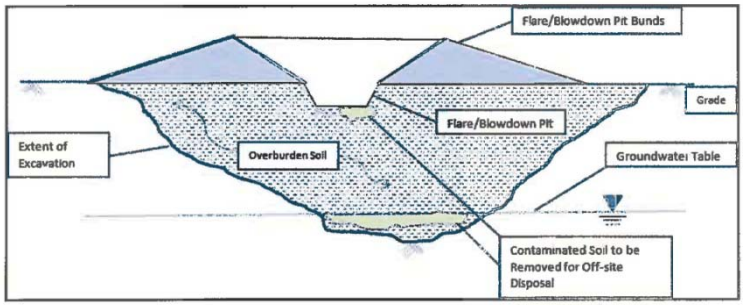


Figure 3: diagrammatic representation of proposed excavation works

"These pits were used, infrequently, for temporary containment, and were unlined … In the past, some pits were used to take fluids from fracked wells" STOS, 2012.

http://climatejusticetaranaki.files.wordpress.com/2011/04/stdc-information-report-re-consents-for-kapuni-contaminated-soil-2012-08-7.pdf
http://www.stuff.co.nz/taranaki-daily-news/news/7704340/Contaminated-soil-removed

"Mobil Oil leased two properties in Auckland's waterfront 'tank farm' for more than 50 years. When Mobil's lease for the two sites ended in 2011, it was found the land they were on had been heavily contaminated… other oil companies as previous tenants and neighbouring tenants all contributed [to the contamination] too… Justice Sarah Katz in February last year decided that ***Mobil was not contractually obliged to decontaminate the subsurface of the land***"
Judgement of Katz J, 7 Feb 2014.

http://s3.documentcloud.org/documents/1697620/waterfrontpdf.pdf

Earlier this year publicly-owned Waterfront Auckland was ordered to pay Mobil almost $1 million in court costs for Waterfront Auckland's failed attempt to get Mobil to pay for cleaning up a heavily contaminated area of Wynyard Quarter.

http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=11425354

Fact: Risks in Food Safety and Market Image

Steers seen on BTW landfarm, June 2014. Photo by Fiona Clark.

Ministry for Primary Industries
Manatū Ahu Matua

Report on the Targeted Surveillance of Milk from Animals Potentially Exposed to Petrochemical Mining Wastes

MPI Technical Paper No: 2014/24

ISBN No: 978-0-478-43730-0 (online)
ISSN No: 2253-3923 (online)

August 2014

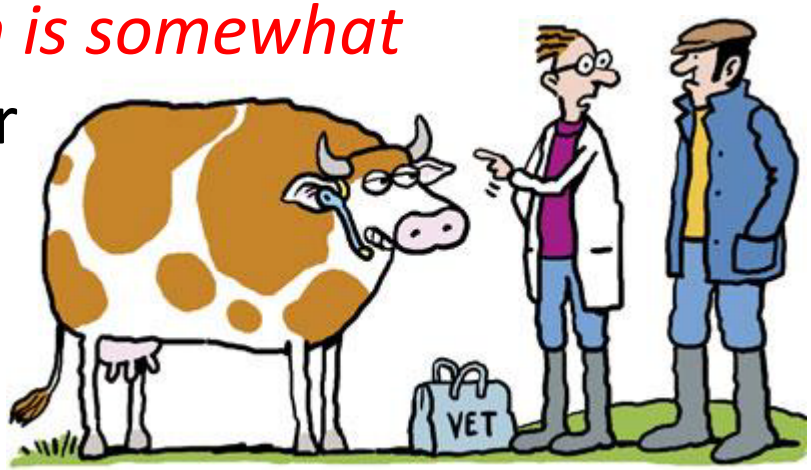
"The surveillance study identified that only very low levels of some of the chemical compounds or minerals that were tested for were found and these did not represent a risk to consumers. Further, there was no evidence to suggest that these very limited detections in milk were due to exposure to wastes from petrochemical mining," MPI

TABLE 4: COMPOUNDS AND MINERALS DETECTED IN FARM MILK

Farm	Compound / Mineral					
	Toluene	Barium	Longer chain saturated hydrocarbons	Polybrominated diphenyl ethers		
			C25-35	#47	#99	#100
	ng/g	mg/kg	ng/g	ng/kg	ng/kg	ng/kg
Control Farm: Blenheim	0.017	0.14	< 0.06	<0.02	<0.02	<0.02
Control Farm: Otautau	0.016	0.10	< 0.06	<0.02	<0.02	<0.02
Control Farm: Rotorua	< 0.01	0.14	< 0.06	<0.02	<0.02	<0.02
Farm A	0.024	0.16	< 0.06	<0.02	<0.02	<0.02
Farm B	0.014	0.15	< 0.06	<0.02	<0.02	<0.02
Farm C	0.012	0.17	< 0.06	3.73	2.04	0.466
Farm D	0.026	0.10	< 0.06	<0.02	<0.02	<0.02
Farm E	0.029	0.15	< 0.06	<0.02	<0.02	<0.02
Farm F	0.019	0.18	< 0.06	<0.02	<0.02	<0.02
Farm H	<0.01	0.16	< 0.06	<0.02	<0.02	<0.02
Farm I	0.014	0.22	1.5	<0.02	<0.02	<0.02
Farm J	0.025	0.10	< 0.06	<0.02	<0.02	<0.02
Farm K	0.022	0.25	< 0.06	<0.02	<0.02	<0.02
Farm L	0.019	0.15	< 0.06	<0.02	<0.02	<0.02
Farm M	0.014	0.17	< 0.06	<0.02	<0.02	<0.02
Farm N	0.020	0.17	< 0.06	<0.02	<0.02	<0.02
Farm O	0.013	0.17	< 0.06	<0.02	<0.02	<0.02
Farm P	0.011	0.14	1.4	<0.02	<0.02	<0.02
Farm Q	0.019	0.14	< 0.06	<0.02	<0.02	<0.02
Farm R	0.014	0.09	< 0.06	<0.02	2.34	<0.02

http://www.mpi.govt.nz/news-resources/publications

"From a scientific viewpoint, if the objective was to determine if cows were being exposed to drilling wastes, it is difficult to give the study any credibility. If the objective was to determine if the presence of petrochemical compounds in milk represent a health hazard, that has only been partially answered … The report expends considerable effort in arguing why what has been detected may not originate from drilling wastes – this approach is somewhat concerning," Dr. Alan Thatcher



Food Safety Minister Nikki Kaye:

"Sheep and beef testing would require huge control samples", take a lot longer than milk testing, and should only be done *"if we actually see something showing up in the milk. …*

We are looking at what is the quickest way to get assurance that there is definitely nothing there and we think that's through milk testing…"

http://tvnz.co.nz/national-news/greens-want-land-farm-meat-tested-contamination-5912913 (April 2014)

Ministry for Primary Industries
Manatū Ahu Matua

Land application of waste from oil and gas wells: *Implications for food safety and animal welfare*

Read these with a critical mind

Food safety and animal welfare guidance if spreading rocks and minerals from drilling oil and gas wells on land

Landcare Research
Manaaki Whenua

ISBN No: 978-0-908334-81-0 (online)

July 2015

New Zealand Government

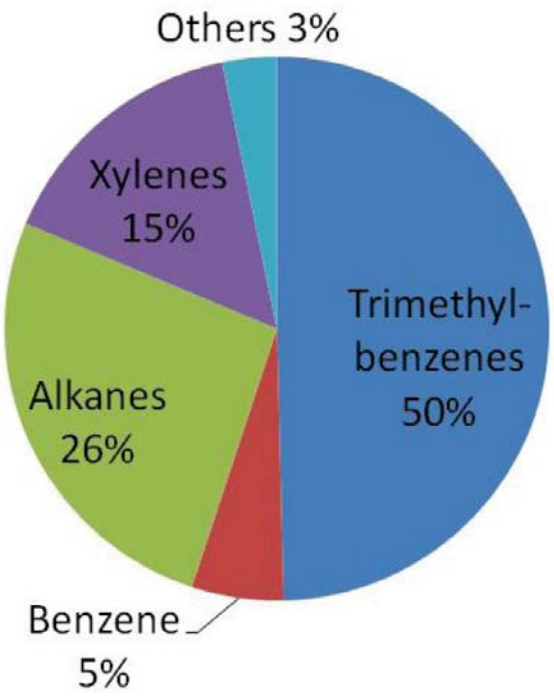
Growing and Protecting New Zealand

Myth 4: Effects on Neighbours are minor

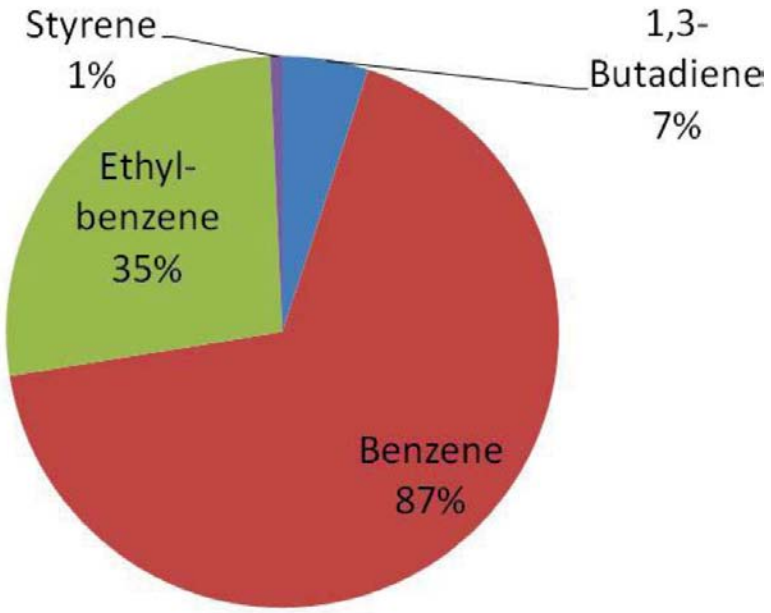
Fact: Human health risk related to air emissions from development of unconventional natural gas resources

Residents living ≤½ mile (800 metres) from wells are at greater risk for health effects from NGD. Cumulative cancer risks were 10 in a million vs 6 in a million.

Non-Cancer Risk Drivers



Cancer Risk Drivers



Dr. Lisa McKenzie, Colorado School of Public Health, University of Colorado, 2012

https://www.bouldercounty.org/doc/landuse/mckenzie2012study.pdf

Association between density and proximity of natural gas wells within a 10-mile [16km] radius of maternal residence and prevalence of congenital heart defects and possibly neural tube defects.

McKenzie et al. 2014
http://dx.doi.org/10.1289/ehp.1306722

Norfolk School is ~600m from Tag Oil's proposed Sidewinder B wellsite.
http://www.norfolk.school.nz/?p=1957

Table 2: Drilling Phase Hazardous Substance Inventory

Substance Name	Form	Conc (%)	Specific Gravity	Proposed Quantity (in known units)	Proposed Quantity (in t or m3)	UN No.	UN Class	HSNO CLASS	Storage or Use	Distance from site boundary
Barite (Halliburton and MI)	Powder	100		40000kg	40t			6.1D 6.7A, 6.9A 9.3C	Storage	>30m
Class G Cement	Powder	100	3.15	5.1MT 5100kg	5.1t			6.1D, 6.5A, 6.5B 8.2C, 8.3A	Storage	>30m
Diesel	Liquid	100	0.85	20000L	17t			3.1D, 6.1E, 6.3B 6.7B, 9.1B	Storage	>30m
Ecotrol RD	Solid	100		1225kg	1.2t			3.1C, 6.1C, 6.1E 6.3B, 6.4A, 6.6B 6.8B, 6.9B, 9.1D	Storage	>30m
Frac Attack*	Powder	100		5000kg	5t			6.3B, 6.4A, 6.7B	Storage	>30m
Gacscon 469	Liquid	100	1.1	2000L	2.2t			6.1E, 6.3A, 6.4A 6.7A, 6.9A	Storage	>30m
G-Seal	Powder	100		4000kg	4t			6.1E, 6.3B, 6.4A 9.1D	Storage	>30m
HZ-20	Liquid	100		1200L				9.1B	Storage	>30m
KCl (Halliburton and MI)	Powder	100		24075kg	24t			6.1E, 6.3B, 6.4A 9.3B	Storage	>30m
Lime	Powder	100		2000kg	2t			8.2C, 8.3A, 9.1D	Storage	>30m
LPG	Gas	100	1.6	100m3	100m3	1075	2.1	2.1.1A	Storage	>30m
Methanol	Liquid	100	0.79	1500L	1.185t	1230	3(II)	3.1B, 6.1D, 6.4A 6.8B, 6.9A, 9.3C	Storage	>30m

carcinogenic
acute toxicity
flammable
mutagen
reproductive toxicity
skin corrosion
eye damage
aquatic toxicity
ecotoxic

Source: Todd Energy AEE for Te Kiri North-A wellsite, March 2014.

Substance Name	Form	Conc (%)	Specific Gravity	Proposed Quantity (in known units)	Proposed Quantity (in t or m3)	UN No.	UN Class	HSNO CLASS	Storage or Use	Distance from site boundary
MIX II (Coarse & Fine)	Powder	100		4000kg	4t			6.7A, 6.9A	Storage	>30m
Monoethylene Glycol	Liquid	100	1.15	1500L	1.75t			6.1D, 6.4A, 6.9A 9.3C	Storage	>30m
Na Formate	Liquid	100	1.92	13,500 gals 51104L	98t			6.1E	Storage	>30m
Novamul	Liquid	100	0.95	3200L	3t			3.1D	Storage	>30m
Novatec F	Liquid	100	1.01	4095L	4.1t			6.1D, 6.5A, 6.5B 8.2C, 8.3A, 9.3C	Storage	>30m
OS1-L	Liquid	100	1.34	1000L	1.34t			8.2C, 8.3A	Storage	>30m
Produced Hydrocarbons	Liquid	100	0.85	127,000L	149t			3.1B, 6.6A, 6.7A 6.9B, 9.1C	Storage	>30m
SSA-1	Solid	100		9900kg	9.9t			6.7A, 6.9A	Storage	>30m
Tuned Spacer III	Solid	100		2268kg	2.26t			6.7A, 6.9A	Storage	>30m

target organ systemic toxicity

acute toxicity

ecotoxic to terrestrial vertebrates

mutagen

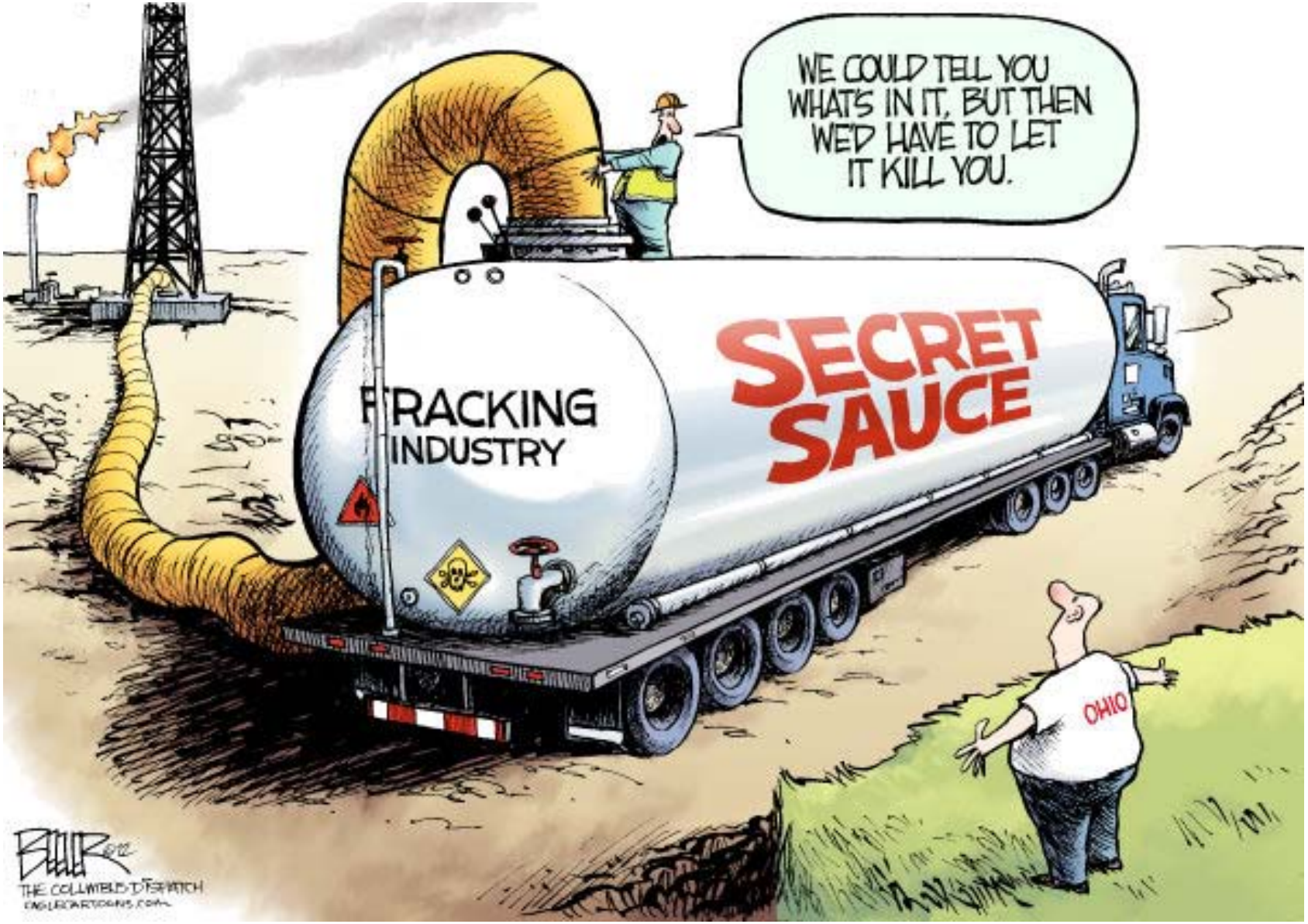
carcinogenic

*Frac Attack is a drilling fluid additive used to seal permeable sands, micro-fractured shales, and vulgular formations. It is not used for fracking in this context.

Note: Guidance from STDC District Plan, Appendix II

- A substance that is taken from a container and used in small amounts while its bulk continues to be stored would be rated as being storage; unless the processing is permanently connected to the bulk storage.
- Small packages generally treated same as bulk quantities.

Source: Todd Energy AEE for Te Kiri North-A wellsite, March 2014.


WE COULD TELL YOU WHAT'S IN IT, BUT THEN WE'D HAVE TO LET IT KILL YOU.
FRACKING INDUSTRY
SECRET SAUCE
OHIO
THE COLUMBUS DISPATCH

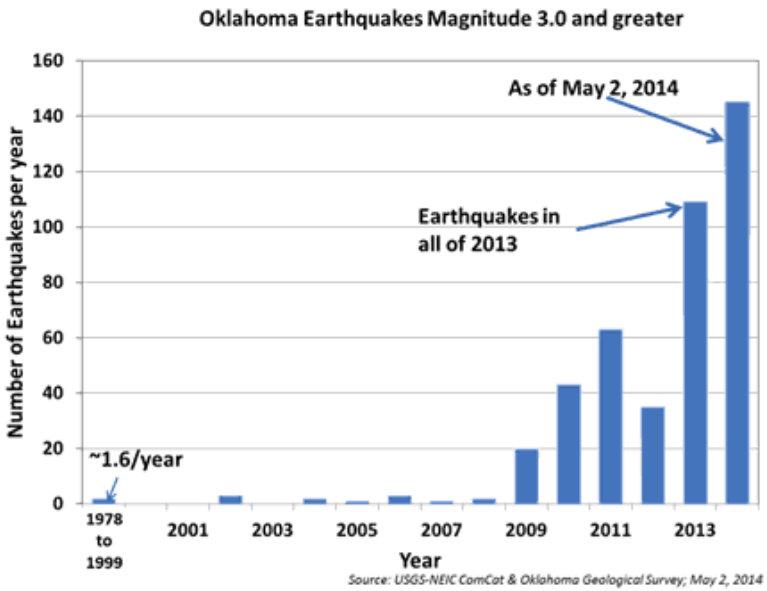
New York State Banned Fracking because of potential Health & Environmental Impacts

"Until the science provides sufficient information to determine the level of risk to public health from HVHF [High Volume Hydraulic Fracturing] to all New Yorkers and whether the risks can be adequately managed, DOH **[Department of Health]** ***recommends that HVHF should not proceed in NYS,"*** Howard Zucker, Acting Commissioner of Health, New York State, 2015

Precautionary Principle

http://www.health.ny.gov/press/reports/docs/high_volume_hydraulic_fracturing.pdf
http://www.huffingtonpost.com/2014/12/17/cuomo-fracking-new-york-state_n_6341292.html

Fact: Deepwell Injection & Fracking can cause Earthquakes



e.g. Oklahoma's heightened earthquake activity since 2009 includes 20 magnitude 4.0 to 4.8 quakes, plus the largest earthquake in Oklahoma's history – a 5.6 quake near Prague on Nov 5, 2011.

http://earthquake.usgs.gov/regional/ceus/products/newsrelease_05022014.php

Dr Anthony Ingraffea explains: *"We've mobilized pre-existing, stable faults," he says.* Underground water from waste disposal *"lubricates those faults and changes the pressure on them."* Naturally, the waste injection wells at issue are the ones that are closest to faults.

http://www.motherjones.com/environment/2014/08/inquiring-minds-anthony-ingraffea-science-fracking-methane

US Geological Survey confirmed in April 2015 that "*in the last seven years, geologically staid parts of the US have seen earthquakes like they haven't seen for millions of years. And they were triggered by drilling for oil and gas … or rather, the process of injecting water deep underground – has been triggering earthquakes in Alabama, Arkansas, Colorado, Kansas, New Mexico, Ohio, Oklahoma and Texas*".

http://www.theguardian.com/world/2015/apr/24/earthquakes-fracking-drilling-us-geological-survey

Myth 5:

The oil/gas industry brings jobs and wealth – we need them

Fact:

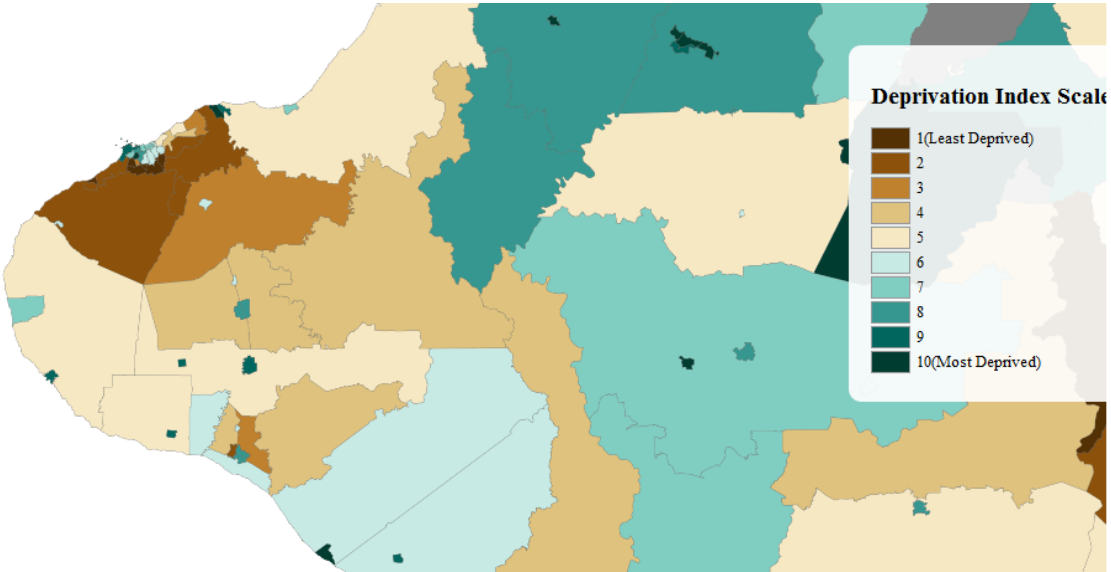
Green energy creates 4x more jobs than oil.

Tax takes from oil industry:

NZ = 46%; World average = 70%

NZ Deprivation Index:

Patea = 10; Kaponga, Eltham, Waitara East = 9, Stratford = 8

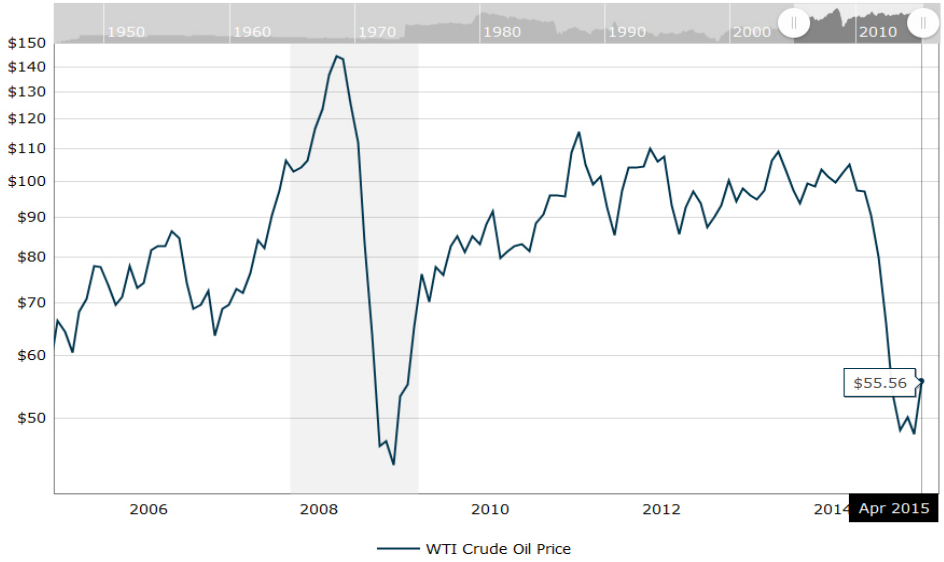


http://www.greenpeace.org/new-zealand/en/campaigns/climate-change/The-Future-is-Here/

http://awsassets.wwfnz.panda.org/downloads/wwf_fossil_fuel_finance_nz_subsidies_report.pdf

http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11254032

A Volatile Market - Crude oil price trend



Carbon Bubble and Stranded Asset

The concept of a "carbon bubble" has gained rapid recognition since 2013, and is being taken increasingly seriously by some major financial companies ...

The concern is that if the world's government's meet their agreed target of limiting global warming to 2C by cutting carbon emissions, then about two-thirds of proven coal, oil and gas reserves cannot be burned. With fossil fuel companies being among the largest in the world, sharp losses in their value could prompt a new economic crisis.

http://www.theguardian.com/environment/2014/dec/01/bank-of-england-investigating-risk-of-carbon-bubble

http://www.zmescience.com/ecology/environmental-issues/fossil-fuel-divestment-0534543/

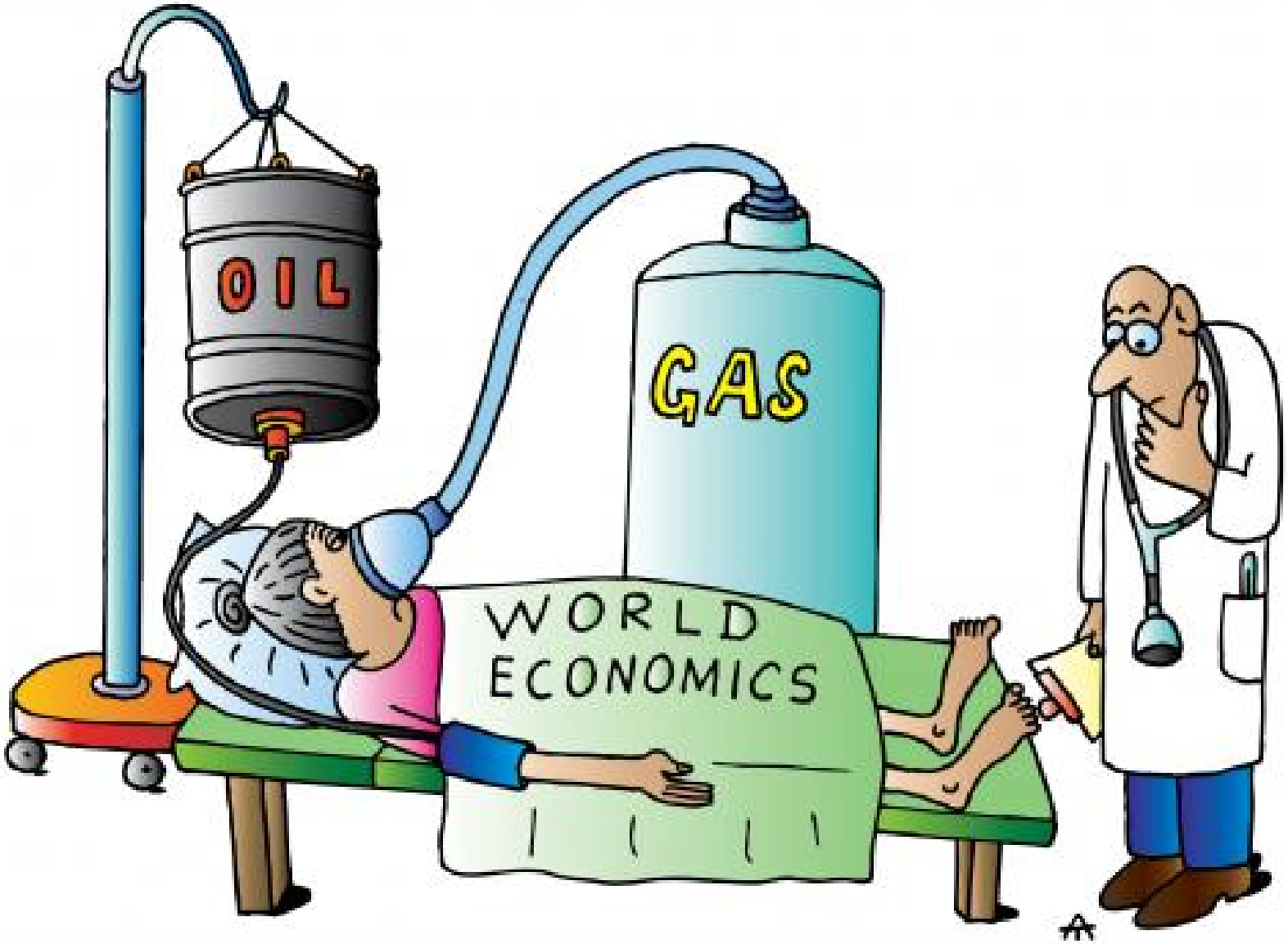
DIVEST from FOSSIL FUELS

DIVEST & REINVEST NOW! Powered by GreenFaith

http://www.greenfaith.org/programs/divest-and-reinvest

Divest for our FUTURE

http://ecowatch.com/2012/11/29/divest/



By Alexei Talimonov

Myth 5:
Natural gas is clean and a necessary step to sustainable energy – it may even be a solution to climate change

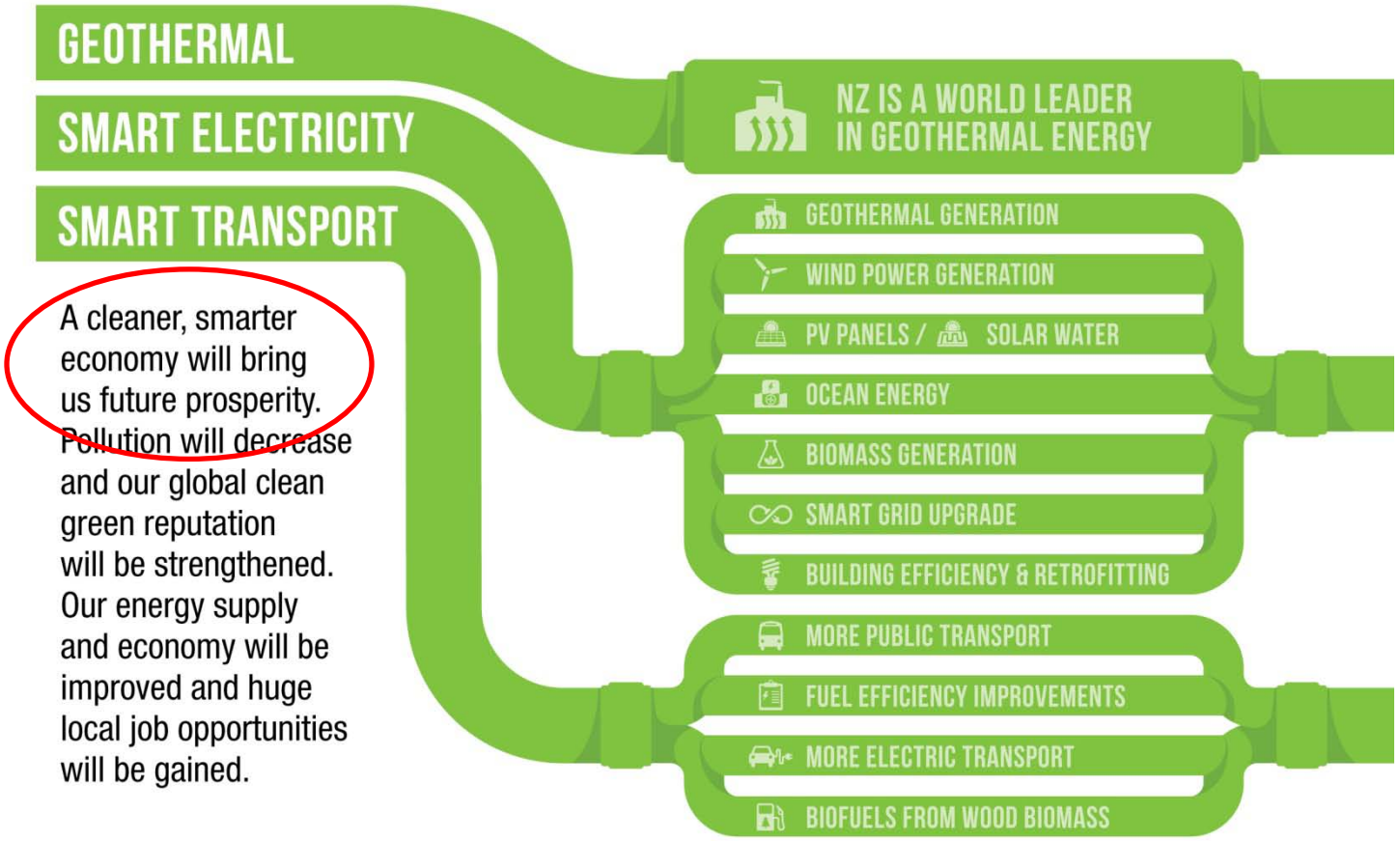
Fact:

"…before we can effectively solve this crisis, we have to 'stop making in worse. … we must cease making large, long-term capital investments in new fossil fuel infrastructure that 'locks in' dangerous emission levels for many decades … step one for getting out of a hole: Stop digging." KC Golden, Environmental policy expert – quoted in **Naomi Klein's *This Changes Everything***

http://thischangeseverything.org/


OIL DEPENDENCY
WHAT DO WE DO?
KEEP DRILLING!

THE RIGHT ENERGY PATH FOR NZ



50% OF JOBS RELY ON NZ'S CLEAN GREEN REPUTATION

70% OF EXPORTS RELY ON NZ'S CLEAN GREEN REPUTATION

GREEN ENERGY CREATES 4X MORE JOBS THAN OIL

http://www.greenpeace.org/new-zealand/en/campaigns/climate-change/The-Future-is-Here/


caglecartoons.com
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SHINE, BABY, SHINE!

www.ClimateJusticeTaranaki.info

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