ETC's Irreverent Review of 2015 and (possibly) Irrelevant Preview of 2016

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The Year that Ended Dangerously

If El Niño weren't enough, the extraordinary winds that struck Yemen and Mexico's Pacific Coast were matched by record-breaking forest fires in the Indonesian archipelago, droughts, torrential rains and floods from Australia to the British Isles and heat-waves on the east coast of North America (in winter). Much of this was El Niño, of course, but some of it was climate change – and all of it wound up in Paris with calls for geoengineering …2015 was the year that ended dangerously.

Editorial

***Realpolitik* in Paris.** ETC Group feels like the Grinch Group that stole Christmas when we complain about Paris. Yes, there was a heightened level of awareness and commitment palpable among governments and civil society and, yes, governments are committed to reporting back every five years creating a space in which many believe it will be self-evident that they need to up their game and commit to bigger and faster GHG cutbacks. As importantly, 2015 was the year in which CSO Climate Change Campaigners worked together better than ever before and often supported one another even when we didn't entirely agree with the tactics. From the World Social Forum in Tunis in March on through the preparatory sessions in Paris and Bonn and then right through Paris again at COP21, folks were trying to understand each other's positions, agreeing on many points even though not everybody spoke out. Sadly, some CSOs and online clicktavism brands felt they owed their followers a victory and resolved to celebrate regardless of reality. False optimism is still lying to your friends – a very high-risk tactic. For industrialized countries at least, climate change continues to be a distant disaster and politicians are still punting the ball down the road an election or two. The *realpolitik* defense - that Paris was the best it could be – needs a reality check.

Realpolitik is only admirable if it creates the political space for an eventual victory. In Paris, we lost time – and ground – that we can't recover.

How so? Almost nobody that was in Paris believes we can keep temperatures in 2100 below 2°C much less 1.5°C. Most everybody recognizes that we will blow past our GHG quota for the 21st century by around 2036 and everything after that will push us somewhere north of 3°C.[1] To justify the difference between government promises on reductions and reality, politicians accepted the myth offered by the fossil fuel industry and other major manufacturers that somewhere around midcentury they will invent geoengineering technologies that can capture CO_2 at the smokestack or the wellhead. Most scientists and many politicians know this is ridiculous. It's like sending our children home on a school bus that has to cross a chasm but the bridge hasn't been built yet and the bus has brakes tested by Volkswagen. When politicians realize they can't suck carbon dioxide out of the atmosphere they will default to another form of geoengineering – Solar Radiation Management (SRM) – another mythical techno-fix that can (wrongly) appear cheap, easy, and can be controlled by a single country or a "coalition of the willing" usurping the planetary thermostat for themselves. Leading into – and out of – Paris, the call for geoengineering is calamitous and growing as evidenced by 9 books and 1100 news stories on geoengineering in 2015 alone. *Realpolitik*, again, will suggest that we have no choice. But the reality in Paris is that industry bought itself the time it needs to protect its trillions of dollars of assets and politicians will slip past the next election unfettered by climate commitments. Despite everybody's best intentions, the illusion of geoengineering is letting industry off the hook and when the time comes to deploy solar radiation management, the people in charge will not be the poor and marginalized betrayed by their governments in Paris. Paris was a tragic failure. *Realpolitik* is what politicians do when they don't do courage.

The Year of Things We Didn't Know We Didn't Know

- **Phytoplankton**, the wee folk at the bottom of the food chain and at the top of the ocean – the little creatures that suck away about half of the world's atmospheric CO_2 every year – were thought to have declined by 40% since the 1950s creating a major force for climate change. Or, perhaps not. This year, we learned that satellite imaging of phytoplankton on the surface of the world's oceans has been color blind and, although the creatures have changed color, the phytoplankton loss is just 7% not 40%[2].
- Unfortunately, other satellites have been misreading the **Amazon** forest cover underestimating the incursion of cattle, cane and soya and exaggerating the trees and their biomass. Instead of a forest loss reduction rate of 25% last year, the loss accelerated by 62%.[3]
- Worse still, the **trees are growing faster but dying faster too** – and storing barely half the CO_2 scientists have assumed.[4]
- Meanwhile, the **boreal forests of North America** may soon become net-emitters of carbon dioxide rather than capturing a third of the world's atmospheric carbon. New estimates suggest that the Yukon Flats forest has been a source of GHG emissions for half a century.[5] Where the Yukon goes, Alaska and Siberia are likely to follow.
- Back on the plus side, however, we also learned that science has misrepresented **China's coal consumption** – not the quantity but the grade – and CO_2 emissions due to coal have been at least 40% less between 2000 and 2013 than previously assumed.[6]
- But, then again, we also learned that the **unexplainable stall in rising temperatures** the last few years is not because climate change isn't real but because the calculations were incorrect. It turns out there was no stall at all and temperatures have continued to rise consistently.[7]
- Climatologists – and the rest of us – also learned as we left Paris that perhaps as much as **40% of global deforestation comes through slave labor** and that most of the world's 35 million legally-defined slaves are either the victims of ecological destruction or are forced to contribute to one third of global annual GHG emissions through illegal mining, fishing, brick making and lumbering.[8] We must all worry about what we don't know we don't know but a drastic reduction in GHG emissions is urgent – and not just for the climate.

The Corporates' Climate

Climate was 2015's dominant theme but the year's subtext was all about the private sector bringing the world new technological solutions. Bankers and bondsmen would build the block chains and algorithms to sort out the new green bioeconomy for us while manufacturers and fossil majors would first reduce then reuse pesky GHG emissions, biobiz would catapult biotech's next generation into nature's driver's seat to manage our health and food systems, and every other niggling worry would be resolved with a cloud-based crowd-sourced app. All this drove ETC to look more closely at the companies and industries promising to take policy off politicians' shoulders.

- In 2015 **Deutsche Bank** paid out billions on regulatory fines but made up for it all by opening a new facility for gene banks.[9] Regulators hit **Goldman Sachs** even harder but the bank's PR machine conjured up a massive boost in green (back?) investments. As part of its new image, Goldman Sachs took over some New York prisons to test drive profitable prison reform.[10] (Orange is the new Green... or, just planning ahead?) Total cost of the post-2008 scandals for the top 25 global banks: $325 billion – with more claims to come.[11]
- In the lead up to Paris, **Exxon Mobile** and **Shell** led the fossil fuel industry in calling for carbon capture and storage technologies that would (coincidentally) protect about $22 trillion in assets and let them continue to dig and drill. Apparently, the old fossils can party now and still profit later.

Sometime around mid-century (cross their hearts) they will capture CO_2 at the wellhead or smokestack and convert it into plastics, foods or pharmaceuticals. Oh, sure. ETC and the Heinrich Böll Foundation released, *Extreme Biotech meets Extreme Energy*, at the climate change conference in December discussing this issue.[12] **BP**'s Deepwater Horizon disaster was five years ago and that old fossil still has to pony up at least $26.6 billion to settle federal, state and civil suits for the techno-failure they couldn't fix[13] on top of the $17 billion in cleanup costs. But why talk about the old days, at the end of 2015 **SoCal gas** admitted that a California pipeline has been emitting methane since October – enough in CO_2 terms, to power 7 million cars a day. There is no hope in plugging the leak until March but in terms of media attention news of this hair-raising gaseous escape has been largely trumped by Donald Trump's offgassing and self-raising hair.[14]

- Most famously, **Volkswagen** was caught installing emission-cheating software in more than 11 million vehicles over several years. The VW exposure showed that most (or all?) auto manufacturers have been rigging emission tests and just about everybody knew about it. VW's costs could exceed $31 billion.[15] Also during 2015, **GM** and **Toyota** were caught hiding safety failures that cost at least 124 lives and billions in damages.[16] Maybe VW could monitor BP's wellhead emissions?
- Over the past two years there have been 2000 M&A's within the drug sector.[17] Great for financiers – not so great for patients. Some small bio pharma companies have been buying up others and then hiking the prices of their orphan and off-patent drugs. The average price increase for 19 drugs studied between 2009 and 2015 was 500%. Some drug prices went up 18-fold.[18] While smaller startup houses have taken most of the heat, well-known companies like **Novartis** and **GSK** have quietly boosted their prices 200 – 300% attracting little notice.[19] Perhaps the most disturbing news in the pharmaceutical industry is that just before Christmas, Martin Shkreli, the CEO of **Turing Pharmaceuticals**, was arrested by the FBI – not for price gouging patients on an anti-parasite drug by 5000% – but for another kind of parasitism – securities fraud.[20]

- Wall Street proclaimed 2015 a record-breaking year with roughly $5 trillion in M&A deals. Ten deals were valued at more than $50 billion each. Not surprisingly, pharmaceuticals led the M&A sector with almost $724 billion in takeovers.[21]
- For ETC, the big mergers were all in food, drink and agriculture. In October the worlds two largest brewers clinked their glasses to a 106 billion dollar tie up consolidating a third of the global beer market under one megabrewer.[22] Two of the Big Six in Ag Inputs – **Dow** and **DuPont** – will merge to become the world's biggest seed and pesticide company. Simultaneously, **ChemChina** and **Monsanto** are bidding for **Syngenta**.

Were **Monsanto** and **Syngenta** to merge (Demonsanto?) they would outgun Deep Doodoo (**Dow – DuPont**). But, as we warned in our November communiqué, *Breaking Bad,* the really big deal is that farm machinery companies like **Deere** and Co. that are orders of magnitude larger than Monsanto – are moving into big data, robotics (including drones) and crop insurance and probably stand the most to gain from taking over seeds, pesticides and fertilizers.[23]

The Technicolored Year

Speed Wars: There is mounting evidence that, aside from China, both public and private science are spending less on R&D.[24] Between robotics, Big Data and crowd-sourcing, more and more of what we used to consider innovation is being managed through AI (Artificial Intelligence ... If you have to ask...), algorithms and blockchains. Now, a number of startup companies are automating the hard work in chemistry and physics. Small molecules (with up to 17 atoms) can form 166.4 billion chemical combinations. This is the work of several lifetimes. A startup company called Revolution Medicines uses "carbon coupling" to model the combinations in days or hours. Other startups like Chematica, (a.k.a. "The Chemical Internet") and Dial-a-Molecule say they are as fast or better.[25] Semantic Scholar, can automatically read and analyse the more than 2 million scientific papers published annually responding to real-life scientific inquiries producing intelligent and surprising correlations. According to the company, conventionally half of all of these papers are only read by three people (one spouse and two parents).[26] Aside from scientific papers, some of the new companies can also screen through patents, blogs and twitter to find ideas or solutions that might apply to a specific problem.

In 2015, we learned that robots can take the drudgery out of innovation and the Biosciences are developing five times faster than Moore's law.

For example, one innovation algorithm adapted a process created by a violinmaker to reduce vibrations in skis. Some scientists argue that 90% of problems have been solved somewhere else and just need to be rediscovered.[27] These speedy new technologies also have political applications. The Declassification Engine can browse 4.5 million US State Department cables written between the 1930s and 80s providing historians with new insights and terrifying Clinton's correspondents.[28]

Crunch Time for CRISPR: The new capacities in Big Data are most impressive when they are linked to the new Biosciences. The speed and efficiency of DNA sequencing doubles about every six months – or, roughly four times faster than Moore's law.[29] In our 2014 year-ender, we wrote about the rising excitement over CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats....If you have to ask...) as a bioscience tool not only for health but agriculture and the environment. Boy, were we ever right! News of gene edited human embryos in China spawned a monsoon of moralisms about how far and fast this new tool is spreading. By year end a DIY Bio CRISPR kit was available on Indiegogo for $130 backed by a promise that "everyone will be able to use these kits (they contain everything you need, no extra equipment is required), even if you have had zero experience with Biotechnology".

Extinction Drivers: Of all the CRISPR craziness, far and away the most worrying development was the creation of the first working gene-drive. A gene drive is an engineered element that will reliably force a genetic trait (gene sequences that would otherwise be recessive or would disadvantage the species and recede into extinction) through an entire species and quite possibly, its wild relatives, thereby re-engineering entire species. Last year gene drives were theoretical – now they exist and the world may never breed the same again.

Proposals for gene drives range from eradicating malarial mosquitos to making weeds more susceptible to Monsanto's Roundup to digitally storing data in the genomes of cloud bacteria (actual cloud-based information storage). Talk about being "bugged". (Edward Snowden would've had to ask...) Gene drives move the battleground against pests and diseases from the field to the forest – in effect, hopping the fence to hunt down an unpopular prey wherever it hides. Since the gene drive can make even negative traits dominant, this forced march into nature could become a "scorched earth" policy against Pachamama. In December, ETC and the Heinrich Böll Foundation released their report on Climate-Smart Agriculture, *Outsmarting Nature,* addressing some of the new technologies.[30]

AI Captain: Last year Elon Musk was warning that AI could end humanity, this year he's part of a group of 'tech titans' investing 1 billion dollars into it (open AI consortium) and his Tesla motors are now running on an AI 'autopilot'. But, Google is still in the driver's seat. Last year, Google acquired UK-based DeepMind and, shrewdly, taught itself to recognise cat videos. NASA was so impressed that it teamed up with Google and, in December, announced the development of a quantum computer – the D-Wave 2X, – that can solve really tough riddles 100 million times faster than the competition. After cats, they're going to find out who let the Dog Star out!

Photo: Spiber Inc.

Webware: Japanese-based Spiber just commercialized SynBio "spidersilk" available in a new North Face jacket. North Face is also going big into AI. ETC doubts that the company's co-founder, environmentalist, techno-critic, Doug Tompkins who tragically died in 2015 in a kayaking accident, would have approved. Tompkins and North Face parted company some time ago. But, the spider's web is getting tangled. A California company, Bolt Threads, claim they will have a SynBio spider product on High Street before 2016 is out aiming to capture the $750 billion global textile market.[31]

No PARKing: The US doesn't just differ from the rest of the world in its adoption of gallons and miles, it also bucks the global trend by refusing to label GM Food. If the Republican-led Congress gets its way, it will make state legislated GMO labelling either illegal or impossible. When a remarkable anti-GMO campaign blocked the Republican-backed DARK Act in December, the biotech industry didn't give up and are now accepting GMO labelling might be necessary but insisting that information is buried within on-pack digital QR codes that can only be read by smartphone apps. So, the DARK Act (Denying Americans the Right to Know) could become the PARK Act (Providing Androids with the Right to Know).

Robiotics: The Internet meant you could edit pictures, rent videos and cars and even get made-to-measure 3D printed selfie models. But, in 2015, you could edit and make lifeforms online too. Silicon Valley's Transcriptic bills itself as the first fully robotic cloud-based biotech lab. Remote users can control lab robots pipetting, mixing, preparing and testing synthetic organisms. Cloud (drone) robots gives the lie to industry claims that synthetic biology will create lab-based employment.

BlockChains: In 2015, the transaction volume of bitcoin, the encrypted online currency, peaked close to $340 million, nearing Paypal's average volume of $397 million.[32] As Bitcoin and other crypto-currencies become established, some of the world's largest banks are collaborating to adopt the underlying Blockchain technology and driving an investment bubble in FinTech (Financial Technology... If you have to ask...). Most intriguing is the development of Blockchain based 'smart contracts' - automatic corporations run by machines. As Primavera de Filippi at Harvard explains: Smart contracts give rise to "distributed autonomous organizations (DAOs) that exist independently of any moral or legal entity.

These algorithmical entities are both autonomous and self-sufficient: they charge users from the services they provide so as to pay others for the resources they need (e.g. bandwidth, cpu). Thus, once they have been created and deployed onto the blockchain, they no longer need (nor heed) their creators." By 2020, blockchains may be debating the morality of providing lethal weapons to autonomous homobiotics.

Nano NO More: Whatever happened to nanotechnology? ETC was the first CSO to take up the issue 15 years ago but, since then, dozens of other strong partners around the world have taken up the cudgels and are making progress (albeit belatedly) especially in the EU. But, nanotech has by no means gone away. The global market for nanomaterials is about 11 million tonnes projected to contribute to end products valued at €2 trillion in 2015.[33] Six million factory workers will be handling nanoparticles by 2020. As we prepared for the Paris climate change negotiations, we learned that, for the first time, children in the city were found to have carbon nanotubes in their lungs.[34]

What a tangled web we weave when synbio spiders conceive!

Tech's 2015 Good News

TFM: Since 2011, ETC has been struggling to establish a UN capacity to manage technologies. In 2012 we got a favourable resolution at Rio+20 but a resolution is a long way from a reality. Happily, key developing states took up the cause with CSOs resulting, in September, in the formation of the UN Technology Facilitation Mechanism including an annual intergovernmental forum supported by a 10-member multi-stakeholder group working with 26 UN agencies or departments.[35] The 10-member group will meet for the first time in early March, 2016 and the whole mechanism will meet for its first forum on June 6 – 7. Neth Daño, ETC's Asia Director, is the only CSO member from Asia in the group.

Tech Assessment for Climate Change: Hard on the heels of the TFM, climate change negotiators agreed to strengthen the technology capacity of the UNFCCC and expand its mandate to clearly include technology assessment. Once again, Neth Daño is representing environmental NGOs in the advisory panel of the Climate Technology Center and Network.[36]

LDC Tech Bank: And, during 2015, the UN moved ahead with proposals to establish a Technology Bank for Least Developed Countries.[37] ETC was asked to provide background ideas for the bank's role in technology assessment and we expect to do more work in providing inputs to the nuts-and-bolts of the bank which should be operational by 2017.

SynBio: During 2015, the UN Convention on Biological Diversity set to work monitoring and analysing biology and the panoply of new biotechniques. A multi-stakeholder working group met in Montreal at the end of the year and will report to the CBD's scientific subcommittee this April. ETC's Jim Thomas is a member of the committee. But, even as the UN inevitably concludes that CRISPR, synthetic biology, gene drives and everything else cry out for oversight, the EU Commission is expected to start 2016 giving a controversial legal opinion that at least some of the same techniques can enjoy a free pass – exempting so called 'new breeding techniques' from GMO legislation. (Incidentally, ETC together with Canada's Bioeconomies media project and Germany's Heinrich Böll Foundation published this year a video in several languages explaining SynBio).[38]

More Good News – The Natural Products Industry Steps In: In 2015 leading ice cream maker Ben and Jerry's told customers they would avoid Synbio ingredients such as Evolva's syn bio vanillin, reflecting what a few other natural products companies had begun to express. Then the Non-GMO project whose butterfly logo adorns over 33,000 food products in North America finalised rules that none of those products could contain Synbio ingredients.

As more and more Synbio products start coming to market the rise of 'Synbio-free' as a label will start to accompany the GMO-free claims already filling the food, cosmetics and fragrances market. Our Program Director, Jim Thomas, is working closely with the natural products industry both in the USA and Europe. Unfortunately, Ecover, the supposedly green soap company who had a summer flirtation with Syn Bio algal oil in 2014 and told consumers they would decide within 6 months whether to commit to biotech or keep it natural, is still dithering a year and a half later.

Whimsical Historical Notes

Ever since we learned that Leonardo da Vinci and Machiavelli joined forces to redirect an Italian River to boost the sea access of one city-state and discombobulate another, we've kept a lookout for other connections between art (or politics – in the case of Machiavelli) and science.

- This year we learned that the artist, Johannes Vermeer and the scientist, Anton von Leeuwenhoek were born just a week apart in 1632 and lived across the Delft Market Square from each other most of their lives. While Leeuwenhoek famously invented the microscope, his neighbor Vermeer perfected the use of looking through different convex and concave lenses as a novel art form. Raising the question of who taught who or was it a blockchain?[39]
- Then, in June, we discovered that swords can be turned into bank shares when the scions of Bonaparte and Wellington were honored guests at the 200th anniversary of the Battle of Waterloo. But, that's not the surprise, Jean-Christophe Napoleon Bonaparte and Arthur Wellesley, Marquis of Douro, now both live in London and work in the financial sector – Bonaparte works for Advent International and Wellesley is a partner at Charterhouse Capital.[40] (They stooped to conquer.)

Favorite Quotes

Catherine McKenna (Canada's Environment and Climate Change Minister):

> ***"Note to self: Next COP, bring a sleeping bag".*** While there's no denying that Canada brought a fresh and positive face to the climate change negotiations in Paris, the brand-new government didn't have time to prepare policy proposals. "Reminder to Minister – next year bring a plan and you won't need a sleeping bag!"

Michael Horn, President Volkswagen America:

> ***"Let's be clear about this, our company was dishonest. And in my German words, we have totally screwed up".***

Books That Made Us Think:

Disconcerting Engineers: Last year, ETC gave highest marks to **Naomi Klein**'s, *This Changes Everything*, her impassioned call for system change to prevent climate change. This year, ETC's highest praise goes to **Oliver Morton**'s, *The Planet Remade*[41] – a decidedly unimpassioned analysis of climate change and proposed geoengineering techno-fixes. Morton, briefings editor for *The Economist* and former editor for *Nature*, has provided policymakers with an excellently reasoned book with whose conclusions we disagree. In a book that is clear, data-filled, and still wonderfully descriptive, Morton lays out the arguments for and against BECCS (Bioenergy with Carbon Capture and Storage) including reforestation, biochar, etc. as well as the most recent proposals to nab carbon dioxide at the smokestack or wellhead and/or suck CO_2 out of the air sometime down the road. He then focuses on the equally wide range of solar radiation management (a.k.a. sun-blocking / temperature-lowering) strategies under debate including cloud whitening and stratospheric sulfate dispersal. In the end, he finds each of these techniques dubious, over-hyped and/or dangerous. ETC agrees.

Morton also takes on the human rights and governance issues: how can the world fairly deploy any geoengineering initiative in a way that is honest and equitable? Again, ETC agrees. But, in the end, the author seems to be suggesting that some or all of the BECCS and SRM strategies should be studied and possibly even tested in the real world. While not one of them offers a solution and all of them have health or environmental risks – not to mention moral hazard, Morton acknowledges – the author thinks that they collectively may make piecemeal contributions to a way forward. Morton offers the scenario of a group of relatively small countries he calls the "Concert" (apparently in the Caribbean, Central America and the Pacific) who quietly undertake their own experiments and final deployment of SRM techniques. Unlike geoengineering boosters or even cautious supporters, Morton is keenly sensitive to the term "we" which he acknowledges usually is confined to well-educated well-off people in wealthy countries and he calls for a broad global debate. While rejecting the "Concert" scenario, ETC couldn't agree more about the need for UN discussion. In 2015, as we mentioned previously, at least nine English language books and close to 1100 newspaper, magazine and journal articles (also only in English) were published discussing geoengineering. The Paris pipe dream of keeping the temperature in 2100 well below 2°C actually puts more pressure on governments to bankroll or at least subsidize BECCS and experiment with SRM sooner than later. As many commentators have acknowledged, there is not a snowball in hell's chance of keeping below a 3° temperature rise given current government reduction promises and the lukewarm support of rich Nations for alternative mitigation strategies. This means that the UN Secretary-General must use his influence in his final year in office to reboot climate change debate within the General Assembly and reach out beyond governments to make other levels of government, civil society and social movements partners in that debate.

Oversight of Geoengineering has to be squarely on the table. Unfortunately, Oliver Morton's thoughtful words facilitate technological incrementalism that could help geoengineers sidestep the current UN moratorium on all forms of geoengineering's through a host of individually small – but collectively large – experiments that will do less to prove or disprove techno-fixes than to cloud the ability of policymakers to see the direction they are being led.

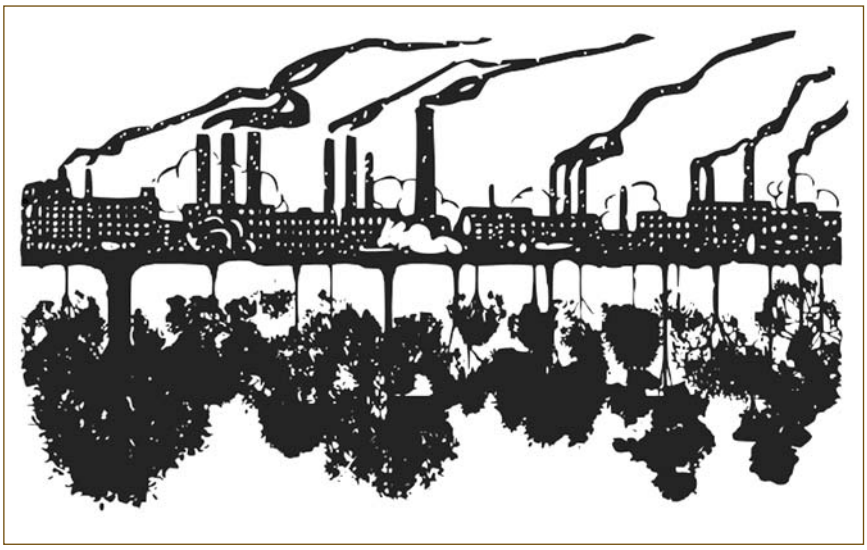

Illustration from Biofuelwatch – www.biofuelwatch.org.uk

Behind the Smoke Screens: Besides *The Planet Remade,* another of the more notably intelligent contributions to the geoengineering debate last year was **Jack Stilgoe**'s book, *Experiment Earth*.[42] A UK Science and Technology Studies professor, Stilgoe had a front-row seat in the collapse of the controversial SPICE Project to create a 'trojan hose' up into the sky to see if solar radiation management could get off the ground. He also enjoyed behind the scenes access to the Royal Society's 2008 geoengineering report. (He worked there.) Refreshingly Stilgoe addresses the emergence of geoengineering in the context of the broader politics of technology, not narrowly as a 'climate' matter. Although *Experiment Earth* takes geo-engineering as its subject (while questioning whether it's even really a technology) it draws together threads from what has been learnt in the last decade's policy debates on nanotechnology, Synthetic Biology, Nuclear power, GMO's and more.

Of Dow and Darwin: On the negative side, the nod has to go, once again, to **Matt Ridley** for his 2015 book, *The Evolution of Everything*,[43] – an appropriate sequel to *The Rational Optimist* which Ridley penned in 2010.[44] Ridley was the chair of Northern Rock, the first British bank to bite the dust following the 2008 financial meltdown. Despite his failure to see the handwriting on the wall then, Ridley, in *The Rational Optimist,* pronounced the planet and its inhabitants pretty much environmentally and economically okay pooh-poohing most everything from inequity to acid rain and species extinction as either irrelevant or overblown. Now, in his new book, Ridley offers a biological basis for his libertarian enthusiasm for the marketplace, unfettered technologies, and as little government as possible. None of this endears him to ETC, but Ridley is nothing if not full of fascinating data, anecdotes and eloquence. He makes many good points but twists the best of them into absurd conclusions. Everything is getting better because of the unseen hand not through the cumulative efforts of good people. People are living longer, according to Ridley. But, as Ridley's book was coming off the presses, the US National Academy of Sciences reported that life expectancies among men in the bottom 20% of incomes was – in real terms – dropping and is now 12.7 years less than a man in the top 20% in that country.[45] Darwinian economics takes Ridley into some interesting territory: intellectual property monopolies are a barrier to innovation [yup], big corporations can be a barrier to change and should never be given subsidies [yup], and collective innovation can have exciting results [yup again]. Still, Ridley is not really a climate change denier but he doesn't get very exercised about it either. We will find our way. The last Chair of Northern Rock should prognosticate more cautiously but the book is still an exciting read and when it's over the reader will still have to admit that Ridley has balls – though not the crystal kind.

ETC's Calendar for 2016

- February 15-17, **FAO International Symposium on " The Role of Agricultural Biotechnologies in Sustainable Food Systems and Nutrition"**
- March 3-4, New York, meeting of the **10-Member Group to Support the Technology Facilitation Mechanism**
- March 9-13, 2016, Anaheim, **Natural Products Expo West**
- Beginning April, Brussels, **IPES Food Meeting**
- April 2-6, Bangkok, **Asia Pacific Forum for Sustainable Development**
- April 12-15, Brasilia, **International Conference on Agrarian Reform**
- April 26-30, Montreal, **Meeting of the UN Biodiversity Convention Scientific Subcommittee** (SBSTTA 20)
- May 2-6, Montreal, **1st meeting of the Biodiversity Convention's Subsidiary Body on Implementation**
- May 23-27, Nairobi, **Global Major Groups and Stakeholders Forum** of the second UN Environmental Assembly (UNEA)
- June 6-7, New York, **First meeting of the Multi-Stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals**
- July 11-22, New York, **High Level Political Forum for the 2030 Agenda**
- August 9-14, Montreal, **World Social Forum**
- September 1-10, Hawaii, **IUCN World Conservation Congress**
- October 17-21, Rome, **Committee on World Food Security** (CFS-43)
- November 7-18, Marrakesh, **UNFCCC 22nd Session**
- December 4-17, Cancun, **UN Biodiversity Convention's- COP13**

ETC's Crystal Ball for 2016

- The US Congress will approve Obama's $4 billion budget to develop **driverless cars**. After all, Congress has been driverless longer than Google and has only crashed a couple of times.
- Francis the Feminist: Having confronted capitalism, technology and climate change, and empathized with Gays, the Pontiff will go to Mexico and acknowledge the **rights of women** and pro-choice, says Sister Sylvia of Perpetual Motion (ETC's Latin American Director).
- ETC staff will vehemently deny that Pat Mooney, when he retires at the end of 2017, will be replaced by a blockchain... (Pat thinks a blockchain has something to do with 50 Shades of Gray... He had to ask...)
- **DeepMind** founder Denis Hassabis, whose AI creation was used by Google to recognize cat images, will recover in a Colorado hospital after his encounter with a mountain lion. "I shouldn't have said here kitty kitty'" said Hassabis.
- Dow and DuPont will merge as will ChemChina and Syngenta turning the Joy of Six ("**the big six**") into Fourplay.
- Brazil's "Ruralistas" will push a pro-Terminator bill through Congress and then move to overturn the UN moratorium against **Terminator Seeds** at the Biodiversity Convention in Cancun, Mexico in December.
- Photosynthesis engineering, the synthetic biology strategy to improve CO_2 absorption in plants, will get a lot of attention in 2016 in the context of both **Climate-Smart Agriculture** and the UNFCCC negotiations in Morocco in November.
- Global cyberhacker group Anonymous will collaborate with global biohacker network DIY Bio in support of Black Lives Matter to launch denial of service attacks against racist police departments by way of gene-drive infected donuts in an operation dubbed **Crispr-kreme**.
- The US government will allow a **geoengineering** (Solar Radiation Management) cloud-whitening test at Moss Landing in California in August.
- The EU Commission will publish its strategy for a **circular economy**... if your head is spinning after the Bio-economy, the methane economy, the sharing economy, the care economy and the hydrogen economy then the circular economy will bring you around. Not just recycling, it's cradle to cradle: turning fossil fuel emissions into more CO_2 emissions; replacing resource extraction with 3-D printing (not to be confused with the ILO's 3-D jobs... "Dirty, Dangerous and Difficult"); recycling the water used to make infant formula (throwing out the baby and keeping the bathwater); and generally turning nanotechnology and synthetic biology into planetary saviours.

"Here kitty kitty..."

Deepmind trained to identify cat images.

Happy New Year!

Endnotes:

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