

# Sustainability Matters

3<sup>rd</sup> March 2016

A fortnightly selection of topical **news and views** about economic, social and environmental issues.

Designed especially for accountants and those who use the services of accountants.

## Sustainability Matters is;

- Compiled and published by Ray Skinner of *Sustainability Matters*, providers of specialist services relating to sustainability and business support. **Business achieving a tomorrow for tomorrow's children.**

## Integrated Reporting: Will It Make a Difference?

*This piece by Nick Shepherd was originally published by IFAC (International Federation of Accountants) as one of its 'Top 10' articles.*

"... So for integrated reporting to be effectively implemented, the metrics developed must be strategic in nature and directly linked to the drivers of organisational value and sustainability. This requires adoption and complete understanding from investors so as an interested party, they start asking the right questions. In many situations, being asleep at the wheel can be caused by not knowing what you don't know. If investors don't understand the interaction of the organisational resources used to create and sustain value, it is going to be hard to support the required strategies for sustainability.

"A key challenge for leadership – both managers and investors – will be making the right decisions. Business attempts to operate on a level playing field and, within this, to make decisions that gain a competitive advantage. This in itself is a challenge in a global business environment with a wide range of differing legislative frameworks. Survival is about making the right decisions and balancing financial returns, which drive access to capital with sustainable decisions both for the business and for society. Successful organisations will be those whose decision makers are closest to the societies and communities within which they operate, know the drivers of organisational value and sustainability, and can make fast and informed decisions.

"It could be argued organisations which already have this integrated thinking have no need for a structured approach to integrated reporting as it already forms the foundation of their business model? However recent studies appear to indicate few companies have yet integrated this approach to explain sustainable thinking.

**More:** [www.hrmaturity.com/integrated-reporting-will-it-make-a-difference/](http://www.hrmaturity.com/integrated-reporting-will-it-make-a-difference/), plus [www.ifac.org/global-knowledge-gateway/business-reporting/discussion/integrated-reporting-will-it-make-difference](http://www.ifac.org/global-knowledge-gateway/business-reporting/discussion/integrated-reporting-will-it-make-difference), and [www.ifac.org/global-knowledge-gateway/governance/discussion/corporate-governance-and-transparency-chicken-or-egg](http://www.ifac.org/global-knowledge-gateway/governance/discussion/corporate-governance-and-transparency-chicken-or-egg)

**Source:** Nick A. Shepherd, 17<sup>th</sup> February 2016. ❖

## Quotes of the Week

"Doing nothing gets you nothing." Sean Reichle

"An ant on the move does more than a dozing ox." Lao Tzu

**Source:** Ann Andrews and the team, 18<sup>th</sup> February 2016. ❖

## SUSTAINABILITY GROUP EVENTS

Next event – Date of webcast yet to be 'sorted'.



Announcements in 'due course'. ❖

## Integrated Reporting – Panel Discussion Seminar

"Users say corporate reporting is no longer fit for purpose – hence the call to New Zealand business for integrated reporting. The panelists at this session will outline the benefits, the domestic and international progress, and propose actions for decision makers that might make integrated reporting more 'top of mind'.

The key speaker is Paul Druckman, Chief Executive Officer of the International Integrated Reporting Council (IIRC), who is well known and respected in business and the accounting profession worldwide. Following an entrepreneurial career in the software industry, Paul operated as a non-executive chairman and director for a variety of companies. He is a former Director of the UK Financial Reporting Council, member of the City Takeover Panel, and President of the Institute of Chartered Accountants in England and Wales. He has also chaired the executive board of Accounting for Sustainability, set up by the Prince of Wales.

### Panelists

- Ann Webster is Assistant Auditor-General, Research and Development in the Office of the Auditor-General. Ann has a long-standing interest in public sector performance reporting.
- Jane Diplock AO is a Director of the International Integrated Reporting Council Board, a Director of Singapore Exchange and a Member of the Public Interest Oversight Board.
- Warren Allen is CE of the External Reporting Board and is a former President of IFAC and partner of EY.
- Mark Hucklesby is Grant Thornton's National Technical Director with 20 years' experience creating and interpreting or commenting on internationally recognised standards.

**Date/Time:** Wed 16<sup>th</sup> March, 4.45pm for a 5pm start, light refreshments 6.30 to 7pm

**Where:** Level 3, Owen G Glenn Building, Grafton Rd, Auckland

**More:** [www.business.auckland.ac.nz/en/about/seminars-and-events/2016/march/meeting-user-expectations.html](http://www.business.auckland.ac.nz/en/about/seminars-and-events/2016/march/meeting-user-expectations.html)

**Source:** Mark Hucklesby, 18<sup>th</sup> February 2016. ❖

## 6 Principles to Catalyse a New Generation of Collaboration for Sustainability

"With the arrival of the UN Sustainable Development Goals (SDGs) and the COP21 agreement (or 'Paris Agreement') on climate change at the end of 2015, there has been a rush of new and renewed calls for cross-sector collaboration to implement them. The last of the 17 SDGs – 'Revitalise the global partnership for sustainable development' – underscores this and lays out a broad collaborative agenda in the realms of finance, technology, capacity building, trade and systemic factors. And it's working .... 65 pages, 4.27Mb

**More:** [www.sustainability.com/blog/6-principles-to-catalyze-a-new-generation-of-collaboration-for-sustainability](http://www.sustainability.com/blog/6-principles-to-catalyze-a-new-generation-of-collaboration-for-sustainability) plus [www.sustainability.com/library/orchestrating-change](http://www.sustainability.com/library/orchestrating-change)

**Source:** SustainAbility, 2<sup>nd</sup> February 2016. ❖

## Wise Response Strategy Workshop and Public Meeting: How does NZ Move Forward from COP21?

"On 27<sup>th</sup> January 2016, Wise Response convened a workshop and also a public forum in Wellington. The workshop was to test interest in a strategic plan on just how NZ might meet its obligations in limiting global warming to the 1.5 degree limit identified in Paris.

"Wise Response considers that to achieve this much better mechanisms for addressing long range, structural and systemic sustainability issues and options will be needed. The two main vehicles explored were;

- A coalition of like-minded NGOs and other concerned parties to develop and promote a long range strategic plan and speak as a single voice for concerted action
- To explore the feasibility of a formal and independent body (e.g. a Climate and/or Futures Forum and/or Commission), whose purpose(s) would be to provide advice to govt on long-range planning needs, including global warming.

"Eighteen organisations were represented at the workshop and a number of experts provided information for the facilitated discussion sessions. The Workshop endorsed;

- The outcome of COP21 aim to stay within 1.5 degrees global warming
- The necessity for a paradigm shift in thinking in NZ
- The desirability of a Climate Forum and an independent Commission (publicly or privately funded, to be developed)
- Majority support from 18 organisations in further exploring the feasibility of a more effective coalition to address the risks we face.
- Amendments to RMA Act and Emissions Trading Scheme consistent with international obligations
- Interest in having a full time employee to facilitate the process.

"A public meeting followed the Workshop with the theme *The Paris Agreement on Climate Change: How New Zealand can up its game* hosted jointly with the Institute of Governance and Public Policy at Victoria University (Prof. Jonathan Boston Chair). Speakers were Sir Geoffrey Palmer on *Climate Change and the law: International and Domestic*, Dr Alison Dewes, Agribusiness Consultant, *"Opportunities in agriculture to reduce GHG emissions"*, Mr Rod Oram, economics/political commentator, *The transport issue and transfer to renewable energy resources*, and James Young-Drew of GenZero and leader of the Youth Delegate to the Paris COP21 Conference *"Why a New Zealand response to COP21 is urgent"*.

"The meeting was standing room only at 250-300 persons so clearly, interest in what NZ can/should/will do after Paris is high. We are currently planning a follow up meeting in Wellington to further the process, following a meeting of our local members. All the presentations and information from the workshop has been posted on our website.

**More:** <http://wiseresponse.org.nz/?p=7851>

**Source:** Wise Response, 19<sup>th</sup> February 2016.

**Editor:** In particular see Sir Geoffrey Palmer's [lengthy and fascinating] *The Paris Climate Change Agreement and the Law: International and Domestic*. ❖

## Methane Gas and what it Means to USA

Excellent insights in this article; not canvass agricultural methane. **More:**

**More:** [www.environmentalleader.com/2016/02/29/epa-chief-methane-emissions-substantially-higher-than-we-thought/](http://www.environmentalleader.com/2016/02/29/epa-chief-methane-emissions-substantially-higher-than-we-thought/)

**Source:** *Environmental Leader*, 1<sup>st</sup> March 2016. ❖

## How Forest Loss Is Leading To a Rise in Human Disease

"In Borneo, an island shared by Indonesia and Malaysia, some of the world's oldest tropical forests are being cut down and replaced with oil palm plantations at a breakneck pace. Wiping forests high in biodiversity off the land for monoculture plantations causes numerous environmental problems, from the destruction of wildlife habitat to the rapid release of stored carbon, which contributes to global warming.

"But deforestation is having another worrisome effect: an increase in the spread of life-threatening diseases such as malaria and dengue fever. For a host of ecological reasons, the loss of forest can act as an incubator for insect-borne and other infectious diseases that afflict humans. The most recent example came to light this month in the *Journal of Emerging Infectious Diseases*, with researchers documenting a steep rise in human malaria cases in a region of Malaysian Borneo undergoing rapid deforestation.

"This form of the disease was once found mainly in primates called macaques, and scientists from the London School of Tropical Medicine and Hygiene wondered why there was a sudden spike in human cases. Studying satellite maps of where forest was being cut down and where it was left standing, the researchers compared the patchwork to the locations of recent malaria outbreaks. They realised the primates were concentrating in the remaining fragments of forest habitat, possibly increasing disease transmission among their own populations. Then, as humans worked on the new palm plantations, near the recently created forest edges, mosquitoes that thrived in this new habitat carried the disease from macaques to people.

"Such phenomena are not uncommon. 'In years when there is a lot of land clearance you get a spike in leptospirosis [a potentially fatal bacterial disease] cases, and in malaria and dengue', says Peter Daszak, president of Ecohealth Alliance, which is part of a global effort to understand and ameliorate these dynamics. 'Deforestation creates ideal habitat for some diseases.'

"The Borneo malaria study is the latest piece of a growing body of scientific evidence showing how cutting down large swaths of forests is a major factor in a serious human health problem – the outbreak of some of the world's most serious infectious diseases that emerge from wildlife and insects in forests. Some 60% of the diseases that affect people spend part of their life cycle in wild and domestic animals.

"The research work is urgent – land development is rapidly taking place across regions with high biodiversity, and the greater the number of species, the greater the number of diseases, scientists say. They are deeply concerned that the next global pandemic could come out of the forest and spread quickly around the world, as was the case with SARS and Ebola, which both emerged from wild animals. ....

"Throughout human history pathogens have emerged from forests. The Zika virus, for example, which is believed to be causing microcephaly, or smaller than normal heads, in newborns in Latin America, emerged from the Zika forest of Uganda in the 1940s. Dengue, Chikungunya, yellow fever, and some other mosquito-borne pathogens likely also came out of the forests of Africa. ....[ A lengthy fascinating, thought provoking article.]

**More:** [http://e360.yale.edu/feature/how\\_forest\\_loss\\_is\\_leading\\_to\\_a\\_rise\\_in\\_human\\_disease\\_malaria\\_zika\\_climate\\_change/2965/](http://e360.yale.edu/feature/how_forest_loss_is_leading_to_a_rise_in_human_disease_malaria_zika_climate_change/2965/)

**Source:** *Yale Environment 360*, 26<sup>th</sup> February 2016. ❖

## The PM's 2016 Summer Reading List

"Welcome to our annual recommended summer reading list for the Prime Minister of New Zealand. Thinking about NZ's long-term future is the overarching purpose of the Institute. It is with this in mind that we have identified the following observations from 2015 that will shape our recommended reading list and our work programme for 2016. ....

1. **The Joy of Tax** (October 2015). Tax is what enables governments to help build resilience and improve wellbeing. But are we taxing the poor too much and the wealthy too little? Are we policing our tax laws well enough? Are we operating in a fair way? ... Are there unintended consequences of our tax system we are not seeing? ...
2. **Superforecasting: The art and science of prediction** (September 2015). I stopped thinking like an accountant when I realised that taking last year's earnings as a basis for forecasting next year's earnings no longer worked. Instead we need a new way of understanding and exploring the world we live in. ....The best forecasters are less interested in whether they were right or wrong but in why they were right or wrong. We need to continuously look for ways to improve our performance and this book provides some useful insights. Importantly, this book suggests prediction is not only possible; it is teachable. This approach should be embraced by MPs and the public service, particularly given the challenges ahead. ...
3. **Strategy Rules: Five Timeless Lessons from Bill Gates, Andy Grove, and Steve Jobs** (April 2015). Once you have an understanding of the future, it is time to shape the future by developing a responsive strategy. This simple book aims to share some home truths. What I really like ... is its focus on 'look forward, reason back' and 'build platforms and ecosystems'. This year I have focused on building a team at the office that is not rule-based but principle-based. My vision has been an ecosystem. You can imagine how delighted I was to find a subsection in this book titled 'Think Ecosystems, not just Platforms' ....
4. **Strategy Builder: How to Create and Communicate More Effective Strategies** (March 2015). Strategy Builder is co-authored by New Zealand's own Stephen Cummings. ... His latest book is written in such a way as to showcase the world's best strategy frameworks and then illustrate how to combine these creatively in order to communicate and discuss the desired strategy. Developing strategy is hard but communicating strategy quickly is even harder, and the value of this book is that it addresses both of these challenges.
5. **How to run a Government** (March 2015) provides a good backdrop to understanding how principles are important for determining strategy and strategy are important for determining public policy. It also has a great section on Stewardship: The role of the centre of a service (pages 92 to 98). It identifies three functions the system needs to consider centrally in order to leave the system better than how it was found ....
6. **Thing Explainer: Complicated stuff in simple words** (November 2015) is included because MPs and policy analysts will need to explain lots of complicated stuff in 2016. As we move forward, trends will combine in a multitude of ways, delivering a variety of outcomes. One of the tools to manage complexity is to make things less complicated. I think the best embodiment of the difference between complex and complicated that I have ever come across is an iPhone. It is not complicated to use, but it is complex to build and even more complex to fix....

**More:** <http://mcguinnessinstituteblog.org/2015/12/24/prime-ministers-2016-summer-reading-list/>

**Source:** McGuinness Institute Newsletter, 26<sup>th</sup> February. ❖

## NZ Post Confirms Electric Vehicles as the Way of the Future

"New Zealand Post is making a significant investment in its parcel and mail business with the addition of new electric delivery vehicles to its fleet.

"A total of \$15m has been set aside for the purchase of the fully electric vehicles over the next two years from Norwegian manufacturers Paxster AS. The first shipment of 50 Paxsters is due to arrive in mid-2016.

"The four-wheeled battery powered vehicles will be used for the combined delivery of parcels and mail in residential areas in larger centres nationwide, appearing in parts of Auckland later this year.

"The four-wheeled vehicles carry loads of up to 200kg but are still small enough to be used on the footpath. They have been part of a successful pilot of combined parcel and mail delivery in Taranaki and have been tested in road trials in Auckland and Wellington.

"Dawn Baggaley, Corporate Sustainability Manager at NZ Post, says 'This is a significant investment in alternative technology and New Zealand Post will arguably be the biggest user of road legal electric vehicles in the country.'

"Dawn says New Zealand Post has ambitious greenhouse gas reduction goals through to 2020 and the investment in the eco-vehicles will support the company reaching those targets.

"..... Another advantage of the Paxster is it is custom designed for efficient and low impact delivery, and our staff will be using vehicles specifically built for their jobs.'

"The Paxster won an Honours Award for Innovation Excellence given by the Norwegian Design Council in 2013.

**More:** <http://sustainable.org.nz/sustainability-news/nz-post-confirms-electric-vehicles-as-the-way-of-the-future>

**Source:** SBN, 24<sup>th</sup> February 2016. ❖

## Revolutionising Resource Use – How Your Business Can Benefit from the Circular Economy

"This learning and networking event will give practical insights into how you can embrace the circular economy and add value to your business. It features talks by leading sustainability organisations.

"Hear practical insights from leading organisations such as Wishbone Design, Tork, Philips and Inzide Commercail (supplier of Interface carpet tiles) into how they have embraced the circular economy and are adding value to their businesses as a result....

**When/Where:** 4:00 to 7:00pm 9<sup>th</sup> March 2016, AUT Auckland

**More:** <http://sustainable.org.nz/sustainable-business-events/auckland/revolutionising-resource-use-how-your-business-can-benefit-from-the-circular-economy>

**Source:** SBN, 22<sup>nd</sup> February 2016. ❖

## Record Inflow Takes Australian Ethical past \$1.4 billion FUM

"Fund manager Australian Ethical Investment has boosted funds under management by 13% in the December 2015 quarter to \$1,401.3 million helped by lower fees and a three-minute joining process, chief executive Phil Vernon said.

"Net flows have continued to increase strongly with record flows for the month of December 2015 of \$34m," Vernon said.

"Our strategy to progressively reduce our fees in our superannuation fund has also contributed to the increasing new business volumes. ....

**More:** <http://ethicalinvestor.com.au/record-inflow-takes-australian-ethical-past-1-4-billion-fum/>

**Source:** *Ethical Investor*, 5<sup>th</sup> February 2016. ❖

## The Big Sustainability Shift

Reflections by outgoing SBC CEO Penny Nelson.

**More:** <https://www.linkedin.com/pulse/big-sustainability-shift-penny-nelson>

**Source:** *LinkedIn Pulse*, 2<sup>nd</sup> March 2016. ❖

## Talented and Influential Sustainability Experts Sought by Auckland Council

"The Chief Sustainability Office is hiring. We're looking for talented and influential sustainability experts who can deliver.

"After the office's first year, we're now undergoing a slight change that opens up three new roles at a more senior level, including:

- Principal Specialist Sustainability and Climate Resilience <https://careers.aucklandcouncil.govt.nz/jobdetails?ajid=dGJSk>
- Principal Specialist Sustainability and Climate Mitigation <https://careers.aucklandcouncil.govt.nz/jobdetails?ajid=WJJSk>
- Principal Specialist Corporate Sustainability <https://careers.aucklandcouncil.govt.nz/jobdetails?ajid=kLJSk>

"Closing date 20<sup>th</sup> March. Applications accepted online.

**Source:** John Mauro, Chief Sustainability Officer, 6<sup>th</sup> Feb. ❖

## Soil Testing from the Sky

"... At the end of this season we will have intensively sampled eight research farms geographically covering both the North and South Islands – including Otago, Canterbury, Nelson, Wairarapa, Hawkes Bay, Wanganui, Central North Island, and the Waikato.

"In the two years since we started we have already delivered on one key aspect ahead of schedule. In two topdressing planes we can now send an electronic instruction to the plane that ensures fertiliser is automatically applied at the intended rate when the plane is over the target area with a post application record of the event.

"No more do farmers need to be concerned that the fertiliser went on the wrong paddock or even the wrong farm. The next step is to automatically apply fertilisers at different rates within a hill country farm based on enhanced resolution from the scanning results.

"This is absolutely transformational, a world first so far as we know, and represents the biggest advancement since topdressing began in the 1950's. When we speak to shareholders about this the most common sentiment thus far has been 'can you go faster with this project?', such is the opportunity for enhancing the performance of our hill country farms and the farmers' desire to leverage technology to improve.

**More:** <http://pureadvantage.org/news/2016/02/16/soil-testing-from-the-sky/>

**Source:** Pure Advantage, 23<sup>rd</sup> February 2016. ❖

## The Elements of Power by David Abraham

Reviewed by Dr Robert Howell.

"This is a book I recommend for people interested in the technological challenges to a sustainable future. Subtitled *Gadgets, Guns, and the Struggle for a Sustainable Future in the Rare Metal Age* [2015], it is an account of the dependence of technology on rare metals, and the political, economic and ecological implications. [1½ pages; copy attached.]

**More:** [www.theguardian.com/technology/2016/jan/11/the-elements-of-power-the-rare-earth-metal-age](http://www.theguardian.com/technology/2016/jan/11/the-elements-of-power-the-rare-earth-metal-age), plus [www.nytimes.com/2015/11/20/opinion/the-next-resource-shortage.html](http://www.nytimes.com/2015/11/20/opinion/the-next-resource-shortage.html) and [www.amazon.com/The-Elements-Power-Struggle-Sustainable/dp/0300196792](http://www.amazon.com/The-Elements-Power-Struggle-Sustainable/dp/0300196792).

**Source:** Robert Howell 21<sup>st</sup> February 2016. ❖

## Social Enterprise Workshops

"If you've got an idea, want to build your enterprise, or simply interested in finding out more about social enterprise in New Zealand, we [Akina Foundation] offer a series of short workshops. The following workshops are currently available on a regular basis ....;

- [Intro to Social Enterprise](#) is for people and organisations who are keen to gain a better understanding of social enterprise and the impact it can make
- [Starting a Social Enterprise](#) is for those who have a great idea or are in the early stages of setting up a social enterprise
- [Social Enterprise for Not-For-Profits](#) is for NFP leaders who want to explore the process and challenges of starting social enterprise
- [Designing Impact for Social Enterprise](#) is for social enterprises which want to explore how to measure and communicate their positive impact.

"We can deliver these workshops as a series, in partnership with funders, councils and economic development agencies in any location. To discuss options, please contact us. [Workshops recently held in Wgtn, Auck and Chch].

**Plus:** *Understanding Impact Investment in NZ*

**More:** <http://akina.org.nz/programmes/workshops/>

**Source:** SBN, 22<sup>nd</sup> February 2016. ❖

## What DiCaprio Said at the Oscars

If you want to know what Leonardo really said in the speech accepting his Oscar on Sunday night as Best Actor see the videos and text at;

- [www.bustle.com/articles/144803-transcript-of-leonardo-dicaprios-oscars-acceptance-speech-gets-political-about-climate-change-video](http://www.bustle.com/articles/144803-transcript-of-leonardo-dicaprios-oscars-acceptance-speech-gets-political-about-climate-change-video)
- [www.bustle.com/articles/144722-leonardo-dicaprio-wins-best-actor-at-the-2016-oscars-its-about-time-video](http://www.bustle.com/articles/144722-leonardo-dicaprio-wins-best-actor-at-the-2016-oscars-its-about-time-video)

**More:** [www.theguardian.com/environment/2016/feb/29/how-leonardo-dicaprio-oscar-climate-change-campaigner](http://www.theguardian.com/environment/2016/feb/29/how-leonardo-dicaprio-oscar-climate-change-campaigner)

**Source:** *eco-News*, 1<sup>st</sup> March 2016. ❖

## Case Study: Patagonia's Circular Economy Strategy

"..... Moreover, in terms of benefits from these circular economy initiatives, Patagonia is reaping several 'ancillary rewards' beyond environmental impact reduction. One of these is improved customer service. 'Worn Wear is all about prolonging the life of products, which translates into a meeting of customer service demands. I think people in general are tired of being let down by large corporations and not receiving good service, and not having them repair things yet failing to explain why', states Cohen.

"On the other hand they know we are going to stand by our products and take responsibility for them and also support any secondary owners. So when we tell people to go ahead and put their old Patagonia gear on Yerdle and trade them around, we treat them [secondary owners] as our customers just as much as the person who initially bought it," she adds.....

**More:** <http://1.ethicalcorp.com/LP=8770> 4 pages (net)

**Source:** *Report Alert*, 9<sup>th</sup> February 2016.

**Editor:** In a word 'Built to last'

**Plus:** [www.greenbiz.com/article/can-circular-thinking-set-us-free-recycling-religion](http://www.greenbiz.com/article/can-circular-thinking-set-us-free-recycling-religion). ❖

Contributions and feedback are welcomed.

Send your news items, handy hints, case studies, suggestions, comments and questions to Ray Skinner of *Sustainability Matters*.

eMail: [ray@sustainabilitymatters.co.nz](mailto:ray@sustainabilitymatters.co.nz) Phone: +64 (09) 443 0773 Web: [www.sustainabilitymatters.co.nz](http://www.sustainabilitymatters.co.nz)

Book Review: *The Elements of Power* by David Abraham (2015: Yale University Press)  
Reviewed by Dr Robert Howell

This is a book I recommend for people interested in the technological challenges to a sustainable future. Subtitled *Gadgets, Guns, and the Struggle for a Sustainable Future in the Rare Metal Age*, it is an account of the dependence of technology on rare metals, and the political, economic and ecological implications.

The importance of rare metals is illustrated by the recounting of Ford's comment: "But for vanadium there would be no automobiles". Ford copied French carmakers to use vanadium steel alloy that was lighter, harder and stronger. In the first world war, the Germans were able to make a gun through the use of molybdenum, Big Bertha, that was able to withstand the heat of firing. The Germans obtained this rare metal from the British colony of Burma. The British initially supplied tungsten ore to Germany, used to strengthen steel cutting tools, until they realised its importance.

But it is the greater use of rare metals in modern technology that makes rare earth metals so important. Abraham states that if the Eiffel Tower was built today only 2000 tons of steel, rather than 7000 would be used because of the addition of niobium. Just a pinch of niobium per ton strengthens steel, reduces its weight and increases its heat resistance. It is used in building pipes, bridges and turbines. (Brazil produces 85% of the world's niobium.) Rare metals make the products such as computers, iphones, tablets, smaller, faster and more powerful. They make permanent magnets that are found in automobile, medical and military products. They are at the core of a lot of green technology, such as electric cars, solar and wind power. They are used in a variety of goods, such as toothbrushes. An electric toothbrush needs circuit boards dotted with materials of tantalum in a capacitor to store energy; neodymium, dysprosium, boron, and iron magnet to provide the power to spin brushes at 31000 strokes per minute; batteries made from nickel and cadmium or lithium. The 35 metals needed come from 6 continents.

Cobalt is used in the manufacture of permanent magnets. In the 1970's 40% of cobalt came from Zaire. Soviet backed rebels fought Mobutu and the price increased and supply became unreliable. Arising from that period efforts were made to reduce dependence on cobalt. Sagawa in Japan did create a permanent magnet without cobalt, using dysprosium. This is mainly found in China. In 2010 when China was in dispute with Japan over East China Sea islands, the supply of neodymium and dysprosium was halted until China's demands were met. China lost two WTO cases over its export quotas, but the general strategy of better control and local value added production will not change.

China controls about 40% of all rare metal, and is the leading global producer of 28 advanced metals. But instead of exporting rare earths to help create jobs in Japan and elsewhere, China wants to build high-tech plants in China and employ Chinese. Already every major wind turbine manufacturer has moved operations to China. Historically the United States supplied all the cerium and neodymium for General Electric's lightbulbs, but all that is now done in China.

The difficulty with the political consequences of where rare earths are located is that substitutes are not easily found. Graedel, Yale School of Forestry and Environmental Studies, found that out of 62 metals he studied, not one metal has a substitute that can replace it for all its original major uses. Twelve have no suitable substitute for any of their properties.

China has been able to produce many of its rare metals due to lower labour costs and environmental standards. Their inadequate environmental standards have led to significant degradation, particularly around the mines. According to Beijing officials, 2000 kilograms of tailings are created to produce every kilogram of rare earths, and some officials believe that they have sacrificed the country's environment for little profit. From a Chinese perspective countries have outsourced their pollution to it. A good deal of the rare metal that China produces could not be done elsewhere (such as Japan) because of environmental regulation. To deal with the environmental degradation worldwide, costs will rise across the whole cycle.

In looking at the introduction of sustainable, earth-friendly and efficient products, the whole life cycle needs to be considered. Nokia and Apple found that only 15% of the greenhouse gases of the whole life cycle of many of their products came from the electricity needed to charge them; the rest is due to manufacturing, shipping and disposal. It is often greener to continue to use an older product rather than buy newer more efficient models.

But the biggest concern for rare metal supply lines, according to Abraham, may be that our new energy saving gadgets work too well and that green tech will quickly become the best tech. With the demand to avoid the impact of climate warming, technology will become dependent on rare earth metals in quantities that are unlikely to be available. Costs will rise and political conflict is likely.