Ethical Investing, Carbon-Neutrality and the Internet-of-Things

Dr Quintin Rayer
DPhil, Chartered FCSI, Chartered Wealth Manager, SIPC
Head of Research and Ethical Investing, P1 Investment Management Ltd

September 05, 2018

ABSTRACT

Environmentally-focused investors often consider climate risks and carbon emissions reduction. Current efforts to report and reduce emissions may prove insufficient to meet the 1.5°C Paris climate goal. Analysis suggests that emissions need to reduce by at least 40% by 2030. To avoid a Malthusian trap, companies need to develop strategies for carbon-neutral operations. Offsetting can help, but emissions reductions are preferable. Technologies associated with the internet-of-things may deliver 15-20% emissions reductions by 2030, mostly via energy and efficiencies, which is far less than the 40% required. IoT technologies can also help with data collection for climate models, and monitoring emissions activities by specific countries and firms to support attribution activities. Ethical investors can support companies that develop strategies for attaining zero emissions or carbon-neutrality. They can also help identify and support firms developing the IoT technologies that are contributing to the above areas.

Keywords: Ethical Investing, Internet-of-Things, Global Warming, Carbon Emissions, Carbon-Neutrality, Zero Net Carbon, Offsetting, Sustainability.

INTRODUCTION

Human activities are well established as the leading cause of global warming [1], with cumulative carbon dioxide emissions the primary driver, a view supported by over 97% of peer-reviewed scientific papers [2]. Environmentally focused investors often consider climate risks [3], [1] including rising sea levels, and extreme weather [4], [5]. Sustainable investing is used to encourage companies to avoid harmful environmental, social and governance practices; including monitoring and reduction of carbon emissions and other greenhouse gases (GHGs).

The science of attributing extreme weather events to human-induced global warming is developing rapidly [6]. Estimates suggest that under a hypothetical climate liability regime, damage contributions for the 2017 US hurricane season alone might amount to 1-2% of share price for the seven listed companies with the highest emissions [4], [5]. Internet-of-things (IoT) technologies are expected to help reduce carbon emissions by more efficient use of energy and other resources [7], [8], [9]. However, enhanced monitoring technologies, improved computer connectivity and increased simulation capabilities associated with the IoT is also likely to strengthen attribution capacity. Investors are interested in both.

Carbon emissions reduction is often considered in sustainable investment criteria, generally as one factor of many, with some investors divesting from firms extracting and producing fossil fuels [10]. However, very few investors target zero carbon emissions or zero net carbon emissions (carbon-neutrality) directly.

The current paper calls for ethical investors to explicitly require firms not only to report and reduce carbon emissions but also to target a goal of zero net carbon emissions (ZNCE). Companies and individuals developing IoT technologies should focus not just on efficiency gains, but also how they can facilitate monitoring of GHG emissions and support strategies that will allow companies to achieve ZNCE or carbon-neutrality.

CLIMATE CHALLENGES

Current efforts to encourage reporting and reduction of carbon emissions may prove insufficient to meet the UN FCCC (United Nations Framework Convention on Climate Change) aims of holding the increase in global average temperatures to well below 2°C above pre-industrial levels while pursuing efforts to limit increases to 1.5°C above pre-industrial levels [11]. These already accept consequences from global warming, recognising that the risks and impacts of climate change will only be reduced, not eliminated. Given slow uptake from governments and the potential for political pressures to delay progress, current efforts may prove insufficient. Analyses suggest that global CO2 emissions need to reduce by at least 40% relative to business as usual by 2030 for the attainment of the 1.5°C Paris agreement goal [12]. However, for global warming to stabilise, carbon-neutrality is required.

Sustainable investing focused on GHG emissions encourages companies to report and reduce carbon emissions as well as targeting carbon-neutrality. Awareness of ethical investing is increasing rapidly, with £16.3 billion of assets under management in the UK ethical funds sector

in June 2018 according to the Investment Association, an increase of £2.6 billion since June 2017 [13].

A MATHUSIAN TRAP

Carbon reporting and reduction initiatives are useful, but given anticipated population growth and desirable economic development in less-developed countries, they may not be enough. The danger is a Malthusian trap, in which spare capacity gained by emission decreases is absorbed by population growth or increases in economic activity. Quoting Malthus "The power of population is indefinitely greater than the power in the earth to produce subsistence for man" [14]. If carbon emissions are only reduced, the reduction is likely to be taken up by increased global population, or increased emissions per capita, resulting from improved living standards in less well-developed counties. In 'per capita' terms, as population increases, emissions per capita must decrease proportionately, to keep overall emissions stable. To avoid this, emissions per capita must drop to zero; then population increases would have no effect. Although carbon emissions are only one facet; sustainability is required in all aspects.

If there is continued exponential GDP growth in the carbon economy, anything less than an exponential reduction in carbon emissions will make no difference [15]. Accumulated CO2 emissions primarily determine peak human-induced warming until they are reduced to zero. In a faster-growing world economy, if average emissions are not allowed to increase, it will be cost-effective to reduce emissions to zero sooner. What matters for peak global warming is the total emissions used to achieve a given rate of economic growth [15].

The scale of the challenge can be seen by considering energy production from fossil fuels, a major contributor to global warming, with 833 gigatonnes of CO2-equivalent emitted in the 28 years since 1988, slightly more than emitted in the prior 237 years from the start of the industrial revolution [16]. The fossil fuel industry and its products made up 91% of global industrial GHG emissions in 2015. This highlights the need for investor involvement as well as significant market shifts away from reliance on fossil fuels. Major emitters will need to develop a transition plan to exit carbon-intensive technologies.

OFFSETTING

Offsetting should also be explored. If a carbon-intensive business is sufficiently profitable, why not just offset in large volume? There are reasons why such an approach may be undesirable.

If extremely high amounts of carbon offsetting were required, it seems likely that there may be insufficient capacity to meet demand, resulting in a shortfall or the creation of substandard offsetting schemes that may not yield the promised benefits. There are also uncertainties in the estimation of emissions and the true amount of carbon taken up by offsetting schemes. Although offsetting may be carried out in good faith, there is a risk it may prove insufficient. Offsetting is helpful, but it might be wise to use it only as a last resort, or as a temporary measure when nothing better can practically be done. Carbon offsetting could be used primarily in two circumstances:

- After technologies have been used to reduce emissions to as low as practicable, in which case offsetting may be used to absorb any residual CO2 emissions.
- As a temporary measure to mitigate carbon emissions while strategies to adopt lower carbon technologies are developed and implemented.

Any carbon-offsetting is better than doing nothing, but a preferred strategy would be to use technology (or other means) to get emissions as low as practically possible and then to use offsetting to address any remaining emissions to attain ZNCE. Temporarily, while strategies are being developed and implemented to reduce emissions, offsetting would also be acceptable until these are in place.

INTERNET-OF-THINGS AND CARBON-NEUTRALITY

The IoT can contribute significantly to sustainability [9], however the current focus around emissions appears to be on savings in energy consumption, including areas such as electricity distribution (smart metering), services and industry (healthcare, education and government) and transport (route and traffic optimisation). These are projected to help reduce GHGs by up to 15-20% by 2030 [7], [17]. This is helpful but well short of the 40% required [12]. However, they also help promote economic growth, which is useful if additional resources can be invested in the development of carbon-neutral strategies and technologies [15].

It can also help with the collection of data for climate models used to evaluate global warming which already use temperature, precipitation and humidity sensing. IoT should be able to extend this including improved data on ocean temperatures and sea levels [18].

Another crucial role the IoT can play which is mostly overlooked by many commentators is the monitoring of activities that contribute to emissions. Monitoring of illegal logging and

deforestation has been raised [19]. Far more significantly, IoT can help monitor emissions of CO2 and other GHGs, or offsetting benefits, feeding these through to central databases and ultimately to computer climate models to determine their impacts. This could contribute to attribution analyses of emissions to specific countries and companies. Installation of emissions monitoring devices in carbon-emitting technologies might even permit individual emissions to be determined. Thus, supporting emissions transparency for investors and climate scientists alike.

However, the Paris Agreement explicitly rules out loss and damage estimates associated with climate change as a basis for liability. This makes it hard to say how rapidly investors should react to the possibility of companies having (or deciding) to make contributions for damages associated with climate change caused by their past emissions. The barriers to a successful compensation case for climate damages remain substantial, but with the science developing, the possibility remains. For major insurance companies or governments footing the bill, the prospect of multi-billion-dollar pay-outs may focus minds on whether the legal barriers could be overcome, since this may allow them to pass on costs.

CONCLUSIONS

To meet climate change targets, significant emissions reductions will be required. Analyses suggest reductions of 40% in carbon emissions by 2030 are needed to achieve the 1.5°C Paris goal. It is unlikely that current reporting and reduction approaches will be enough. To avoid a Malthusian trap, companies need to develop strategies for zero emissions or carbon-neutrality (ZNCE). Carbon-offsetting is helpful, but uncertainties in how effective it is mean it is preferable to use technology (or other methods) to reduce emissions as much as practically possible and use offsetting to address residual emissions. Offsetting should also be used temporarily while strategies are being developed and implemented to achieve ZNCE.

Current IoT technologies can contribute towards global warming containment but estimates of 15-20% emissions reductions by 2030 fall well short of the 40% required, with further action necessary to meet the 1.5°C Paris goal. Companies need to develop business plans to achieve carbon-neutral operations. Both ethical investors and IoT technologies can support progress in this area.

Ethical investors need to ask for companies to be judged on their development and implementation of ZNCE strategies in addition to current sustainability criteria. Carbon-intensive industries will require a preliminary step of transition to lower-carbon technologies on a realistic

timescale. Without a significant increase in profile, many ethical fund providers will maintain the ‘status quo’ of carbon reporting and limited reduction strategies, rather than including a clear emphasis on the need to target ZNCE. Fund management houses can be tempted to adopt lesser ethical criteria while focusing on the marketing advantages that ethically-labelled funds provide. Lacking expertise in this area, many ethical investors are only weakly positioned to challenge this. The climate science suggests that fund managers’ failure to pursue ZNCE directly may be an important opportunity lost.

Apart from energy and efficiency savings, IoT technologies will need to contribute in other areas including:

- Enhanced data acquisition and collection for climate change models used to evaluate global warming.
- Monitoring of GHG emissions activities, and offsetting benefits, with data collected and used to improve attribution analyses of emissions by specific countries and firms.

Wealth management companies that select ethical funds have an essential role. They can screen funds to determine which are most suitable for their clients. They can also help identify and support firms that are developing the IoT technologies that are actively contributing towards GHG emissions reduction, products that support strategic moves towards ZNCE, climate data collection for global warming analyses, as well as methods that enhance collection and distribution of emissions and offsetting data from individual counties and companies.

To make progress towards containing global warming, ethical investors and IoT technologists will need to work together at many levels: investors to support companies developing ZNCE strategies, or IoT technologies promoting those strategies, and IoT developers to research and implement the novel technologies required.

REFERENCES

[1] N. Stern, "Stern Review executive summary," New Economics Foundation, London, 2006.

[2] J. Cook, D. Nuccitelli, S. A. Green, M. Richardson, B. Winkler, R. Painting, R. Way, P. Jacobs and A. Skuce, "Quantifying the consensus on anthropogenic global warming in the

scientific literature," *Environ. Res. Lett.,* vol. 8, no. 024024, p. 7, 2013.

[3] J. Porritt, "The world in context: beyond the business case for sustainable development," Cambridge: HRH The Prince of Wales' Business and the Environment Programme, Cambridge Programme for Industry, 2001.

[4] Q. G. Rayer and R. J. Millar, "Investing in Extreme Weather Conditions," *Citywire Wealth Manager®,* no. 429, p. 36, 8 February 2018.

[5] Q. G. Rayer and R. J. Millar, "Investing in the climate," *Physics World,* vol. 31, no. 8, p. 17, August 2018.

[6] National Academies of Sciences, Engineering, and Medicine, "Attribution of Extreme Weather Events in the Context of Climate Change," The National Academies Press, Washington, DC, 2016.

[7] Ericsson, "ICT and the low carbon economy," Extract from the Ericsson Mobility Report, EAB-15:037849/1 Uen, Revision A, Stockholm, 2015.

[8] K. L. Lueth, "The effect of the internet of things on sustainability," 27 January 2018. [Online]. Available: https://dzone.com/articles/the-effect-of-the-internet-of-things-on-sustainabi. [Accessed 30 August 2018].

[9] R. Arias, K. L. Lueth and A. Rastogi, "The effect of the internet of things on sustainability," World Economic Forum, 21 January 2018. [Online]. Available: https://www.weforum.org/agenda/2018/01/effect-technology-sustainability-sdgs-internet-things-iot/. [Accessed 30 August 2018].

[10] 350.org, [Online]. Available: https://350.org/. [Accessed 30 August 2018].

[11] UN FCCC, "Adoption of the Paris Agreement," United Nations Framework Convention on Climate Change, 2015.

[12] R. J. Millar, C. Hepburn, J. Beddington and M. R. Allen, "Principles to guide investment

towards a stable climate," *Nature Climate Change,* vol. 8, pp. 2-4, 2018.

[13] Investment Association, "Fund Statistics," 30 June 2018. [Online]. Available: https://www.theinvestmentassociation.org/fund-statistics/. [Accessed 30 August 2018].

[14] T. R. Malthus, An Essay on the Principle of Population, Oxford World's Classics reprint, 1798.

[15] M. R. Allen, "Drivers of peak warming in a consumption-maximizing world," *Nature Climate Change,* no. DOI: 10.1038/NCLIMATE2977, p. 4, 2016.

[16] P. Griffin, "The Carbon Majors Database, CDP Carbon Majors Report 2017," 2017.

[17] "#SMARTer2030, ICT Solutions for 21st Century Challenges," Global e-Sustainability Initiative (GeSI) and AccentureStrategy, Brussels, 2015.

[18] Technative, "Could IoT Help Combat Climate Change?," 9 October 2017. [Online]. Available: https://www.technative.io/could-iot-help-combat-climate-change/. [Accessed 31 August 2018].

[19] K. Williams, "How the Internet of Things can fight climate change," 2 May 2017. [Online]. Available: energypost.eu/internet-things-can-fight-climate-chang. [Accessed 31 August 2018].

CITATION

This paper may be cited as: Q G Rayer (2018), Ethical Investing, Carbon-Neutrality and the Internet-of-Things, Pre-release from proceedings of the International Conference on the Internet-of-Things and Smart Machinery (IoTsm 2018), Imperial College, London, United Kingdom, 5-6 September 2018, 8 pages.