Evolution of the New Zealand Voluntary Carbon Market: An Analysis of CarboNZero client disclosures

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Abstract
Climate change has the potential to dramatically change the world as we know, both in terms of the environment and the way in which societies operate. Public policy responses to climate change continue to evolve, with many western economies proposing mechanisms for emission reductions, for example through a tax on carbon or emissions trading schemes. In the absence of finalised regulation, organisations choosing to offset their carbon emissions are engaging in the voluntary carbon market (VCM). Through an empirical description and analysis of organizations comprising the VCM field in New Zealand, this paper provides evidence of the evolution of the carbon market as well as the level of success of CarboNZero's certification programmes (CarboNZero^{Cert} and CEMARS^{Cert}) in reducing organizational emissions. Examination of disclosure documents of clients of CarboNZero indicate that the growth of VCM in New Zealand is slowing down. Further, CarboNZero's programmes were found to be only modestly effective. This research thus finds that incorporation of carbon accounting is not necessarily evidence of organizational action or improvement on climate change abatement.

Keywords
New Zealand, organizations, disclosures, climate change, greenhouse gas emissions, carbon management

Introduction

Climate change is arguably the greatest challenge facing humanity in the twenty-first century. The scientific consensus is that global warming is due to anthropogenic greenhouse gas (GHG) emissions (IPCC, 2013) and both adaptation and mitigation are necessary to reduce the risks of dangerous climate change. The debate has moved beyond environmental and scientific spheres to political, social and economic arenas. As Choi et al. (2013, p. 58) explain, 'there have been strong calls from environmental, business and political leaders to respond to the myriad of challenges that the threat of global warming brings'. Public policy responses to climate change continue to evolve, with many western economies instituting mechanisms for emission reductions, for example through a tax on carbon (e.g. province of British Columbia, Canada) or emissions trading schemes (e.g. European Union, New Zealand).

Carbon trading emerged from international climate change debates as the favoured, politically acceptable, policy mechanism to mitigate GHG emissions (UNFCCC, 1998). These markets are now the primary international policy approach to mitigate climate change (Lovell & Ghaleigh, 2013) and a growing body of literature exploring carbon markets (e.g. Lohmann & Sexton, 2010; Newell, Pizer & Raimi, 2013) and carbon offsetting (e.g. Mackerron, Egerton, Gaskell, Parpia & Mourato, 2009; Lovell & Liverman, 2010; Milne & Grubnic, 2011) has emerged. The decentralised and collaborative nature of markets is suggested to provide flexibility and result in cost-effectiveness (Bäckstrand & Lövbrand, 2006). This market approach relies on the principle that internalizing an external environmental cost can transcend the tensions between economic development and environmental protection (MacKenzie, 2009).[1]

In the case of carbon markets, emissions are commodified with the aim to drive a shift toward a low-carbon economy. Proponents often take a pragmatic posture arguing that the problem of climate change is so urgent and the market so powerful that the latter has to be incorporated into the solution steering toward ecological goals (Mol, Sonnenfel & Spaargaren, 2009). They emphasise the win-win possibilities with several case studies highlighting the business case for climate change action (e.g. Schultz & Williamson, 2005; Tang & Yeoh, 2007; Sullivan & Gouldson, 2013). Yet while Hrasky (2012, p. 176) suggests 'the way in which firms interact with the natural environment is increasingly being seen as an important aspect of corporate legitimacy', Veal and Mouzas (2012) find that the price of carbon remains too low to change corporate behaviour (see also Milne & Grubnic's (2011) analysis of New Zealand's national carbon emissions).

There is an on-going debate about whether or not voluntary carbon trading without a cap (e.g. Braun, 2009; Wittneben, Okereke, Banerjee & Levy, 2012) can lead to absolute emission reductions. Additionally, there is concern surrounding the efficacy of voluntary carbon offsetting in general (e.g. Spash, 2010): the voluntary market tends to have lower transaction costs, which often translates to offset schemes that are less rigorous in nature (e.g. Lovell & Liverman, 2010).

Nevertheless, in the absence or anticipation of state policies, burgeoning voluntary markets are emerging. With the exception of the Chicago Climate Exchange (CCX), where participants determine a voluntary cap by consensus, most voluntary markets are unregulated

[1] With that said, Bohm, Misoczky & Moog (2012) argue that under the market-based mechanism of the Kyoto Protocol, carbon markets will worsen global inequities and exacerbate uneven development. The authors are also critical of the effectiveness of putting a price on carbon as a method of internalizing externalities.

with no fixed reduction targets. The market and companies are left to decide the parameters of carbon trading without the intervention of the state. The field is thus left open for various actors to influence the shaping and creation of new institutions; this influence has been virtually unexplored in the academic literature.

A carbon services industry of consultants, brokers, retailers, certifiers, and auditors is rapidly evolving and expanding to fill any perceived structural holes in the network and to provide a 'social infrastructure of skills' (Voß, 2007, p.339). Certifiers occupy a critical position, acting as intermediaries between consumers and producers of carbon credits. Thus, they have the potential to influence the practices, narratives, governance and regulation of voluntary offsets through a reflexive process (Lovell, Bulkeley & Liverman, 2009).

At an organisational level, early research noted an active political resistance and business reluctance to support regulatory climate change policies (e.g. Levy & Egan, 2003; Livesey, 2002). More recent work indicates a more proactive, business-minded and economic response with businesses now engaging in various programmes, with measures, targets and market trading (e.g. Gouldson & Sullivan, 2013; Wade, Dargusch & Griffiths, 2014); businesses are developing carbon management strategies and action plans for emission reductions (e.g. Weinhofer & Hoffmann, 2010; Lee, 2012; Downie & Stubbs, 2012; Bottcher & Muller, 2013). The initial driver for this corporate strategic shift was the adoption of the Kyoto Protocol in 1997 (Kolk & Pinske, 2004; Lee, 2012).[2] Economic and competitive considerations are noted as the dominant factors shaping business strategies (Levy & Newell, 2000; Okereke, 2007).

Other motivations enticing organisations forward along the resistance-acceptance-commitment continuum include ethical considerations, credibility and leverage in climate policy development, market positioning, regulatory demands, societal pressures and investor pressures (e.g. Okereke, 2007; Hrasky, 2012; Lee, 2012; Luo, 2012). A different hypothesis concerning motivation would contend that many businesses only support weak voluntary practices in order to ward off stronger compulsory controls by the state.

In New Zealand, the national strategy to combat climate change has until recently encompassed aspirations for both a carbon-neutral economy and a carbon-neutral public sector (Birchall, Ball, Mason & Milne, 2013), and included a framework for a regulated emissions trading scheme targeting major emitters in specific sectors (NZ Government, 2007). However, following a change in government in November 2008, most carbon neutral plans appear to have been abandoned (e.g. Birchall, 2014b) and full implementation of the emissions trading scheme has been delayed subject to review (e.g. Birchall, 2014a). In the absence of finalised regulation, engaging in the voluntary carbon market is currently a primary mechanism available for organisations choosing to offset their carbon emissions.

Through an empirical description and analysis of organizations comprising the VCM field in New Zealand, this paper provides evidence of the evolution of the carbon market as well as the level of success of the programme in reducing organizational emissions. This study of the New Zealand VCM organizational field expands on a 'surprisingly large, rich and varied' carbon accounting literature (Ascui, 2014, p. 19), and documents the entire range of consumption, production and services related to the carbon offsetting industry. Additionally, this research highlights the role of carbon accounting in organizational climate change abatement.

[2] For a discussion on the current state of the Kyoto Protocol, see Bothe (2014).

Given the country's small size and geographical isolation, New Zealand offers the unique advantage of exploring the entire range of consumption, production and services related to the carbon industry within well-defined and manageable boundaries. The focus of this research is on organizations that were self-declared, accredited with, or pursuing 'carbon neutral' status under voluntary carbon offset schemes, as well as their interaction with the evolving carbon market services industry. The evolution of the VCM organizational field is investigated by examining disclosure documents of clients of CarboNZero, the most prominent carbon neutral certifier in New Zealand.

Methods

CarboNZero's clients are required to produce yearly third-party verified public reports of their GHG emission and carbon management plans. Disclosures made by CarboNZero clients were compiled and examined. CarboNZero has two certification programmes: CarboNZero^{Cert}, which includes measuring, reducing and offsetting emissions and CEMARS^{Cert} (Carbon Emissions Measurement and Reduction Scheme), which does not include offsetting. Both programmes were included in this study for comparison. In total, 340 disclosure documents were collected: 263 for CarboNZero^{Cert} and 77 for CEMARS^{Cert}.[3] These account for all available CarboNZero^{Cert} and CEMARS^{Cert} disclosure documents from New Zealand organizations from the beginning of the formal certification programme in 2006 until the end of the collection period in March 2012.[4]

Analysis of the documents involved first tabulating all organizations and their total emissions and offsets purchased for each disclosure year. Any mentioned changes in measurement scope or method were flagged to exclude inconsistent emission accounts from year-to-year comparisons. Changes in emissions were then calculated for all comparable emission accounts. Due to the abundance of data included in this study, document analysis was limited to total organizational emissions and did not include any formal discourse analysis of the text in the disclosures.

Overview of the VCM Organizational Field in New Zealand

Internationally, the VCM field formed as a business response to climate change, and by 2006 was growing rapidly (Hamilton, Bayon, Turner & Higgins, 2007; Gössling, et al., 2007; Bayon, Hawn & Hamilton, 2012). Corporate consumers are typically responsible for over 90% of offset volumes contracted in the VCM (Peters-Stanley & Yin, 2013), and this investigation focuses on organizational business actors. The VCM organizational field is comprised of offset purchasers, offset suppliers, and a range of intermediaries and service providers. The field is continually in flux. In June 2010, 221 New Zealand organizations were identified in the organizational field: 97 certified or self-declared 'carbon neutral', 52 additional offset consumers, 67 carbon services (certifiers, consultants, brokers, retailers, auditors, lawyers, etc.), and five exclusively offset providers.[5]

[3] The most recent documents at the time of collection were for the 2010-2011 certification period, which runs from 1 July 2010 to 30 June 2011. The CarboNZero website was revisited in June 2013 to ensure that all documents for the 2010-2011 certification period were compiled.

[4] The first available documents were for the 2005-2006 certification period.

[5] Organizational actors were identified through a snowball effect, with certifier and registry websites being particularly helpful (See Murphy, Birchall & Milne (2015) for a more detailed description of the method used to identify organizational actors in the VCM).

Offset Consumers

Of the 97 carbon neutral organizations identified, approximately three-quarters were certified to the CarboNZero programme; only a handful were certified to other programmes such as Offset the Rest or Green Carbon, and an additional few advertised themselves as carbon neutral without being certified to any particular programme. As expected, a majority of the organizations are concentrated in the major cities (Auckland, Wellington, and Christchurch). There was also found to be an overrepresentation in Marlborough, primarily attributable to carbon neutral wineries in this region.

An additional 52 organizations were identified as purchasing offsets without any stated intention of becoming carbon neutral. The reason for the purchase was primarily for one-time special events, for travel, as a showcase for their environmental/sustainability focused mission statement, or on behalf of their clients (e.g. Air New Zealand purchased offsets on behalf of clients who wished to counterbalance their travel emissions). Whether or not carbon neutrality was the goal, the story of the offsets purchased (e.g. tree planting in a particular region) was often prominently displayed.

Offset Producers

New Zealand's domestic offsets market is forestry-dominated, but also includes wind energy and specialty projects. Table 1 contains a list of carbon offsets projects in New Zealand. EBEX (Emissions-Biodiversity Exchange in the 21st century, also known as EBEX21) was the first large scale offset project established in New Zealand.[6] This native forest regeneration programme allowed interested landowners to create carbon credits by permanently converting eligible land to native forest through natural regeneration. EBEX is now part of the government-administered Permanent Forest Sink Initiative (PFSI) that generates Kyoto-compliant AAUs (Assigned Amount Units). The resulting carbon credits can be traced back to individual properties around the South Island, facilitating the alignment between offset consumers and producers (e.g. the New Zealand Wine Company initially purchased credits from a local landowner in the Marlborough Sounds region and told the story of native forests regeneration efforts in their marketing).

Renewable energy producers also took advantage of opportunities in the market. Meridian Energy and TrustPower both not only established wind farms (Te Apiti and White Hill for Meridian and Tararua I, II, and III for TrustPower) and sold the associated carbon credits, but also pursued CarboNZero certification for their organisation. To offset their organizational emissions, TrustPower utilised credits from its own wind farm while Meridian Energy initially chose to purchase credits externally from TrustPower.[7] Though both these organizations would later move away from offsetting, their efforts showcase the complex interplay between the consumption and production of offsets.

Table 1. New Zealand carbon offsets projects.[8]

<INSERT TABLE 1 HERE>

[6] See www.ebex21.co.nz for more information.
[7] The offsets used are described in each organizations yearly CarboNZero disclosure documents.
[8] While all major VCM registries were explored, the Carbon Catalogue (www.carboncatalog.org/projects) was found to be the most inclusive list of New Zealand projects at the time of this study.

Intermediary Actors

New Zealand's small size facilitates relationship-forming between actors in field; everyone knows everyone. Adding to the network of actors in the field are a range of consultants, certifiers, auditors, accountants, lawyers, etc., that provide an infrastructure of skills for organizational climate change actions and emissions trading. This carbon services industry rapidly evolved in conjunction with the carbon market to fill any perceived needs and structural holes in the field. These intermediary actors occupy a critical position by advising their clients and thus influencing norms and practices. Although the VCM is less prescriptive than regulated markets, organizations in the field have attempted to assure credibility through self-regulation. For example, TZ1 was started in New Zealand in late 2007 and quickly became a world-leading registry for voluntary carbon assets, generating confidence in the marketplace by managing the ownership of carbon offsets.[9]

Standards and programmes have become central pins defining the rules and norms in the VCM, and the carbon services industry has had an active role in shaping these standards and programmes. With roughly three-quarters of carbon neutral organizations adhering to its programme, CarboNZero is by far the most popular carbon neutral certifier in New Zealand. They also offer training for consultants and verifiers. Their certification requires independent verification by approved verifiers who have completed the CarboNZero training programme. This raises an interesting dilemma, however, particularly with regard to potential for conflicts of interests: verifiers are being trained by the organization for which they are doing the verification. With that said, this method has been approved by the International Accreditation Forum (IAF). In short, CarboNZero occupies a central position in the intricate network of actors in the field, linking together not only offset consumers and producers but also various service providers.

Results and Discussion

Evolution of the Organizational Field

The evolution of the New Zealand VCM organizational field was investigated by analyzing CarboNZero client disclosures. Since CarboNZero is the most prominent carbon neutral certifier in New Zealand and since their clients are required to produce yearly third-party verified public reports of their GHG emission and carbon management plans, these disclosure documents allowed a quantitative review of historical programme participation trends and were used as a sample to probe the development of the organizational field.

Disclosures made by clients participating in CarboNZero's two certification programmes, CarboNZero^{Cert} and CEMARS^{Cert}, were compiled and examined.[10] Although the CEMARS^{Cert} programme does not necessarily involve participation in the VCM, both programmes were included in this study for comparison.

Although CarboNZero^{Cert} is the larger programme in terms of the number of organizations in the organizational field, the GHG emissions accounted for by the programme are dwarfed as compared to those of the CEMARS^{Cert} programme, see Table 2. In the most recent year investigated, the 2010-2011 certification period, the total carbon footprints for

[9] TZ1 stands for New Zealand being in Time Zone 1. The registry was later sold to Markit, a global financial information services company, but still maintains a New Zealand connection: the registry's New Zealand founder, was retained as the Managing Director of Markit Environmental Registry.

[10] All figures presented here are based on publicly available disclosure documents at the time of investigation; documents were compiled from the carbonzero.co.nz website in July 2011, March 2012, and June 2013.

CarboNZero^{Cert} organizations was 43,457 tonnes CO_2e compared to 2,174,982 tonnes CO_2e for CEMARS^{Cert} organizations. The lack of costly offsetting in the CEMARS^{Cert} programme may make it more attractive to GHG emission-intensive organizations.

Table 2. Total GHG emissions accounted for by CarboNZero programmes, and participation trends.[11]

<INSERT TABLE 2 HERE>

The CarboNZero^{Cert} programme formally began in 2006. Meridian Energy was the first organization to be certified with its first available disclosure document reporting on the 2005-2006 certification period. By the next year, nineteen organizations had been certified. Certified organizations for the 2006-2007 period include Meridian Energy, Urgent Couriers, Toyota New Zealand, the Christchurch International Airport, and five wineries led by the New Zealand Wine Company. Over the years, there was also a growing involvement from small businesses.[12] Major sectors represented by certified organizations include electricity, winery, food & beverage, transport, and tourism.

In comparison, the CEMARS^{Cert} programme began two years later for the 2007-2008 certification period. Westpac New Zealand, Palliser Estate Wines and the Energy Efficiency and Conservation Authority (EECA) were among the first batch of organizations CEMARS certified. Like with CarboNZero^{Cert}, a contingent of wineries (five) became certified. But in contrast to the many small businesses involved in CarboNZero^{Cert}, CEMARS certified organizations are primarily larger and more GHG emission-intensive organizations (hence the discrepancy between the small number of organizations in the programme and the large total emissions accounted for by the programme).

Meridian Energy, Contact Energy, and Toyota New Zealand, which were all CarboNZero certified, added CEMARS^{Cert} to their certification portfolio in 2008-2009. For Meridian Energy, this was a means to transition to the CEMARS^{Cert} programme; they abandoned CarboNZero^{Cert} the following year. For Contact Energy and Toyota New Zealand, this was a means to account for, but not offset, large sources of emissions (generation emissions for Contact Energy and freight emissions for Toyota New Zealand) which were outside of the emissions inventory boundary for their CarboNZero certification. Contact Energy remains CarboNZero^{Cert} for their Corporate Office operations and Toyota New Zealand remains CarboNZero^{Cert} for their operational activities excluding vehicle freight; both companies' disclosure documents explicitly note these boundary details. By carefully defining the scope of the certifications, organizations can in some instances choose to forego costly offsetting for the dirtiest parts of their organization.

As evidenced in Graph 1, participation in CarboNZero^{Cert} increased linearly for the first five years, adding a net average of 19 organizations per year. However, the programme's rate of

[11] Disclosure documents were not available for five CarboNZero^{Cert} and one CEMARS^{Cert} organizations for the 2010-2011 certification period. These organizations were nonetheless included in the participation counts for that period since their disclosure documents for the subsequent 2011-2012 period indicated continued involvement with the programme.

[12] CarboNZero previously had a Participant programme for small businesses emitting less than 50 CO_2e which did not include formal certification. This programme was later replaced by the CarboNZero Small Enterprise Certification Programme. 17 organizations who were involved with the Participant programme chose not to pursue certification. Since these organizations did not have any available disclosure documents and were never certified, they were not included in this study.

growth slowed considerably for the 2010-2011 certification period, the last year investigated, adding only a net total of three organizations. The 2010-2011 certification period not only had a lower client retention rate than previous years, it also had the fewest number (16) of new organizations joining the programme. Similarly, participation in the CEMARS^{Cert} programme increased steadily for the first two years, and then slowed for the 2010-2011 certification period.[13]

Graph 1. CarboNZero^{Cert} and CEMARS^{Cert} participation trends.

<INSERT GRAPH 1 HERE>

Each year some organizations drifted away from the certification programmes and new organizations joined. The overall re-certification rate for CarboNZero^{Cert} was 84% with a yearly retention breakdown as follows: 100% in 2006 (1 of 1), 84% in 2007 (16 of 19), 83% in 2008 (33 of 40), 87% in 2009 (48 of 55), and 83% in 2010 (62 of 75). In contrast, CEMARS^{Cert} had a perfect retention rate in its first two years (4 of 4 and 14 of 14). However, in its third year, the re-certification rate dropped to 81% (22 of 27), comparable to that of the CarboNZero^{Cert} programme, which seems to indicate a tapering off of interest.

In total, disclosure documents were available for 140 New Zealand organizations. There were 108 CarboNZero^{Cert} organizations over the period of time investigated, i.e. six years from the formal beginning of the programme. 10 organizations continued or were still continuing with the certification after five years certified, 17 for 4 years, 19 for three years, 31 for two years, and 31 for one year. Conversely, 15 organizations dropped out of the CarboNZero^{Cert} programme after one year of certification, seven organizations after two years, five after three years, and three after four years. By the same token, there were 37 CEMARS^{Cert} New Zealand organizations over the period of time investigated (including five organizations that were also involved with CarboNZero^{Cert}). Four have been CEMARS certified for four years, eight for three years, 12 for two years, and 13 for one year. And, of the five organizations that left the CEMARS programme, three had been certified for one year and two had been certified for two years. In short, CEMARS^{Cert} had a much lower dropout rate (5/37 = 13.5%) than CarboNZero^{Cert} (30/108 = 27.8%).

Organizational GHG Emissions Trends

The disclosure documents were analyzed for trends in organizational GHG emission accounts to evaluate the successfulness of the programmes in reducing emissions. Analysis involved tabulating all organizations and their total emissions for each disclosure year. Any disclosed significant changes including changes in measurement scope or method, as well as any corporative divestments or acquisitions or one time construction emissions were flagged to exclude inconsistent emission accounts from year-to-year comparisons. Changes in emissions were then calculated for all comparable emission accounts.

Table 3 shows aggregated organizational GHG emission changes for both the CarboNZero^{Cert} and CEMARS^{Cert} programmes; the table shows whether emissions increased or decreased for all year-to-year comparisons as well as for the total organizational change per organization

[13] It should be noted however that while CarboNZero^{Cert} operates almost exclusively in New Zealand, CEMARS^{Cert} has a broader international client focus with over 100 organizations certified in the United Kingdom and seven in Chile. Disclosure documents from international organizations and the overall international rate of growth of the programme were beyond the scope of this study and were not investigated.

(i.e. their first year compared to their most recent certification).[14] Just over one third of organizations have reduced their emissions since joining the CarboNZero^{Cert} programme, compared to more than half of those in the CEMARS^{Cert} programme. One of the stated goals of both programmes is to reduce/manage organizational GHG emissions. These results suggest that the programmes have been only modestly effective in regard to this objective, with CEMARS^{Cert} organizations having a slightly higher success rate.

Table 3. Changes (i.e. increase or decrease) in organizational GHG emissions.[15]

<INSERT TABLE 3 HERE>

Yearly trends in organizational GHG emission changes were also investigated. Graph 2 depicts the year-to-year comparison results broken down by year for both the CarboNZero^{Cert} and CEMARS^{Cert} programmes. The 2008 assessment, i.e. comparisons between 2007-2008 and 2008-2009 certification disclosures, was the only year where the number of organizations that reduced their emissions surpassed the number of organizations where emissions increased. One possible explanation is that the decrease is linked not to the successfulness of the programme in that year, but coincides with a general contraction of the economy following the 2007-2008 global financial crisis.

Graph 2. Year-to-year comparisons of organizational GHG emission accounts - number of organizations with increasing or decreasing emissions for each disclosure year.

<INSERT GRAPH 2 HERE>

Changes in emissions were also explored in terms of tonnes of CO_2e. The size of year-to-year organizational changes for CarboNZero^{Cert} organizations ranged from 0.2 to 1224 tonnes CO_2e. Aggregated changes in comparable emissions shown in Graph 3 reinforce the yearly trend findings with the 2008 assessment being the only year which saw CarboNZero^{Cert} organizations achieve a net emission decrease.

Graph 3. Aggregated changes in comparable emissions for CarboNZero^{Cert} organizations.[16]

<INSERT GRAPH 3 HERE>

Since participation in the programme increased each year, changes relative to total emissions accounted for as well as to the number of organizations in the programmes were also considered, see Table 4. The results in part (a) of Table 4 show relatively large increases in emissions in the first years of the CarboNZero^{Cert} programme, 2006 and 2007, followed by a decrease in 2008. In 2009 and 2010, the increase in terms of total emissions was relatively small (2% and 5%, respectively), but the average increase seen by organization was comparable to that of the initial years (15-16% versus 21%). This discrepancy was due to a

[14] Please contact the corresponding author for disaggregated results by organization.

[15] Organizations can be counted more than once in the year-to-year comparisons if they have multiple comparable years.

[16] The changes in emissions displayed in this graph are for comparable emissions and not total emissions accounted for. For example, the change in emissions for 2008 includes only organizational emissions accounts for organizations that had both 2007-2008 and 2008-2009 certification period disclosures and where there were no mentioned changes in measurement or scope between the accounts for these periods.

number of organizations with small carbon footprints having proportionally large increases while some emission-intensive organizations achieved reductions which were small relative to their total footprint.

In comparison, CEMARS^{Cert} organizations saw a net decrease in emissions for both the 2008 and 2009 assessments. However, the decrease in emissions for CEMARS^{Cert} organizations in 2009 was primarily due to Contact Energy decreasing its emissions by 249,217 tonnes (i.e. -12%) due to higher rainfall resulting in increased availability of hydro generation, thus requiring less thermal and geothermal generation (see part (b) of Table 4[17]). The achieved reductions were thus not the outcome of anthropogenic efforts, but simply the product of natural environmental variation. The 2009 CEMARS^{Cert} results (i.e. a total percentage change of -12% but an average organizational change of +5%) also demonstrate the immense impact that one large emission-intensive organization can have, overshadowing the successes or failures of all other organizational reduction attempts.

Table 4. Changes in comparable emissions - total change in tonnes, percentage change, and average percentage change per organization.[18]

<INSERT TABLE 4 HERE>

Year-to-year individual CarboNZero^{Cert} organizational emission changes ranged from -48% to +103%, with an average of +11% and a median of +5%, while CEMARS^{Cert} changes ranged from -41% to +80%, with an average of +4% and a median of -1%. Overall individual CarboNZero^{Cert} organizational emission changes, i.e. the difference between an organization's most recent year emissions and its first year, ranged from -48% to +201%, with an average of +22% and a median of +13%, indicating a cumulatively upward trend in emissions.

The effect of the length of time involved in the programme was investigated by tracking organizational emissions changes through the years of participation. There are two opposite hypothesis as to when reductions are easiest to achieve: 1) in the first year due to initial low hanging fruit opportunities or 2) in later years since it takes time to implement new measures. Table 5 shows the number of organizations that increased or decreased their emissions with each year of participation in the CarboNZero programme. Although the results suggest that proportionally more organizations reduced their emissions in later years rather than in the

[17] Stripping out the effect of companies most affected by this kind of external variation (i.e. energy companies), 2009 CEMARS^{Cert} organizations' comparable emissions increased by 5%.

[18] The changes in emissions displayed are for comparable emissions and not total emissions accounted for. For example, the changes in emissions for 2008 include only organizational emission accounts for organizations that had both 2007-2008 and 2008-2009 certification period disclosures. In other words, the effect of organizations joining or leaving the programme was stripped out.

The percentage changes are dependent on the comparable emissions accounted for in that year. Since the comparable emissions accounted for grew over time, percentage changes may be smaller even though the change in terms of tonnes CO_2e may be larger.

The percentage change (%) represents all comparable emissions of the programme as a whole, while the average organizational percentage change (Avg. % per org.) weighs each organization equally irrespective of the size of its carbon footprint. The percentage changes were calculated as follows: % = sum of all comparable changes in emissions (Year 2 - Year 1) divided by the sum of Year 1 emissions for these comparable emission accounts. Avg. % per org. = average of the individual organizational percentage changes [(Year 2 – Year 1)/ Year 1].

first year, the small sample sizes in later years of participation as well as the confounding effect of the previously noted emissions decrease in 2008 renders uncertain the cause-and-effect relationship. Further investigation, beyond the scope of this project, would be necessary to draw conclusions.

Table 5. Tracked emissions changes for CarboNZero^{Cert} organizations.[19]

<INSERT TABLE 5 HERE>

Conclusions

The VCM organizational field comprises a multifaceted network of offset purchasers and suppliers, as well as a range of intermediaries and service providers. In New Zealand, the offsets market is dominated by forestry projects, led by Landcare Research's EBEX native forest regeneration project, but also includes wind energy and specialty projects.

CarboNZero occupies a central position in the intricate network of actors in the field, linking together not only offset consumers and producers but also various service providers. In this study, CarboNZero programme participation trends were used as a sample to probe the development of the VCM organizational field in New Zealand.

In the most recent certification period investigated (2010-2011), CarboNZero^{Cert} included 78 organizations, while CEMARS^{Cert} included 32. Yet the total carbon footprints for CarboNZero^{Cert} organizations (43,457 tonnes CO_2e) was dwarfed as compared to CEMARS^{Cert} organizations (2,174,982 tonnes CO_2e), suggesting the lack of costly offsetting in the CEMARS^{Cert} programme may make it more attractive to emissions-intensive organizations.

Trends in organizational GHG emissions accounts were also investigated to evaluate the successfulness of the programmes in reducing emissions. The programmes were found to be only modestly effective: 38% of CarboNZero^{Cert} organizations and 54% of CEMARS^{Cert} organizations have reduced their absolute emissions. The only year that saw a net emissions decrease was 2008. The effect of the length of time involved in the programme was investigated but the results were inconclusive. The results did however showcase the immense impact of external factors, natural environmental variation, and large emissions-intensive organizations; these can overshadow the successes or failures of all other organizational reduction attempts. Overall CarboNZero^{Cert} organizational emissions increased on average 22% and showed a cumulatively upward trend in emissions.

These results document the great difficulty of solving the anthropogenic climate change problem, especially reducing or offsetting emissions, by only intentional voluntary measures. Unintended and unwanted restraints on consumption in the form of the 2008 recession and nature's fortuitous cooperation in the form of increased rainfall did more to reduce emissions than voluntary ecological modernization. Moreover the evolution of the VCM organizational field documented here shows that its growth is slowing down. It remains to be seen whether that trend will continue or return to an upward trajectory.

[19] The results in this table include only organizations with comparable emissions through all their years of participation in the CarboNZero programme.

The importance of this research is linked to the importance of the climate change problem. The VCM has the potential to be an important component of a solution to climate change, yet there is no evidence that this strategy presents a fundamental institutional change towards a low-carbon economy. This notion is echoed in the literature as well: though concern for climate change exists, genuine emission reductions remain absent (Spash, 2010). This is further evidenced in these findings, which demonstrate that incorporation of carbon accounting is not necessarily evidence of organizational action or improvement on climate change abatement.[20]

Given the urgency of the problem and the amount of resources being invested in carbon mitigation, it is imperative to investigate how actions and accountabilities are being shaped and rationalized. The institutional frameworks surrounding the VCM, in New Zealand or otherwise, are still developing and could have significant implications for the efficacy of the market as a solution to climate change.

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[20] These findings also highlight the limitations of environmental accounting in general, and demonstrate that accounting in and of itself is not evidence of action and/ or improvement.

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