

## **Abstract**

The Sustainable Habitat Challenge (SHAC) is a network of young designers, architects, engineers, and builders who pick up pencils and tools to prototype the sustainable built-environment.

SHAC is addressing representation and participation deficit<sup>1</sup> in global governance by facilitating small groups' will to create houses, buildings, and transport options. Using a combination of competitive and collaborative frameworks, groups of young people and their mentors are supported to exercise their combined agency to develop and implement design responses to the challenge of sustainability. Teams of young students, apprenticeships, and early career professionals design and build adaptations to their built environment.

Prototypes include houses, buildings and transport options of the type needed by the western world for adapting to climate change and a lower rate of resource use. These built objects help spark a wider understanding of the possible local responses to global challenges.

Key SHAC methods include: volunteerism, the replacement of adversarial oversight with collaborative processes, competition and cooperation. SHAC values include innovation, generosity, experimentation, commitment and learning. In the New Zealand context, the institution of the volunteer in the social, sporting, or artistic club or society still allows for experimentation, learning, and the pursuit of excellence largely unfettered by adversarial oversight.

How will we live well, with purpose, with less reliance on resources? This paper presents a case study of the SHAC network and outcomes.

## **Background**

My name is Tim Bishop. I trained as an electrical engineer and in energy and buildings. I have an interest in anthropology, social science, and in myths. I grew up in California, but moved to New Zealand ten years ago following my love of hiking – New Zealanders call it tramping. I am interested in SHAC because think it is insane how much time and energy that people waste buying or worrying about housing, or paying off their mortgages.

I want to tell you about the SHAC in this article. I cannot remove my self from the narrative sufficiently to critique the story, so instead I will just tell it. I've learned a little of the language of analysis to assert the possibilities, but I will leave it to others to weight the evidence objectively and evaluate this case.

My journey with SHAC began in 2006 when I was sitting in my office with my colleague Maria and the arrival of an unexpected visitor. Maria and I worked together on a project looking at simple renovation strategies for 40-50 year old government built "state houses." We were based at the physics department of the University of Otago. Maria had trained as an architect, and I as an engineer with an undergraduate degree in electrical circuits and systems.

My interest in housing really came from my experience living in Dunedin for several years, with its beautiful but unheated and hence cold Victorian era housing. I quickly found that many students, young people, and lower income families lived in houses that were quite cold. While it was obvious that the brick or timber clad single family detached timber framed homes had been built in a different era, I had not yet come to the idea that the houses had been built **for** a different era – when energy for heating was cheap coal, when streetcars carried people from suburb to suburb, young people spent all day exploring miles from home, and when mothers spent their days at home, growing food, making clothes, and teaching pre-school children.

Our project was to identify, model, and test several strategies for reducing household heat losses with the aim of improving comfort, improving energy efficiency, and reducing energy use. The building codes in New Zealand focused on heat loss reduction, and thus so followed our approach to our research.

The setting in the physics department, which housed energy studies undergraduate and graduate programme, gave me confidence that we would get our numbers right, but I had a suspicion that we were not asking the right questions.

I had recently volunteered with Solar Action, a renewable energy society, to stage a solar home day that showed the use of renewable energy in Dunedin homes. I was impressed with the popular interest in the idea as much as the poor outcomes: large expensive homes that while very efficient had much higher energy budgets than the student housing in which I lived.

The unexpected visitor was a reporter with a video camera. He was to interview me about my research - What was I doing, what did we find. “But what should we be doing?” He reaffirmed the question that I had in my own mind by asking it of me: “What do we need to do?” I remember that I was not sure, but that I thought that we needed to bring together many types of people – not just technical people or designers or builders. They know the various ways to give people what it is imagined that they want - but we also need people who could re-imagine what might be wanted. We needed to set down a challenge to re-create a sustainable human habitat. At that time I still imagined that the need was only to re-design the physical man-made infrastructure.

I was lucky that I happened to make this claim to a person with a video camera, for shortly later some people with the power to make things happen – a network to whom I have not been formally introduced - arranged for a grant to create such a national “Sustainable Habitat Challenge -SHAC” hosted at the Otago Polytechnic.

A sizeable grant from the New Zealand Ministry for the Environment and support from the Otago Polytechnic gave SHAC a good start with funding to run a 2-year competition between polytechnics and universities, starting in 2008.

The challenge saw 9 teams design and build their vision of more sustainable housing. We didn't specify prescriptive parameters - so what we received for submission was a variety of vernacular approaches to sustainability<sup>2</sup>. Alanah Ryan, a sociologist, wrote a conference paper on the resulting outputs, looking at the different "logics" of sustainability implied by team submissions<sup>3</sup>.

SHAC worked with SolarAction - The New Zealand Renewable Energy Society - to understand total energy use in an analysis in the style of David McKay's excellent basic physics review of energy use "Without Hot Air"<sup>4</sup>.

Aided by the group Regeneration, in 2012 SHAC ran a design and build competition around very small buildings that do not require permitting or licensing.<sup>5,6</sup>

## **Recent Projects**

In 2012, SHAC members facilitated several groups with building projects in the earthquake damaged city of Christchurch, New Zealand.

### **1) Gapfiller Trust**

Gapfiller<sup>7</sup> is a creative urban regeneration initiative that activates vacant sites with temporary creative projects in the earthquake damage city of Christchurch, New Zealand. Projects of the group include an outdoor coin operated "Dance-o-mat," a bicycle powered cinema, and the outdoor book sharing "book-fridge."

Ryan and Coralie of Gapfiller realized that while land in Christchurch was very expensive to buy, that it could be borrowed temporarily if the difficulties regarding finding the landowner, getting insurance, and getting permission could be eased. It is a new model of accessing land.

I was introduced to Coralie and Ryan of Gapfiller at the end of 2011, and SHAC, Gapfiller and Regeneration began a joint project to create a needed temporary small office for the Trust. Regeneration would bring young people, SHAC would bring designers and builders, and GapFiller would bring the volunteers needed for a small solar powered office. A number of people constructed the small whimsical office in a couple weeks. The design included prefabricated pallet walls, printing plates from the local newspaper, and wood and sheet materials from nearby demolished buildings<sup>8</sup>.

The first Gapfiller projects of 2011 inspired me to see the collaborative design and construction of small buildings as community projects. But with the success of this small office, Gapfiller has been inspired to attempt community projects in the form of buildings: More recently, the Gapfiller Trust has completed the impressive "Pallet Pavilion" temporary architecture project<sup>9</sup>.



## **2) Life in Vacant Spaces Recycled Office**

The success of the GapFiller projects in Christchurch led to a reaction from the local council – a second trust was established called Life in Vacant Spaces. If Gapfiller was like a theatre production company – producing “performances” on unused land, then LiVS was to be a stage or gallery – accessing land to be venues for a number of artists and developers to practice their craft. LiVS facilitates access to land, but does not produce projects. Ryan of Gapfiller, also on the governing board for LiVS, suggested the approach SHAC to produce a small temporary office – for the cost of two years office rent of \$12,000.

In New Zealand, only registered design professionals are allowed to design buildings, and the level of documentation and planning required takes the fun, spontaneity, and adaptability out of the process. There are a few less well known exceptions to these requirements which this project sought to demonstrate. Continuing on from the Gapfiller building, we wanted to show a “subconsent” building that combined many of the exceptions together.

The result was a 10m<sup>2</sup> office, with a 5m<sup>2</sup> porch, a less than 20m<sup>2</sup> deck, and a less than 20m<sup>2</sup> awning. Claire Williamson and Oscar Baldry designed and led the construction of a small office using volunteer labour. The young architect and engineer couple were glad to have a chance to see through a design to competition, volunteers were excited to be involved and learn about innovative building, and a couple skilled builders were keen to share their skills with new people.

Claire and Oscar’s flat-mate Tim, has participated on a number of Burning Man building projects. With new understanding about the possibilities within New Zealand for small subconsent buildings, he is now proposing a Burning Man inspired temple to be constructed in Christchurch<sup>10</sup>



#### 4) Scaffold Pavilion

With a design led by Sean Bollinger, SHAC created a small temporary outdoor pavilion/stage with solar powered lighting. A community of local musicians and artists came to use the facilities for the week-long installation, and several expressed a desire to build and use a repeat.



### **3) Renew Brighton and the New Brighton Creative Quarter [cQ]**

The SHAC network's largest building project took place in the lower income Christchurch suburb of New Brighton in October 2012.

The community organization Renew Brighton approached SHAC for help to create several small structures based on designs from the SHAC 2012 10m2 challenge<sup>11</sup>. Members were frustrated that the earthquake recovery effort had barely touched their extensively damaged neighborhood.

They reviewed the SHAC 10m2 design challenge entries and asked if SHAC could help them develop and build some of the concepts. I made a presentation to their group and with their support applied for a small grant. With this grant, donations from suppliers, and time from volunteers and students from SHAC and Unitec, we came together to construct three subconsent structures over a four-day long weekend in October 2012. Mark Mismash from Unitec was incredibly supportive and had many of his students involved in designing and creating the space.

The result has been dubbed the Creative Quarter; a funky and quirky public space that is perfect for New Brighton. It features an outdoor dance theatre complete with a movie screen, dance floor, shade sail, and solar-powered lighting and music; a compact bach suitable for use as a shop, office or recreational area; a flexible pavilion/exhibition space; and a stunning, origami-inspired, multi-purpose space with wooden panels for walls.

After the build was complete, the community organization was able to inspire additional volunteers and professionals to continue the development of the site. As of December 2012, Josh is working part time at the site, now supported by council funding, to organize movies and curate the space<sup>12</sup>. Local volunteers are continuing to landscape the sandy site and install herb gardens.

There has been some vandalism, and recently, the shade sail was cut. But it has been followed up by repainting and re-stitching.





## **SHAC and related groups**

I define the SHAC group broadly: everyone who has at one point contributed towards a project. A narrower definition might be those who have registered on the web site, leaving their name, email, and a short answer to the question “What is my vision for Sustainability?” Two hundred some odd people have registered. Appendix 1 includes quotes from all people who signed up in 2012. The quotes suggest SHAC contributors are led by values, they are interested in exploring a new way of building and working together.

## **Net Gains Model**

SHAC exists as one group in a system that includes many interdependent groups. The Net Gains Handbook<sup>13</sup> classifies groups as networks of connection, alignment, or of productivity. Connection networks link people, alignment networks develop a shared sense of identity or values, and productivity networks are invite and task people with a specific goal. I see productivity networks as a container of will or a desire to create, along with a world view and suggested solution implementation strategies.

### **Connectivity Networks**

- University of Otago [Department of Physics]
- Otago Polytechnic [School of Design, Engineering, Architecture]
- Unitec [School of Architecture]
- Opus International
- Life in Vacant Spaces Trust
- Facebook

### **Alignment Networks**

- Regeneration

### **Production Networks**

- SHAC
- Renew Brighton
- GapFiller

The pattern I see is that the alignment and productivity networks are inherently values led, and within the connection networks it is values led members that harness organizational support for the projects of friends in alignment or productions networks.

I want to note in particular the Regeneration network, an alignment network started by Billy Mathieson in 2008. Regeneration has introduced me to many capable New

Zealanders. In one way it is just people coming together to share stories. But this may be all we need<sup>14</sup> for an empathic civilization.

The Regeneration network is a group of people from around New Zealand who come together several times year to engage in dialog, open space, and peer teaching. Key Regeneration network techniques are developing trust among members through the sharing of stories in an open space like group process. Regeneration group processes are heavily influenced by Scharmer's "Theory U"<sup>15</sup>

We come together for a few days [3-6] at a time. In the morning we sit in a large circle and talk at length about what is on our mind using a technique called Dialog. As people talk, we listen to them without interruption. We hear – and are present for - person after person. We are not having the back and forth of an argument, nor a surface level conversation. We hear story after story - somehow connected to each other.

Sitting there listening, and afterwards too, I felt like I had some small understanding of a large and complex problem. The process does not have us explicitly discussing any one issue, however, after the dialog I felt that I saw one facet of a large topic.

I had an idea about what I could do, and the support and acceptance of others to act. Rather than be forced to articulate and defend a single strategy to be implemented by the group, I could be comfortable in my own sovereignty to immediately act..

I have met a number of people at Regeneration events. I don't know what everyone is doing, or even why, but I believe in their intention. Regeneration has provided the trust and relationships for help grow several production networks, including SHAC.

I like to think that this network of groups cooperating to achieve their aims is starting to achieve what Anatol Rapoport hopes for interacting cooperative groups<sup>16</sup>

I think the capacity of this joint network of networks gives evidence of "agency as a dynamic trait that can be created and lost" and is "not a zero sum game"

I believe that this network including SHAC now has the capability to create a more sustainable habitat, and that this shared understanding is starting to emerge. We are joining communities together in a safe space, and we are prototyping and creating possibilities for the future.

## **Tipu Ake Lifecycle Model**

The Tipu Ake lifecycle is another way of looking at SHAC and its place in a network or ecosystem of groups<sup>17</sup>.

Rather than focusing on a linear process to achieve an outcome, the Tipu Ake model considers cycles and habits of organizational and network activity that build in an

understanding of motion, learning, and development in the understanding of how organizations increase skill and competency.

The model is the activity of the bush, with soil, seeds, pests, trees and birds live as interdependent life. Network activity is conceived as a tree that grows in this bush environment.

Soil is created from the decayed material of past developments, and a seed germinates with courage when the will to create is first expressed. Roots develop out of teamwork based around a shared vision. Root development is essential to support successful growth.

A shoot emerges and a trunk becomes evident, formed by management to implement the initial idea using procedures and processes. But the tree must still push upward through the existing canopy of established systems and politics. Various systems and groups may intend to support, nurture, or block development.

Branches are the sensing of organization, and flowers the wisdom, representing the intellectual capital of a group.

Fruits represent the wellbeing produced by the organisation, valued for their many benefits to the wider community.

Pests can be viewed as either risks to be avoided, or as a positive scavenging process that recycles organisms at the end of their life.

Birds are the risk-takers and developers, taking seeds from fruit and planting them in new ground.

This analogy facilitates an analysis that “sees” the growth and change, looks at all levels at once, acknowledges interdependence, and values creativity and apparent chaos.

So how does this apply for to SHAC? How can this analogy, this way of seeing, make sense of the form of an organization? Firstly, what is the sun that guides all growth? How does the SHAC organization sense and grow towards the sun? SHAC has a strong shared vision that we can live well with less reliance on resources. This shared feeling is the sun. Understanding the shared vision is very important.

SHAC has grown on fertile ground, as there have been thousands of years of experimentation and development of housing types and styles, and 30-40 years of history around the technical harnessing of renewable energies for the household. These many ideas, many of which are dormant, lie ready to spur growth.

If the branches are the productivity networks that are learning by doing, then trunk is the trust network – for me – the Regeneration network – that supports, connects and nourishes the efforts of the production networks to reach out.

## **SHAC and the 5 A's of Earth System Governance**

SHAC is helping facilitate the capacity for groups of people with more time than money to come together to create their man-made environment. This is facilitating group agency.

And in what way are private actors accountable? SHAC projects are Accountable by the institution of volunteering and generosity that allow contributors to “vote with their feet” – when those contributing no longer believe in the utility of the project, they stop contributing. By structuring efforts as “volunteer” rather than paid work, perceived illegitimacy around allocation and access are far more quickly and freely expressed.

Allocation and Access refers to equity and fairness. SHAC projects are small and easy – call them achievable, while at the same time celebrated and useful. This is largely due to what size of project can hold the interest of volunteers.

Finally, SHAC projects contribute to Adaptiveness – the resilience of systems by creating a group of contributors who are invested in the project and in each other. Within the small building project, people quickly learn to find and adapt plans to make the outcome possible. And after the project the habit of working together remains – the group is primed for action.

Finally, there is the architecture. What about SHAC's methods that stimulate these “five A's?” Is it something about facilitating our need and capacity to create? That desire seems to be innate, and the fun that can be had when working on a challenge together could be what makes it work.

My time hiking and exploring with New Zealand tramping clubs taught me that, when volunteers come together to jointly have an adventure and solve a problem, fun, creative solutions, and excellence are all frequent outcomes.

## **Discussion**

Earth system governance is concerned with “going beyond traditional hierarchical state activity” and “some form of self-regulation by societal actors, private-public cooperation.” For SHAC, self regulation and a push for innovation and solving problems is a result of the use of volunteers.

Who are SHAC volunteers? They are early career design professionals who want to see the bigger picture, or they are young people interested in how buildings work,

or people who like to help out on interesting projects. Volunteers regulate SHAC activities.

Volunteers need encouragement. When adversarial oversight with collaborative processes, there is more resiliency in the face of failure.

Volunteers are excited by innovation, so there is an enhanced drive to experiment. Volunteers are not paid; so financial requirements are less; which means trying new ideas is less risky. We are less limited by the need to get a product to market, or on the approval of funders or what the bank says or not, and even if the outcome will be reached or not – it is ok to fail.

I think an issue with normal building development processes is that they are trying to please “everyone” – so the brief and financial requirements quickly grow. While smaller SHAC projects are sharply limited by what can be done quickly and at low cost. While both conventional and volunteer driven projects strive to be quick and low cost, the need to motivate volunteers and task them with an achievable project means that there are forces that encourage innovation and discourage project size or complexity.

Volunteer led projects push down decision-making so that if you are willing to do the work you are given permission to try to solve the problem.

This is something similar to the open source software movement process that allows people to solve their own problems in an environment that supports distributed decision-making and action.

### ***Future Plans***

Come join in future SHAC projects. On the books for early 2013 we have

- A retrofit of a single family house
- The construction of a micro house ~ 10m<sup>2</sup> / 100sq ft
- The construction of a mini house < \$20,000 NZD / 16,000 USD
- Retrofit of a community buildings in Dunedin and Christchurch.

### **CONCLUSION**

Our conversations about global climate change, inequity, or resource use are often strident and unproductive. By analogy, arguing about how to measure intelligence, or even about the need for better teaching does not directly inform teaching practice, or indicate other ways of learning. Talking about the need for progress, or how to measure achievement does not inform how we should develop the needed design responses. Or develop the developers.

SHAC's goals are to get people together and act on our purpose. The results is prototyping possibilities for the built environment by facilitating small groups will

to create. This is living with purpose, living simply, and living well - with less reliance on resources. The advantage of this has been documented for some time.<sup>18</sup>

SHAC members are exploring the “overall governance architecture – forms of steering, decentralized, open to self-organization, the role of different agents in this governance architecture, the overall adaptiveness of the governance system, mechanisms of accountability, and modes of allocation.”

Governance failures and non-governance is sometimes the result of lack of seeing the whole. SHAC is encouraging people to be part of the whole process, and gain more understanding.

I believe that young people in New Zealand learn a large set of informal rules about housing: Building a house is best left to the experts, group action is ineffective, and excellence and high performance is the sole realm of the highly trained professional. Making positive change in your life is profoundly difficult and best left to the experts.

And while in theory the professional is the lone group left still left to practice free from supervision, most must bear adversarial oversight that seeks to prevent poor performance through indelicate requirements that obstruct and disempower all but the most energetic student.

We need to move away from an architecture that supports doing anything for money, and nothing without it. Volunteers can lead us out of this.

We don't want a built environment that is paid for by people who do not live there, built by people who do not live there, and coordinated by just an overworked small handful of people.

SHAC is a chance to match the interest in learning and doing exhibited by young people with skilled mentors. What young people lack in skill is balanced by desire. Why do people participate in SHAC projects? Is it to develop familiarity with agency, or a desire for experiential education, or to gain experience in multi-discipline teams, or in innovation, - or is it just satisfying basic needs and creating one's environment? Could SHAC be a “coordinated and synergistic approach to collective problem-solving” [p82 ESG SIP]?

There is still a need to assess “claims of feasibility of proposed solutions” with natural and social scientists. “will devolving power inherently reduce reliance on resources? Or just increase competition for resources?” Is education in values needed as well? Ostrom and Rapoport believe effective governance by a network of small groups in some circumstances. Perhaps when given the pen, people will build what is suitable, because the surplus left over once the need is met belongs to them, not an anonymous developer? But there is still a need to prove that that the prospect scales to “larger” projects.

The commitment to experimenting, learning, and working together with volunteers is helping SHAC prototype and explore possibilities for a sustainable built environment.<sup>19</sup>

## Appendix 1

In 2012, 34 people registered on the web site, leaving the following comments:

- The reason I got into engineering in the first place was to be useful. I pride myself in creating sustainable designs. Living sustainably and ethically is something I value strongly
- community based living
- small scaled, traditional technologies with modern upgrades
- Consume a fraction of the energy whilst providing a healthy comfortable environment to live in.
- my vision is to convert all building into sustainable building
- It is my goal to learn about sustainable living practices throughout my education as an architect. I am interested in applying passive design in my work as I believe architecture has more potential than simply being able to provide services to people. It can be a vessel in which we attempt to improve not only our lives, but other species' and the Earth's as well.
- 100% green 100% sustainable fuels and power
- Christchurch has experienced an incredible loss, but with that comes the opportunity to grow, to be reborn. We have the opportunity now to recreate our habitats sustainably, and not many people experience that chance.
- Building and living in a warm and dry home using passive solar and other forms of sustainable energy.
- to build a small home on a trailer base, using mainly recycled materials to stay mortgage free during the process to create our living space together with my partner allowing ourselves to be creative aiming for good, not perfect
- well create a Sustainable Habitat where people can live and feel comfortable.
- Living together.
- firmitas, utilitas, venustas
- I have a keen interest in the energy efficiency, liveability and durability of buildings and cities. Increasing the sustainable living standards of old and new buildings in New Zealand is extremely important. Especially on the South Island, where winters are cold, it is essential that buildings perform in a way that keeps citizens warm while also contributing positively to the overall well-being of NZ's environment. I am most excited about sustainability in regards to passive solar design, low embodied energy (ie, using local/natural materials and local craftspeople), good insulation and/or thermal properties of building enclosures, as well as low dependence on vehicular travel (ie, urban siting, walkability of essential goods, thriving neighbourhoods, etc.). I believe the most sustainable buildings are those that have stood the test of time... those that have endured and remained in use for hundreds (if not thousands) of years.
- 100% Recycled, zero waste restorative ecological living environments
- Construction consumes physical resources; we have to be modest in our use, respect the earth for providing them. The labour of people is the biggest resource as the skills, energy and care imbues materials with possibilities and qualities that inspire, comfort and beauty. With these principles at work, physical environments evolve that are supportive of the life that is envisaged for a place.
- everyone has something to contribute
- Chemical free, sustainable products combined with intelligent design
- A sustainable lifestyle is one that works together with nature, not against. It is applying concepts of permaculture, bio mimicry, closed loop cycled, cradle to cradle, and many more. Chemicals and pollution don't belong in our atmosphere, or our bodies. With the growing trend towards



sustainable lifestyles, my vision is to be at the forefront of this progression. It is to see a healthy future that includes a thriving environment, sustainable population and an understanding by everyone of the importance of looking after our surroundings.

- No treated timber, very little power consumption. Importing my house is a compromise in energy use but a great long-term gain. So far decent passive house and components are not available NZ made. Have not seen any decent window made in New Zealand.
- My vision for sustainable living is a way of life that enables me to live within my means, as lightly on this earth as possible, in an abode that I want to live in. To me, a sustainable life also means common sense, positivity, community and shared knowledge.
- Planning to build a Sustainable home from scratch. Based on Earthship model from the US. Looking for our section now, hope to start building in the next month or so.
- I would love to see, robust, resilient, repairable homes, growing like strawberries in our suburbs.
- That people live in zero carbon homes that produce energy for the community. To question what we need and what we want. " We live in a time where people buy things that they don't need, with money they don't have, to impress the people they don't know."
- Communal, bottom-up, empowering, smart, cost-effective, resilient, safe, beautiful. Am working on a project to meet all these and more ;)
- all in house and responsible for oneself with spare to share.
- Model for others and the mainstream. To show the resourcefulness, resilience and power of those who simply live but also make it fun, fulfilling and enriching to people's everyday life. I am working on "Simply Happy - a sustainable life model and education project
- Where a family can build and live in a house that has the least impact on the environment and where the house allows the occupants to be independent of expensive utilities
- going with the flow of nature
- that we could all work out how little it takes to live well.
- Is always evolving.
- I am a simple person with simple ambitions
- Well, part of my vision is to enjoy the beauty of artisan eco homes by making them and living in one.

## References

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<sup>1</sup> (Dombrowski,2010)

<sup>2</sup> SHAC (2010), 2009 Finalists Video, <http://vimeo.com/12257320>

<sup>3</sup> Ryan, A., (2010) SHAC 09: Competing Logics of Sustainable Architecture in a New Zealand Competition, Conference Proceedings, Sustainable Building 2010, Wellington, New Zealand

[http://www.branz.co.nz/cms\\_show\\_download.php?id=6ba65923ea304be3d47d082863a6dd95d44e6b3e](http://www.branz.co.nz/cms_show_download.php?id=6ba65923ea304be3d47d082863a6dd95d44e6b3e)

<sup>4</sup> \_\_\_\_\_, 2010, Solar Action Bulletin 92 – New Zealand's Energy Future, [http://www.solaraction.org.nz/home/?q=system/files/SAB92+NZ+Energy+Future+\(email\).pdf](http://www.solaraction.org.nz/home/?q=system/files/SAB92+NZ+Energy+Future+(email).pdf)

<sup>5</sup> SHAC 10m2 Design Challenge, <http://micro-architecture.shac.org.nz/wp/2012/03/01/10m2-challenge-2012/>

<sup>6</sup> Entries to the SHAC 10m2 Design Challenge, <http://micro-architecture.shac.org.nz/wp/category/10m2/10m2-challenge-entry/>

<sup>7</sup> <http://www.gapfiller.org.nz/about/>

<sup>8</sup> <http://www.gapfiller.org.nz/10m2-office-build-project/>

<sup>9</sup> <http://www.gapfiller.org.nz/summer-pallet-pavilion/>

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<sup>10</sup> <http://templeforchristchurch.org/>

<sup>11</sup> SHAC 2012 10m2 Challenge Entries Google Plus Photo Archive,  
<http://goo.gl/hxIwY>

<sup>12</sup> <https://www.facebook.com/CQ.brighton>

<sup>13</sup> Plastrik, P., Madeleine T. (2006). *Net Gains: a handbook for network builders seeking social change*. Retrieved from <http://www.in4c.net/files//28/Net-Gains-Handbook.pdf>

<sup>14</sup> Jeremy Rifkin, "Empathic Civilisation", [www.youtube.com/watch?v=l7AWnffRc7g](http://www.youtube.com/watch?v=l7AWnffRc7g)

<sup>15</sup> Scharmer, C. Otto (2007) *Theory U: Leading from the Future as it Emerges*. The Society for Organizational Learning, Cambridge, USA.

<sup>16</sup> Rapoport, Anatol, (1974), *Conflict in man-made environment*, Penguin Books, Harmondsworth, Middlesex, England

<sup>17</sup> Te Whaiti Nui-a-Toi, (2001). *Tipu Ake Lifecycle- A Leadership Model for Innovative Organisations*, Auckland: Te Whaiti Nui-a-Toi, <http://www.tipuake.org.nz>

<sup>18</sup> (Thoreau, *Walden*, 1882)

<sup>19</sup> See Amos Rapoport [no relation to Anatol] (1977) "Human Aspects of Urban Form: Towards a Man-Environment Approach to Urban Form and Design")