WHAT RESULTS FROM A PROGRAM DESIGNED TO FACILITATE THE REDUCTION OF THE ENVIRONMENTAL FOOTPRINT OF THE EMPLOYEES OF AN OIL AND GAS COMPANY IN CALGARY, ALBERTA?

By

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Abstract

Employees at Statoil Canada participated in an action research, cooperative inquiry-based program that was designed to facilitate the reduction of their office environmental footprint. The program was designed using a combination of techniques that have been shown in previous studies to produce pro-environmental change. Almost 90% of participants that were offered the program opted to take part. During a 4-month period, participants set up individualized programs to reduce their environmental footprint in a manner of their own choosing. Results were collected both formally, through self-report data from a web-based Action Tracker, through 1 on 1 interviews and through a facilitated discussion and informally, through impromptu conversations, emails and observation. The data suggests that the program was effective in reducing environmental footprint, although it remains to be seen if the changes will be long lasting.
Chapter 1: Context

Introduction

Depending on whom you ask, humans (the genus *homo*) have existed for just over 2 million years, or at the very least, for approximately 250 000 years (*homo sapiens*; (Hart & Sussman, 2008). Also depending on whom you ask, the environment has existed for 4.5 billion years (Allegre, Manhes, & Gopel, 1995). Our relatively brief interaction with the environment, over the course of a quarter of a million years, has been dynamic, as has been our understanding of that interaction. Prehistoric man has been portrayed as a simple creature, peacefully coexisting with his / her environment, but more recently has been portrayed as a serious force of change, being responsible for vast and previously unimagined acts of deforestation and environmental degradation (Nash, 1982).

Throughout this history of change, what has remained more or less constant is our attitude towards the environment. For the vast majority of our existence, the environment was the thing that was our biggest challenge. It was a difficult place to live in, to get nutrients from, and to be protected from. For most of our history, we spent our lives trying to not be killed by the weather, or by predators, or by starvation. The environment was endless, and our ability to survive in it was finite. Even as recently as 200 years ago, the same challenges that faced pre-historic man were still foremost in our minds as we tried to stay warm during winters, cool during hot summers and we worked endlessly to bring food to the table. We were safest when away from the natural environment, as we built huts and villages and cities to keep the dark forces of nature at bay (Nash, 1982).

Over time, as different civilizations managed to start to successfully escape the all-encompassing preoccupation of feeding themselves while preventing other forces of
the environment from killing them, so too began to grow the same civilizations’ ability to impact the environment. During the last 300 years (but much more significantly during the last hundred), modernization in many parts of the world has allowed people to worry less about where food was going to come from, and more on how they could spend leisure time. Time and refined resources, previously scarce, could now be used to produce more than the bare essentials, and as production (and the number of people) increased, our impact on the environment started to become significant (Grove, 1996).

At the same time, because the challenges posed by the environment became less and less, and because the amount of non human-constructed environment also grew scarcer and scarcer, our relationship with the environment began to change. The receding, dark and threatening forest started to become beautiful, and treasured. And, as people saw the trees disappear, the notion that the environment was endless gradually started to become replaced with the slightly alarming notion that it might all run out some day. The conversation began to shift from how we could keep the environment from impacting us, to how we could keep ourselves from impacting the environment (Nash, 1982).

Today, the evolution of that relationship finds us in a place where the importance of decreasing our impact on the environment is starting to take center stage in day-to-day conversations, in business, and in politics. In 1983 the United Nations, as a response to a growing concern “about the accelerating deterioration of the human environment and natural resources and the consequences of that deterioration for economic and social development,” (United Nations, 1987), established the Brundtland Commission which ultimately produced the landmark Brundtland Report on the state of the environment.
The report, Our Common Future, identified, in an international forum, the degradation of the environment as a major world-wide concern (Brundtland 1987). Later, Grove (1996) echoed the sentiments of the Brundtland commission:

The world is widely seen to be in the throes of an environmental crisis, in which an artificially induced ‘greenhouse effect’ hangs over humanity like a climatic Sword of Damocles. As a result, environmental matters have become a part of the political agenda in almost every country. Increasingly, too, the prescriptions of environmentalists are receiving popular acclaim and support that, before now, was heard only from a minority. Ideas about conservation and sustainable development, in particular, have become highly politicized (Grove, 1996).

Indeed for the first time, the environmental agenda seems to be a serious political force (Zehr, 2000). In Canada, recycling is in the process of becoming the norm, rather than the exception, and previously unchallenged business activities such as coal power generation, oil sands and petrochemical production are under intense scrutiny from the public, and also from potential customers abroad (CTV.ca, 2009). The term “footprint” has appeared and is in constant use to describe how big our impact is, with respect to the impact of carbon (carbon footprint), the impact to the earth as a living system (ecological footprint) and even, generically, to describe the impact to the environment (environmental footprint) ((Kitzes, 2009; Saffire, 2008).

Even though attitudes are changing, the debates remain significant and questions about how big our environmental impact (environmental footprint) is, about what is most crucial, or urgent, about what should or should not be done, are more numerous than answers. And in a sea of questions, challenged and debated answers, and whirling
uncertainties, people have been left to fend for themselves. The question of how to best minimize our environmental footprint is not definitively answered; neither is the question of how urgent minimizing that footprint is (Bradshaw & Borchers, 2000). In the face of the cognitive dissonance that is produced by these conflicting positions, people will often resolve the discomfort by “rejecting or avoiding information that challenges belief systems” (Bradshaw & Borchers, 2000). When new, and especially conflicting, information comes that challenges people’s existing lifestyles, the confusion that is caused is easily resolved by avoidance. So in the end, when people decide if and what they should change, what they should reduce, and how to strike a balance between what they want and what the true cost of their wants might be, they unfortunately end up avoiding the confusion by doing nothing.

Without a clear set of parameters, without some certainty over the benefits / costs of changing lifestyles, if someone comes to us and asks us to give up something we are currently doing, we will likely ask why. If the answer is not credible, or understandable, or important, we are not likely to seriously entertain the change (Doble, 1995). And in the mean time, our footprint continues to add up, and the debates about what we should do continue to rage on. We do not know how big our impact is, but there is a general consensus that it is significant (Meffe, Nielsen, Knight, & Schenborn, 2002; Rosenzweig, et al., 2007). We do not know what we should do; yet there is a general consensus that we should do something. But where to begin?

Perhaps the place to begin is not to finally answer what the best thing to do is, or to answer how imminent our destruction is, but to look at what we are doing, and to ask, based on our current and individual understanding of the issues, if there are things that we
are willing to change right now. As individuals, are we willing to make some changes, even if it is not certain that the seas will rise by 7 metres? And even if we are willing to change, can we make that change stick?

Much research has been done into methods to produce behavior change with respect to environmental behavior. One study, published by Dwyer (1993), examined the results of 54 environmental studies alone, done between 1980 and 1993, and there is an entire journal, *Environment and Behavior*, that is dedicated to the subject. Unfortunately, a review of much of the literature has yielded two disappointing results: firstly, most research has examined only change, and has not focused on long-term change. Secondly, the research that has been done on change has found few methods that yield significant results, and even fewer that yield long-term results (Dwyer, 1993; Kollmuss & Agyeman, 2002; Stern, 2000; Young, 2000). Most of the studies that were analyzed focused on one method of change and even most of the methods that produced change showed a return to baseline conditions as soon as the program ended. So one challenge is to cause people to make change even for a short time, although a few methods have been found that can achieve that, with some reliably, with tools such as incentives; (Young, 2000). The bigger challenge, however, is to cause people to make change that is long lasting, and sustainable. But who are the people?

*Who Should be Researched?*

The question of whose environmental footprint is being reduced is relevant. It would be great if people in general would reduce their footprint. In other words, it would be easier, and far more effective, if a program could be designed that would cause all
people to reduce their impact on the environment. If that happened, the program could be applied everywhere and reductions would happen all over, potentially making a significant reduction in the impact that humanity has, worldwide. For this project, choosing and answering the research question, “How can we make people want to reduce their environmental footprint?” would have been grand, but may have been impossible, as there may be no single answer.

People, unlike CO₂ molecules, are all different and their behaviours are correspondingly different. Different lifestyles and their accompanying motivations, backgrounds and socio-economic realities mean that people’s impacts on the environment, even before entering any program, are all different (Christensen, 1997). Somebody that can afford to drive a Hummer will have a different impact on the environment than someone who lives in a grass hut and practices subsistence farming. These differences also mean that the changes they would be able to make, and just as importantly, the changes that they would be willing to make, are different. The subsistence farmer does not have the same ability to reduce his / her impact as the Hummer driver, and the factors that may motivate them to change may be very different. They way they communicate, the way they expect to be communicated with, would likely also be quite different and dependent on their particular context. The guiding question for such a project needed to be more specific, and to include context. And the context I knew well was the one of my current workplace.

Thus, the research question began an evolutionary journey. At this point, the research question that guided this project included context and changed from “How can we make people want to reduce their environmental footprint?” to, “How can we make
the employees of an oil and gas company, located in Calgary, Alberta, want to reduce their environmental footprint?”

What Kind of Research Should be Done?

The recognition described above, that context plays a crucial part in the research endeavour, is explained by Stringer, who suggests that all inquiry should exhibit three characteristics: Decentralization, Deregulation, and Cooperativeness in Execution (Stringer, 2007).

Decentralization. Decentralization refers to the movement away from traditionally defined objective and generalizeable “truths” toward context-specific results. According to Stringer, although traditional problem – hypothesis research is immensely valuable, its validity can break down in social research where people, their behavior, and the innumerable parameters that are unique to each context, tend to make it almost impossible to isolate all but one variable (Stringer, 2007). Research that does not attempt to jam context-specific behavior into a theory that explains everything can be more honest, and can certainly do a better job of serving its audience, as it has been designed specifically for it.

Deregulation. Deregulation also recognizes that the traditional approach to inquiry, although perfectly suited to calculating the trajectory of an object moving through space, is difficult to apply to a medium that is largely constructed by its participants (Stringer, 2007). Social experience is different for each participant, and this project focused on empowering the specific participants in my work context to understand and change their reality. This approach is commonly used in endeavors
designed to bring about positive change, and it relies on the participants’ “subjective meanings of their experiences” to help them change their lives, “the institutions in which they live and work, or even the researchers’ lives” (Creswell & Miller, 2000).

Cooperativeness in execution. Cooperativeness in execution refers to the approach taken in this project that blurs the lines between researcher and participant. All involved are participants, all have an important voice in determining the direction that the project will take, and the researcher attempts to build solutions along side other participants (Stringer, 2007). This approach believes that when each person is a participant, instead of being an object that is being investigated, more can be achieved by the study (Willis, 2007). The traditional role of the researcher as expert is blurred. Although I had researched behavior change and methods, and likely had much more extensive knowledge about the topic than other participants, my approach was not to be prescriptive. The knowledge I had was to be shared with participants and was to be incorporated, along with theirs, into a context-specific program that was intended to honor both formal research and informal experiences.

Action research. The process described above identifies a particular approach to research: Action research is a qualitative research technique that is democratic and collaborative. It attempts to decentralize, deregulate and cooperate in execution, in order to enable participants to take action to solve an identified issue or issues (Stringer, 2007).

To be clear, this is a very different form of research than that used traditionally: qualitative research is different from traditional quantitative research in many more ways than just the way data is collected. As explained above, this different paradigm is used
specifically because, when dealing with people, it is not possible to isolate all variables, since it is not possible to even identify all the variables. As Ket de Vries et al. argue,

To accurately measure the effectiveness of a program under ideal conditions, a control group… should be compared to the study group; both should be tested and retested over time, using the same instruments and observers; everyone should answer with complete honesty and full self-awareness to avoid desirability bias; and the whole exercise should take place in a quasi-vacuum, with no discernable extenuating circumstances in the organizational environment during the time of the study (Kets de Vries, Florent-Treacy, Guillen Ramo, & Korotov, 2008).

Additionally, reality is seen as something that is at least partially constructed, and interpreted through the messy filter of people, as opposed to something that is viewed impartially by an external observer (Willis, 2007). As Creswell writes, researchers focus on the specific contexts in which people live and work in order to understand the historical and cultural settings of the participants. Researchers recognize that their own background shapes their interpretation, and they ‘position themselves’ in the research to acknowledge how their interpretation flows from their own personal, cultural and historical perspectives (Creswell & Miller, 2000).

For a project whose main focus was a group of people and their changing behavior, and whose goal was not simply observation but active change, a qualitative approach seemed to me to have been the only possible approach.

Cooperative Inquiry is the specific form of qualitative research that was used in this investigation. Cooperative Inquiry is an approach where participants are co-
researchers, where participants’ ideas and thinking guides investigation development and direction (Reason, 1999). Cooperative Inquiry helps the investigators, who are also the research subjects accomplish two main goals.

The first is an improved understanding of the world; one that is more creative and that offers new ways of looking at things. The second is empowerment to cause change; empowerment, not strictly in the giving power sense of the world, but in the removing obstacles sense, specifically by providing participants with the knowledge necessary to make change (Reason, 1999). Such an approach believes that good research is research that is done with people, rather than on people (Reason, 1999) (Willis, 2007), and as such involves them in the creation of ideas and plans. The belief in Cooperative Inquiry is that the participants are intelligent and can contribute, and that they are perfectly capable of working together to generate solutions to a problem. In Cooperative Inquiry, the outcome of the research is not only the creation of document, but also the examination and solution of real problems in real life. Additionally, according to Heron, a foundational goal of Cooperative Inquiry is to enable people to self-determine (J. Heron, 1996). According to Heron and Reason (1997),

people collaborate to define the questions they wish to explore and the methodology for that exploration… together or separately they apply this methodology in the world of their practice… which leads to new forms of encounter with their world (John Heron & Reason, 1997).

Since participants would have significant impact on the direction of the project, and even on what was measured, the evolution of the research question continued from, “How can we make the employees of an oil and gas company, located in Calgary,
Alberta, want to reduce their environmental footprint?” to “What results from a program designed to make the employees of an oil and gas company, located in Calgary, Alberta, want to reduce their environmental footprint?” And since the action research process blurs the traditional lines between external researcher and participant, it is also relevant to ask, “Who was the researcher?”

**Researcher Background**

As the principal researcher in this project, I unavoidably had significant influence on the final destination, as well as the courses charted and travelled. Willis (2007) states that, as a qualitative researcher,

> You pick certain things to study because you have an interest. You probably also have an idea about the results and conclusions you will end up with… Recognize your biases and values to the best of your ability and acknowledge them (Willis, 2007).

Throughout the project, I attempted to make best use of my strengths, in order to help achieve desirable outcomes. At the same time, tried to minimize the negative impact my particular set of qualities had on the project, and on the people involved in it. In order to achieve both, and to help the reader perhaps understand how I arrived at some of the decisions I made, I feel the need to explain where I have come from.

I am currently working in the Health, Safety and Environment department for Statoil Canada, a wholly owned local subsidiary of Statoil ASA, a large Norwegian oil and gas company. I have been with the company for 2 years, working primarily in the area of Emergency Response, and have been tasked with designing emergency response
plans, with training personnel, and with the implementation of a crucial program throughout the company. Although the gravity of the subject carries with it a certain implied authority, I do not have any direct reports and have little formal authority to force anybody to do anything; I have been tasked, daily, with the need to exert influence in an area where I only have implied authority. Because I have lived that reality for the 2 years, I have had to form a wide number of relationships throughout the company, and have been fortunate enough, on most occasions, to gain the trust of my colleagues. Although there have been challenges, and it is not always possible to forge ideal relationships with all people, I believe that overall my initiatives have been viewed positively by many employees working in the company. Out of the 200 plus employees working at Statoil, I have had contact with over fifty of them, and with most members of senior leadership. Since I know, to some degree, employees in almost all areas of the company, and since I have some understanding of the culture of the company, including power structures, who to approach for help, what people think about, and other aspects of the company’s day to day life, I was well positioned to try to effect behavior change (Coghlan & Brannick, 2007).

Before I worked for Statoil, I spent 10 years as a junior high school teacher. During that time, I taught primarily science, health and outdoor education, I coached, and I spent many, many days with kids sailing on the West Coast of British Columbia, as well as backpacking, hiking and sea kayaking various trails and archipelagos in Western Canada. Although I have a B.Sc. in Zoology, and I love science, it was not the subject matter that drew me to teaching. I loved making a positive difference in people’s lives, and it was on the court, or the trail, or on the sailboat that I felt most fulfilled, as I tried to
help young minds on their particular journeys. I was lucky enough to be entrusted by
many students with important dilemmas and struggles, and the relationships I forged with
students became very strong.

This history is very relevant to the current project, because in the course of
teaching, and trying very hard to guide young people toward wise, positive choices, I was
able to experiment, on a daily basis, with various techniques for change. I had regular
arguments with colleagues about what worked and what did not, and what our roles as
educators should be. At the risk of straying a bit from the current goal, which is to
succinctly provide details of my background as a context for this project, I feel like I have
to expand on these arguments; they are relevant to the current project and to the
methodology I chose.

Some teachers came to school daily and immersed themselves in trying to teach
mathematics, or English, or social studies, to the best of their abilities. They did not
worry about the existential dilemmas of the junior high school student, and certainly did
not involve themselves with their students to the extent I did. They did not engage in
philosophical discussions, they did not spend weeks in the wilderness with their students.
They taught their subjects, as well as they could, and let their students sort out their other
issues, or challenges, by themselves. As a young teacher, full of energy and
determination to help, I respected these teachers’ points of view, but saw their choices as
lack of commitment, or lack of ability to cause “real” and meaningful change. I did not
judge them as deficient because of this, as I recognized that different people were at
different places in their careers, and had different skill sets. Some teachers had families
and kids of their own; others were good at designing clear lessons. Just because they did
not do what I did, it did not mean they were not good teachers, and the content of the lessons was certainly important. But the real important work, I thought somewhat arrogantly, was to get in the kids’ heads, so they could see the value in logic, in positive relationships, in responsibility; so they could be the best they could be.

Through coaching, or weeklong sailing trips, or backpacking, I found out, quite quickly, that it was easy to get kids to change. I quickly and easily developed strong relationships, students respected and liked me, and they started to listen, and to make changes for the better. I was full of joy at the positive impact I was having (and of considerable hubris), and continued to immerse myself in the pursuit of excellence with my students. The really interesting part, however, did not become apparent for a few years, and as I started to realize it, my life, and my teaching, changed.

Although students made great leaps and bounds when on the various trips, although the force of the relationship I had with them caused them to stop drinking, smoking, to study more, etc, when they returned to school from the trips, or when they graduated from my classes and moved on to other influences, they almost always reverted to their previous habits. Yes, I could make them change while I was in their lives and controlled some of the environment they interacted with, but for the most part, those changes seemed temporary, and appeared not to reflect any lasting change in the way they thought. Even now, as I type this, I can see my other older colleagues, who just came to school to teach math and social studies, patiently smile at my belated realization. I wonder if they always knew, or if they too walked the same path as I did. It seems that some of my colleagues knew that their job was to provide tools, so their students could learn to use them, if and when they wanted to. I had finally realized, that only very rarely
could we cause people to WANT to do something they did not want to do before. We can show them how to do it, we can help remove obstacles that prevent them from doing it, but we can almost never make them want to do it. And, on a moral level, I also started to question my right to try to make someone, even a young someone, to want something they did not want before.

These realizations are crucial, because according to the change model I was using as a teacher attempting to support students to make positive changes, change was wholly dependent on the agent of change, namely me. If my efforts stopped, or if I went away, the subjects almost always returned to baseline conditions.

This project has been strongly guided by the above realizations. Although I still have some skills in forming relationships, and in influencing change based on those relationships, I consciously tried to stay away from those approaches. My goals for this project were to enable people to change, and to facilitate conditions that might make that change long lasting, regardless of whether I was still involved with the program. The use of the word enable is purposeful. I did not attempt to make people want to reduce their environmental footprint, but rather attempted to give them tools to do so, while removing the obstacles that prevented them from doing it before the project began. There were conversations and presentations about the benefits of reducing footprint, but I did not try to use my relationships, or fear, or manipulation to achieve results. And, although this approach may have had lower chances of producing large change, it was more honest, and hopefully in the long term, according to my previous experience, more effective. So the question, in the end, was not, “What results from a program designed to make the employees of an oil and gas company, located in Calgary, Alberta, want to reduce their
Reducing Office Environmental Footprint

environmental footprint?” but, “What results from a program that is designed to facilitate the reduction of the environmental footprint of the employees of an oil and gas company, located in Calgary, Alberta?” Just as it is important to understand the context of the principal researcher, however, it is also important to gain a general understanding about the context of the other employees.

Employee Background

It is relevant to discuss the context of the employees at Statoil, especially because that context changed continuously throughout the course of the project. At the inception of the footprint project in early 2008, oil prices were skyrocketing (Williams, 2009), the economy was reaching the end of a prolonged period of overheating (Calgary Herald, 2007), and the company was 2 years away from completing construction of an oilsands project, while in the middle of an integration that combined three formerly independent companies into one. During the past year and a half, the stress from the integration has abated, while “oil prices tumbled and the world economy went into a tailspin” (CBC News, 2009). With these changes, economic uncertainty has gripped the oil and gas industry. Additionally, Statoil employees started to very quickly approach a mid 2010 deadline for starting production on a multi-million dollar project, and there were (and are) many things left to do, in a short time. The company has effectively had a hiring freeze for almost a year, and a new president recently took over, bringing a new focus on, as he said it, “Deliver, deliver, deliver” (Bacher, 2009). Consequently, during the past few months everybody’s attention has been refocused on finishing the project on time. Additionally, during the past few months, several key personnel have left the company.
for undisclosed reasons, including one of the principal sponsors of this project. For all these reasons, the morale and focus of employees has been, over the course of the last year, under constant flux. This changing reality had real consequences for the design of the project, which had to be dynamic to minimize the potential resistance to change that could have appeared in the face of people’s changing mood and priorities, as well as in the face of the fear that accompanies uncertain times. According to Doppelt (2003),

Resistance occurs not only when new threats appear to the status quo. It can also emerge after a change has been launched if people become overpowered by feelings of ambiguity or loss of control. Most people do not respond well to situations they cannot control. When change moves too fast for people to assimilate, or when they fear they do not have the capacity to successfully adjust to or prosper in the new order, resistance will occur (Doppelt, 2003).

Therefore, the footprint project was designed to be flexible, and most of all sensitive. I did not want to increase stress, or to exacerbate the potential negative feelings that may have already been brought about by constant change.

With the above in mind, in order to maximize our chances for success, I also wanted to determine what research had been previously done in environmental behavior change. I needed to know what had produced positive results, but more specifically, what had produced lasting pro-environmental change.
Chapter 2: Literature Review of What has Worked in the Past

Introduction

This section will examine the published research in order to identify what strategies have been successful in facilitating pro-environmental change, and change in general. Although, as discussed previously, there has been little success in causing people to make lasting change, a few strategies have emerged and include:

- Commitment, modeling and feedback
- Goal setting
- Tailor made program
- Multi-strategy approach
- Kotter’s eight steps

Commitment, Modeling, and Feedback

Among the methods in the 54 environmental behavior studies examined by Dwyer, three strategies emerged that showed some positive results: commitment, modeling, and feedback (Dwyer, 1993). Commitment is a “formal, explicit and public pledge to engage in a specific target behavior” (Katzev & Pardini, 1987-1988), and has been identified as an effective tool for changing behavior (De Young, 1996; Dwyer, 1993; Staats, Harland, & Henk, 2004). Further, individual commitment versus group commitment has been studied and results have shown that although both types of commitment are effective at promoting change, only individual commitment has been effective long-term (Wang & Katzev, 1990). These results have supported my own experiences in teaching, where having an individual conversation with a student was
much more effective in eliciting change than eliciting a group commitment from the whole class. Based on the literature reviewed and my own teaching experience, although it would have been much more efficient to try to obtain commitment from employees during larger meetings, individual meetings were set up so employees could commit to their participation individually.

Another type of commitment, public commitment, has also been found to be effective at promoting environmental change (Deleon, 1995). Because public commitment would have required participants to make their commitments in front of a larger audience, I decided not to use this approach. I did not want to put that kind of pressure on participants, and I also wanted them to be able to keep the details of their participation confidential.

Modeling and feedback were also studied in connection with resource use and showed some promising results (Dwyer, 1993). Four studies were conducted that showed that both feedback and modeling were effective at reducing energy consumption in the home. In the first two studies, modeling and feedback strategies were used to positively influence conservation behavior with respect to heating and cooling in two all-electric townhouses and apartments. In the first study (winter), authors found that modeling, represented by the showing of a videotape that demonstrated conservation behavior (including the wearing of sweaters and blankets), was effective at reducing energy consumption. A second group was shown the same videotape, but was also provided with daily, written feedback on the results of their thermostat changes. This second modeling and feedback group reduced consumption significantly when compared to control groups and also reduced their impact more than the modeling-only group.
The second study (summer) produced similar results and concluded that modeling and feedback were more effective at influencing conservation behavior than modeling alone and that modeling alone was more effective than control groups. During the summer study, however, the modeling-only group maintained their consumption reductions during a three week follow-up period, while the others did not (Winett, et al., 1982).

In the third study on modeling and feedback, a 20-minute television show demonstrating some simple energy conservation behaviors was shown to a group of 175 homeowners. The television show demonstrated to study participants how to keep cool during the summer without having to turn up their air-conditioning. This single showing modeling of behavior was shown to be effective in causing study participants to reduce their energy consumption, even during a winter follow-up period (Winett, Leckliter, Chinn, & Stahl, 1984).

Although some conflict exists among the studies as to which is most important, modeling, or feedback, both methods seem to provide promising tools to reduce consumption. Furthermore, since the modeling in all of the studies used single showings of a 20-minute videotape, it is likely that more consistent and continuous modeling behavior would have more significant results (Dwyer, 1993). Just as with commitment, this approach was also reinforced by my teaching experiences, where most good teachers maintained that demonstrating the behavior that we were trying to elicit from students was one of the most effective ways to get them to act. Based on the literature and on my own experience as an educator, it became apparent that it would be important to create
opportunities to model the behaviour necessary to reduce Statoil’s environmental footprint during the course of the research initiative.

Feedback has also been studied in combination with commitment. During a study on recycling behavior, feedback and public commitment were used to attempt to increase recycling behavior in households. A commitment-only group was asked to sign a letter making a public commitment to recycle. A feedback-only group was given weekly information on how many pounds of recycling their group generated, but was not asked to make any commitments. A combined intervention group received both strategies for increasing recycling. Interestingly, the commitment-only group did not increase their recycling behavior, while the feedback-only group did (25% increase). The biggest increase in recycling behavior, however, came from the combined intervention group, which showed a 40% increase in recycling (Deleon, 1995). These findings are important, not only because they offered important strategies that could be used to reduce impact, but also because commitment and feedback are social consequence behaviors that are inexpensive to administer. It was important, due to the limited budget that was available for the project, to use strategies that were not cost-intensive.

Based on the findings of Deleon (1995), as well as of others, Staats et al (2004) have suggested that a combination of feedback, commitment, as well as information and a supportive social environment would be particularly useful in promoting pro-environmental change.

Commitment has been suggested to be useful in overcoming the initial inertia against change when people do not yet have the competence necessary to feel able to make change. Information and feedback, especially performance feedback, has been
suggested as useful means to increase the competence level needed by people who may be convinced WHY they should change, but simply did not know HOW to change (De Young, 1996).

Feedback has also been explored by Houwelingen and Raaij (1989). In their study, 325 Dutch families received feedback strategies in order to cause a reduction in their households’ energy use. The authors postulated that feedback has three important functions in promoting change. The first is learning: “Consumers learn the energy consequences of specific behaviors, and the information provided reduces uncertainty” which makes them more likely to act (Houwelingen & Raaij, 1989). This also supports De Young’s findings that people require the confidence necessary to feel like they know what to do.

The second function of feedback is habit formation. According to Houwelingen and Raaij, “habits, routinely performed strings of acts, are being set and reinforced. Without being energy-conscious all the time, people are behaving in an energy-conserving way. Habits formed with feedback should remain after withdrawal of the feedback” (Houwelingen & Raaij, 1989).

The third function of feedback is “internalization of behavior, i.e., energy-conscious attitudes are formed through being confronted with one's own behavior” (Houwelingen & Raaij, 1989). Because the feedback elicits behavior, after some time people’s attitudes should change to conform to their habitual behavior. During their study, where feedback was used in combination with goal setting, the authors found significant pro-environmental change.
Unfortunately, in Houwelingen and Raaij’s study behaviors gradually returned to baseline conditions after the feedback mechanism was removed, suggesting that permanent feedback may be necessary to cause long-term change. According to the authors,

Energy use as a consequence of household behavior is either not a topic of permanent awareness or is difficult for residents to assess without the presence of feedback information. People seem to need a permanent reminder and a regular check in their home in order to save energy (Houwelingen & Raaij, 1989).

As a result of reading the literature, it became obvious that for the footprint project, designing a way for participants to receive feedback about the success of their efforts was going to be an important way to promote change, and that the feedback would have to be regular.

**Goal Setting**

Goal setting, and specifically participative goal setting was also explored by Ludwig and Geller (1997), and yielded some encouraging results. In fact, the benefits of goal setting have been well documented, and Locke and Latham concluded a review of over 500 studies on the topic that firmly established the strong connection between goal setting and changing behavior. The same review also found that there was no appreciable difference between assigned and participative goal setting (Locke & Latham, 2002). So, according to Locke and Latham, it should not matter whether the goals for footprint reduction are chosen by the participants or assigned by the principal researcher. Ludwig and Geller, however, examined the effects of participative versus assigned goal setting,
not only with respect to targeted behavior, but also with respect to non-targeted behavior. In a study that examined safety practices of pizza delivery drivers, they found that goal setting improved behavior in their targeted area (coming to a complete stop at an intersection), but only participative goal setting improved performance in non-targeted areas (wearing seatbelts and using turn signals) (Ludwig & Geller, 1997). This was an important finding that influenced the design of this research initiative, as the reduction in environmental footprint can be done in a myriad of ways, not all of which are possible to track. For this project, it was hoped that, if participative goal setting were used, a halo effect would be observed, where participants would even change behaviors that had not been specifically identified by the project. This generalization of behavior was important if we were to make significant positive change.

_Tailor-Made Program_

A participative approach was also necessary if footprint reduction actions were to be appropriately matched to the participants. Tudor et al, in a study that examined sustainable environmental behavior in a large organization, determined that actions should be “tailored” to work for the specific departments (Tudor, Barr, & Gilg, 2008). According to Tudor et al, actions that were general and designed to work for the whole organization were less likely to be successful than actions that took the individual contexts of smaller departments into account. If this concept is to be taken even further, it seems logical that the more we are able to tailor a program to the individual, the more easily the participants would be able to effect meaningful change, as long as they were still able to receive support from the larger organization. Since the only way to custom
design the program to an individual was to gather specific information about what they could and could not do, about what they wanted to do, about what they knew or did not know what to do, their participation in the design process was crucial, and was incorporated into the methodology, which is explained in the next chapter.

*A Combination of Approaches*

Although the research described previously has for the most part concentrated on one or two techniques for promoting pro-environmental behavior, very little research has been done where a variety of different approaches have been combined (Dwyer, 1993). According to Staats et al. (2004), “Intervention techniques that only change one specific type of behavior, and then only for the duration of the intervention, have limited practical value” (Staats, et al., 2004). The authors suggest a combined strategy approach in order to cause significant and lasting effects. Staats et al. created an “EcoTeam” approach to reducing environmental impacts. EcoTeams were small groups (6-8 people) of individuals who knew each other and who met, monthly. At the meetings, the teams chose one theme (garbage, gas, electricity, water, transport, and consumer behavior) and discussed strategies to reduce the impact of that theme. The following month, they committed to and implemented some of the strategies they discussed. The following month they chose another theme and repeated the cycle. The strategies used in this project included information, feedback, as well as the positive reinforcement brought by a supportive social environment, to effect long-term change. This approach was highly successful in producing change, as half of the 38 household behaviors were changed for the better. Additionally, the improvements were maintained or expanded, even 2 years
after the program ended (Staats, et al., 2004). The authors suggested that creating change, and perhaps even lasting change, was possible if we also used a combination of the strategies that have been discussed in this section.

*Kotter’s Eight Steps*

Another combination approach in leading change was suggested by Kotter (2002). In attempting to cause long-term change in organizations, Kotter identified eight steps that are necessary, that comprise many of the strategies described above. According to Kotter, the eight-step programme can be applied to many kinds of transformations, including cultural (and therefore behavioural) change (Kotter, 2002). The eight steps to creating change are:

- Increase urgency – doing something, not necessarily fear-based, to cause the participants to care more about the perceived problem.
- Guiding Team – once urgency has been increased, a team of individuals with the requisite skills to effect changes needs to be created to support the desired change process.
- Vision – the guiding team needs to be able to create a clear vision and matching sets of strategies.
- Communication – the vision needs to be communicated in a simple, heartfelt way to people. Actions are more important than words.
- Empowerment – obstacles that keep people from acting on the vision need to be removed. The important focus is not the giving of power, but the removal of obstacles.
• Short-term Wins – waiting a long time for positive feedback about success makes it difficult for people to sustain efforts. According to Kotter, these wins are critical for increasing momentum, silencing critics and providing credibility.

• Don’t Let Up – as some success is experienced, momentum must continue to be built in succeeding waves of change that lead to the achievement of the vision.

• Make Change Stick – continuing efforts over a long period of time are necessary to overcome well-established traditions that may act counter to the desired change. Actions that engage emotions, over time, will incorporate the change into the culture of the organization and make it permanent. (Kotter, 2002)

Kotter, as mentioned above, as well as the rest of the reviewed literature yield a number of strategies that show promise in producing significant change, and most pertinent to this specific research initiative, pro-environmental change. Commitment, feedback, information, modeling, goal setting, as well as Kotter’s eight steps were combined to produce, as Staats et al (2004) suggest, a combined intervention approach to reducing environmental impact.
Chapter 3: Methodology

Introduction

The methodology for the environmental footprint project was qualitative. As already mentioned, when people and their behavior are involved, the inherent complexity and variability in the system makes this approach logical (Kets de Vries, et al., 2008). Within the qualitative research framework, I chose an action research, cooperative inquiry slant because of the way it positions the participant as a valued and equal member of the research endeavour (Willis, 2007). I believed that this would increase the chances of success, while allowing me to make changes that were not wholly dependent on me. Also to increase the project’s chances of success, I incorporated the strategies that have been successful in causing lasting pro-environmental change. This chapter will describe, in detail, the methodology that was created from these foundational principles and will include:

- My position within the cyclical nature of the methodology
- Selection of participants and level of participation
- Ethical considerations
- Scope of the project
- Measurement techniques
- Methods we used to reduce the footprint

My Position Within the Action Research Cycle

Although there are many minor variations on the approach to be used in action research, most follow the general cyclic formula: Look, Think, Act. Using this iterative
approach, the researcher first gathers relevant information (look), explores and analyzes the situation (think), and then plans, implements and reports (act) (Stringer, 2007). For this project, I had spent the last year and a half in the first stage (look). I had observed the organization, listened to conversations, and tried to build an accurate picture of how the office works in terms of culture, organizational priorities, power structures and important relationships. I then used the information gathered to understand what was and is happening at Statoil with respect to pro-environmental behavior and combined this knowledge with the research on successful behavior change (think). That information was used to design and implement a change program with the intention of facilitating a reduction of the environmental footprint of the company (act).

Participants

White, Suchowierska, and Campbell (2004) have stated that participant selection is a core Action Research principle. They further write, “Participants who have an investment in or are beneficiaries of the results of research should be chosen” (White, Suchowierska, & Campbell, 2004). Since “recruitment of these participants will increase the likelihood of engaging in relevant research activities and obtaining credible, valid, and applied outcomes,” (White, et al., 2004) the project was made available to all employees and consultants working in the offices of Statoil in Calgary. This meant that up to 300 people had the theoretical possibility to join the project, although many of them spent minimal time in the office and were often in the field. Realistically, there were likely approximately 200 that were in the office enough to be able to learn about the project and to actually participate in it. Because the purpose of the project was to
facilitate change in behavior, and because any change, no matter how small, would help, I decided that I would not prevent anyone that showed interest from participating, even if they were rarely around.

*Level of Participation*

Participants were invited to take as big a part in the project as they wanted. Nominally, two levels were identified:

- Steering committee participation – people that were interested in being heavily involved could take part in a steering committee where they could play a large creative role and would be expected to complete tasks that would benefit the whole project.
- General participation – people that were interested in reducing their footprint but did not have the time or interest to play a larger role would only be asked to do as much as they were willing to impact their own office footprint.

Because participants’ schedules were dynamic, they were invited to have some flexibility in moving between the two levels. The steering committee was important to share the load of the project and to generate collaborative input and followed Kotter’s eight steps towards producing meaningful change (Kotter, 2002). It also allowed most other participants, who were quite busy, to have a much more limited participation.

*Ethics*

Statoil did not have an ethical policy regarding the use of its employees as study participants, but the sponsoring university does and, morally, I felt like I also had a strong
obligation to protect the people that agreed to give of themselves to help achieve the goals of the project. Using the Royal Roads University Research Ethics Policy as a guideline, the following principles were adhered to:

1. Respect for Human Dignity
2. Respect for Free and Informed Consent
3. Respect for Vulnerable Persons
4. Respect for Privacy and Confidentiality
5. Respect for Justice and Inclusiveness
6. Balancing Harms and Benefits
7. Minimizing Harm
8. Maximizing Benefit (Royal Roads University, 2009)

A spirit of respect for potential study participants was always foremost in my mind, and a foundational consideration for the project was that participants were never made to feel badly, or to feel excluded, or pressured in any way. This also extended to a respect for the participants’ time, and all activities were designed to produce the most benefit to the project and to participants, while minimizing the time that already busy employees had to give. This was not only a respectful way to approach participants, but was also a way to maximize the benefit to them.

In order to ensure free and informed consent, a consent form was written and given to all potential participants, who were asked to read it before signing. The form explained to participants that their identity would be kept confidential, and that the results of their individual efforts would not be shared with anyone. Participants were told, however, that their results would be added to the results of others, and that aggregate data
would be shared with everyone, even though their particular part would never be identifiable by anyone other than me. Additionally, participants were told that their participation (or lack thereof) in the project would not be tied to their compensation or employment status at Statoil in any way. Potential participants were told how much time they would be expected to spend on the project in its entirety (approximately less than 3 hours), and that they could discontinue participation at any time without penalty of any kind. A copy of the consent form is attached as Appendix M.

Scope

Since the company was already making efforts to reduce its operational impact in the field, this project concentrated on minimizing the footprint of employees in the office environment. Additionally, because the project was focused on reducing business-related impacts, the scope had to be well defined to ensure that only office related activities were covered. Thus, I decided that office related activities began each morning when employees left their homes for work, and ended when they returned home at night. In this way, commuting to work, everything that happened at work, and commuting home were part of the scope, but what employees did outside of that time were not. Additionally, since I am located in the Calgary office, only employees that worked in the Calgary office were eligible for participation.
Measurement

As this project followed a cooperative inquiry model, I did not want to pre-determine exactly what would be measured. Data concerning a reduction in footprint was important, and was initially chosen based on two factors:

1. Validity: did the data actually reflect a reduction in footprint?
2. Practicality: were we actually able to collect the data?

In order to decide if the data measured a change in environmental footprint, the question of what exactly environmental footprint was, had to be answered. The size of people’s impact on the earth has many metrics, and the word footprint is assigned to many of them (Saffire, 2008). The Global Footprint network defines ecological footprint as the area of land that is required to generate all the resources that a person uses and to absorb all the waste that the same person generates (Kitzes, 2009). The word footprint, however, has been applied to environment, as well as carbon, and anything else that people want to measure the impact to or of (Saffire, 2008). For the purposes of this project, it was not practical to try to fit within an already rigid metric such as the Global Footprint Network’s ecological footprint, which includes parameters that could never have been collected within the scope that was already defined. I was trying to measure the reduction of employees’ impact on the environment, and to do it in a practical way. That impact I called environmental footprint, and included:

- Carbon dioxide (CO₂) produced
- Water used
- Energy used
- Paper used
These metrics are commonly accepted as indicators of impact on the environment (Kitzes, 2009) and were also possible to track during the project, either directly or indirectly.

The tool that I had in mind to use for capturing much of this data did not yet exist. Paul Edney’s Inspire Enterprise was an organization that had heard of the project and approached me to develop a web-based Action Tracker that would allow people to track their progress, while calculating the amounts of CO₂, water, energy and paper that people would save. This tool was a good combination of measurement and feedback that placed very little demand on the participants in the project. Based on the literature reviewed and the objectives of the research initiative, the offer from Paul Edney to create an innovative system designed specifically for this study was ideal. Inspire Enterprise provided a calculation methodology for the Action Tracker software results and this is presented in the appendices at the end of this document.

Additionally, I wanted to capture any other changes that would come as a result of the project, either in attitude or in impact, which perhaps would not be visible through the Action Tracker. Although I had a few ideas of how to do this, and considered some focus groups and personal interviews, as well as general observation, I did not want to plan this part of the project before I could give my steering committee members an opportunity to have a voice.
Methods: What Did We Do?

Initially, methods were quite general, to preserve the room necessary for participants to be active determiners of the direction of the project. The initial plan was as follows:

1. Establish broad vision for project
2. Identify potential steering committee members
3. Pitch project to steering committee
4. Form steering committee
5. Collaboratively create project plan. Decide on:
   a. Final scope
   b. Measurement
   c. Strategies to roll out project and to facilitate reduction in impact
6. Pitch project to all employees
7. Perform actions to reduce impact
8. Review and adapt plan

Vision. My initial vision for the project, in retrospect, was naïve: I had imagined a small group of dedicated individuals who, as a steering committee, would be excited to participate in all aspects of project planning and execution. I wanted to design a program to facilitate the reduction of our employees’ environmental footprint, but since I was using a Cooperative Inquiry approach, I did not want to be prescriptive in assigning the goals, or the methods of the project. I had, however, done a significant amount of research, and was ready to discuss what I knew with my group as we formulated, together, exactly how we would tackle the subject.
Selection of steering committee. The initial invitation to be part of the steering committee was informally made to a small number of people that I already knew would likely be interested in the project. This was because they either worked in the environmental part of our company, or because I had informal conversations with them where they revealed a pro-environmental stance and I thought that they might be willing to participate. As I had a few more conversations with this small number of people and floated general ideas about the topic, they also suggested a few other potential participants who I did not know. This slightly expanded group initially numbered a dozen people.

Kick-off meeting. For this group, I prepared and delivered a PowerPoint presentation that outlined:

- The research goals and scope
- Why we were trying to change
- Short and long-term opportunities
- Methods that have worked in the past
- Some proposed ways to measure results
- An invitation to take part and
- Next steps

The meeting went relatively well, and participants were generally supportive of the project. The enthusiasm that I was looking for, however, was strangely absent and I could not understand why. Some participants suggested that I prepare a project plan as a conversation starter for our next meeting. One suggested that, at our next meeting, we should start with the plan and brainstorm ideas for actions. Another participant, who
holds a very senior position in the company, gave us valuable advice about what we
would have to do, and how we would have to frame the project in order to get buy in
from the organization and from senior leadership. When invited to take part, all
participants intimated that they would need some time to think and that they found it
difficult to tell me what their level of commitment would be without more detail. It was
resolved that I would prepare a project plan and present it to them at our next meeting.

*Initial project plan.* Because I did not want to prescribe what we would do and
how we would do it, I created the eight-step initial plan described above, and proposed
ways of measuring and some activities that I thought could be part of the project. The
plan was vague and tentatively assigned a few participants to tasks. I was trying to use
Kotter’s eight steps for organizational change as a guide (Kotter, 2002), but wanted to
give committee members the opportunity of having input into how we would increase
urgency, how we would communicate for buy-in, and how we would empower for action.

*Project plan meeting.* Upon presenting the initial project plan, I was confronted
with the same strange feeling as I had at the kick-off meeting. I was waiting for people to
jump in, and to enthusiastically provide new ideas, or to volunteer to take on the
development of initiatives, but this return of energy never came. Some good ideas were
generated, however, and included:

- Postponing roll-out to all employees to Sept 1, as the summer was near and most
  people were tired and would also be away for large parts of the next 2 months
- Including somebody from IT on the committee, as many actions would be related
to computers use and printing
- A kick-off fair where employees could learn everything that was discussed.
• Early actions had to be “sure fire winners” which would cost little and produce results

• A possible survey to gather baseline information about employees’ current footprints, habits, and areas where they might be willing to change

When I asked for people to volunteer to take on the planning and development of some of the initiatives, nobody volunteered. I left the meeting feeling very discouraged, as my steering committee seemed content to critique all my ideas, but always put all the actual work of developing actions and ideas back on me.

Refined project plan. I struggled for some weeks, stuck between my ideal of a collaborative team approach to reducing our footprint, and the apparent reality of a group of people that wanted the best, but had many other conflicting priorities and seemed to have little willingness to devote more time or energy than they were already giving. In the end, I realized that my committee was willing to give me time, and even to perform tasks, but that they wanted me to do most of the planning. As one participant later stated,

You, as researcher and expert had the effect of creating uncertainty in the group with respect to the agenda and method. It was assumed that you had a plan since you had called the meeting and had expertise in the subject. This is what led people to hold back until you understood what you wanted of them. (Anonymous, personal communication, 2010)

They were interested in the project, but either because they were waiting for more direction, or because they didn’t have the time, they did not participate in planning with me. So, using the feedback the committee had already given me, I tried to incorporate all the best methods researched by Tudor et al. (2008), Staats et al. (2004), Kotter (2002),
Dwyer et al. (1993), and others to come up with a simple project plan that would work with our employees. Put simply, the act part of the look, think, act sequence (Stringer, 2007) was as follows:

1. Intranet story
   a. Communicate for buy-in (Kotter, 2002)
   b. Increase urgency (Kotter, 2002)

2. Department meetings
   a. Communicate for buy-in (Kotter, 2002)
   b. Increase urgency (Kotter, 2002)
   c. Participant recruitment (White, et al., 2004)

3. One-on-one meetings with all participants
   a. Communicate for buy-in (Kotter, 2002)
   b. Obtain commitment (De Young, 1996)
   c. Tailor program to individual (Tudor, et al., 2008)
   d. Participative goal setting (Locke & Latham, 2002; Ludwig & Geller, 1997)
   e. Provide information (Staats, et al., 2004)

4. Measuring results with web-based Action Tracker
   a. Feedback (De Young, 1996)
   b. Habit formation (Houwelingen & Raaij, 1989)

5. Mid project celebration
   a. Celebrate quick gains (Kotter, 2002)
   b. Supportive social environment (Staats, et al., 2004)
c. Feedback (De Young, 1996)

d. Provide information (De Young, 1996)

e. Gather information from participants (qualitative data)

f. Refine goals and establish long-term actions

Based on the above, the refined plan that was presented to the steering committee is outlined in Figure 1.

When I presented this detailed plan to the steering committee, I finally received the response I had been looking for all along: enthusiastic participation. The committee
Reducing Office Environmental Footprint

members finally got from me what they wanted: a clear pathway with less ambiguity, so they would know exactly what needed doing and where they could provide value. The major tasks in the project were identified and people immediately volunteered to perform the needed tasks. Since the journey from Vision to Refined Project Plan has been described, what follows is a more detailed description of the remaining steps in the refined plan, beginning with the Intranet Story.

*Intranet story.* The refined plan was completed in June, 2009, but it was decided by the committee that it would be best to wait to roll out the project to all employees until the beginning of September, as there was a general feeling that people were tired after a long spring, and that most people would be going on holidays over the 2 months of the summer. The committee also decided, however, that we needed something to stir up some interest and to give people something to think about over the summer. That way, at the beginning of the fall, when work schedules would get filled again, we would not be coming to already busy people with something brand new. Mass emails are plentiful at our company and are not widely read; furthermore, many people see the mass emails as annoying and we didn’t want to generate negative energy towards the project, so we approached the communications department to use the company internal website to post a news story about the project. The internal website is widely read and it also gave people a chance to read about the project when and if they had time. Additionally, a certain excitement and buzz is created when a project in Calgary makes it on to the company website, and this gave the project added legitimacy. The piece ran in late June and also gave employees a dedicated email address to send comments or suggestions to. It included some heart felt quotations from me, was simple and inviting, following Kotter’s
guidelines for communicating effectively (Kotter, 2002). The story is included in Appendix O.

Department meetings. Also in the spirit of communicating for buy in, the committee needed an effective way to reach most employees and to pitch the project to them, while being respectful of their busy work schedules. Setting up a single meeting time for hundreds of people would have been logistically difficult, as the company does not have a single auditorium that can fit all employees and finding a single time when all employees would be able to attend one meeting would have been impossible. We could not have mandated attendance, so it would have been likely that many people would not have chosen to attend an optional meeting about a project they knew little about, even if the meeting did not conflict with already scheduled meetings. Thus, it was decided that the best way to reach everybody would be to make a short presentation at all the company department meetings. The presentations were short (under 30 minutes), were delivered to employees that were attending a meeting anyway, and occurred in small groups that allowed a much more personal connection between the presenter and the audience. Because department meetings usually comprise a dozen employees at most, everyone should have had the opportunity to make comments, to ask questions, to make suggestions, and to provide the committee with the kind of feedback necessary to improve the project. During these meetings, steering committee representatives presented details of the project to employees, using a PowerPoint presentation (Appendix P); we attempted to increase urgency by making a case for participation that would have little or no cost to the employee but would potentially bring significant positive results, we told potential participants what their commitment would be, and we explained to potential
participants how they would be protected, should they choose to participate, or even if they chose to end their participation before the end of the project. Because each department is different and has a slightly different culture, establishing meetings by department was supposed to allow us to somewhat tailor presentations to the culture of the department (Tudor, et al., 2008). Lastly, those that chose to participate were told to expect a member of the committee to set up a one-on-one meeting time with them, that would take less than 30 minutes, where they could discuss individual actions participants could take to reduce their office footprints. This was an attempt to communicate effectively with the employees (Kotter, 2002), and also allowed us to hand out, and collect, consent forms for employees that were interested in participating.

One-on-one meetings. Following department meetings, all interested participants were contacted by a committee member to schedule one-on-one meetings where the program was customized for each participant (Tudor, et al., 2008). I prepared a list of questions that should be asked of participants, and the committee vetted this list (included in appendix L). The list was used by all committee members as a way to guide the conversation during the one-on-one meetings, and was also used to explain to the participants what areas we targeted for reductions. During the one-on-one meetings, committee member facilitators:

• Introduced themselves, and established a comfortable rapport with the participant
• Asked participants what their current habits were around a small list of pre-identified areas for reduction. Those areas were:
  - Commuting habits
  - Paper use at work
• Reusable cup use at work
• Elevator / stair use at work
• Computer / monitor / cell phone charger unplugging outside of work hours
• Recycling frequency of cans and paper

• Conversed with participants about their habits and identified areas where improvements could be made
• Identified where participants were interested in making changes. If obstacles existed which prevented participants from improving, facilitators tried to remove obstacles
• Stressed that sustainability was the goal, and that participants should not make changes that they thought they would not be able to follow through on
• Asked participants if they were willing to commit to the changes they discussed
• Asked them what, if anything, outside of these targeted areas could be done to make significant changes in our environmental footprint. Participants were told that the sky was the limit here, and were instructed not to limit themselves to Calgary office-based activities
• Helped participants log on to the web-based Action Tracker, where they could log their actions
• Helped participants enter their commitment in the Action Tracker; their commitment would be visible to them every time they logged on
• Helped participants enter one action, so they would know how to do the logging
• Told participants to expect a weekly reminder by email to update their actions
• Told participants that people’s nature usually caused them to over-report the amount of good they did. Reminded participants that nobody would know, except them, how they were doing and asked participants, when erring, to err conservatively, on the side of having reduced less rather than more.

The questions (Appendix L) were chosen based on what areas for change we thought were possible in our context and took into consideration our arrangement with the property management company, as well as the direction I had been given by management to keep costs very low. A list of participants, facilitators and when and if interviews were complete was maintained by me in order to track our attempts to complete interviews with all participants. This also allowed me to keep an updated distribution list so I could send participants who had received their one-on-ones a weekly reminder to update their Action Tracker. This was important because I did not want to annoy participants who did not yet know what the tracker was with reminders to do something they could not yet do.

Measuring results with web-based Action Tracker. Work on the Action Tracker had occurred over the summer and constant collaboration with Inspire Enterprise was needed to perfect the tool. Because of corporate standards, the tracker not only had to accomplish what it was designed to do, but also had to have the correct fonts, sizes, colors, and other design elements that were required. The Action Tracker software had the potential to not only measure our progress, but to also provide effective feedback to participants about how they were doing, letting them know what was being saved as a result of their actions. It was also able to help us celebrate quick gains, by showing all
participants how much we were achieving together. In the end, after much iteration, trials, errors and redesigns, the Action Tracker was designed to:

- Capture and constantly display the commitment of each participant
- Provide cumulative feedback to each participant about their actions
- Provide information to participants about what each action saved: clicking on an action opened a window that described the action and its effects (see Appendix N, Figure 3)
- Celebrate quick gains by showing what our reductions were, as a whole company (see Appendix N, Figure 4)
- Capture what the participants reported they were reducing in order to measure results

The tracker was also easy and quick to use, and required employees to spend less than 5 minutes a week to enter their reductions for the week.

Lastly, the tracker included a space so any participants could nominate others that had performed specific actions that were very positive. Even though participants had been guaranteed anonymity, we anticipated that employees would talk to each other, and we wanted the possibility for participants to celebrate each other’s efforts. In order to protect employees, anyone that had been nominated was asked for permission for their name and accomplishment to appear on the site.

Celebration lunch. In order to maintain momentum, and to celebrate our initial gains (Kotter, 2002), we decided that a celebration had to be planned for approximately 2 months after the program began. Initially this meant that we needed to hold our event at
the end of October or the beginning of November. The celebration was, in my mind, a huge opportunity to achieve several goals at once:

- Celebrate quick gains with our participants. Have a space where all could get together and see what we achieved together
- Maintain the momentum we started to build. Since most people had their one-on-one meetings some time ago, this was the first time in weeks or months where some participants had a forum to discuss the project
- Gather feedback from participants about what was and was not working, and where they wanted the project to go from here. A primary concern for the project was respecting people’s time, so every time we were able to spend some time with participants, we had to make the most of it

As the end of September came, it became apparent that we would not be able to hold our celebration until much later in the fall. The end of October was the date that the company planned on officially launching its new name (StatoilHydro became Statoil), and we did not want to compete with the events planned around the brand launch. The middle and end of November did not work, since I was out of the office due to other commitments, and the committee suggested that I should be present for any celebration. Unfortunately, toward the end of October, tragedy also struck and the company experienced a fatality in the field. The stress and negative energy that was generated by the incident and subsequent investigation made a celebration inappropriate at that time, and for some time after.
By the time all was considered, the soonest we were able to hold the celebration was December 16. Prior to the event, a meeting was held with facilitators where we discussed some facilitation tips, which included:

- Allowing participants space to choose the direction of exploration
- Trying to include participants that were quieter, while not allowing anyone to monopolize the conversations
- A request to document conversations
- A request to make sure everyone felt comfortable and welcome. Facilitators were asked to engage people in easy conversation as soon as they arrived, so they would not feel awkward

The event was catered using a local business that used locally grown organic foods, and delivered its wares using a 600 cc truck. Participants were welcomed, and results were shared with everyone. The structure of the celebration was explained to all, and participants were invited to share their thoughts with their colleagues as they ate. Food was served buffet style, and participants and facilitators ate lunch with each other while sitting at tables of six to eight participants. In the middle of the tables was also a live miniature cedar centerpiece that symbolized the tree that participants had saved in just a short time. After the event, the tree was given to facilitators as a thank you for their help. Also at each table were question cards that facilitators and participants used, if they wanted, to steer conversations. The questions were:

- Where do we go from here?
- Expanding the project to home – what would that look like?
• How could we make a blue bin program work in the office (the blue bin program recycles essentially all waste; our office only recycled paper, cans and bottles, toner cartridges, and batteries).
• What worked well (and what did not)?
• How did the commitment work? Did it help?

The event was scheduled for 90 minutes, with the understanding among committee members that the celebration would end naturally, when it seemed that energy for the conversations was running out. At that point, participants were thanked for their efforts and told that they would be contacted in the New Year with details on where the program will go from here.

Other activities. Because this was a Cooperative Inquiry project that was designed to change in the face of feedback from participants, there were also other activities that were not initially planned for, but were added to the project at the suggestions of participants. These activities are both methods, but also results and as such will be discussed in the findings chapter that follows.
Chapter 4: Findings

Introduction

This chapter will present the study findings from the beginning days as the steering committee began working together in early fall of 2009, through to the closing celebration.

Facilitators began making presentations at department meetings in the first week of September. Three facilitators covered the majority of departments in less than one month, while it took over 2 months for all departments that could be reached to schedule their presentations. Participation data is presented in Table 1.

Table 1

Footprint Project Participant Statistics

<table>
<thead>
<tr>
<th>Group Type</th>
<th>Number of Participants</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>People present for department meetings</td>
<td>173</td>
<td>100, of total employees approached</td>
</tr>
<tr>
<td>Initial participants</td>
<td>154</td>
<td>89, of total employees approached</td>
</tr>
<tr>
<td>Participants that withdrew</td>
<td>1</td>
<td>0.65, of participants</td>
</tr>
<tr>
<td>Number of people that received their one-on-one meetings</td>
<td>131</td>
<td>85, of total participants</td>
</tr>
</tbody>
</table>

Three facilitators were responsible for the department meetings, while eight facilitators were responsible for the 154 one-on-one meetings that employees signed up for. Because each meeting took approximately 30 minutes, and because it was often difficult to schedule meetings during times that were convenient for both participant and facilitator, it took over 2 months for some employees to start actually participating in the
Reducing Office Environmental Footprint

For this reason, even by the end of the formal project data collection period (December 31, 2009) there were still 23 employees that had agreed to participate in the project but had not received instruction on how to do so. For the employees that had received their one-on-one meeting, some were able to perform actions to reduce their footprint starting in the first week of September, while others were not able to start until the middle of December, because it took that long for their one-on-one meeting to be scheduled. Results from participating employees were grouped into the following four categories:

• Action Tracker software self-report data
• Other observed reductions
• Celebration lunch feedback
• Changes to the program, as suggested by participants

For the rest of this paper, individual participants, when mentioned, will be referred to as “they” instead of “he” or “she.” This is because, in order to maintain confidentiality, the gender of participants was not captured when recording their results or comments.

Action Tracker

The Action Tracker software measured four self-reported metrics: the amount of CO₂ saved, the amount of energy saved, the amount of water saved and the amount of paper not printed. Additionally, the Action Tracker measured the number of actions that participants registered during the course of the project. Participants were explicitly instructed to only record changes in their behavior: thus if they already took the bus to work, they would not record anything under the “taking alternative transport to work”
action, but if they changed from driving their car to riding their bicycle, or walking, or taking the bus, they would. It should be noted that, for calculation purposes, the impact for not driving alone in the car was only compared to taking the bus. This meant that if people decided to walk or ride their bicycle instead of driving (which did not occur, as far as we could determine), the Action Tracker software would treat their walking or bicycling as taking the bus. This increased our measurement error, but it made sure that, even if we were less accurate, we underestimated the size of their footprint reduction. As far as we know, there were no participants that changed from taking the bus to walking or bicycling, or vice versa.

The actions that were measured by the Action Tracker were:

- Taking alternative transport to work (this meant not driving single passenger vehicle)
- Printing less
- Turning off computer and monitor at night
- Turning off only monitor at night
- Unplugging cell charger at night
- Recycling cans
- Recycling paper
- Taking the stairs
- Using reusable coffee mugs for coffee (even out of the office)

A summary of the Action Tracker data is provided in Table 2 below and the means and methods for all reduction calculations are presented in Appendices A-K.
Table 2

*Data Captured by the Action Tracker During the Contest*

<table>
<thead>
<tr>
<th>Metric</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of employees using tracker at least once</td>
<td>106 employees</td>
</tr>
<tr>
<td>Number of employees tracking at least 3 actions</td>
<td>80 employees</td>
</tr>
<tr>
<td>Number of employees who never registered a single action</td>
<td>45 employees</td>
</tr>
<tr>
<td>Number of actions performed</td>
<td>1369 actions</td>
</tr>
<tr>
<td>Amount of CO₂ reduced</td>
<td>1160 kg</td>
</tr>
<tr>
<td>Volume of water saved</td>
<td>3426 L</td>
</tr>
<tr>
<td>Amount of energy saved</td>
<td>551 kWh</td>
</tr>
<tr>
<td>Number of pieces of paper saved</td>
<td>9910</td>
</tr>
</tbody>
</table>

*Other Observed Reductions*

These results were not captured by the Action Tracker software, but were verified to have taken place, and are outlined below:

*Paper switch to 30% recycled.* All paper used by the company was switched from 0% post-consumer recycled paper to 30% post-consumer recycled paper as a result of the project. The employee in charge of ordering paper saw the project as a sign that it would be okay to make that kind of change and they did it. As they explained,

Your Footprint project showed me that the company wanted to take action and that the ideas I had to change current practices would be supported on every level. The project meant that I didn’t have to “test” out the acceptance of changes, but that I could go ahead and implement environmentally friendly changes and make those decisions myself. (Anonymous, personal communication, 2009)
This change meant that 2 400 000 pieces of paper ordered per year that were 30% recycled instead of 2 400 000 pieces per year that were not recycled at all were ordered, resulting in 86 trees being saved per year. Additionally, this action saved 25 700 kg of CO₂ from being produced, 6048 kWh or power from being used, and almost 50 000 L of water from being used.

*Refuse delivery of phonebooks.* One of the project participants, when asked to take delivery of all the phone books for the company, not only refused delivery, but also removed our company from the delivery list for all future years. They decided that, since phone directories were available online, we didn’t need to waste the trees. Although this didn’t result in paper being saved this year, the 40 Yellow Pages (with 2100 pages each) and 40 White Pages (with 800 pages each) PER floor of our company (10 floors) will perpetually result in 580 000 pieces of paper (1.16 million pages) not printed EVERY year. They said they did this because, as a participant in the project, they thought more about where we could use less. This resulted in a savings of 19 trees, 9939 kWh of energy not being used, 90 691 liters of water not being used and 20 505 kg of CO₂ not being produced.

*Remove disposable coffee cups.* At the request of the footprint project steering committee, the office services department contacted the coffee machine vendor and asked the company to remove all disposable coffee cups from the coffee machines. Our company now has no more disposable cups and all employees and visitors drink coffee from the reusable mugs that have been available for years.

*No more disposable plates.* The employees that are responsible for the ordering and delivery of catering, who were also participants in the project, decided to request all
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catering vendors to stop including disposable plates, cups and cutlery with their delivery orders. Although the size and frequency of catering orders vary, this has resulted in a savings of dozens, and sometimes hundreds of disposable plates, cups and cutlery per day.

Celebration Lunch Feedback

This data comes from conversations with participants during the celebration event that occurred on December 16. The celebration came 3.5 months after the first participants joined the project and just a few weeks after the last participants joined. Forty participants attended the lunch, which accounts for 26% of all participants (as Christmas approached many were away). The group was varied, consisting of participants from all parts of the company. What follow are both general group impressions and specific comments, as captured by facilitators. Because data was recorded by facilitators who were supporting a free-flow conversation about the various issues encountered during the project, the exact number of comments from participants around particular points was not captured; rather, facilitators recorded general observations and impressions of the group, as indicated not only by their verbal input, but also from nods and other indicators of general agreement. For this reason, while descriptions of the number of participants, such as many, most and some are used, specific numbers are not associated with the information presented below.

Increased awareness. Throughout the conversations at the tables, many participants commented that their general awareness about the size of their footprint increased because of the project. One said that the project “made you more aware of
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things you don’t normally think about” (Anonymous, personal communication, December 16, 2009). Another said that their “personal awareness was raised” (Anonymous, personal communication, December 16, 2009).

**Doing more than they promised.** In addition to the actions that were discussed in the Other Observed Reductions section above, the increased awareness that was reported by many participants was said to be responsible, at least in part, for additional actions they completed to reduce footprint, both at the office and at home. Some participants described actions that they now perform at home, including unplugging the toaster at night. One person reported transferring the new habits they started at work to home, and another participant said that they started taking the bus instead of the car, even though they had not committed to this in the one-on-one meeting.

Even though deciding to print fewer documents was specifically discussed in the one-on-one meetings, actions such as making sure that the printer is operational were not. One participant reported that now “I check to see that the printer is working before I try to print five times” (Anonymous, personal communication, December 16, 2009). This action was above what the participant had committed to and other participants also reported that they do more than they initially committed to.

**Expanding the program to home.** Several times throughout the project, including during the celebration lunch, participants commented that they would like to see the program expanded to include the home. Most participants present at the lunch were interested in having some kind of option to do this. Several participants expressed a desire to use the Action Tracker to help their kids reduce their impacts, although there were many different ideas on how this should be done. Some people were interested in
the company helping them set up the tracking, while one participant was quick to say that although they were interested in expanding the program to home, they wanted the company to play no part in administering the tracking: “I don’t want Statoil in my home” (Anonymous, personal communication, December 16, 2009) they told me unapologetically. Some wanted the company to put together a package to help families start the program and one participant, who emailed me with a request to start the program at home, volunteered to help get it going for any employees that were interested.

**Commitment helped.** Participants present for the celebration lunch were polled about the role of commitment in the success of the project. All of the participants that commented on the role of commitment reported that it was a positive and important part in helping them perform their actions: “The commitment was essential to doing the things that were done” (Anonymous, personal communication, December 16, 2009), said one participant, while another reported that “personal commitment was key” (Anonymous, personal communication, 2009).

Some participants said that they felt badly if they did not keep their commitment, but when questioned, and others also reported that “peer pressure helps” and that “knowing that people knew about your commitment helped you stick to it” (Anonymous, personal communication, December 16, 2009).

**Not everybody persevered.** A few participants confessed that although they did well at the beginning of the program and performed most of their actions, they had stopped by the end. Some others reported that they got frustrated with some of the actions, and stopped doing them, while continuing with the ones that were not frustrating. A recurring example of this was unplugging cell chargers, which was difficult to do,
because the plugs were under participants’ desks. Several participants committed to unplugging their chargers but soon stopped because they didn’t want to crawl under their desks every night. The same participants said they continued with their other actions.

*Changes or Additions to the Program as Suggested by Participants*

Participants, who included both committee members and those that played a smaller role, made valuable suggestions throughout the program. A number of suggestions were implemented immediately, while others are still under consideration.

*Poster reminders.* Several participants asked for visual reminders to be placed in prominent areas to help all employees reduce their impact. This included reminders for actions that were specifically addressed by the project, such as reminders to take the stairs, placed by the doors going to the elevators, as well as reminders for actions that were not tracked, such as reminders to turn the lights off in meeting rooms, placed by the doors, so people would see them on their way out of the rooms. These poster reminders were created at the suggestion of participants.

*Labels on the recycling bins.* A few participants mentioned that many employees regularly throw garbage (which includes leftover food) into the recycling bins. When this happens, all the contents of the recycling bin are discarded, as nobody is willing to sort through the bin to separate the soiled content from the recycling that has not been affected. Participants asked us to create and attach effective labeling to the recycling and garbage bins to reduce this problem. One of the committee members is currently working on a solution to this problem.
 Changing the Action Tracker. A few participants were unable to turn off their computers at night, as they needed to stay on in order to run complicated simulations that regularly take many hours. Other employees, frustrated by the time it takes for the computer to turn on in the morning (at times over 10 minutes), were unwilling to turn their computers off, but wanted an option to turn off only their monitors. They requested that we add an action to the Action Tracker software that would track turning off only monitors. This change was made to the Action Tracker early in the data collection period.

 Changes still under investigation. Participants also suggested that we add many other actions and activities. Some pertained to changes in the office footprint, while others extended to other aspects of the company’s operations. This research project very intentionally focused on Statoil’s Calgary office footprint only, yet the suggestions pertaining to possible actions in the field are worthy of note. The actions that are being investigated for implementation are outlined below:

• Starting a composting program in the office
• Making available and promoting low impact catering. We have started to use a low impact, organic caterer for some catered meals, but a plan to make this information available to the rest of the company is still under development
• Finding a way to incorporate drilling waste into the construction of new wells and roads. Although this is not a new idea, it is currently not being done in our company. Future drilling is currently in the planning stage, and interest has been shown to explore this possibility again. The impacts to footprint if a solution was
found in this area may eclipse all the other benefits from the program that have been discussed so far

- Approaching the building management company to turn off lights at night earlier, to turn them on in the morning later, and to turn the temperature down by five degrees Celsius during the night. This may require coordination with the other tenants in the building

- Expanding the program to other Canadian locations (St. John’s or field) or other Statoil locations

- Adding regular information sessions to educate staff about ways to reduce their impact

- Establishing an internal program (perhaps with website) to facilitate car pooling

- This has already been mentioned, but a way to expand the program to the home is being investigated

- Facilitating access to an FTP site so contracts can be uploaded and made available to contractors. Currently contracts are always printed and sent to contractors for review. This is an iterative process that results in hundreds of pages being printed for every change, for every contract. Changing this process would result in thousands of pages being saved every month

The diverse data that was captured by the Action Tracker software, during the celebration lunch, and through informal conversations and emails, formed a rich patchwork describing the potential impacts of the footprint project. In the next chapter, I will try to assess the significance of these results.
Chapter 5: Discussion

Introduction

So what does all this mean? Do the findings indicate that the program “worked”? And if so, which of the strategies that were employed were effective? What can we learn from this project? And lastly, where do we go from here?

Did the Program “Work”?

The research question was “What results from a program that is designed to facilitate the reduction of the environmental footprint of the employees of an oil and gas company, located in Calgary, Alberta?” so in a sense, it was impossible for the program not to “work.” A question was asked, and results were generated, which will inform future efforts in this area. Viewed slightly differently however, the question was asked because of a perceived need to make change that results in the reduction in environmental footprint. The intent was to reduce footprint, ideally in a sustainable, long-term manner, so regardless of whether data was generated, it is pertinent to ask if the intent was met. And here, the answer may be slightly different, depending on what filter the results are viewed through:

Filter 1: Quantified, verifiable reduction in CO₂, energy, water and paper. The actions recorded in the Action Tracker software were self-reported. Much research has been done into the validity of self-report data and the findings are congruent: participants consistently over-estimate the amount that they reduce their impact by, and the magnitude of their error is sometimes quite large (Dwyer, 1993; Tudor, et al., 2008; Weinhardt, Forsyth, Carey, Jaworski, & Durant, 1998). This propensity was even
observed first hand in this study when one of the committee members said, “I don’t always take a reusable cup” (Anonymous, personal communication, 2009) and further probing revealed that they had actually only done it once. The committee member, however, made this error before I had explained to them that it was important to always under-estimate the magnitude of their reported footprint reductions. The request to always underestimate was made during the one-on-one meetings to all participants, as well as in every weekly reminder email that was sent to participants when it was time for them to update their Action Tracker, specifically to try to reduce self-reporting error.

Weinhardt et al. (1998) identified several effective techniques, which included putting participants at ease and building rapport with participants, as effective when attempting to reduce the error inherent in self-report data. These techniques were purposefully used in the one-on-one interviews, and had been used with the committee member that is mentioned above.

The Action Tracker software provides data about the reduction in footprint. Despite the use of the techniques mentioned above; however, because of the self-reporting aspect of the tool, the exact magnitude of that reduction is not quantifiable. Thus it appears that although, with respect to the Action Tracker data, the intent of reducing footprint was met, it is not possible to say to what degree that intent was met.

While the Action Tracker footprint reductions cannot be accurately measured, the reduction in footprint that was made through other actions was. The refusal to accept phonebooks resulted in a savings of 580 000 pieces of paper per year. Changing to 30% post-consumer recycled paper resulted in a savings of 720 000 pieces of paper being not made from trees every year. The resulting 45 709 kg of CO₂ not produced from these
two actions alone are significant. The 140 000 liters of water and the 16 000 kWh of energy were also very significant, as were the 105 trees that were saved.

When compared to the thousands of trees that have been cut down to build well sites for our company in the field, or when compared to our company’s total carbon footprint, which is measured in megatons, however, this does not appear to be a significant reduction. But, when one considers that these actions are going to provide their benefits in perpetuity with little measurable cost to the company, the reductions gain in significance. These changes will also, hopefully, be long lasting. The findings indicated that some project participants are committed to continuing their efforts. So in these regards, the intent was more than partially met.

*Filter 2: An expanded, more holistic definition of achieving intent.* The impacts that can be accurately quantified, as described above, are certainly important. What are also important however, are the impacts to environmental footprint that are not easily quantifiable. Thus, although the Action Tracker cannot be used to provide accurate, exact information about the magnitude of reductions, it does provide relevant information. Even though people may have overestimated the amounts of their footprint reductions, they certainly did not all make all of them up. The fact that there was no compensation or other tangible benefit that they received from reporting a larger impact suggests that they had little reason to significantly inflate results, and very likely completed many of the actions they said they did. People were probably fairly honest, an assertion that is supported by the feedback that was received during the celebration lunch, where participants freely confessed to sometimes forgetting to perform certain actions,
where they admitted to sometimes giving up on the more frustrating actions, and where they also admitted to not logging as much as they should have.

Additionally, many commented that they completed the actions most of the time (most participants during the celebration lunch reported meeting 70%-80% of their commitments), even though they often did not log the actions in the Action Tracker. Since less than 80% (80/106) of employees that used the tracker used it more than three times, it is actually likely that the magnitude of the group’s achieved results was higher than was reported.

Because they signed up for the project, participants demonstrated a desire to reduce their environmental impact. Desire to change has been found to have a positive effect in change efforts (Rejeski, Katula, Rejeski, Rowley, & Sipe, 2005). Because they committed to completing actions and because they used the Action Tracker, participants also demonstrated an intention to perform the actions they chose in their one-on-one meetings. Prior research also points towards intention as the single biggest predictor of future action (Krueger, Reilly, & Carsrud). The presence of desire and intention lend credibility to the assertion that participants likely completed many of the actions they committed to.

Although the impacts of desire and intention to change were difficult to quantify, they were evident in the following ways:

- Some participants took on their own, unplanned initiatives, such as the phonebook initiative, the recycled paper initiative, the reusable coffee cup, plate and utensil initiatives, doing the actions at home, and adding more actions, such as unplugging toasters. This added awareness and propensity to transfer habits to
other arenas, such as the home, reduced impact even though the magnitude of the reductions was not recorded. It’s important to also note that many project participants were not able to participate in the celebration lunch (40/154 participated), where some of this data was collected. This means that likely there were many additional actions completed that were not identified or measured.

- Participants suggested actions that are still in the process of being implemented and the footprint reduction associated with those actions has not been measured. Thus, initiatives such as the FTP site initiative described earlier in this chapter are being worked on as we speak and will likely cause an even larger impact on footprint in the future.

- Some initiatives are not in the planning or implementation stage, but are being considered as a result of this project. Unlike the FTP site initiative, which is being actively pursued, there are other potential ideas that are being seriously considered and investigated. Even though they will not all be implemented, the ones that will be will bring added reductions to environmental footprint.

Several findings lead me to the conclusion that despite the narrow scope of this research initiative and its focus on the environmental footprint of Statoil’s Calgary office, participants are now thinking in broader terms. Many participants reported an increased awareness of all the different areas where they have an impact. For example, some participants were surprised to learn that their cell phone chargers continue to draw power even when their phones are not attached to them. Others also showed surprise that their monitors used energy at night, when their computers were unused. Many assumed that their computers powered down (they do not) and that energy use at night is negligible (it
is not). Participants reported that the increased awareness of their impacts, but also of what they can do to reduce impacts, was a benefit of the project. This certainly suggests an intention on the part of participants to continue reducing their impact. It is sensible to conclude that programs intended to reduce environment impact in one context, can have a “spill over effect” into other aspects of participants’ lives.

The verifiable quantitative data, when viewed together with the qualitative data described above, suggest that the intent of the project, to reduce environmental footprint in the Statoil Calgary office, was achieved. Comments made by project participants, during the celebration lunch near the end of the data collection period, were supportive of the project continuing and many even wanted the option to expand it to their homes. Certainly, although data was only collected for 4 months, there are indications that many participants intend to continue their footprint reduction actions. Under this filter, intent seems to have been met and I suggest that the project “worked.”

**Which Strategies Were Effective?**

This study was designed to combine an array of different strategies to facilitate a reduction in participants’ environmental footprint. Unfortunately, it was not possible to collect specific information about the effectiveness of each strategy during data collection. The project solicited already busy people to perform actions and my assessment about employees’ willingness to give their time to various parts of the project led me to limit the quantity of data that was collected. This assessment was supported by the steering committee, which insisted that any interaction between the project and participants had to be highly focused. Out of this respect for participants’ time, data
collection was prioritized towards footprint reduction, rather than particular information about the effectiveness of particular strategies. The conclusions around the most effective strategies, based on the findings presented in the last chapter along with the current literature, are discussed below:

Commitment. The research suggested that commitment (De Young, 1996; Dwyer, 1993; Katzev & Pardini, 1987-1988; Staats, et al., 2004; Tudor, et al., 2008) and especially individual commitment (Wang & Katzev, 1990), would be an effective way to promote pro-environmental behavior. As mentioned in the previous chapter, participants commented during the celebration lunch that commitment was an important factor in their success.

Some participants reported feeling badly when they did not keep their commitment. The same participants also revealed that the reason they felt badly wasn’t because they were having a higher impact on the environment, but specifically because they had made a commitment and were not meeting it.

The participants who believed that peer pressure had a positive impact on their success in the project are supported by research data on peer influence and youth (Furia, Lee, Strother, & Huang, 2009; Scheier, 2010), and on adults (Duangpatra, Bradley, & Glendon, 2009). The research supports the conclusion that participants felt more compelled to keep their commitments because one-on-one meeting facilitators knew what their commitments were.

Modeling. It is not clear if the behavior modeled by participants and steering committee members had any effect on results. One of the steering committee members indicated their belief that modeling was important, as they consistently reminded me that
we needed to be prepared to model the behavior we were about to ask others to engage in, or the project would have no chance of succeeding. Unfortunately, no other data was gathered that mentioned the possible effects of modeling.

*Feedback.* I believe feedback, as was also suggested by Dwyer (1993) and others, was also important. Weekly emails to participants always included our achievements to that date and I believe they helped motivate participants to continue, by showing them that their efforts were having an effect. This phenomenon also became apparent when, during an extended and particularly busy time at work, I neglected to keep in regular contact with my steering committee. At the end of that time, I contacted the steering committee members to solicit their help to facilitate a few more one-on-one interviews and, as a result, I received an angry email from one member who had “given up” because they had not received any feedback and encouragement for a long time, and had therefore become discouraged. The member told me that without more feedback from me about how the project was doing, they didn’t know if anything we were doing was working and they found it difficult to stay motivated.

*Goal setting and tailor-made.* Making the program individual was, in my opinion, the single most important factor in achieving an environmental footprint reduction. Participants reported that the actions were easy to follow, which was a major reason why they were able to meet their commitments. Helping each participant choose the way they reduced their footprint was the reason for this ease and supports the findings of Tudor et al (2008).

As part of the customization of the program, participants chose their own goals. Since the individual participants knew best what they were willing and able to do, this
helped make the goals achievable. As previously mentioned, this finding is supported by
previous research that has also found goal setting to be an effective method for
encouraging change (Houwelingen & Raaij, 1989; Locke & Latham, 2002).

In addition, Ludwig, and Geller (1997) found that participative goal setting was
responsible for behavior change in non-targeted areas and this finding was also supported
in this project by the participants who extended their footprint reducing actions to the
home, and by the participants who initiated footprint reducing actions that were not even
mentioned in the one-on-one meetings by facilitators.

Information. Several studies also reported that providing information increased
the success of programs aimed to increase pro-environmental behavior (De Young, 1996;
Houwelingen & Raaij, 1989; Staats, et al., 2004). These findings were supported by the
comments made by many participants during the celebration lunch. When asked what
worked well in helping them make changes, one participant said, “Information awareness
about what can be recycled is key” (Anonymous, personal communication, December 16,
2009), while another said that “one-on-ones were really effective. They helped to find
out what was possible” (Anonymous, personal communication, December 16, 2009).
Houwelingen and Raaij (1989) hypothesized that the reason for this effect was that
learning what to do reduced the uncertainty that prevented people from acting. Another
participant summed up the group’s apparent position saying, “If people know what to do,
they will do it” (Anonymous, personal communication, December 16, 2009).

Communicating for buy in. Communication for buy in was Kotter’s fourth
necessary step in effecting meaningful change in organizations (Kotter, 2002). From my
own experiences at the company, and from general water cooler talk that I have
overheard over the past 2 years, I realized that email would likely not be a good way for
important messaging, and that our communication strategy would have to be carefully
designed to maximize effects.

The one-on-one meetings were used for a variety of reasons, and an important
one was that they could be part of finding the simple, heartfelt way to communicate that
Kotter suggested (Kotter, 2002). Participants agreed, saying that the one-on-ones worked
well, with one participant suggesting that, “The personal meeting made me feel more
accountable” (Anonymous, personal communication, December 16, 2009; italics mine).
Since we could not take the time to have many individual meetings with all 154
participants, important messages were delivered in the one-on-one meetings, and at the
celebration lunch, while simpler messages, such as reminders, were delivered using
emails and strategically placed posters. A few people mentioned the effectiveness of the
posters and one participant said, “Visual reminders like ‘take the stairs stickers’ on the
doors and emails helped promote taking action” (Anonymous, personal communication,
December 16, 2009).

What Lessons Can we Learn?

The following lessons should be considered in the continuation of this program,
and may be useful in the establishment of other change programs:

Not everyone on the steering committee had the same level of commitment as the
researcher. When I began the project I expected that there would be a significant number
of employees that would enthusiastically join and would have the energy and
commitment necessary to shoulder a large part of the workload. These were the people
that were to become members of the steering committee. Unfortunately, because of the labor-intensive nature of the methods chosen for the project, we needed many more people to be involved in the committee, and specifically to facilitate the one-on-one interviews, than there were enthusiastic volunteers. This means that it was necessary to quickly identify those volunteers who required more constant support from me. Even though all volunteers were well intentioned, those that had a lower level of commitment needed more constant attention, supervision and support. The example that follows illustrates the importance of this point: Even though we had discussed effective communication strategies, two volunteers started inviting participants to their one-on-one meetings by email. Viewed superficially, these actions seem to be perfectly reasonable: participants had already agreed to be part of the project and had shown interest, so email was an efficient way to resolve the logistical issues of setting up a meeting. When examined a little more thoroughly, however, the analysis changed: the participants had taken part in a department meeting where the project was explained to them, but for many of them weeks, and even over a month had gone by before they were contacted to set up their one-on-one meeting. This means that their initial interest had likely waned, an effect that was magnified by the fact that they had not yet participated in the personal one-on-one interview that would have cemented their commitment to the project. Sending emails to set up one-on-ones in that context was destined to fail, and in fact it did: the committee member contacted me to express frustration that many of the participants were not returning her invitations. As a result, I had a quick meeting with the committee member and explained to them that email was probably not the best way to reach people in this context. The committee member immediately nodded knowingly,
indicating that they already knew what I had explained. The problem was not that they did not have the necessary information to have come to the same conclusion; the problem was that, because of a lower commitment level, they had superficially analyzed the problem of setting up meetings, and had chosen the quickest and easiest method that first came to mind. When they walked by the participants’ offices and made a personal connection to quickly set up the meetings, the majority of scheduling problems vanished.

Ideally, the core guiding team would all be highly committed (Kotter, 2002), and highly important activities, at the very least, could be handled only by those committee members that want to be the most involved. If that is not possible, however, it is important to be aware of who requires more support and supervision and to continually provide it.

Another way to resolve this issue is to make sure that the principal researcher remains open to sources of volunteers that may not immediately apparent at the beginning. For this project, I thought that I had identified a good core group that was going to work side by side with me to reduce our footprint but, in the end, the volunteers that gave the most to the project joined later: I initially had not even thought of them, and without their help we would never have been able to complete the one-on-one meetings that were the cornerstone of the project.

Lastly, it is important to be aware that steering committee members may be much closer in level of passion for the project to the other participants than to the principal researcher. As the person who initiated the project, I had the necessary internal drive to sustain me through all hurdles, frustrations and challenges. Other committee members, despite appearances, despite the fact that they may have talked in the same way about the
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project as I did, still needed regular feedback, and encouragement, just like all the other participants.

*Face-to-face interactions are huge opportunities.* Communication during personal meetings and face-to-face interactions can be very effective, because during these times participants are not busy multitasking or being distracted by other activities (active participants), because they have the opportunity to ask questions and because both verbal and non-verbal channels may be used (Betts, 2009). Due to these factors, such opportunities are hugely important and must not be wasted. We tried to make sure that during these events we maximized what we were trying to achieve in every way possible. Planning the one-on-one meetings took weeks and the planning of the celebration lunch took over a month. In the end, what happened at each event was fairly simple, but that simplicity was arrived at through a careful process of weighing and discarding alternatives, analyzing impacts, and working on every detail. A large amount of up front planning for interactions was necessary to make them as beneficial as possible. Because there will likely not be many of these opportunities, it is important to give face to face interactions the necessary attention to make them successful.

*Administrative help is crucial.* A project such as this involved a number of administrative, time consuming tasks. Organizing and maintaining lists, ordering catering, setting up meeting spaces, organizing posters, as well as other activities had to be completed in order to support actions. These actions took a significant amount of time and, if I had been forced to complete all of them, would have prevented me from continually seeing, assessing and reacting to, the big picture. For this reason it is important, if possible, to delegate these administrative tasks to other participants.
Initially, I was reluctant to do this, not wanting to ask people to complete tasks that they might consider menial, but I quickly found out that there were many participants that were eager to be able to contribute in this way. Not everyone wants to participate in high level conceptual planning and analysis, and every committee will likely have members that enjoy organizing and performing clear, administrative type tasks. These people were crucial to the success of the project and were supported and celebrated as valuable participants.

*It took longer than I thought to do everything.* I initially thought we could roll the project out to employees in early spring, 2009. After preliminary meetings with potential committee members, I revised that time to late spring 2009. Subsequent meetings with the committee changed the roll out date to September 1. When we started to schedule department meetings, which were supposed to be completed before the second week of September, we realized that some would not be done until well into the fall. Because one-on-one meetings began in the first week of September, we estimated that all these meetings would be done by the end of September; although most meetings were completed before the end of October, the last meeting was completed less than a week before the mid-December celebration lunch, over 2.5 months later than originally planned. Everything took much longer than I first thought, even though I am used to the bureaucracy and pace of the company. In action research projects where, by definition, researchers do not have a clear idea of all the turns and twists the project might take, estimated timelines must be established very, very conservatively. I tried to plan timelines with safety margins built in, but the actual time that many activities took eclipsed even these considerations.
Recommendations

We have arguably only finished step six of Kotter’s eight steps to creating meaningful change. Step seven, Don’t Let Up, and step eight, Make Change Stick, remain (Kotter, 2002). The challenge will be to capitalize on participants’ willingness and excitement to continue, while respecting the request made by many of them to be solicited less by Action Tracker reporting requirements. While it would be easy to discontinue tracking with the Action Tracker, research suggests that removal of feedback has the danger of causing a return to baseline conditions (Houwelingen & Raaij, 1989). Intuitively, I agree with these findings and it does not feel to me like, as an organization, we have truly internalized our new behaviors. Undoubtedly, many individuals will continue to perform some, or even all of their new actions, but I believe that many could also start to return to baseline conditions without more maintenance. Recent research on how long it takes to form a habit supports this hypothesis and suggests that it may take individuals anywhere from 18 days to 254 days (Lally, Jaarsveld, Potts, & Wardle, 2009).

It is not realistic to expect the relatively few one-on-one meeting facilitators to engage in one, or even two more rounds of individual meetings with participants. I believe this personal contact would be effective in keeping the momentum going, but we will not be permitted by participants to do this. A meeting is planned for the steering committee, where options will be discussed. Potential approaches would be to ask participants to log actions only once a month, as well as to keep reminders and information coming by email, but participants can (and likely will) easily ignore both of these approaches. Any mode of communication that is repetitive has the risk of quickly becoming routine, and ignored.
Because of the large interest that has been expressed by employees to make changes in this area, I recommend that Statoil investigate a formalized approach to integrate footprint-reducing activities in all areas of its operations. The scope of such an approach could include both office as well as field processes and would connect the efforts that are already being made in specific industrial areas (such as reducing oilsands viscosity) to the myriad of other activities that take place in the company every day. It has also been recommended by a senior leader that this project be expanded to include the parent company, in Norway. Successfully expanding the program to include all Statoil employees would mean that over 30 000 employees would be engaged in reducing the company’s footprint, and the results from such an endeavor could be very significant.

Another area for continued investigation comprises the many suggestions for change that participants have made, and that have been listed in the results section of this paper. Expanding the program to the home, or to the field, brings significant challenges, but has the opportunity to lay the groundwork for some significant and meaningful change, especially in the field where the environmental footprint of the company is very large when compared to the office environment. A changed attitude, a willingness to make changes, and an extension of footprint reducing activities in non-targeted areas for field participants could yield huge results. Finding some success in these activities, and regularly sharing new results with participants may be the necessary step to keep up momentum without resorting to the repetitive email approach.
Conclusion

My inspiration for this study was a desire to make a difference, and to help my colleagues reduce the impact that their activities have on the environment. I wanted to take a non-alarmist and non-manipulative approach to helping lay people make a difference. Initially I had no idea what we could accomplish together, or even if the initiatives would work. Almost 90% of the employees that were offered the program chose to participate and, together, created a program that was easy, positive, and that made a number of environmental footprint reductions. The long-term implications of the participants changes in awareness and in attitude are not yet clear, but I hope that the changes that have been made already will be used as stepping stones to further improvements in the office, but also in the field and at home.
References


Reducing Office Environmental Footprint


Appendix A: Recycle Paper Calculations

Impacts

Power consumption, CO₂ emissions, water use.

Data sources

Statistics from US Environmental Protection Agency
(http://www.epa.gov/osw/conserve/materials/paper/basics/index.htm#benefits and
http://epa.gov/climatechange/wycd/calculators/Warm_home.html)

Recycling 1 short ton (0.91 t) of paper saves 7 thousand US gallons (26 m³) of water, 1,000 kg of CO₂ equivalent, and 4,100 kilowatt-hours (15 GJ) of electricity

Statistics from US Environmental defense fund based on Uncoated Freesheet copy paper (http://www.edf.org/papercalculator/index.cfm )

1 short ton of Uncoated Freesheet (copy paper):

• 30 million BTUs energy
• 5,882 lbs CO₂ equivalent
• 22,219 Gallons water

1 Ton of copy paper = 400 Reams of paper (500 pieces/ream) from Conservatree
(http://www.conservatree.org/learn/EnviroIssues/TreeStatistics.shtml)

Calculation

Power consumption:
4,100 kWh / (400 reams X 500 pieces) = kWh = 0.021 kWh / sheet

CO₂ emissions
1,000 kg CO₂ / (400 reams X 500 pieces) = 0.005 kg CO₂ / sheet

Water use:
7,000 Gallons / (400 reams X 500 pieces) = 0.035 Gallons / sheet = 0.13 L / sheet
Appendix B: Recycle Cans Calculations

*Impacts*

Power consumption, CO$_2$ emissions, water use.

*Data sources*

Power consumption

Recycling one pound of aluminum saves 7.5 kWh (Source: Can manufacturers institute – http://www.cancentral.com/funFacts.cfm)

An empty aluminum can weighs approximately half an ounce (15 g). There are roughly 30 empty aluminum cans to an avoirdupois pound (450 g) (Source: weighed on digital scale).

CO$_2$ emissions

Statistics from US Environmental Protection Agency (http://epa.gov/climatechange/wycd/calculators/Warm_home.html)

Recycling 1 short ton (0.91 t) of cans saves 4,000 kg of Carbon equivalent

Water use:

A large amount of water is used in the production of coal-fired electricity. Based on above Statistics for Alberta energy generation and information on water requirements for the generation of electricity obtained from Texas State Energy Conservation Office (http://www.infinitepower.org/calc_pollution.htm)

For every 1 kWh of electricity produced using coal, 2.84 L water is used. Based on 50% electricity generated by coal-fired power plants in Alberta, a conversion factor of 1.42 L/kWh used in calculations below
Calculation

Power consumption:
\[ 7.5 \text{ kWh} / 30 = \text{kWh} = 0.25 \text{ kWh} / \text{can} \]

CO\(_2\) emissions
1 short ton = 2,000 lbs, multiply by 30 cans / lb = 60,000 cans / short ton

\[ 4,000 \text{ kg CO}_2 / 60,000 = 0.067 \text{ kg CO}_2 / \text{can} \]

Water use:
\[ 0.25 \text{ kWh} / \text{can} \times 1.42 \text{ L} / \text{kWh} = 0.355 \text{ L} / \text{can} \]
Appendix C: Recycle Glass Calculations

*Impacts*

Power consumption, CO₂ emissions, water use.

*Data sources*

Power consumption
Recycling one glass container saves 0.1 kWh of power (Source: Glass Packaging Institute http://www.gpi.org/)

CO₂ emissions
Sourced from WRAP (Material Change for a better environment – http://www.wrap.org.uk/retail/case_studies_research/carbon_audit.html page 9)

For manufacture of one glass bottle with a weight of 200 grams:

0.118 kg CO₂ / bottle

Water use:
A large amount of water is used in the production of coal-fired electricity. Based on above Statistics for Alberta energy generation and information on water requirements for the generation of electricity obtained from Texas State Energy Conservation Office (http://www.infinitepower.org/calc_pollution.htm)

For every 1 kWh of electricity produced using coal, 2.84 L water is used. Based on 50% electricity generated by coal fired power plants in Alberta,, conversion factor of 1.42 L/kWh used in calculations below:
Calculation

Power consumption
0.1 kWh / bottle (from source)

CO$_2$ emissions
0.118 kg CO$_2$ / bottle (from source)

Water use
0.1 kWh / bottle X 1.42 L / kWh = 0.142 L / bottle
Appendix D: Reduce Printing Calculations

Impacts

Power consumption, CO₂ emissions, water use.

Data sources

Statistics from US Environmental Defense Fund based on Uncoated Freesheet copy paper (http://www.edf.org/papercalculator/index.cfm)

1 Ton of Uncoated Freesheet (copy paper):

- 30 million BTUs energy
- 5,882 lbs CO₂ equivalent
- 22,219 Gallons water

1 Ton of copy paper = 400 Reams of paper (500 pieces/ream) from Conservatree (http://www.conservatree.org/learn/EnviroIssues/TreeStatistics.shtml)

Calculation

Power consumption

30,000,000 BTUs / (400 reams X 500 pieces) = 150 BTUs / sheet converted into kWh = 0.044 kWh / sheet

CO₂ emissions

5,882 lbs CO₂ / (400 reams X 500 pieces) = 0.03 lbs CO₂ / sheet converted into kg

= 0.014 kg CO₂ / sheet

Water use

22,219 Gallons / (400 reams X 500 pieces) = 0.11 Gallons / sheet converted into

L = 0.42 L / sheet
Appendix E: Reusable Mug Calculations

**Impacts**

Power consumption, CO₂ emissions, water use, paper savings.

**Data sources**

Weight of one piece of paper = 5 grams (Source: Weighed using digital scale)


Statistics from US Environmental Defense Fund based on Uncoated Freesheet copy paper (http://www.edf.org/papercalculator/index.cfm)

1 Ton of Uncoated Freesheet (copy paper):

- 30 million BTUs energy
- 5,882 lbs CO₂ equivalent
- 22,219 Gallons water

1 Ton of copy paper = 400 Reams of paper (500 pieces/ream) from Conservatree (http://www.conservatree.org/learn/EnviroIssues/TreeStatistics.shtml)

**Calculation**

Paper savings:

20 gram / cup / 5 grams / sheet = 4 sheets / cup

Power consumption:

30,000,000 BTUs / (400 reams X 500 pieces) = 150 BTUs / sheet converted into kWh = 0.044 kWh / sheet

So 4 sheets / cup X 0.044 kWh / sheet = 0.176 kWh / cup
CO₂ emissions
\[
5,882 \text{ lbs CO}_2 / (400 \text{ reams X 500 pieces}) = 0.03 \text{ lbs CO}_2 / \text{ sheet converted into kg}
\]
\[
= 0.014 \text{ kg CO}_2 / \text{ sheet}
\]
So 4 sheets / cup X 0.014 kg CO₂ / sheet = 0.056 kg CO₂ / cup

Water use:
\[
22,219 \text{ Gallons / (400 reams X 500 pieces)} = 0.11 \text{ Gallons / sheet converted into L = 0.42 L / sheet}
\]
So 4 sheets / cup X 0.42 L / sheet = 1.68 L / cup
Appendix F: Take Alternative Transport to Work Calculations

*Impacts*

CO₂ emissions.

*Data sources*

CO₂ per gallon fuel: Energy Information Administration (Official Energy

Motor Gasoline Lbs CO₂ /gallon = 19.564 lbs/gallon * = 2.34 kg/L

Average vehicle fuel consumption: Transport Canada

(http://oee.nrcan.gc.ca/Publications/statistics/cvs05/chapt
1.6)

10.6L/100 km**

*Calculation*

Using the above statistics

- Convert Lbs CO₂ /gallon to Kg CO₂ /Liter = 2.34 kg/L
- Average car does 0.106 L/km
- Therefore total CO₂ emissions in kg/km for average NA vehicle:

\[
\text{kg/L} \times 0.106 \text{ L/km} = 0.248 \text{ kg/km}
\]

*Assumptions*

It is assumed that employees drive light (under 4.5 tonnes) gasoline vehicles.
Notes

* This figure represents only the CO\textsubscript{2} emissions of the final fuel product and does not include additional CO\textsubscript{2} emissions created during fuel production.

** These statistics are from 2005 and are based on actual kilometers driven and fuel consumption (rather than projected or estimated fuel consumption data.)
Appendix G: Take the Stairs Calculations

**Impacts**

Power consumption, CO₂ emissions, water use.

**Data sources**

Power consumption
Using current technology elevator – data from Kone elevators
(http://www.kone.com/countries/en_GB/Products/Elevators/konemonospaceplatform/Energyefficiency/Pages/default.aspx )

Average elevator uses 11,800 kWh/year

Average elevator trips/day from New York city government source

500 trips/day

CO₂ emissions
50% Alberta’s energy is generated through coal-fired plants and another 38% by natural gas (http://www.energy.gov.ab.ca/Electricity/1586.asp)


Conversion factor kg CO₂/kWh = 0.93 kg/kWh

Water use
A large amount of water is used in the production of coal-fired electricity. Based on above Statistics for Alberta energy generation and information on water requirements for the generation of electricity obtained from Texas State Energy Conservation Office (http://www.infinitepower.org/calc_pollution.htm)
For every 1 kWh of electricity produced using coal, 2.84 L water is used. Based on 50% electricity generated by coal fired power plants in Alberta, a conversion factor of 1.42 L/kWh was used in calculations below:

**Calculation**

**Power consumption**

Using the above statistics:

\[
\frac{11,800 \text{ kWh/year} \times 50\%}{260 \text{ days}} = 45.4 \text{ kWh/day}
\]

\[
\frac{45.4 \text{ kWh/day}}{500 \text{ trips/day}} = 0.09 \text{ kWh/trip}
\]

Average 21 floors/trip = 0.004 kWh/floor

**CO₂ emissions**

\[
0.004 \text{ kWh/floor} \times 0.93 \text{ kg CO₂/kWh} = 0.0037 \text{ kg CO₂/day}
\]

**Water use**

\[
0.004 \text{ kWh/floor} \times 1.42 \text{ L/kWh} = 0.006 \text{ L/day}
\]
Appendix H: Turn Off Computer at Night Calculations

*Impacts*

Power consumption, CO\textsubscript{2} emissions, water use.

*Data sources*

Power consumption

Computers/monitors are Dell with 19inch monitor. Statistics obtained from University of Pennsylvania and are based on actual watt meter readings ([http://www.upenn.edu/computing/provider/docs/hardware/powerusage.html](http://www.upenn.edu/computing/provider/docs/hardware/powerusage.html))

Dell with 19inch plasma – uses 3 watts when plugged in and in sleep mode

CO\textsubscript{2} emissions

50% Alberta’s energy is generated through coal-fired plants and another 38% by natural gas ([http://www.energy.gov.ab.ca/Electricity/1586.asp](http://www.energy.gov.ab.ca/Electricity/1586.asp))


Conversion factor kg CO\textsubscript{2}/kWh = 0.93 kg/kWh

Water use

A large amount of water is used in the production of coal-fired electricity. Based on above Statistics for Alberta energy generation and information on water requirements for the generation of electricity obtained from Texas State Energy Conservation Office ([http://www.infinitepower.org/calc_pollution.htm](http://www.infinitepower.org/calc_pollution.htm))

For every 1 kWh of electricity produced using coal, 2.84 L water is used. Based on 50% electricity generated by coal-fired power plants in Alberta, a conversion factor of 1.42 L/kWh used in calculations below:
Calculation

Power consumption
   Using the above statistics and assumptions below:

   \[ 0.003 \text{ kW} \times 18 \text{ hrs}^* = 0.054 \text{ kWh/day} \]

CO₂ emissions
   \[ 0.054 \text{ kWh/day} \times 0.93 \text{ kg CO}_2/\text{kWh} = 0.05 \text{ kg CO}_2/\text{day} \]

Water use
   \[ 0.054 \text{ kWh/day} \times 1.42 \text{ L/kWh} = 0.076 \text{ L/day} \]

Assumptions
   * Assuming 6 hrs of use per day and in sleep mode for 18hrs
Appendix I: Unplug Cell Charger Calculations

Impacts

Power consumption, CO$_2$ emissions, water use.

Data sources

Power consumption

Page 26 of the Nokia report – cell charger on standby uses 1.3 watts

(Pranshu, Singhal, 2005). Please see “First Stage” and download final report from Nokia)

CO$_2$ emissions

50% Alberta’s energy is generated through coal-fired plants and another 38% by natural gas (http://www.energy.gov.ab.ca/Electricity/1586.asp)


Conversion factor kg CO$_2$/kWh = 0.93 kg/kWh

Water use

A large amount of water is used in the production of coal-fired electricity. Based on above Statistics for Alberta energy generation and information on water requirements for the generation of electricity obtained from Texas State Energy Conservation Office (http://www.infinitepower.org/calc_pollution.html)

For every 1 kWh of electricity produced using coal, 2.84 L water is used. Based on 50% electricity generated by coal fired power plants in Alberta, conversion factor of 1.42 L/kWh used in calculations below:
Calculation

Power consumption
  Using the above statistics and assumptions below:

  \[ 0.0013 \text{ kW} \times 23.33 \text{ hrs}* = 0.03 \text{ kWh/day} \]

\( \text{CO}_2 \) emissions
  \[ 0.03 \text{ kWh/day} \times 0.93 \text{ kg CO}_2 /\text{kWh} = 0.028 \text{ kg CO}_2 /\text{day} \]

Water use
  \[ 0.03 \text{ kWh/day} \times 1.42 \text{ L/kWh} = 0.04 \text{ L/day} \]

Assumptions

  * Cell phone is charged for 1hr every 3 days, and therefore charger in use for
  
  23.33hrs/day
Appendix J: Switching to 30% Recycled Paper Calculations

Data sources and calculations

Impact of using 30% PCW paper from a production process point of view:


To produce 1 Ton of Uncoated Freesheet (copy paper):

• 30 million BTUs energy
• 5,882 lbs CO$_2$ equivalent
• 22,219 Gallons water

1 Ton of copy paper = 400 Reams of paper (500 pieces/ream) from Conservatree (http://www.conservatree.org/learn/EnviroIssues/TreeStatistics.shtml).

So impact of virgin paper per sheet:

Power consumption

\[
\frac{30,000,000 \text{ BTUs}}{400 \text{ reams X 500 pieces}} = 150 \text{ BTUs / sheet converted into kWh} = 0.044 \text{ kWh / sheet}
\]

CO$_2$ emissions

\[
\frac{5,882 \text{ lbs CO}_2}{400 \text{ reams X 500 pieces}} = 0.03 \text{ lbs CO}_2 / \text{ sheet converted into kg} = 0.014 \text{ kg CO}_2 / \text{ sheet}
\]

Water use

\[
\frac{22,219 \text{ Gallons}}{400 \text{ reams X 500 pieces}} = 0.11 \text{ Gallons / sheet converted into L} = 0.42 \text{ L / sheet}
\]
Statistics on resource use for producing recycled paper vs. virgin:

- 64% less energy used (Bureau of International Recycling)
- 55% less water (www.treecycle.com/info.html)
- 74% less CO₂ equivalent (www.treecycle.com/info.html)

So, for every sheet of 30% PCW paper used:

- Energy saved – 0.64 X 0.044 kWh/sheet X 0.3 = 0.0084 kWh/sheet
- Water saved – 0.55 X 0.42 L/sheet X 0.3 = 0.0693 L /sheet
- CO₂ reduced – 0.74 X 0.014 kg/sheet X 0.3 = 0.003 kg/sheet

Impact of using 30% PCW paper from a tree savings point of view:

The average tree produces 8,333 pieces of paper (www.conservatree.com).

The average tree keeps approximately 907 kg of CO₂ out of the atmosphere in its lifetime (www.conservatree.com).

So for every sheet of 30% PCW paper used – 907 kg / 8,333 pieces X 0.3 = 0.0327 kg CO₂/sheet

**Impacts summary**

For every sheet of 30% PCW paper used instead of virgin paper:

- Power saved = 0.0084 kWh / sheet
- Water saved = 0.0693 L / sheet
- CO₂ reduced = 0.0357 kg / sheet

Including production process (0.003 kg / sheet) and tree conservation impact (0.0327 kg / sheet).
Statoil uses 2,400,000 sheets of paper per year.

Virgin sheets saved each year by using 30% PCW paper

\[ 2,400,000 \times 0.3 = 720,000 \text{ sheets} \]

Trees not felled (based on 8,333 sheets/tree average)
\[ 720,000 / 8,333 = 86.4 \text{ trees} \]

Power saved
\[ 720,000 \times 0.0084 = 6,048 \text{ kWh} \]

Water saved
\[ 720,000 \times 0.0693 = 49,896 \text{ L} \]

CO\(_2\) reduced
\[ 720,000 \times 0.0357 = 25,704 \text{ kg CO}_2 \]
Appendix K: Refusing Phonebooks Calculations

Data sources and calculations

Directory paper is printed on 34 gram / m² paper, copy paper is 75 gram / m², so 1 piece of copy paper is = 2.2 pieces of directory paper

(www.yellgroup.com/files/7TAKKH/our+sustainability+story.pdf)

Impact of virgin copy paper from a production process point of view:

Statistics from US Environmental Defense Fund based on Uncoated Freesheet copy paper (http://www.edf.org/papercalculator/index.cfm)

To produce 1 Ton of Uncoated Freesheet (copy paper):

- 30 million BTUs energy
- 5,882 lbs CO₂ equivalent
- 22,219 Gallons water

1 Ton of copy paper = 400 Reams of paper (500 pieces/ream) from Conservatree (http://www.conservatree.org/learn/EnviroIssues/TreeStatistics.shtml)

So impact of virgin paper per sheet:

Power consumption

30,000,000 BTUs / (400 reams X 500 pieces) = 150 BTUs / sheet converted into kWh = 0.044 kWh / sheet

CO₂ emissions

5,882 lbs CO₂ / (400 reams X 500 pieces) = 0.03 lbs CO₂ / sheet converted into kg = 0.014 kg CO₂ / sheet

Water use

22,219 Gallons / (400 reams X 500 pieces) = 0.11 Gallons / sheet converted into L = 0.42 L / sheet
Phone Directories/Yellow pages use 40% recycled content paper

Statistics on resource use for producing recycled paper vs. virgin:
- 64% less energy used (Bureau of International Recycling)
- 55% less water (www.treecycle.com/info.html)
- 74% less CO\textsubscript{2} equivalent (www.treecycle.com/info.html)

So, for every sheet of 40% Recycled paper not used
- Energy saved: $0.64 \times 0.044 \text{ kWh/sheet} \times 0.4 = 0.0113 \text{ kWh/sheet}$
- Water saved: $0.55 \times 0.42 \text{ L/sheet} \times 0.4 = 0.0924 \text{ L/sheet}$
- CO\textsubscript{2} reduced: $0.74 \times 0.014 \text{ kg/sheet} \times 0.4 = 0.0041 \text{ kg/sheet}$

For the other 60% virgin paper not used
- Energy saved: $0.044 \text{ kWh/sheet} \times 0.6 = 0.0264 \text{ kWh/sheet}$
- Water saved: $0.42 \text{ L/sheet} \times 0.6 = 0.252 \text{ L/sheet}$
- CO\textsubscript{2} reduced: $0.014 \text{ kg/sheet} \times 0.6 = 0.0084 \text{ kg/sheet}$

Adding the two impacts together gives us the impact per sheet of not printing phone books from a production process point of view:
- Energy saved: $0.0113 + 0.0264 = 0.0377 \text{ kWh/sheet}$
- Water saved: $0.0924 + 0.252 = 0.344 \text{ L/sheet}$
- CO\textsubscript{2} reduced: $0.0041 + 0.0084 = 0.0125 \text{ kg/sheet}$

CO\textsubscript{2} Impact from a tree savings point of view:
- The average tree produces 8,333 sheets of paper. (www.conservatree.com)
- The average tree keeps approximately 907 kg of CO\textsubscript{2} out of the atmosphere in its lifetime (www.conservatree.com)
Phone directories use 60% virgin paper, so for every sheet not used: 907 kg / 8,333 sheets X 0.6 = 0.0653 kg CO\textsubscript{2} /sheet kept out of the atmosphere as a result of not felling trees.

*Impacts summary*

Estimate of pages saved through rejection of phone books:

40 Yellow Pages (with 2100 pages each) and 40 White Pages (with 800 pages each) per floor (10 floors) will perpetually result in 580,000 pieces of paper (1.16 million pages) not printed per year.

Using above mentioned multiplier – 1 piece of copy paper is = 2.2 pieces of directory paper

Therefore, 580,000 pieces directory paper = 263,636 pieces of copy paper

Production impact
- Energy: 263,636 X 0.0377 kWh/sheet = 9,939 kWh
- Water: 263,636 X 0.344 L/sheet = 90,691 L
- CO\textsubscript{2}: 263,636 X 0.0125 kg/sheet = 3,295 kg CO\textsubscript{2}

Trees saved (60% virgin paper)
(263,636 X 0.6) / 8,333 = 19 trees

CO\textsubscript{2} impact (from trees not felled):
263,636 X 0.0653 = 17,215 kg CO\textsubscript{2}
Appendix L: Questions Asked During One-On-One Meetings

Commuting
- How do you get to work (single vehicle driver, car pool with spouse, etc)
- Have you ever considered taking transit
- What are the obstacles preventing you from taking transit
- If those obstacles were removed (only refer to obstacles if this makes sense), would you start
- Have you ever considered carpooling with colleagues
- What would have to happen so you would choose to do this

Elevator use
- Do you take the elevator for all trips
- When do you / don’t you
- Would it be difficult to take the stairs down for all trips of 2 stories or less
- How about 3
- How about up
- Would you commit to (whatever you think they may reduce) until the end of November

Printing
- What kinds of documents do you print right now
- For what purpose
- Do you print emails
- How many of those documents are necessary to print – example, signature pages)
• Have conversation about what it would take to get them to commit to only printing signature or hard copy required documents. Get this information

• If we could support with e, would they commit to agreeing to not print at all, except for hard copy required documents, until end of December

Recycling paper
• Do you always recycle paper in the office? Do you ever throw out paper in garbage

• How many sheets a week

• What is preventing you from always recycling paper

• If there is something that could be done there, ask if we remove the obstacle, would they commit to ALWAYS recycling paper from now on until the end of December

• If they say it’s just laziness, try to get them to commit to recycling everything

Recycling drink containers
• Same as paper

Turn off computer, turn off monitor, turn off power bar
• Ask them if they ever turn off computer, monitor, power bar

• How many times a week, on average, out of 5 days

• Give them phantom power information

• Ask them if there is anything that would prevent them from committing to do this

• Ask if we remove these obstacles, if they would commit to making changes

• This is one that is easy to forget to do at the end of the day. Ask if there is anything we can do to help them remember
Always using reusable drink containers – ceramic cups / glasses in office, and maybe using a reusable container when they go to Starbucks, etc

- Do you always use a reusable container in the office
- How about when you go out and bring coffee back
- Get an idea of how often this happens
- Ask if they would commit to always using reusable in the office first. See if they would be willing to always use reusable even when going to Starbucks
- See if there are obstacles here that can be removed

Other
- This is where we ask if there are other things that we can do, get suggestions and ideas. Have a short chat, don’t commit to anything, record ideas

Take them through tracker
- Show them how to log in
- Write down the commitments they made
- Remind them that they have to go in once a week and update
- It’s important to let them know that the tracker is only for things they are starting to do as a result of the project, AND NOT to track things they do already. So if they already take alternative transport to work, or if they don’t print, then they leave those boxes unchecked. This is only to measure change
- Make sure we have their email address
- Talk about the lack of reliability with self-reported data. It’s extremely important that they don’t say they have done things they haven’t done. Make sure they commit to things they are going to do, and no more, and then report
accurately, even if they don’t do what they said they were going to do. Tell them that individual records won’t be kept.

Comments
• Ask them for comments, feedback; see if they want even greater involvement than they already have. This is where we can get some people to take on mini projects.
Appendix M: Sample Informed Consent Form

INFORMED CONSENT FORM

You are invited to participate in a study that aims to reduce the energy footprint of the Calgary office of StatoilHydro. This study is being conducted by Vlad Grigore as part of a Master’s Thesis in Management and Environment at Royal Roads University. The project supervisor is Karen Dawson (403-560-4889). If you would like additional information, you may also contact Barry Worbets, VP HSE, or Merete Heggelund, Chief of Staff.

I hope to learn if there are ways that energy use in the office environment of StatoilHydro can be reduced. You were selected as a possible participant in this study because you are an employee of StatoilHydro.

If you decide to participate, I will ask you to, at a minimum, fill in a short survey and, depending on your level of commitment, participate in no more than three focus group discussions, or other activities such as a brainstorming session, or other energy reducing activities, as decided by you. The study will not demand more of your time than you are willing to give, and will end Nov 1, 2009. Once in the program, you will have an opportunity to experiment with ways in which your energy footprint can be reduced. This will reduce your impact on the environment and will make StatoilHydro a more sustainable company. Additionally, there may be other benefits to you, depending on the actions that you decide to take. Ways to remove the obstacles that prevent us from being more sustainable will be explored, including potential incentives to employees. Remember, there will be no expectation for you to give more time or energy to this project than you are comfortable giving.

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. Some information may be shared with a third party Action Tracker who will measure your individual and aggregate impacts. You will only be identified by code number and your name will not appear on any documentation. Results will be discarded three years following the conclusion of the study. This information will be kept private and will only be shared with the researcher. You will have access to study results in the form of the Thesis document.

If you have any questions, please do not hesitate to contact me. If you have any additional questions later, please contact Vlad Grigore at vlg@statoilhydro.com who will be happy to answer them.

You are making a decision whether or not to participate. This decision will have no impact on your employment at StatoilHydro Canada. Your signature indicates that you have read the information provided above and have decided to participate. You may withdraw at any time without penalty should you choose to discontinue participation in this study. Should you decide to withdraw, your individual data may only be used to calculate aggregate results for the period in which you participated.

______________________________  _______________________
       Signature                       Date

______________________________  _______________________
Signature of Witness (If appropriate)  Signature of Researcher
Appendix N: Action Tracker Screen Shots

Enter Actions Action Tracker Page

Figure 2. Action Tracker screenshot. Participants ticked the boxes representative of the actions they completed since their last log-in. When they ticked a box, a window appeared that allowed them to enter a how much of that action they performed.
Additional Information Action Tracker Page

Figure 3. Additional information on reducing paper use. Additional information was accessed for any of the actions by clicking on that action.
Figure 4. Early cumulative results example. This was aggregate data, added from all employee logged actions.
Appendix O: Intranet Story Article

Take action in the Calgary office!

We all know that we can do more to reduce our impacts on the environment; we all know that doing so can be pretty inconvenient, but we also know that it is the right thing to do. The challenging question to answer is where to begin. So if you could take a short amount of time to find some simple ways of reducing your footprint that does not significantly impact your life, would you?

Over the next few weeks, a pilot project will be launching in Calgary, which will support volunteer participants (you!) in determining some small yet significant changes to reduce the impacts that many of our daily choices have. A tabulation of the change at the end of the project timeline will ultimately show what we have achieved together. By designing each participant’s involvement to be exactly what they choose to accomplish, the hope is that we will create lasting change, continuing well beyond project timelines.

As Project Manager Vlad Grigore says, “I hope everyone will take the short amount of time required to look at what small changes might work for them. Nothing that will be asked of participants will be difficult, and each person will be able to do as much or as little as they would like.”

The project will be presented during department meetings over the next few weeks to enlist participants and to answer any questions. If you have any further questions or you simply cannot wait to begin, please email footprint@statoilhydro.com

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StatoilHydro’s Environmental Principles

- Act in accordance with the precautionary principle
- Minimise environmental impact
  * Comply with applicable legislation and regulations
- Set specific targets and improvement measures
  * Consult and cooperate with relevant stakeholders
  * Make our policy available to the public
- Reduce greenhouse gas emissions
- Seek optimal utilisation of natural resources
- Contribute to protecting biodiversity
- Continuously improve energy efficiency, environmental performance and products
- Reduce fresh water use through sustainable water resource management
- Minimise waste generation
From SH HSE Presentation - Waste management

- Reuse - recycling - safe storage
- Recycling throughout the value chain
  - Handling drill cuttings
  - Low radioactive waste
    - safe storage onshore
  - Heavy oil upgrading
    - sulphur and coke
  - Recycling at petrol stations
  - Waste handling at offices

Calgary Office Environmental Footprint Project

- Supported by SLT
- Supports A2A Strategic Objectives
- Supports Action on HSE Canada Scorecard
- Thesis project for Vlad Grigore, candidate M.Sc. Environment and Management, Royal Roads University

Your Team:

Names removed for confidentiality reasons

StatoilHydro
Goal

- To reduce the negative impact that our activities in the Calgary office have on the environment.
- Impact measured as Environmental Footprint

Our Office Environmental Footprint Includes the...

- Water that we use
- Energy that we use
- GHGs that we produce
- Paper that we use

What if we could make our footprint smaller in a few easy steps?
Reducing Office Environmental Footprint

**Program is**

- Individual – each person decides what / how much they do
- Measurable – we will all be able to track what progress we make
  - Energy used in office
  - Paper used
  - Recycling done
  - CO\(_2\) emitted
  - Commuting
- Voluntary
- Important – together, all our individual actions can make a big difference

**What Will You Have To Do?**

- 20-30 minute meeting with footprint committee member at beginning of project (Aug-Sept):
  - Information gathered about the way you use energy, paper, etc.
  - Conversation about what, if anything, you would feel comfortable doing
- Another 20-30 minute meeting with footprint committee member at end of December
- Make some small changes, as decided by you, ONLY if you decide they work for you
- Spend LESS THAN 5 min a week entering information in your Action Tracker
  - 1 weekly reminder will help you remember
- Total time until end of December: <3 hrs
We Can Do A Lot Together

- We can decrease the impact we have on the environment
- We can save $ spent on consumables – help the company in challenging economic climate
- Pilot for making change in field, St John's, ........
- Just the beginning?

We Need Your Help

We talk a great environmental talk…. Help us walk our talk.