FOOD COOPERATIVES AS VEHICLES FOR DISSEMINATING LOW-CARBON APPROACHES

by

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Abstract

This paper explores whether food cooperatives can provide an effective vehicle for developing and disseminating low-carbon strategies and behaviors. Research included literature reviews and inquiries into the nature and behavior of food cooperative trade associations and retail operations. With a positive prospect for effective communications with stakeholders, a carbon change action plan was created for managing "carbon reduction" change process in food cooperatives. An appendix of "Carbon Resources" was also compiled to assist food cooperatives and stakeholders in initial efforts to begin changes in carbon behavior. The results revealed an opportunity for food cooperatives to utilize their unique situation to communicate important information to their stakeholders.

Food cooperatives, operating with a voluntary membership unified around food and using non-traditional commercial-exchange channels, provide a unique and potentially powerful model for spreading the message of sustainability and changing behaviors specifically toward reducing carbon emissions. Since food is a life sustaining source of nutrition and a fundamental source of social good, it provides a magnetizing point of social connectivity. Consequently, cooperatives organized around food offer the daily opportunity for interpersonal connections and social exchange. The membership network's open communication channels offer a tremendous platform to initiate an important discussion of low-carbon initiatives and sustainability among stakeholders because most food cooperatives are: already committed to sustainability; receptive to changes in lifestyle and behavior; dedicated to member education, training and information; and working effectively together.

Furthermore, carbon, climate change and food security are interrelated issues. Carbon, as we shall see, directly contributes to climate change. Climate change threatens entire agricultural regions and places food sources at risk. In a closed system with a finite resource base, waste combined with a growing population is not sustainable. At the same time, inefficiencies present both opportunities and incentives for improvements. Carbon reduction can become a prime target for such opportunities and incentives because carbon is a proxy for waste and waste is one metric of inefficiency.

Objective

This paper explores the potential for food cooperatives to function as role models for the development and dissemination of low-carbon behaviors and strategies. For the purpose of this paper, carbon is waste, a proxy for inefficiency; therefore, low carbon is low waste. An example of a low-carbon role model is an entity which exhibits, in both actions and words, positive movement toward reducing anthropogenic carbon emissions and associated impacts.

The food cooperative system is established on the principle of sustainability. Food cooperatives represent a communications channel populated with stakeholders receptive to alternative modes and messages and committed to sustainability, at least in terms of food needs.

This paper focuses on how food system interact with carbon issues might raise awareness of the power food cooperatives could have in reaching audiences who, by nature, are both receptive to the message and apt to relay it to the broader community. The question posed is whether food cooperatives can be effective vehicles for spreading low-carbon ideas and behaviors. Food cooperatives function in non-traditional channels which can be effective in communicating behavior changing low-carbon initiatives. Since actions to address climate change are required at all levels of society, the argument is that any action taken to reduce carbon is important and meaningful.

Methodology

This paper's methodology consists of two parts:

1. A review of the literature regarding food cooperatives, energy use in food systems, carbon dioxide's role in climate change, sustainability and the relationships among all of these.

2. A description of a Carbon Change Action Plan drawn from the work of D. Keith Denton [1] and Norm Christensen.[2]

Introduction

People, of course, need to eat. A large part of American society is fortunate in that satisfaction of their extended, multi-level needs occurs, from their perspective, almost effortlessly. Food, water, shelter and security have been taken for granted by many people for years, if not generations. Over this period, many Americans have lapsed into the assumption that "the environment will take care of itself." As early as 1987, however, the Brundtland Commission reported to the World Commission on Environment and Development of a "common understanding of the alarming and unacceptable trends which face the globe." The report also cited the urgent need "for serious and drastic action to be taken."[3] Since this initial report, climate change has become an increasingly high profile issue. Escalating efforts to raise public awareness have emerged from sources across society ranging from the United Nations (UN) and the World Health Organization (WHO) to multinational efforts at global environmental policy in Kyoto, Copenhagen and Cancun, to high-profile individuals taking up the cause, as for example, Al Gore's movie, *An Inconvenient Truth*, Thomas Friedman's book, *Hot, Flat and Crowded* and Richard Branson's funding for the Carbon War Room.

For many, the need-satisfying act of acquiring food is an economic process. Nearly all economic activities require some level of energy input, whether in its production or use. Even renewable energy technologies require energy in the manufacturing process. In a fossil fuel based economy, virtually all such energy expenditures generate some level of carbon emission. Increasing levels of carbon dioxide, however, have been identified as a major factor responsible for climate change.

Adapting to a changing climate and achieving food security are vital, interrelated issues, whether from a local level or a global perspective. To achieve food security and environmental sustainability on a global level, agricultural models must have resource efficiency and "climate compatible planning," meaning planning that incorporates projected climate change into specific agricultural techniques and strategies. At a local level, the agriculture model's impact will be directly correlated to the economic environment available to participants. This includes infrastructure, knowledge sharing and market transparency. The foundation of food security rests on the fundamentals of sustainability: people, economics and environment ─ particularly on the interdependence of people, land and technology.

Any efforts to address and ameliorate change are better than nothing because the long term consequences of global climate change are immense. Human impacts on the environment have led to global warming, which exacerbates natural events such as floods, droughts, desertification and violent storms such as hurricanes, tornadoes.[4] Former Chilean President Ricardo Lagos stated the dilemma succinctly: "We need to balance all options in order to actually make progress. We can't argue out all viable options or else we'll end up with no progress."[5] At the time, President Lagos was speaking of energy options; however, the philosophy applies to many of the dilemmas facing society and the environment today.

Because this problem transcends all boundaries efforts to address current climate issues and to anticipate the effects of projected changes are being made at all levels and on a continually greater scale. Responses, actions and reactions vary according to the perceived threat that climate change poses.

Finances are not always the constraint. Instead, barriers to the transition to low-carbon, renewable energy sources are more likely to be social and political, not technological or even economic. Consequently, a transition to renewable energy technologies will likely entail more than targeted economic policies, which are inherently inefficient.[6]

Addressing climate change, therefore, is not a once-and-done project, but a process that requires a long-term outlook. The timeline is measured in years, decades and centuries and requires a commitment to change.

One significant issue is how to encourage end-users to adopt renewable end-use technologies such as residential solar panels and electric vehicles, in place of conventional, fossil fuel systems. The changeover may require broad-based action on a number of fronts to overcome the ‘‘socio-technical impediments to renewable energy’’:

> Consumers practically ignore renewable power because they are not given accurate price signals. Intentional and unintentional market distortions prevent consumers from becoming fully invested in their choices. Newer and cleaner technologies that may offer social and environmental benefits but are not consistent with the dominant paradigm of the industry continue to face comparative rejection. Changing this dominant paradigm may require concerted social and political efforts beyond traditional sorts of economic incentives.[7]

This paper proposes that food cooperatives might provide an effect alternative channel for changing behavior and disseminating information on low-carbon initiatives. A state of awareness is the first step required in accumulating the information required to make informed and thoughtful environmental choices about sustainable practices. The goal of this document is

to increase awareness of the interconnectedness of food, carbon and climate change as a way to enhance the potential role food cooperatives can play in initiating a broader awareness of carbon reduction needs in today's environment.

This project offers a prime example of a grassroots effort ─ small in scale, yet with the potential to reach far beyond its physical walls. Any effort to remediate climate change is a bold one, regardless of scale. Presenting this information in the socially benevolent environment of food cooperatives ─ in all stages from production, purchasing, and preparation to its ultimate consumption ─ will spread awareness to an ever increasing number of stakeholders due to the unity of common interest and the very social aspect that food evokes across all levels of society

Literature Review on Food Cooperatives

Food cooperatives are member-owned, member-governed businesses that operate for the benefit of their members according to common principles agreed upon by the international cooperative community. Cooperative members pool resources to bring about economic results unobtainable by one person alone. Regardless of the goods or services provided, cooperatives aim to meet members' needs.

The University of Wisconsin's Center for Cooperatives' 2009 study, "Research on the Economic Impact of Cooperatives", provided an abundance of information on the scope of cooperative influence on the U.S. economy and society. While the study examined the broad effects all cooperative businesses exert, it was extremely helpful illustrating the significant reach food cooperatives have into U.S. society.

The study suggests that cooperatives have an understated influence in the U.S. economy. It found that 29,284 cooperatives operating at 72,993 establishments in every sector of the

economy and in every congressional district collectively account for nearly $652 billion in revenue, $154 billion in income, $3 trillion in assets, more than two million jobs, and more than $74 billion in wages.[8] Most are consumer owned. The agricultural sector accounts for most producer cooperatives. While it is difficult to estimate the number of Americans who are members of at least one cooperative (many individuals are members of multiple cooperatives), the number of cooperative memberships has been placed at over 350 million, with consumer cooperative membership accounting for 340 million members.[9]

The most prevalent cooperative business units are consumer cooperatives created to deliver goods and services, which benefit members through lower prices by bulk purchasing and by patronage refunds, dividends or rebates reflecting purchases made at the cooperative. In the U.S. the most common consumer cooperatives are credit unions, electric cooperatives and food stores. The single largest cooperative is REI, the outdoor sporting goods retailer begun in 1938 and now operating with more than 100 stores and over 4 million members.[10]

The U.S. Department of Agriculture (USDA) website also provides a tremendous source of information and data on agriculture and sustainable farming and food initiatives. Of particular value was the USDA's "Know Your Farmer, Know Your Food" program aimed at facilitating the development of vibrant local food systems. The USDA Economic Research Service (ERS) also provided a wealth of economic and statistical information on local food systems.

Food cooperatives, as a growing factor in food systems, were a logical sector to address because of their focus on sustainability, community and member education. Complementing these attributes is the affinity members share with food, a decidedly social commodity. Research into similar studies revealed an absence of study on the effects food cooperatives might have as

an avenue for carbon reduction sustainability initiatives. Inquiries to the National Cooperatives Grocers Association (NCGA) and Cooperative Grocer's Information Network (CGIN) confirmed the absence of any studies. All of these factors were instrumental in framing this paper's research topic and research methodology.

Principles for Food Cooperatives

Cooperatives operate in a well-defined and legislated arena. The Geneva-based International Co-operative Alliance (ICA) defines a cooperative as "an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise."[11]

Appendix 1 provides the cooperative definition, values and principles as presently set forth by the ICA's statement on cooperative identity. The cooperative principles set forth serve as guidelines for cooperatives to implement their values. This paper focuses on three of these principles:

1. **Education, Training and Information**: Cooperatives provide education and training for their members, elected representatives, managers, and employees so they can contribute effectively to the development of their cooperatives. They inform the general public - particularly young people and opinion leaders - about the nature and benefits of cooperation.

2. **Cooperation among Cooperatives**: Cooperatives serve their members most effectively and strengthen the cooperative movement by working together through local, national, regional and international structures.

3. **Concern for Community**: Cooperatives work for the sustainable development of their communities through policies approved by their members.[12]

Environmental responsibility coupled with community social responsibility provides the major motivation for many food cooperatives. Internal and external stakeholder pressure further drives a cooperative's underlying ethical motives as well as its pervasively positive "corporate" values. The vast majority of members are those individuals, families and businesses that believe in the environmentally-conscious philosophy under which most cooperatives are founded.

As the birthplace of both the organic food trend and local food movement, retail food cooperatives are seedbeds of positive social innovation and education. In the U.S., food cooperatives include small specialty stores, natural food stores and full-line supermarket style operations in over 350 communities. Most of these are open to the community at large, that is, non-members may shop, but receive none of the benefits of membership such as receiving patronage discounts, rebates, dividends or specialized services, or voting on cooperative policy. At the regional level, cooperative food wholesalers provide products and support services to independent grocers, and occasionally co-brand with private label goods.

Whether at the local store or the national association level, food cooperatives have a significant number of members attracted by a mutuality of similar interests. Local ownership creates the uniqueness of each cooperative's personality, yet is the common thread of food that unites these members.

Consumers' interest and participation in retail food cooperatives tends to increase in periods of social, political and economic turmoil. Although their secondary needs may vary considerably, cooperative members consistently want their cooperatives to provide price, quality,

and selection advantages. Growth periods also occur when large numbers of consumers experience economic difficulties and develop an interest in ownership and control of their retail food sources when they become concerned for food safety and when they experience a strong desire for an ethical society.[13]

Education, Training and Information

Because food cooperatives are socially-conscious organizations, responsive to members' needs, they increasingly address the fifth cooperative principle, "Education, Training and Information." They most often do so by creating ancillary educational forums, but the methods and approaches vary significantly. For example, members free to champion causes within their food cooperative often create blogs dedicated to their favorite issue.

At the local store level, educational forums range from website pages, ongoing classes and seminars and special speaker opportunities and address a variety of topics as guided by member interest. At the national level, several associations exist which are specifically dedicated to supporting cooperatives. Some, such as the Cooperative Grocers Information Network and the National Cooperative Grocers Association, specifically target local food cooperatives in their membership. Others, such as the National Cooperative Business Association (NCBA), address the broader cooperative market.

The Cooperative Grocers Information Network (CGIN), a collaboration of retail food cooperatives, facilitates the sharing of information and resources among over 180 retail members. Exemplifying the principle of cooperation among cooperatives, CGIN's purpose is **"**to strengthen all retail food cooperatives by creating community and facilitating the sharing and

development of resources among members."[14] Materials made available through CGIN, for example, are limited only by members' willingness to share.

The National Cooperative Grocers Association (NCGA) provides business services for 118 member natural food cooperatives in 33 states.[15] NCGA strives to unify natural food cooperatives in order to optimize operational and marketing resources, strengthen purchasing power, and ultimately offer more value to natural food cooperative owners and shoppers everywhere. While NCGA focuses on its members' business operations, it also owns and operates *Cooperative Grocer***,** a bi-monthly trade magazine with 336 food cooperative subscribers offering an extensive membership of both readers and contributing writers. With an emphasis on how to learn from others about both business operations and a more healthful, trustworthy, and transparent food supply, *Cooperative Grocer*'s mission is to improve mutual education among food cooperatives and other key allies of food cooperatives.[16]

Food, as a magnetizing point of social connectivity, also facilitates more casual social exchanges throughout the food cycle, especially during production. Whether a backyard garden or a 10,000-acre farm, people talk about gardens, crops and weather. At the point of purchase, perfect strangers interact in produce sections, but rarely anywhere else in a regular grocery store. Mealtime discussions are regular affairs for most people, especially in the kitchen during preparation and at the table during consumption.

Furthermore, the breadth of food cooperative membership is impressive. With over 350 retail locations, food cooperatives reach several million members directly while rippling farther through a myriad of vested stakeholders in the broader community.[17] Messages delivered through the food cooperative network are shared in all directions and across all levels, from the trade associations and food cooperative itself, to its members and stakeholders spreading out into

the local community and beyond. This vast and growing spread provides an untapped opportunity to reach a significant number of receptive people willing to listen and entertain change in their behaviors around sustainability issues.

The kind of mutually-interested, educationally-attuned community that food cooperatives represent constitutes a fairly unique channel for message delivery, distribution and reception as this paper proposes. The food cooperative community atmosphere is generally receptive to topics that other organizations might find controversial. The myriad of daily interactions around food offer abundant chances for sharing information to sustainability-focused consumers most apt to adopt low-carbon behavior changes. This combination of opportunity, scope and receptivity illustrates how food cooperatives might serve as a low-carbon model, offering both a business location to implement low-carbon measures and as an excellent vehicle for the dissemination of knowledge regarding carbon influences on the food system and related climate change issues. Consequently, while food cooperatives are a non-traditional, grassroots channel, they hold the potential for making significant impacts in the sustainability of their community, and all other levels in reducing carbon impacts.

Local Food and Farmers' Markets

The demand for locally produced food is increasingly consumer driven. Numerous marketing campaigns are educating consumers on the health and nutritional benefits of fresh food and reiterating the message that local produced foods are fresh, high-quality and healthy foods. Motivations vary from desire for low environmental impact, sustainably produced food, product freshness and quality, nutritional value and support for local farmers and support for the local economy.

Nevertheless, there is not a consensus on an accepted definition of “local food.” According to section 6015 of the Food, Conservation, and Energy Act of 2008, the total distance that a product can be transported and still be considered a “locally or regionally produced agricultural food product,” [18] is less than 400 miles from its origin, or within the state in which it is produced.

A local food system, also known as a community food system, "is a collaborative effort to integrate agricultural production with food distribution to enhance the economic, environmental, and social well-being of a particular place (i.e., a neighborhood, city, county or region)."[19] This concept of localized food has gained significantly greater traction in conjunction with the emergence and growing adoption of sustainability and the growing realization of the importance of environmental stewardship, resource management and food security. “One of the primary assumptions underlying the sustainable diet concept is that foods are produced, processed and distributed as locally as possible. This approach supports a food system that preserves local farmland and fosters community economic viability, requires less energy for transportation, and offers consumers the freshest foods." [20]

Local initiatives have grown increasingly more popular over the past several decades. Initially designed to provide local markets for locally grown and raised goods, food cooperatives have evolved into a growing market presence. Several factors have contributed to this growth:

- Increased awareness of the effects of agricultural fertilizers and pesticides and animal growth hormones on humans and the environment has raised food safety concerns.

- The damage caused by large scale environmental degradation factory farming has resulted in environmental regulation and increased demand for both locally grown foodstuffs and organically raised foodstuffs.

U.S. Department of Agriculture's campaign, "Know Your Farmer, Know Your Food," has also helped start of a national conversation about the importance of understanding where your food comes from and how it gets to your plate. Its goal is "to create new economic opportunities by better connecting consumers with local producers. Today, there is too much distance between the average American and their farmer, and we are marshaling resources from across USDA to help create the link between local production and local consumption."[21]

An excellent example of a similar local initiative is North Carolina's 10% Campaign, which encourages North Carolina consumers to commitment to spending 10% of their existing food dollars in support of North Carolina farmers, businesses and communities. The 10% Campaign is the direct result of the Farm to Fork initiative, which focused on collective efforts at the state level to support the development of local and regional food systems in their attempts to achieve sustainability. The Farm to Fork initiative challenged itself to "build a sustainable food system that strives to be economically viable, environmentally sound and socially just," defining a food system as "all the processes involved in feeding people — growing, harvesting, processing, packaging, distributing, marketing, consuming, disposing and recycling."[22]

Farmers markets provide a vital link in the local food supply chain. As the intermediary in this aspect of the local food economy, these markets offer a physical location for the interactions between consumers and local farms and related businesses. Facilitating the exchange

of farm fresh produce to consumers while retaining money in the local economy, farmers markets provide a connection between farms and society.

Farmers markets have risen in popularity recently. According to the USDA's Agricultural Marketing Service, the number of farmers markets increased from 1,755 in 1994 to 2,756 in 1998 to 5,274 in 2009 and as of mid-2010, there were 6,132 farmers markets operating throughout the U.S. Direct marketing of farm products through farmers markets continues to be an important sales outlet for agricultural producers nationwide.[23]

According to the 2005 National Farmer Market Managers Survey, sales at farmers markets were slightly over $1 billion annually, and more than 25 percent of vendors at surveyed markets derived their sole source of farm income from sales at farmers markets.

Presenting low barriers to entry, farmers markets are often the initial marketplace point of entry for small and medium-sized producers. Low costs help these producers develop and grow their businesses, while allowing an ancillary retail opportunity to producers who participate in other distribution models.

Consumer benefits include access to healthy, locally produced, farm-fresh food and the satisfaction of knowing where and by whom their food was grown. Communities benefit as farmers markets become key components in vibrant robust local economies, beyond just the food economy of supporting farms and businesses and creating jobs. Farmers markets also provide easier access to fresh, healthful food in communities where access to fresh, nutritious food may be otherwise limited.[24]

Food Economics

Agriculture involves more than just food. Agricultural products and related goods and services provide vital environmental goods and services including, but in no way limited to: *ecological goods* such as food, drugs and timber; *ecological services* such as pollination, seed dispersal and pest control along with habitat, biodiversity and species richness preservation; *climate regulation* such as solar radiation distribution, regulation of precipitation, evaporation and evapotranspiration; water purification, catchment and flood control; *soil stability* which prevents erosion and siltation; and *life- and climate-related functions* such as carbon sequestration and nitrogen fixation. While the valuation of these goods and services can differ dramatically based on the motivation for the assessment, it is commonly acknowledged that all of them directly support human life and wellbeing.[25]

The World Economic Forum recognizes that industrial agriculture can be a positive driver of food security, environmental sustainability and economic opportunity; in fact, it is the only investment sector that addresses all three of these pressing issues simultaneously.[26] However, while industrial agriculture generates positive benefits it also produces externalities, negative benefits whose cost are borne by society. For example, according to the World Economic Forum, modern agriculture employs 40 percent of the global population (including 70 percent of the bottom1 billion), but it is also responsible for 30 percent of global Greenhouse Gas (GHG) emissions and 70 percent of global water withdrawals. The global agriculture sector, of course, supplies life sustaining food, but its efforts still leaves close to 1 billion people hungry.[27]

Not every food or agriculture-related business is a publicly traded multinational corporation with annual revenues dwarfing the GNP of some small, third-world countries. The

vast majority of businesses involved in the food distribution system fall under the classification of a Small to Medium Business Enterprise (SME). The Small Business Administration's (SBA) Office of Advocacy estimates there were 27.5 million businesses in the U.S. in 2009, with SME firms (fewer than 500 employees) representing 99.9 percent of the total.[28] Economic impacts aside, the breadth and depth these businesses reach in society is significant.

The vast majority of food cooperatives and local food initiatives operate in the SME environment. They present excellent examples of these resilient networks addressing the triple bottom of their local communities. However, "the globalization of markets seems to have forced SMEs to choose between hyper-efficient behaviors, which create brittle mono-focused, low-price driven networks and have few environmental or social conscious boundaries, versus more resilient socially, environmentally and financially bounded networks that tend to be regional or local."[29]

Literature Review of Sustainability as Related to Food Cooperatives

Sustainability is a complex, dynamic concept with different levels of application. At a macro, trans-national level, countries look to sustainability as the means to achieve improvements across the triple bottom line, that is, across social, economic and environmental boundaries. Nations can also use sustainability as a practical methodology that allows them to seek such improvements on a global stage.

At the corporate level, sustainability involves the organization's role as a citizen in addressing its responsibilities to the triple bottom line. This often is part of a mix of corporate social responsibility and corporate citizenship in the creation or adaptation of a sustainable

business. Competiveness, legitimation, and environmental responsibility have been identified as primary motivators for companies to go green.

Drilling down to the individual level, sustainability can become both a lifestyle and personal philosophy. "Sustainability can be about helping others be more effective in addressing their responsibilities regarding environmental stewardship, social well-being, and economic prosperity or about making oneself more aware of the environment, humanity and commerce."[30]

Obviously, the philosophy of sustainability transcends all boundaries; it is the application of national, corporate and or individual interpretations to real world circumstances that illustrate differences. In 2001, Peter Senge wrote:

> Sustainability is a challenge to society as a whole. Business can play a legitimate leadership role as a catalyst for larger changes. A new environmentalism is emerging, driven by innovation, not regulation –the challenge is to develop sustainable businesses that are compatible with the current economic reality- it won't matter how good they are ecologically and socially.[31]

Food, Carbon and the Climate Crisis

Carbon is an essential building block of life and energy source. Plant life uses the carbon dioxide as fuel for the photosynthesis process. Photosynthesis removes carbon dioxide from the atmosphere and replaces it with life sustaining oxygen. Yet, while carbon and carbon dioxide are essential for life, as with many things, too much is also not good for life. The Keeling Curve offers irrefutable proof that atmospheric carbon dioxide levels have increased to the highest levels since this study began over five decades ago.[32] If our society continues with a "business as usual" attitude and fails to reduce carbon emissions, atmospheric carbon dioxide will increase

and exacerbated the harmful effects of climate change. Indeed, studies project that even if emissions were to drop to zero, the climate changing trends already underway will continue for decades or longer.[33]

Energy related activities based on fossil fuel combustion accounted for the vast majority of U.S. carbon dioxide emissions for the period of 1990 through 2008. In 2008, approximately 84 percent of the energy consumed in the United States was produced through the combustion of fossil fuels. The remaining 16 percent came from other energy sources such as hydropower, biomass, nuclear, wind, and solar energy. Of the top five key economic sectors, electricity is responsible for about one third of all U.S. greenhouse gas (GHG) emissions and 40 percent of total carbon dioxide (CO_2) emissions.[34]

Despite the ongoing discovery of new reserves and improved technology to extract existing reserves, fossil fuels are a finite resource. Yet, our energy needs are projected to increase due to a combination of population growth and our current wasteful, high-consumption patterns. Obviously, something is going to have to give.

At the same time, increased atmospheric carbon dioxide levels continue to produce a cascade of negative environmental events, collectively termed climate change. Although the greenhouse warming effect is actually caused by a number of emissions, carbon dioxide is the primarily identified causal factor and one identified as potentially being most manageable in efforts to address the impact of climate change throughout the global environment.

Greater variability in inter-diurnal temperatures is projected to result in regional climate changes. These changes include geographic specific changes (increases or decreases) in ambient temperature and wind, precipitation and relative humidity ─ all potentially contributing to

changes in the historical ecosystem structure and function. Of significant importance is the strengthening of the El Nino Southern Oscillation (ENSO), resulting in greater variability and polarity of wet and dry seasons. Wet seasons are becoming wetter and dry seasons similarly are becoming drier. The combination of a strengthening ENSO and increasing temperatures is already leading to changes in various ecosystems.

Human influenced land use change contributes to increases in the global atmospheric concentration of greenhouse gases, changes in surface albedo and weather patterns.[35] Arable regions, agricultural lands and forests provide a myriad of environmental goods and services. Some environmental benefits include: climate regulation which distributes solar radiation, which in turn cools the tropics and warms temperate zones and regulates precipitation, evaporation and evapotranspiration, water purification, catchment and flood control; soil stability preventing erosion and siltation; vital ecological processes including pollination, seed dispersal and pest control; vital ecological goods and services such as food, drugs, timber, life and climate related functions ─ carbon sequestration and nitrogen fixation. These benefits are impacted by deforestation, fragmentation and climate change without prejudice, often as a byproduct or secondary result of an unrelated action.

Addressing climate change can drive economic development across all levels ─ local, regional and global. As a byproduct of other processes, carbon is often considered a waste, and waste is inefficient. As carbon output is reduced, efficiency rises. A decrease in carbon output and corresponding improvement in efficiency yields multiple benefits: in the business environment, it increases competitiveness, lowers costs and potentially heads off regulatory requirements that could prove cost prohibitive; at the consumer level, it lowers expenses and, if nothing else, reduces carbon emissions.

Based on available technology, managing and lowering carbon across all levels of society ─ called "decarbonizing" ─ will be an ongoing process of continual action and improvement. Regardless of carbon footprint size, reducing carbon will involve searching out opportunities to identify reducible embedded carbon (carbon associated with the production and or transportation of a good or service) as well as hidden carbon (carbon differential between goods or services, thus an opportunity to replace or substitute with a good or service with less embedded carbon).

For example, consumers have any number of choices when an automotive means of transportation is required. The consumer can choose a hybrid or a Hummer. Both vehicles have embedded carbon, the carbon involved in creating the actual vehicle. Given the appropriate data the hidden carbon could be determine as the differential between the two vehicles as they roll off the production, and in use on a daily basis.

From a business perspective, proposing change creates the opportunity to engage stakeholders who then have the opportunity to be proactive and environmentally conscious and can generate true greenwill and front run any potential regulations or legislation.

Fossil Fuels and Food Security

If one assesses the total resource usage in delivering a meal to a consumer, it quickly becomes apparent that the food system represents a deep and broad use of energy. The impact of the food sector on energy, resource use and the environment is extremely important to note for several reasons. First, in the coming decades, the food sector will face growing demands that will in turn place escalating demands on energy, water and arable land because the global population is projected to increase by a third, reaching 9 billion by 2050.[36] Because our current economy is based on fossil fuels, these escalating energy demands will entail similarly escalating carbon

emissions with their exacerbating effects on climate change. In turn, climate change results in adverse effects on natural ecosystems, including increased flooding and droughts, increased desertification and the corresponding reductions in areas of arable land in the coming years ─ which negatively impacts food production.[37]

A food system involves the cycle of production, transportation and consumption of food. A recent USDA Economic Research Service report found that energy produced from fossil fuels is used heavily throughout the U.S. food supply chain, including in: the manufacture and application of agricultural inputs, such as fertilizers and irrigation; crop and livestock production, processing and packaging; distribution services such as shipping and cold storage; the running of refrigeration, preparation and disposal equipment in food retailing and foodservice establishments; and in home kitchens.[38] Currently, all the fossil-fuel energy consumed by the food system has a very significant by-product – carbon dioxide emissions, the primary greenhouse gas.

In 2008, production, transportation and home preparation accounted for 66 percent of the energy consumed throughout the cycle. To put this in relative perspective, food retail ─ predominantly grocery stores ─ accounted for only 4 percent of total food system energy consumption.[39] Refrigeration, which must be kept on around the clock, consumes 38 percent of a grocery store's energy usage, while lighting accounts for an additional 23 percent.[40] For those grocery stores open 24/7, over 60 percent of their energy demand never drops off. It is a constant load requirement often linked to a fossil fuel powered electric utility.

The combination of a food chain that depends on fossil fuels and a projected population growth that places greater demands on agricultural resources raises several concerns. National

energy security, for example, involves factors such as the volatility of petroleum price, supply and accessibility. These issues affect agriculture production costs, which affect supply stability and the security of an energy dependent food system. Petroleum volatility, therefore, has direct impacts on food availability in geographic terms (feeding urban area), which is directly tied to food security.

The development of the U.S. transportation infrastructure has also had a powerful impact on current our food and energy security situation. Domestic agriculture commerce in general and agricultural specialization in particular was spurred by the introduction of an extensive interstate highway system with lower transportation costs and improved refrigeration technologies. The U.S. underwent a production shift based on specific geographic and climatic environmental factors, with California and Florida being the two biggest beneficiaries of agriculture specialization.

Satisfying consumer demand was no longer constrained by local seasonality. Consumer demand for fresh fruits and produce was met by transporting the goods from regions where seasonality did not affect production. Transportation costs were analyzed since they were easily quantifiable and directly affected profitability, but no thought was given to the energy embedded into miles these foods as they traveled hundreds or thousands of miles. Consumer demand was accommodated further as refrigerated shipping introduced goods from new markets. Again, embedded energy and greenhouse emissions did not factor into the logistics of food transportation.

Within the U.S., the economics of food production have changed radically over the past century. America, the land of plenty, has moved away from the social ethos of self-sufficiency to

a fast food, convenience-store mentality. The small family farm has given way to mega corporate farms. In some cases, entire agricultural market sectors have been exported to other countries. It is not uncommon to find large-scale corporate farms where mono-cropping of genetically modified food is the prevalent practice. This includes applications of massive amounts of petroleum-based fertilizers and pesticides, indiscriminately irrigated with water from ancient aquifers.

Agriculture specialization, low cost transportation and a growing population demanding year round produce has proven to be a profitable financial combination for most of the twentieth century. The resulting commercial farm concentration and its impact on global agricultural transportation also affect our food and energy security. A 2009 U.S. Government Accountability Office study revealed that less than 2 percent of farms were responsible for 50 percent of farm sales in 2007, and that from 1982 to 2005, the market share of the top four grocery store chains more than doubled, as measured by sales.[41] Interconnected global markets have also arisen in the search for economies of scale. The constraint to bringing goods to markets thousands of miles away from the point of production is continually surmounted ─ but at an increasingly expensive environmental cost.

As climate change has been elevated to celebrity importance, the global impact of market concentration and connectedness has correspondingly taken precedence in the media spotlight, with food miles gaining traction as the carbon/climate metric of choice. The National Sustainable Agricultural Information Service (NSAIS) defines food miles as follows:

> [It] is the distance food travels from the location where it is grown to the location where it is consumed ─ the distance food travels from farm to plate. Recent studies have shown

> that this distance has been steadily increasing over the last fifty years. Studies estimate that processed food in the United States travels over 1,300 miles, and fresh produce travels over 1,500 miles, before being consumed. Food miles have become one method for evaluating the sustainability of the global food system in terms of energy use.[42]

Given the links between petroleum-based energy security, food security and carbon emissions, it is worthy to note that between 1997 and 2002 over 80 percent of the increase in annual U.S. energy consumption was food-related. In 2007, the U.S. food system accounted for almost 16 percent of the Nation's energy budget.[43] Food programs at all levels impact multiple issues beyond their stated goals. Sustainable food systems and food security are inseparable.

So, while the American food landscape has benefited from the economics of specialized agriculture, we are now increasingly aware of the impact this development has put on the environment. While the cost per mile can be calculated into the retail price and recouped from the consumer, the cost of the externality generated in transporting those goods are added to the environmental effects that a developed society continues to impose on the global environment.

Almost every product contains a level of embedded carbon, that is, carbon which is created in the production and/or transportation of the product. We have learned a great deal about the impact of food, and the food chain, on our environment and the climate in recent years. Melons on a mid-winter breakfast table in New England mean 3,000 food miles from California, associated greenhouse gas emissions (GHG), fertilizers, pesticides and groundwater depletion. Other examples include Costa Rican bananas, Argentinean beef, Columbian coffee, Chilean avocados or wine.

Public, private and community initiatives attempting to address impacts caused by both agri-business concentration and long-distance transportation are also emerging. These initiatives are leading to the development of sustainable local food systems, with efforts focused on production decentralization and dramatic reductions in transportation distances from production to consumption. For example, the 2010 North Carolina Farm to Fork Guide highlights the benefits of developing local food systems, emphasizing local economic growth, reduced food miles and a goal of sustainability for food systems and economies.[44]

These initiatives often also highlight the issue of "food security." The World Food Summit of 1996 defined food security as existing "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life." Food security involves the triple bottom line – sustainable economic, social and environmental development ─ whether on a global, national or local level. According to the World Health Organization, food security is built on three pillars:

- *Food availability*: sufficient quantities of food available on a consistent basis.
- *Food access*: having sufficient resources to obtain appropriate foods for a nutritious diet.
- *Food use:* appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation. [45]

Food security has several contentious issues. Food politics, for example, are divided into nationalists espousing food security first and free traders who believe the markets will allocate food via global trade. Food security is influenced by income levels, prevailing economic conditions and community ethos towards healthy eating. Similarly, there are those who believe

that current problems lie in distribution logistics, not in food supply, and others who believe future needs cannot be met by current methods or levels of production.

Food security and sustainable local food systems are interconnected. At the local level in the U.S., food security is gaining focus as part of the decentralizing initiatives. These are often dual purposed initiatives such as the USDA's "Know Your Farmer, Know Your Food" simultaneous support for development of local food systems and improving food security.

Challenges to Timely, Effective Change

We have to innovate, not legislate, our way out of this situation to create strategies that address the situation today and in the future. Indeed, the need for innovative solutions is more applicable today than when Peter Senge called for them ten years ago.[46] Yet, a number of challenges exist to addressing pressing sustainability issues in a timely, effective way. These include:

- *Timing*: "Transitions are long term, possibly multi-generational processes that are derived from 'co-evolutionary processes' where institutional, technological, behavioral, ecological, economic and other processes intertwine and reinforce each other. Transitions consist of a number of system innovations: organization transcending innovations that drastically alter the relationships between companies, organizations, and individuals involved in the system."[47] American society will most likely undergo a prodigious shift as baby boomers age out and are replaced with more socially and environmentally aware consumers, but the fact remains that generational change takes time.

On the other hand, behavioral change needs to occur faster due to the urgency surrounding climate change and resource depletion. The opportunity to initiate a changeover from consumer based environmental awareness can begin at the local level; consumers can use their voices and wallets to effect these changes. In the final analysis, no time is better than the present to begin addressing the issues causing these damaging environmental impacts.

- *Entrenchment:* Embedded habits and thinking present an immense challenge to addressing those factors contributing to climate change and global resource overuse and depletion. Such entrenchment is a by-product of generations of consumers believing that, if they could afford "it," then it was their right to buy "it" regardless of its true cost. Reassessing and changing ingrained or embedded habits and thinking is one of the most important actions we can undertake towards creating change.

- *Systemic change*: Besides the obvious need for time to effect evolutionary change, multiple stakeholder involvement is required in order to create more radical and structural changes in the manner in which "deeply embedded, persistent environmental issues ─ such as climate change"[48] and resource dependence and overuse are adequately addressed. "Sustainability issues at the level of societal sectors cannot be addressed by single organizations, but need to be thought of as systemic challenges in which business, government and civil society each play different roles. Sustainability involves structural changes over long periods of time, and requires co-evolutionary changes in technology, economy culture and organizational form."[49] Such change will become pervasive and self-maintaining as sustainability buy-in gains greater social traction.

"To direct transitions towards sustainability, new modes of governance are needed that take into account the long time horizon, the uncertainties and complexities and the multitude of actors and interests involved."[50] This involves communication and interaction between the numerous stakeholders involved in the issue.

- *Collective Learning:* "Collective learning is essential for system innovation as it helps to develop knowledge about root causes, linkages and patterns, to construct shared meanings and to clarify common ground and differences in perspectives, interests and needs."[51] While the importance of utilizing sustainability knowledge across the board in decision making, management, policy and design is widely recognized, it is still in early development, and adoption may depend on progress in other areas in order to gain greater traction.[52] The habit of collective learning in food cooperatives offers the opportunity to share beneficial knowledge on a regular basis. It also creates the pathways for passing successful change and adaptation approaches onto future generations.

Business Opportunities

Senge implies that a change from "business as usual" is required to achieve sustainability. Food cooperatives offer an excellent example both of a change from "business as usual" and of a sustainable business model. While not one of Senge's "new innovative solutions," food cooperatives continually deal with successful adaptation to new circumstances. They address the pillars of sustainability in a de facto manner. At the core of these requirements is a commitment to sustainability in all cooperative dealings; in this way, the cooperative principle of concern for community animates concern for sustainability across all levels.[53]

Food cooperatives wishing to retain market share have continued economic success or to simply remain economically viable must balance stakeholder satisfaction with current economic reality. There are fewer social boundaries when people own and work for companies which, in turn, are reliant on those same people for their livelihood. This is a community that is united around a common interest in healthy food and which understands the need for and value of environmental wellbeing. Food cooperatives offer the opportunity to innovatively perform a very important role in the support and propagation of low-carbon initiatives and sustainability by using their open channels of member communication.

When successful sustainability strategies are shared, common factors emerge. This is especially true due to increasing corporate disclosures on sustainability measures. Some disclosure is required for regulatory reporting purposes. Other disclosure is voluntary, purely for purposes of competitive advantage. Market share acquired through *greenwill* is a valuable company asset. It typifies the strategy of creating revenues strictly by informing the public of the company's awareness of environmental issues and the actions taken to address these issues.

Greenwill is the "green" goodwill a business derives from green business practices and sustainability initiatives. Greenwill is increasingly becoming a significant determinant in many consumer choices. The 2010 ImagePower® Green Brands Survey, a consumer survey on green beliefs and behaviors, found that globally more than 60 percent of consumers want to buy from environmentally responsible companies, while 75 percent of U.S. consumers say it is somewhat or very important to them that the brands they buy come from green companies. Among U.S. respondents, energy use and efficiency is considered to be the biggest green issue today. Economic concerns continue to take precedence over environmental ones with 79 percent of

those polled expressing greater distress about the economy, yet, 35 percent of consumers say they will spend more on green in the coming year.[54]

Three main factors ─ competitiveness, legitimation and ecological responsibility ─ have been identified as the primary motivations for a company to embrace environmentally responsible initiatives, that is, to "go green." These motivating factors are further influenced by drivers such as legislation, stakeholder pressure(s), economic/market opportunities and corporate values and ethical motives.[55]

A new mentality is emerging where environmentally conscious consumers make intentional and informed purchasing decisions. In such cases, consumer spending becomes a key indicator of greenwill with expenditure patterns indicating changes in attitudes. These green buyers are electing to purchase hybrids, compact fluorescent lights, water efficient fixtures, energy star appliances, LEDs, carbon offsets and green power. Such purchasing preferences indicate an attitude potentially receptive to adoption of a group behavior philosophy based on a goal of reducing consumption, inefficiencies and waste byproducts, while minimizing resource depletion. By many definitions, this means a philosophy receptive to, if not actually embracing, sustainability.

Sustainability is the essence of the seventh cooperative principle described by the International Co-operative Alliance (ICA, see Appendix 1): concern for community. This principle explicitly states that cooperatives will work for the sustainable development of their communities through policies approved by their members. This enables individual cooperatives to define sustainability as it applies to their community and its unique needs. This also enables

the cooperative to function as a change agent if members determine it is in the interest of the cooperative and the community.

Because cooperatives are consumer-owned businesses that represent and safeguard member interests, they often perform desirable gatekeeper functions by screening products against stated member preferences. As information clearinghouses, cooperatives perform a crucial distribution function as well. Aiding in the formation and success of food cooperatives, therefore, can yield immense sustainability benefits ranging from the synergistic energies these units can deliver to the triple bottom line actions they provide as both gatekeepers and clearinghouses.

The current food cooperative movement presents the opportunity to address cause, effect and solutions at a local level with a receptive audience eager to learn more about what they can do to make positive change. The food cooperative environment presents an ideal seedbed to nurture and grow the changes needed to overcome adversely embedded behaviors and to introduce new ways of dealing with a common situation.

For these changes to nurture and take root they do not need to be monumental, innovative or disruptive. They just need to be changes that stakeholders understand and can discuss with others. Each cooperative entity, through its community of owners, suppliers and external stakeholders, can spread the word through a trickle down method and reach countless degrees of dissemination. The philosophy is brutally simple: if it’s good for people, planet and profit, then it makes sense to ensure that such knowledge spreads. This is where the cooperative model can excel and where the three highlighted cooperative principles come into play.

Initiating a Carbon Change Action Plan

A state of awareness is necessary in order to initiate change. Awareness is also necessary to understand how "business as usual" differs from the optimal condition. Framing the process positively leads to a more receptive atmosphere among participants.

To accept that change is necessary is a difficult step; it implies the notion that something is amiss and requires modification. For many people and organizations, change is an unwelcome intrusion into life or business as usual. Change creates new situations with unknown outcomes which can be very unsettling. Even when a need for change is acknowledged, a common reaction is to wait to see what others have undertaken and what has been accomplished.

Changing embedded carbon behavior can begin with an awareness of the carbon impact one exerts on the environment – what is commonly referred to as a carbon footprint. With this one piece of data, a baseline can be established from which change can proceed. Change at this point is a purely voluntary initiative, only time will tell what measures may become legislated or regulated to force change in individual and business carbon behaviors.

Implementing voluntary change is an admirable goal, yet it can still present an equally difficult course of action. Those voluntarily seeking to bring about a change in their embedded carbon behaviors have untaken an admirable journey, one that can last one step or a lifetime. Instead of imposing a cataclysmic shift, change can be viewed as a process of continual change implemented over time.

Much has been written about the role of management in organizational change, with particular focuses on quality initiatives, restructuring and optimizing financial returns. However, we are looking at implementing a societal change utilizing the business organization as both

change participant and change messenger. Adaptation of general management change facilitators is necessary to address triple-bottom-line, socio-economic-environmental change.

I give particular credit to change management processes proposed in two articles: "Nine Ways to Create an Atmosphere for Change"[56] by D. Keith Denton, and "Future Forest, Future Fires"[57] by Norm Christensen. Their suggestions are intended to facilitate the creation of an atmosphere receptive to change, populated with people most likely to follow through on the change. Based on these advisories the following steps can be considered a "Carbon Change Plan" to assist in initiating and managing the long term changes required to create changes in carbon behavior:

Elements of a Carbon Change Action Plan

1. *Explain that the world is changing and will continue to change*. Change is a given. History provides examples of social, economic and environmental change across millennia.

   Calls for environmental action have increased dramatically since the first Earth Day in 1970. Thanks to the 1987 Brundtland Commission Report to the World Commission on Environment and Development, there are now reports from an ongoing Intergovernmental Panel on Climate Change (IPCC) and multi-national summit meetings that discuss change. In the United States, greenhouse gas emissions caused by human activities increased by 14 percent from 1990 to 2008, global greenhouse gas emissions from human activities increased by 26 percent from 1990 to 2005.[58]

2. *Create awareness of both the status quo and the goals to be accomplished*. As with any journey, it is essential to know the starting point as well as the desired destination,

although that destination may change en route – see #6. Appendix 2 has resources which can clarify the situation today. While there are many goals, all are directed at ultimately reducing anthropogenic influences on climate change. Therefore each and every effort to decrease carbon emissions contributes to this overall goal. Involve everyone; this is an issue of immense import; it is both possible and important to create dialogue across all socio-economic and age groups.

3. *Build support for changes and describe the benefits of changes.* Engage stakeholders and community. According to the Greener World Media Inc.'s October 2009 U.S. Green Confidence Index (GCI), the most trusted sources of environmental information are family, friends and colleagues. We are all stakeholders in this process; some of us just do not know it yet. Knowledge is both power and empowering. Change is occurring and it is important to inform people that they can have an impact in the direction the change will take. Communicate the message that one's actions will invest in the intergenerational equity of future generations.

4. *Set realistic goals, create measurable improvement steps and approach change incrementally. Manage the cycle – the entire change process – not just the moment.* Realistic goals are more achievable. These often involve small constant steps which allow for greater stamina. Awareness of the steps required to achieve goals increases the probability of goal attainment. The ability to take a long term outlook affords the opportunity for adjustments to be made as new information is gathered and processed. Also, small steps will maintain involvement and continued attentiveness throughout the journey. Managing the change process is the essence of stakeholder relations. Good

relations require open communication and stakeholder acceptance is essential for this process.

5. *Manage the process towards the desired state of future change*. Throughout this process every effort is positive and meaningful. Do not create boundaries as boundaries only create limitations. An eye to the future is essential, but the ability to adapt is crucial. Change begets change and, while we are certain change will occur, we don't always know the direction it will take us. A long term outlook must be maintained. Projected impacts of long term climate change are the results of computer modeling. But, the complexity of global environment hardly lends itself to predictive modeling.

6. *Communicate, educate and train*. Never forget that it is the people who will make this work; buy-in and engagement of stakeholders and community is essential. The need to communicate, educate and train is of paramount importance.

   Maintain a continuous dialogue. New developments occur constantly and can have a direct impact on these efforts. It is imperative that channels remain open and functioning.

   Information helps to better understand the situation, the situation, the desired results and what actions are required to work towards those results. Remember that the internet provides a wealth of both information and disinformation on the topics of climate change and carbon. Still, word of mouth can also be a powerful instrument in the movement to reduce carbon.

   Appendix 2 offers resources to maintain information on climate change, though more information will undoubtedly become available as more climate data is studied.

7. *Implement the Plan.* Volumes have been written about change and the change process. Communicating with stakeholders is always the first and most important step. Turning a Carbon Change Action Plan into a practical change process should begin with explanation and education such that stakeholders become aware of the plan and vested in the process. This group involvement and engagement process can begin simply, with a basic lesson in the food-carbon connection that starts with explaining that growing food requires energy. Everything involved in food requires energy at some point in the process and right now that energy comes primarily from fossil fuels, which release large amounts of carbon dioxide. Farmers use fertilizers that are derived from petroleum; tractors, combines and the vehicles used to transport food to consumers use fossil fuels; even the electricity used in refrigeration and preparation comes primarily from coal, oil or gas burning plants. Each energy-consuming step burns a fossil fuel which emits carbon ─ and carbon is creating changes in the environment.

Appendix 2 provides links to resources which may prove helpful to those seeking to understand and start changing carbon behaviors.

Conclusion

Through their stakeholders, food cooperatives can serve as vehicles for communicating the low-carbon message to the broader community.

This paper has discussed various ways in which food cooperatives can be effective vehicles for communicating information, changing behavior and promoting low-carbon initiatives. Food cooperatives occupy a fairly unique niche in society with a voluntary membership united around the common interest of food. As a social good, food offers the daily

opportunity for interpersonal connections and social exchange and affords the opportunity to communicate new information, such as examples of how to lower one's carbon impact. Through daily interactions around food, cooperatives offer the alternative communication channel to consumers most apt to adopt low-carbon behavior changes, namely, those already interested in sustainability.

Climate change and food security are each momentous issues. Countless resources are applied to the problem each presents to society. Introducing climate change and food security information into a food cooperative's repertoire leverages the sustainability-focused philosophy that already pervades this movement; thus, the outlook appears positive for cooperatives to reach a noteworthy segment of the population.

This cooperative community united around food is significant predicated on their unity, openness, receptivity and focus on sustainability. Food cooperatives can perform a very important role in the support and propagation of low-carbon initiatives and sustainability by using their open channels of member communication, relaying the message that action to reduce every person's carbon footprint must begin now.

The geographic distribution of food cooperatives is spread throughout the U.S. While concentrations exist in New England, the Midwest and the Pacific Coast, the diffusion is extensive enough that information dissemination has a significant likelihood of being achieved. The breadth of food cooperative membership is impressive. With over 350 retail locations, food cooperatives reach several million members directly as well as a multiple of vested stakeholders and the broader community.

Because membership in any of the cooperative trade associations is wide-spread and voluntary, communication does not rely on a central repository for data. Indeed, the actual number of food cooperatives in business could not be precisely determined. Several sources placed the number at over 350. Likewise the number of food cooperatives in development is uncertain. There are several hundred planned, but there is no accepted stage at which one qualifies as a food cooperative for inclusion purposes. Options vary from when articles of incorporation are filed, to when financing is secured, to when minimum membership is subscribed, to when the doors actually open.

Because food cooperatives are owned by the members, the business focus is not necessarily one of profit above all else. While the cooperative needs to be economically sustainable, it does not have to enter into every profit maximizing opportunity. This allows a degree of leeway in the selection of supply chain members. Conversations with several food cooperative managers confirmed that a supplier's sustainability philosophy was as important as product price and quality. Regardless of whether a supplier is a food cooperative member, the supplier is a vested stakeholder and often embraces the cooperative values in their own business. The point is that the suppliers are an extension of the food cooperative and are effective spokespeople in sharing and spreading the message of sustainable lifestyle actions.

Thus, while hard data on food cooperative members and stakeholders is not available, it is an accepted generalization that this particular segment of society is an open, receptive audience committed to sustainability. For many, the commitment is both a personal philosophy and lifestyle choice.

This audience is driven both by greenwill and by their sustainability ethos. Also advancing audience reception are the cooperative principles of: 1) providing member education, training and information; 2) cooperation among cooperatives; and 3) concern for community with the dedicated goal of sustainable development in their communities and sustainability overall.

There are a number of agriculture and food initiatives at national, state and local levels aimed at focusing efforts to connect consumers with local producers and support sustainable local agriculture, local food systems and address food security. Support across these levels illustrates the importance of local agriculture and the connection between the parties involved.

The absence of legislative and regulatory environmental action of any consequence can create a push from the populace level. The cooperative principle of concern for community through sustainability initiatives is perfectly married into the principle of member education, training and information. Their members' unity of interest in a sharing atmosphere with food as a social connector leads to a greater receptivity to messages which in turn leads to greater awareness and openness to change. Behaviors become embedded over time and change takes time to take effect, but it can only occur if awareness is achieved.

The biggest hurdle will be coordinating the effort. As autonomous businesses, food cooperatives are ultimately independent businesses linked by the common factor of food. The initiative will need to be undertaken to create a communication channel between all cooperatives dedicated to supplying information that can be used by the cooperative and successfully passed along to members, stakeholders and the broader community.

In sum, food cooperatives are an untapped alternative channel. They present the opportunity to reach a significant population segment willing to entertain change resulting in significant impacts in the sustainability of their community and all other levels in reducing carbon impacts. This creates a tremendous platform to communicate messages to a large audience receptive to non-traditional outlooks and channels. Messages delivered through the food cooperative network are shared in all directions and across all levels, from the trade associations to the food cooperative, to members and stakeholders spreading out into the local community and then beyond.

Appendix 1: International Co-operative Alliance's Statement on Cooperative Identity[59]

Definition: A cooperative is an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise.

Values: Cooperatives are based on the values of self-help, self-responsibility, democracy, equality, equity and solidarity. In the tradition of their founders, cooperative members believe in the ethical values of honesty, openness, social responsibility and caring for others.

Principles: The cooperative principles are guidelines by which cooperatives put their values into practice.

1. **Voluntary and Open Membership**: Cooperatives are voluntary organizations, open to all persons who are able to use their services and who are willing to accept the responsibilities of membership without gender, social, racial, political or religious discrimination.
2. **Democratic Member Control**: Cooperatives are democratic organizations controlled by their members, who actively participate in setting their policies and making decisions. Men and women serving as elected representatives are accountable to the membership. In primary cooperatives members have equal voting rights (one member, one vote) and cooperatives at other levels are also organized in a democratic manner.
3. **Member Economic Participation**: Members contribute equitably to, and democratically control, the capital of their cooperative. At least part of that capital is usually the common property of the cooperative. Members usually receive limited compensation, if any, on capital subscribed as a condition of membership. Members allocate surpluses for any or all of the following purposes: developing their cooperative, possibly by setting up reserves, part of

which at least would be indivisible; benefiting members in proportion to their transactions with the cooperative; and supporting other activities approved by the membership.

4. **Autonomy and Independence**: Cooperatives are autonomous, self-help organizations controlled by their members. If they enter to agreements with other organizations, including governments, or raise capital from external sources, they do so on terms that ensure democratic control by their members and maintain their cooperative autonomy.
5. **Education, Training and Information:** Cooperatives provide education and training for their members, elected representatives, managers, and employees so they can contribute effectively to the development of their cooperatives. They inform the general public - particularly young people and opinion leaders - about the nature and benefits of cooperation.
6. **Cooperation among Cooperatives**: Cooperatives serve their members most effectively and strengthen the cooperative movement by working together through local, national, regional and international structures.
7. **Concern for Community**: Cooperatives work for the sustainable development of their communities through policies approved by their members.

Appendix 2- Carbon Resources

The following information has been gathered from the internet. The objective is to provide a useful list, not necessarily a long or by any means exhaustive list. It is intended to provide sources for interested parties to review in order to gain an awareness of the importance of managing carbon and come to an understanding of possible initial steps.

This is not intended to be a total roadmap to a low-carbon existence. Rather it frames the first step in a continuous journey. Whether this journey is undertaken by a business or an individual it will be a process of continual adjustment. Information is just one factor affecting efforts to reach the most attainable level of carbon efficiency.

The long term perspective for this process requires that new information be continually aggregated, filtered and processed into understandable messages. Information dealing with issues ranging from new scientific studies and discoveries on the expansive topics of carbon and climate change, technological advances, new products and processes, political policy and legislation and market responses to all these issues will need to be assimilated and processed.

The internet has the potential to produce information overload and deliver conflicting information. It is recommended that information sources be assessed for ability to deliver impartial, unbiased, timely and relevant information.

Please note, this not an instruction manual on how to vet sources. Resources listed here are believed to be trusted sources of reliable information. Wherever possible a mix of government, non-government (NGO) and private sources have been furnished. Organizations are presented alphabetically and where possible capacity descriptions are from each organization's website.

Any number of topics could have reviewed in this section. These topics are thought to provide a good starting point in the journey to understanding how to reduce our carbon impact.

Climate Change

Climate change refers to any significant change in measures of climate (such as temperature, precipitation or wind) lasting for an extended period (decades or longer). Climate change is often used interchangeably with global warming. Global warming refers to an average increase in the temperature of the atmosphere near the Earth's surface, which can contribute to changes in global climate patterns. However, rising temperatures are just one aspect of climate change.[60]

Carbon Disclosure Project (CDP) https://www.cdproject.net/en-US/Pages/HomePage.aspx

CDP is an independent non-profit organization with the largest database of primary corporate climate change information in the world. Organizations from across the world's major economies measure and disclose their greenhouse gas emissions and water management and climate change strategies. CDP discloses this information at the heart of financial and policy decision-making.[61]

Climate Change Economics http://climatechangeecon.net/index.php

The scope of this website is the economics of climate change and responses to it. The objective is to offer access to the best available objective analysis of the options facing the United States to address the carbon intensity of our economy. The site is founded on the evidence that the carbon intensity of the U.S. economy could be lowered without major changes

in lifestyles. Other advanced industrialized countries maintain very high standards of living; yet use much less energy per capita than the U.S. There is the opportunity to change.[62]

Intergovernmental Panel on Climate Change (IPCC) http://www.ipcc.ch/

The Intergovernmental Panel on Climate Change (IPCC) is the leading international body for the assessment of climate change. The IPCC is an intergovernmental body established to provide a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts. Currently 194 countries are members of the IPCC.

The IPCC is a scientific body. It reviews and assesses the most recent scientific, technical and socio-economic information produced worldwide relevant to the understanding of climate change. It does not conduct any research nor does it monitor climate related data or parameters.

By endorsing the IPCC reports, governments acknowledge the authority of their scientific content. The work of the organization is therefore policy-relevant and yet policy-neutral, never policy-prescriptive.[63]

Natural Resources Defense Council (NRDC) http://www.nrdc.org/

NRDC is the nation's most effective environmental action organization working to protect the planet's wildlife and wild places and to ensure a safe and healthy environment for all living things. NRDC works to solve the most pressing environmental issues we face today: curbing global warming, getting toxic chemicals out of the environment, moving America beyond oil, reviving our oceans, saving wildlife and wild places, and helping China go green.[64]

The Pew Center on Global Climate Change http://www.pewclimate.org/

The Center's mission is to provide credible information, straight answers, and innovative solutions in the effort to address global climate change. Working on an issue that is often polarized and politicized, the Pew Center provides a forum for objective research and analysis and for the development of pragmatic policies and solutions.[65]

The Pew Center offers "Climate Change 101: Understanding and Responding to Global Climate Change," a series of reports structured to provide a reliable and understandable introduction to climate change. Information covers climate science and impacts, climate adaptation, technological solutions, business solutions, international action, federal action, recent action in the U.S. states, and action taken by local governments.

Scripps CO2 Program http://scrippsco2.ucsd.edu/home/index.php

The Keeling Curve is the best-known CO2 study and illustration of the impact of humanity on the planet as a whole. Lessons can be learned about making long-term measurements based on the experiences of this program. "Keeling Curve Lessons" provide an excellent tutorial on anthropogenic carbon impact.[66]

U.S. Environmental Protection Agency: Climate Change (EPA) http://www.epa.gov/climatechange/

Climate change is a problem that is affecting people and the environment. Greater energy efficiency and new technologies hold promise for reducing greenhouse gases and solving this global challenge. EPA's website provides information on climate change for communities, individuals, businesses, states, localities and governments.[67]

United States Global Change Research Program (USGCRP) http://www.globalchange.gov/

The U.S. Global Change Research Program (USGCRP) coordinates and integrates federal research on changes in the global environment and their implications for society. Every 10 years, the USGCRP must develop a new Strategic Plan, which is used to guide the research and coordinating activities of the program for the following decade. The next Strategic Plan is due in 2011. USGCRP issues "Our Changing Planet," an annual report which summarizes recent achievements, near term plans and progress in implementing long term goals.[68]

Carbon Calculators and Carbon Offset Intermediaries

Carbon calculators are useful to determine an estimated level of greenhouse gas emissions. There are numerous carbon calculators available for free on the internet. Some of these resources differ in what they offer. The EPA delivers a 'rough ballpark' estimate of greenhouse gas emission and allows users to explore actions to reduce emissions and provides an estimated savings from these proposed actions. Other resources provide calculator to assist in arriving at a carbon footprint and then offer services to purchase carbon offsets.

Carbon footprints will differ based on the source. The footprint of an individual or family should be smaller than the carbon footprint of a business. Factors influencing individual or household emissions include a combination of: *personal choices,* for example, in automotive or lighting; *habits,* for example, in home temperature, unplugging appliances or recycling; *economics* including, for example, age of appliances and HVAC equipment; *on-site renewables,* for example, green technology adoption; and geographical locations including, for example, type of fuel used to generate electricity, seasonal temperature fluctuations. Thus, no two carbon footprints will be identical.

While there are numerous individual factors leading to unique carbon footprints, businesses face a significant and increasing number of factors impacting their carbon footprint. In addition to those above, adjusted for the business environment, just a few of many considerations would include: *business type*, for example, manufacturing, distribution, retail or service; *number of locations*; *age of facilities and equipment*; *transportation requirements*, for example, fleet vehicles or supplier delivery methodology; and *economics* including, for example, financial health and ability to fund efficiency improvements.

A number of carbon calculators are shown below. These have been chosen using the following considerations:

- *Objectivity*: Each organization has its own motivation for making this resource available. What is the organization supplying the calculator's purpose for supplying this tool – environmental benefit or corporate benefit by selling you carbon credits?

- *Track Record*: measurement tools are undergoing constant and continual improvement. Established resources in this arena are more apt to maintain a state of the art calculator. Does this organization update its calculator as better metrics become available?

- *Transparency*: This is tied directly to both objectivity and track record. Legitimate organizations are willing to provide answers to customer's questions. Will this organization stand up under the light of day?

The following resources offer carbon calculators only:

- Conservation International Carbon Calculator

- The Nature Conservancy

- US EPA Household Emissions Calculator

The following resources offer carbon calculators and carbon offset intermediary services, as well as the ability to differentiate between individual/family and business.

- *Carbonfootprint.com* – individual/family
- *Carbonfootprint.com* – designated SME business
- *Carbonfund.org* – individual/family
- *Carbonfund.org* – business
- *Terrapass* – individual/family
- *Terrapass* – business

Carbon offset programs generally fall into one of three headings. Each deals with a sector of the environment tied directly to climate change. Briefly these areas include the following:

- *Renewable Energy & Methane Capture Projects*: involves projects designed to reduce reliance on fossil fuel generated energy.
- *Energy Efficiency & Carbon Credits:* efficiency is both cost effective and expeditious in reducing fossil fuels reliance.
- *Reforestation & Avoided Deforestation:* forest projects not only sequester carbon but protect and provide invaluable ecosystem goods and services.

Carbon Offset Verification

As part of the due diligence process any potential carbon offset purchaser should ascertain that the credits they are purchasing are tied to real, tangible carbon reducing projects, what the carbon market terms "certified emission reductions." These can be as epic as multi-national clean development mechanisms (CDM) or as local as renewable energy certificates (REC).

The following are recognized verification organizations:

- American Carbon Registry
- The Climate, Community & Biodiversity Alliance
- The Voluntary Carbon Standard

While the U.S. EPA is not a project verifier, it does provide information on green power projects, allowing purchasers to evaluate direct transactions with green power producers. See the link to EPA greenpower index at: *U.S. EPA Green Power Partnership*.

Food Miles

Food miles are the distance food travels from where it is grown to where it is purchased or consumed. Local food travels shorter distances and generates less pollution. The following resources address both food miles and local food systems.

The National Sustainable Agriculture Information Service (ATTRA) provides "Food Miles: Background and Marketing," a report on food miles that addresses how food miles are calculated, investigates how food miles affect producers and consumers, and evaluates methods for curbing the energy intensiveness of our food transportation system.

The U.S. Department of Agriculture (USDA) program "Know Your Farmer, Know Your Food" is a USDA-wide effort to create new economic opportunities by better connecting consumers with local producers. It is also the start of a national conversation about the importance of understanding where your food comes from and how it gets to your plate. Today, there is too much distance between the average American and their farmer and we are marshaling resources from across USDA to help create the link between local production and local consumption.

The USDA Report "Energy Use in the U.S. Food System" provides information on the importance of energy in growing, processing, packaging, distributing, storing, preparing, serving, and disposing of food.

Appendix 3 - Definitions[69]

Dominant Paradigm: the values, or system of thought, in a society that are most standard and widely held at a given time.[70]

Farmers Market: Marketing outlet at which farmers sell agricultural products to individual customers at a temporary or permanent location on a periodic and recurring basis during the local growing season or during the time when they have products available, which might be all year.

Food miles: The distance a food product travels from the place of production to the location where it is sold for final consumption.

Local food: Food produced, processed, and distributed within a particular geographic boundary that consumers associate with their own community.

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