Chapter Nine – Call it Biomimicking, Permaculture, Industrial Ecology, Natural Capitalism, Resiliency, Regeneration – Trends of Note

"Nature is trying very hard to make us succeed, but nature does not depend on us. We are not the only experiment." - R. Buckminster Fuller

It has been said, pay little heed to headlines (potentially short-term fads / teller of time), but study carefully trend lines (maker of clocks). In our modern world we often think big changes come about in months rather than years but even with the fastest evolving technologies we have, arguably the Internet and Smartphones - we are talking multiple decades of evolution and transformation (see http://physics.ucsd.edu/do-the-math/2015/09/you-call-this-progress/#more-1551 for a powerful perspective).

Some of the most influential books I have read in examining very important trends are: **Small Is Beautiful** by E.F. Schumacher, **Natural Capitalism** by Paul Hawkins, Avory and Hunter Lovins, **The Geography of Hope: A Tour of the World We Need** by Chris Turner, **The Happiness Trap** by Dr. Russ Harris and **The Necessary Revolution: How Individuals And Organizations Are Working Together to Create a Sustainable World** (Peter M. Senge, Joe Laur, Sara Schley, Bryan Smith and Nina Kruschwitz). I have leaned heavily upon these fine works, and even taken the liberty of excerpting parts, as I work to weave this chapter together, to discuss what appears to be pervasive, emerging trends.

What does Walmart (to a quite limited degree) and Interface Flooring Systems (to a significant degree) have in common that they credit with break-through success? It's been given various labels such as biomimicking, permaculture, industrial ecology or natural capitalism but ultimately no matter what we might call it or the nuances of execution – it is countries, organizations and companies attempting to find a sustainable competitive advantage. The challenge within this ever-evolving goal is that, for all the great things the fossil fuel based industrial revolution brought into reality, if we lack sustaining and affordable energy, energy will prove its undoing. Obviously, reverting to the way it was before the fossil fuel driven industrial revolution is not a preferred option and currently there is not a full alternative renewable energy solution by most accounts.

Wal-Mart—the epitome of overgrown big-box big business (Walmart by themselves are China's eighth-largest trading partner) has taken steps towards meeting the challenge and some time ago hired Amory Lovins of the Rocky Mountain Institute and his think tank to teach Walmart how to make dozens of tweaks to its lighting and refrigeration, the trim of its trucks and the width of their tires. This was evidence, perhaps, of the dawn of the true Schumacheresque in the art of mainstream economics. Walmart has a distribution center in Calgary that is the latest and greatest of these efforts and is paying back handsomely. Lovins credits the source of much of their concepts to the Schumacher book entitled "Small is Beautiful". A 1995 Times Literary Supplement survey placed this book alongside the works of Sartre and Jung in a ranking of the hundred most influential books since the Second World War; and a 2000 Time magazine list of the preceding century's heroes included Schumacher.

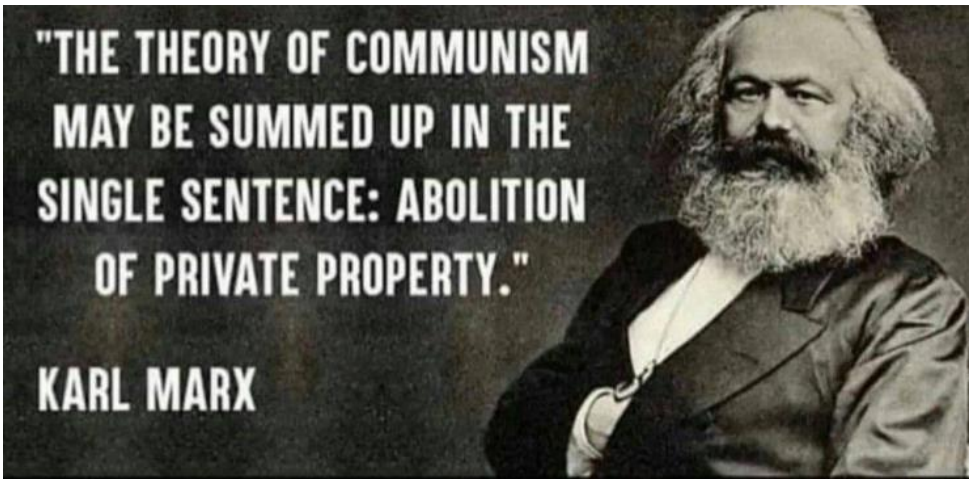
Regarding economics there is a powerfully disruptive point made in the pages of Small Is Beautiful regarding nothing less than the first principle of a sustainable global market economy. Schumacher wrote "It is inherent in the methodology of economics to ignore man's dependence on the natural world."

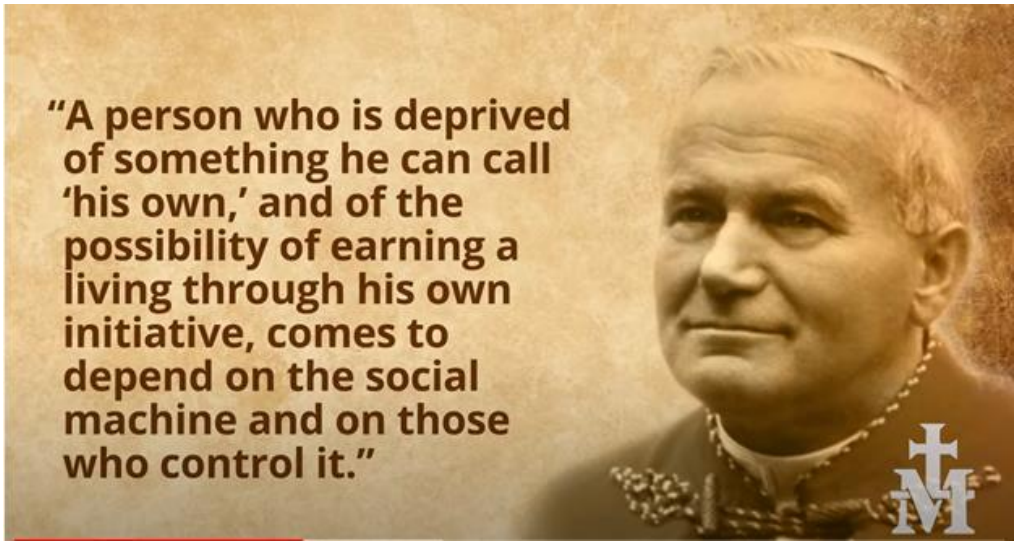
Ignoring non-renewable resource issues has been well captured by Walt Patterson, a fellow at Chatham House (an English think tank) and a prominent theorist and activist on energy issues since the dawn of the first OPEC crisis. Patterson captured the concept in a curious story about the early days of electricity he recited as part of a lecture he gave at the London Planetarium in June 2000. Thomas Edison's first electrical grid, Patterson explained, was a modest affair based entirely in lower Manhattan. A cogeneration system existed for the purpose of providing electric light and building heating, for which his customers paid a fixed rate per bulb. Edison owned and operated the power station, the wires, the fixtures — the works. But it wasn't long, Patterson continued, before there was "a critical change in the arrangements — the introduction of the electricity meter". From that time on, Edison, his contemporaries and their successors were no longer selling electric light; they were selling electricity, by the metered unit. The advent of the electricity meter had an additional consequence. If you are selling electric light, you want the whole system producing the light to be as efficient and cost-effective as possible. If, on the other hand, you are selling units of electricity as measured by an electricity meter, someone using less efficient lamps has to buy more electricity from you to get the same level of illumination (in other words benefiting from inefficiency, something that nature rarely does – call it biomimicry lost). From the point of view of the seller, inefficiency on your customer's premises is good for your business. This perverse incentive has underpinned the electricity business for a century and it has led to other perverse incentives, Patterson noted, "such as America's nuclear power industry having received $1 trillion in public money over the years, while delivering to Americans in return, less total energy than wood does but very costly and dangerous waste issues" (see https://www.zerohedge.com/geopolitical/japan-proposes-dumping-radioactive-waste-pacific-storage-space-dwindles)

Incentivising inefficiency and waste are not some thing that nature does but it has hugely been built into our economy. Example durable goods are designed with intentional obsolescence in mind (an enormously wasteful and environmentally damaging and unsustainable practice), as most cars and appliances, for example, currently are. Some companies have thought through a better model which provides a sustainable advantage such as Interface Flooring Systems. Interface Flooring Systems, one of the world's largest producers of commercial carpet tiles, which since 1994 has been hard at work on becoming a fully sustainable multinational corporation, has avoided perverse incentives and instead offers a win–win for their customers. Interface's dramatic reconfiguration arose from an epiphany that struck its founder, Ray Anderson, while he was reading the book called The Ecology of Commerce by Paul Hawken (who later went on to co-author Natural Capitalism with Amory and Hunter Lovins).

The emergence of a service-and-flow economy at Interface was embodied in a program called Evergreen, which the company called its "product of service" option (this was Hawken's original terminology). The program involved leasing carpet to customers instead of selling it outright, with servicing and replacement of worn-out patches included in the terms of the contract. First introduced in the late 1990s, Evergreen quickly revealed the limits of a single natural capitalist enterprise when its customer base remained mired in pre-Anthropocene thinking. Interface's big institutional clients, for example, often had internal cultures or accounting practices that either precluded the leasing of carpet entirely or divided up the cost of the lease across various departments in a way that obscured the long-term savings the program offered. It also confused the hell out of banks unaccustomed to the idea of a "perpetual lease."

In balance and with good intentions such arrangements are perhaps part of the solution… but as with so very much someone might take it to horrid extremes… https://www.forbes.com/sites/worldeconomicforum/2016/11/10/shopping-i-cant-really-remember-what-that-is-or-how-differently-well-live-in-2030/?sh=690a7e9d1735





Who knows what the twenty-first century has in store for us? The dismantling of the 'Big' – big bombs, big dams, big ideologies, big contradictions, big countries, big wars, big heroes, big mistakes. But the mega corps and governments arguing for the WTO, the EU and the Paris Accord continue to push for bigger government with bigger global taxes and all in all small business crushing red tape.

"We have but one earth, blessed with finite amounts of coal and light sweet crude, nurtured by a closed loop of a climate with only one external input: the energy of the sun. The elaborate process by which crude oil is formed over millions of years, a geological miracle so rare that stored energy of this quality exists only in scattered precious pockets. The useful life of things has seemed to constrict particularly quickly during the Anthropocene Era. Which is ironic because we're also surrounded more than ever by items that will live on for millenia. Namely plastic, that is: the most ubiquitous petrochemical by-product of the age of oil and a common symbol of both its enviable standard of living and its existentially hollow and poisonous downside (see http://grist.org/living/this-video-explains-how-those-plastic-bits-in-face-washes-scrubs-and-toothpastes-can-hurt-ecosystems/).

Starting with the consumer-culture explosion of the 1950s, the nature of the West's unparalleled prosperity was sometimes summed up with the phrase 'plastic fantastic'. This invoked a wondrous new polymerized age of Bakelite appliances and E-Z-clean laminated surfaces, vinyl records and polyethylene hula hoops. Then came life-saving plastic implants in hearts and image-enhancing ones in breasts, nylon shoes and polyester suits, stain-resistant nylon carpet and waterproof polytetrafluoroethylene (i.e., Gore-Tex) jackets—all of it shrink wrapped for your safety and packed in polystyrene for your convenience. I tap on plastic to write this line. Durable, inexpensive, ubiquitous, seemingly limitlessly multipurpose plastic (to date derived from oil) – or "Plastic Fantastic" to quote Chris Turner from his book The Geography of Hope.

Necessity is the mother of all innovation. Going back to a time before plastic does not appear a completely desirable option, but a great many can foresee a time when finite petroleum-based plastic will be unaffordable and a great many can see the environmental damage that it has done and is ungoing. We would have been well served if we could have moved to alternatives long before now. Such a challenge represents a huge sustainable opportunity for whoever might solve it.

One example of strange bedfellows striving to solve the plastic dilemma are Heinz and Ford. This is because it has been discovered that we might make car parts from tomatoes. Usually, finding ketchup residue in your car is a bad thing. But what if the ketchup in question was not caked onto your cup holder—what if it actually was the cup holder? The Ford Motor Company has announced a partnership with Heinz to develop a new type of plastic derived from tomato waste. How many tomato greenhouses will be needed if that takes off? How many months or years or decades might that adoption curve take?

Our fossil fuel derived lifestyle is so pervasive and successful that the majority cannot imagine how we cannot just continue in the same way as we have been. There is one real life example though of a wholesale economic failure that inspired perhaps the industrialized world's only major experiment to date with a radical revolution in sustainability. It is one of very few examples to be found where a society transitioned from high energy density fossil fuels to low energy density renewable – not completely but in a very big way. It happened in Cuba, during those chaotic years after the collapse of the Soviet Union that the Cuban government refers to as "the Special Period." In a 2005 report in Harper's Magazine on the aftermath of those tumultuous years, the environmental journalist Bill McKibben described it more evocatively as "the point in Cuban history where everything came undone." The Cuban economic system had been wholly dependent on the artificially high prices the Soviets paid for its export crops—sugar, in particular—the proceeds from which Cuba used to buy bargain-priced Soviet wheat, rice and machinery. With the Soviet Union's dissolution and the United States intensifying its trade embargo, the Cuban economy went into freefall.

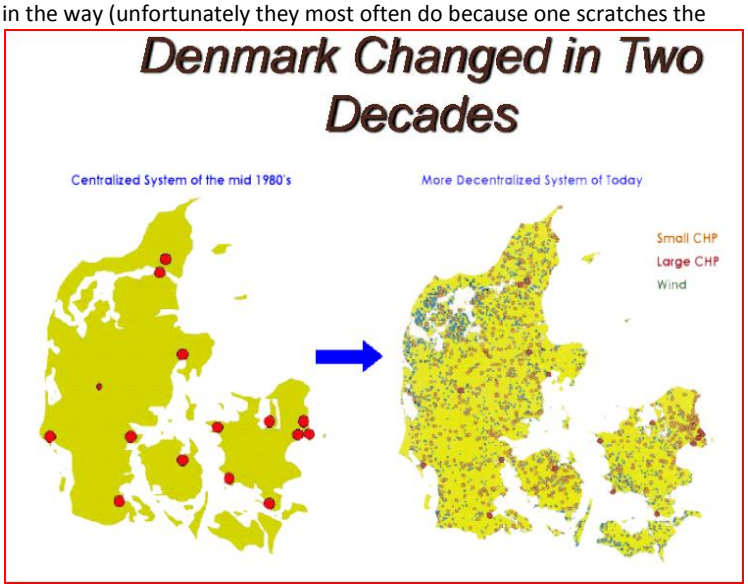
Cuba's agricultural sector, reliant on cheap Soviet fossil fuels for everything from the gas in its tractors to the pesticides coating its crops, was hit particularly hard; the United Nations estimated that the average Cuban's caloric intake fell from 3,000 per day in 1989 to 900 in 1993. But Cuba, in part because it was a single-party police state and a very small country rapidly decentralized and reorganized, transforming its food production in just a decade into a world leader in organic, small-scale, post-carbon farming. Somewhere between half and two-thirds of Havana's food is now farmed inside its city limits, and 60 percent of the country's agricultural output, aside from sugar, is organically grown. As tractors were abandoned for oxen and ploughs, the ranks of Cuban blacksmiths swelled fivefold, and there were booms in veterinary medicine and yoke manufacture. Cuba's universities now buzz, McKibben reported, with the study of strange fungi and bacteria to combat pests and disease (biomimicking). Not only did Cuba survive the Special Period and learn anew how to feed itself, it now stands on better footing than almost any other nation to continue to do so in what will become the oil-starved Anthropocene Era at some point.

Those that want to believe that kicking the fossil fuel habit will be easy, clearly have not studied places like Cuba. Wishful thinking is not an intelligent response… it is a way to plan to lose… dealing what is real is imperative (see http://energyskeptic.com/2018/how-cuba-survived-peak-oil/)

Nevertheless, perhaps making such a change, in an orderly fashion is far more rational than what the debt laden G8 and G20 are railing on against. A 1998 study by the International Center for Technology Assessment in Washington entitled "The Real Price of Gasoline," for example, added up "the many external costs of using motor vehicles". The study tallied up everything from the oil industry's tax subsidies to the costs of protecting supply lines to the environmental, health and social costs of running all those millions of internal combustion engines, and it came up with a cost—per year, in the United States alone—of between $558.7 billion and $1.69 trillion, which equates to $5.60 to $15.14 per gallon at the pump. This is one key example of many, why the G8 has the debt problems it does.

A 2001 Cato Institute study estimated that the United States spent $60 billion every year by the 1990s just on the military protection of Persian Gulf oil supplies — this before the trillion-dollar plus war in Iraq was added and the aftermath ongoing migration issues. Even in a so called free country, central planning for decades made these choices, insisted there were no other options and then finally pivoted abruptly to the so called poorly central planned "green new deal"… the citizenry has been used and abused!

Certainly, Cuba was the extreme but there are also examples of middle ground adoption and transition for the next evolution of the economy. Fossil fuels still fire most of Denmark's power plants, but the majority of those, including twelve of the fourteen largest, employ combined heat and power (CHP) schemes (Just like Edison designed into his first power plant), wherein the plant's waste heat is used to heat nearby houses and offices. Fifty-nine percent of Danish homes are warmed by district heating — one big high-efficiency boiler/furnace instead of thousands of individual ones — and 82 percent of that heat would otherwise be waste from central fired electricity production. This means that roughly half of the houses in Denmark are heated by an energy supply that in the rest of the world – dissipates into the skies in noxious, climate heating clouds. Denmark has become the epitome of combined large plants and a rapidly grown plethora of small, decentralized plants proving it can be done if big governments and big utilities do not get in the way (unfortunately they most often do because one scratches the back of the other).



Perhaps it will be the Century of the Small. THE WISDOM OF THE MIDDLE. It is often asked of a sustainable thing: Is it scalable? A wind farm or PV array, a vibrant neighbourhood or thriving farmers' market — is it scalable? Sometimes it seems that it's comforting to a certain breed of contemporary minds to think that it is somehow natural that all things expand to the inhuman scale of GDP-driven global capitalism, and that things that can't achieve such proportions are of no more worth than any other externality.

What is being asked is whether a wind farm could be turned effectively into a coal-fired power plant or a farmers' market convinced to impersonate a chain of big-box grocery emporia. But the very problem sustainability presumes to address is a direct result of fossil-fuelled industrial society's *unnatural scale*. The better question would thus be: Is it replicable? The scalability question is irrelevant—it is not in the nature of many sustainable things to grow to that kind of size. Everything we have learned from a century's worth of the 'Big' suggests that people's needs are often far better served by the small. This observation was eloquently translated into economic terms by E.F. Schumacher in his 1973 book, Small Is Beautiful: Economics as if People Mattered which provides a comprehensive solution to the wide array of ecological and economic problems. Decades before the full scope of the Anthropocene's problems was at all evident, Schumacher knew enough to recognize an unsustainable system when he saw it, and he reckoned that classical economics was a major source of its instability. "The modern industrial system," he wrote, "with all its intellectual sophistication, consumes the very basis on which it has been erected." The externalities, in other words, could not remain outside of our accounting forever without precipitating the collapse of the entire project. Moreover, the modern "economist-turned-econometrician," though he might be able to calculate GDP to the last penny, "would lose all his certainties if he even entertained such a question" as whether his calculations were "to be taken as a good thing or a bad thing…. The idea that there could be pathological growth, unhealthy growth, disruptive or destructive growth is to him a perverse idea which must not be allowed to surface." Which is why, I'd wager, we continue to hear from our most revered econometricians even today that the inescapable problems of today must somehow be "balanced" against growth, as if a healthy market economy were not wholly dependent in anything but the immediate short term and on the health of the climate and environment in which it functions. But far too many refuses to acknowledge this or trace back the all the systemic causes of things like food

inflation. Climate change has become a big catch all and "surprise" big international government favors that as the reason for yet another new global GHG tax except for China where the big multinationals have parked their manufacturing – cheaper energy gives China an ongoing competitive advantage, while selling out G7 companies large and small.

Put perversely, is the growth of an abstract measure (e.g. GDP) somehow more important than the survival of the people whose activity it enumerates? "Our most important task," Schumacher wrote, "is to get off our collision course." The first step in this process, he argued, was to "thoroughly understand the problem and begin to see the possibility of evolving a new life-style, with new methods of production and patterns of consumption: **a life-style designed for permanence**." The emphasis is mine, added because it's the most succinct working definition of sustainability I've yet encountered. The title of Schumacher's book only alluded to the nature of his solution. Schumacher was not a single-minded advocate of the small, nor was he opposed to robust markets or international trade or any of the other unpalatable positions routinely ascribed to the heretics who dare to question the wisdom of growth at any cost. Schumacher celebrated the small to counter the out-of-control orgy of the big he saw everywhere holding sway. And what he was most concerned with was the middle—or, more accurately, "the Middle Way," a concept he borrowed from the teachings of the Buddha. Schumacher's survey of the topography of this middle ground is worth repeating in full: "In the affairs of men there always appears to be a need for at least two things simultaneously, which, on the face of it, seem to be incompatible and to exclude one another. We always need both freedom and order. We need the freedom of lots and lots of small, autonomous units, and, at the same time, the orderliness of large-scale unity and coordination. When it comes to action, we obviously need small units, because action is a highly personal affair, and one cannot be in touch with more than a very limited number of persons at any one time. But when it comes to the world of ideas, to principles or to ethics, to the indivisibility of peace and also of ecology, we need to recognize the unity of mankind and base our actions upon this recognition".

Schumacher imagined a "Buddhist economics" in which the "minimum means" possible—particularly those local means most readily available—would be employed toward any given end, with non-renewable ones used "only if they are indispensable, and then only with the greatest care." Now there is a way to prioritize!

MANY CHANGES WE FACE PROMISE TO RECOVER WHAT WE'VE LOST.

Many experts now argue the oil and energy prices will serve as the catalyst and bellwether of economic cycles like interest rates have in the past and likely will again. Jeff Rubins argues the largest reason for the recent great recession of 2008 was $147 per barrel oil. If this has been already, and is likely the case going forward, its impact will be huge as energy prices effect everything and especially the big three global systems – energy & transportation, food & water and material waste & toxicity.

The human mind has given us an enormous advantage as a species. It enables us to make plans, invent things, coordinate actions, analyze problems, share knowledge, learn from our experiences, and imagine new futures. The clothes on your body, the shoes on your feet, the watch on your wrist, the chair beneath you, the roof over your head, the book in your hands — none of these things would exist but for the ingenuity of the human mind. The mind enables us to shape the world around us and to an extent conform it to our wishes, to provide ourselves with warmth, shelter, food, water, protection, sanitation, and medicine. Not surprisingly, this amazing ability to control our environment gives us high expectations of control in other arenas as well. Now, in the material world, control strategies generally work well. If we do not like something, we figure out how to avoid it or get rid of it, and then we do so. A wolf outside your door? Get rid of it! Throw rocks at it, or spears or shoot it. Snow, rain or hail? Well you cannot get rid of those things, but you can avoid them by hiding in a cave or building a shelter. Dry, arid ground? You might get rid of it by irrigation and fertilization, or you might avoid it by moving to a better location. But as we have also pointed out before, most of this progress and innovation slows without cheap energy.

I get asked repeatedly, with energy prices repeatedly patterning to brief reprieves and then returning to rapid, unwanted price escalation, why the adoption of proven, cost saving innovations such as combined heat and power (CHP) are not adopted at the rapid rate in Canada as they are in Europe and Asia, especially seeing as most people argue emphatically that such technologies will materially delay the imminent threat of peak fossil fuels. The first reason likely is that North Americans have not yet seen the sustained high energy costs of Europe and Asia and so we hope that price spikes of $14/GJ for natural gas and $147 per barrel of 2008 are not returning. Equally important is that there are too few highly visible examples for a sustained period of companies and organizations gaining competitive advantage from being more energy efficient. Hope for continued low energy prices as opposed to perceived risk leaves us to remain behind Europe and Asia. North Americans are so far behind in the energy race, we often think we are first!

Ages do not generally end abruptly. Everyone does not generally just wake up one day and say *"This isn't working. We must change"* unless it is forced like it was in Cuba. When faced with the magnitude of the changes that peak fossil fuel energy represent, the majority of the people and institutions try harder to maintain the status quo, especially when the status quo was

a prosperous and reportedly relatively happy time (See http://charleshughsmith.blogspot.ca/2015/09/heres-why-status-quo-is-doomed.html).

The below contains extensive excerpts from the book The Happiness Trap by Russ Harris which I have worked to relate to opportunity, given the energy issues we face.

Of course, people not only seek happiness, they try to hold on to it—especially, to avoid any sense of 'unhappiness' or having to think about all the effort and challenge peak fossil fuel represents. Unfortunately, these very control efforts can become heavy, planned, closed, rigid and fixed. Happiness is not just a matter of feeling good. If it were, drug abusers would be the happiest people on the planet. Indeed, feeling good can be a very unhappy pursuit. It is not by accident that drug users call their methods of doing so a 'fix'—because they are chemically trying to hold something in place. Like a butterfly pinned to a table – happiness dies unless it is held lightly. Drug abusers are not the only ones. In the name of producing an emotional result we call happiness, most of us too often engage in behavior that is the exact opposite and then feel awful and inadequate with the inevitable result. Until we wise up, we are all generally trying to get a 'fix' on happiness.

In the western world we have enjoyed a higher standard of living than humans have ever known before. We have better medical treatment, more food, better housing conditions, better sanitation, more money, more welfare services and more access to education, justice, travel, entertainment and career opportunities. Indeed, today's middle class has lived better than did the royalty of not so long ago, but of course it also not eternal bliss. Perhaps when we think about the implications of peak fossil fuel, we need to acknowledge that the change can lead to recovering some of what we have lost and that certainly is where the opportunity lies regardless of whether it is housing, malls or where we work. Carma Developments, undertook this sort of rethinking some years ago as they contemplated how to develop McKenzie Town in Calgary and looked at old communities in Massachusetts, etc. and found that town centers, being able to walk to work and to shop, garages in the back yard as opposed to the front and so forth dramatically improved social interaction and the quality of community life. Decades since initial development, McKenzie Town today remains highly desired and maintains arguably higher property values. Much of the philosophy behind its design is soft psychology.

The psychology and personal development sections of bookstores are growing at a rate never seen before, and the bookshelves are groaning under the strain. The titles cover depression, anxiety, anorexia nervosa, overeating, anger management, divorce, relationship problems, sexual problems, drug addictions, alcoholism, low self-esteem, loneliness, grief, gambling—if you can name it, there's a book on it. Meanwhile, on the television and radio, and in magazines and newspapers, the 'experts' bombard us daily with advice on supposedly how to improve our lives, all too often with more consumption.

It is estimated that depression is currently the fourth biggest, costliest and most debilitating disease in the world. In any given week, one-tenth of the adult population is suffering from clinical depression, and one in five people will suffer from it at some point in their lifetime. Furthermore, one in four adults, at some stage in their life, will suffer from drug or alcohol addiction, which is why there are now over twenty million alcoholics in the United States of America alone. But more startling and more sobering than all those statistics is that almost one in two people will go through a stage in life when they seriously consider suicide and will struggle with it for a period of two weeks or more. Scarier still, one in ten people will at some point attempt to kill themselves. Think about those numbers for a moment. Think of the people in your life: your friends, family, and co-workers. Consider what those figures imply: that of all the people you know, almost half of them will at some point be so overwhelmed by misery that they seriously contemplate suicide. And one in ten will attempt it! In the past two centuries we have doubled the span of the average human life. But have we doubled the richness, the enjoyment, the fulfilment of that life? These statistics give us the answer, loud and clear: happiness is not normal! Why Is It So Difficult To Be Happy?

To answer this question, we need to take a journey back in time. The modern human mind, with its amazing ability to analyze, plan, create and communicate, has largely evolved over the last hundred thousand years, since our species, Homo sapiens, first appeared on the planet. But our minds did not evolve to make us feel good, so we could tell great jokes, write sonnets, and say, 'I love you'. Our minds largely evolved to help us survive in a world fraught with danger. Imagine that you are an early human hunter-gatherer. What are your essential needs to survive and reproduce? There are four of them: food, water, shelter, and sex, but none of these things mean much if you're dead. So, the number one priority of the primitive human mind was to look out for anything that might harm you and avoid it! The primitive mind was a 'Don't get killed' device, and it proved enormously useful. The better our ancestors became at anticipating and avoiding danger, the longer they lived and the more children they had. With each generation the human mind became increasingly skilled at predicting and avoiding danger. And now, after a hundred thousand years of evolution, the modern mind is still constantly on the lookout for trouble. It assesses and judges almost everything we encounter: Is this good or bad? Safe or dangerous? Harmful or helpful? These days, though, it is not sabre-toothed cats or 200-kilogram wolves that our mind warns us about. Instead it is losing our job, being rejected, getting a speeding ticket, not being able to pay the bills, embarrassing ourselves, upsetting our loved ones, getting cancer, or any of a million and one other common worries. As a result, we spend a lot of time worrying about things that, more often than not, never happen. And that is more than enough, thank you very much, without contemplating the enormously complex question

of, is peak fossil fuel real, when and what are the dangers of sticking with the status quo or the opportunities of sticking our necks out and attempting to persuade the many stakeholders, that now is the time to do something different.

Given the above, one might think the middle ground should be the easiest space to occupy but how very strange it is, that it often feels to us, not to be – whatsoever. Some of this, we submit, is caused by the vastness of the energy complex subject matter especially as we try to consider all its ramifications. How does the average person, who is under constant stress, find time and motivation to research and discern fact v fiction when they also know there is only so much, they can influence? The majority of people are more prone to believe someone in power sitting behind a big brand 'news' name, for example and hope they will have the majorities best interests in mind… lots of folks are feeling increasingly panicked with how seldom that has proven to be true in the past couple of decades.

Another essential for the survival of any early human is to belong to a group. If your clan boots you out, it will not be long before the wolves find you. So how does the mind protect you from rejection by the group? By comparing you with other members of the clan: Am I fitting in? Am I doing the right thing? Am I contributing enough? Am I as good as the others? Am I doing anything that might get me rejected?

Sound familiar? Our modern-day minds are continually warning us of rejection and comparing us against the rest of society. No wonder we spend so much energy worrying whether people will like us! No wonder we are always looking for ways to improve ourselves or putting ourselves down because we do not 'measure up'. A hundred thousand years ago we had only the few members of our immediate clan to compare ourselves with. But these days we can open any newspaper or magazine, switch on any television, tune in to any radio, and instantly find a whole host of people who are smarter, richer, taller, slimmer, sexier, stronger, more powerful, more famous, more successful, or more admired than we are. What is the fastest way to make a teenage girl depressed? Show her a fashion magazine. When she compares herself to all those air-brushed, collagen-enhanced, digitally altered supermodels, she is guaranteed to feel inferior or downright unattractive. And the rest of us are not that different. Thanks to evolution, our minds are now so sophisticated they can even dream up a fantasy of the person we would like to be — and then compare our 'real' self to that impossible standard. What chance have we got? We will always end up feeling not good enough!

Now, for any Stone Age person with ambition, the general rule for success is the more, the better. The more sophisticated your weapons (and the more of them you have), the more food you can kill. The more plentiful your food stores, the better your chances are for living through times of scarcity. The more substantial your shelter, the safer you are from weather and wild animals. The more children you have, the better the chance that some of them will survive into adulthood. No surprise then that our modern mind continually looks for more: more money, more status, more love, more job satisfaction, a newer car, a younger-looking body, a younger-looking partner, a bigger house. And if we succeed, if we actually get more money or a newer car or a better job, then we are satisfied— for a while. But sooner or later (and usually sooner), we end up wanting more. Thus, evolution has shaped our minds so that we are almost inevitably destined to suffer psychologically: to compare, evaluate and criticize ourselves; to focus on what we're lacking; to be dissatisfied with what we have; and to imagine all sorts of frightening scenarios, most of which will never happen. No wonder humans find it hard to be happy!

The word 'happiness' has two very different meanings. Usually it refers to a feeling: a sense of pleasure, gladness, or gratification. We all enjoy happy feelings, so it is no surprise that we chase them. However, like all our other feelings, feelings of happiness do not last. No matter how hard we try to hold on to them, they slip away every time. And as we shall see, a life spent in pursuit of those feelings is, in the main, unsatisfying. In fact, the harder we pursue pleasurable feelings, the more we are likely to suffer from anxiety and depression. The other meaning of happiness is 'a rich, full and meaningful life'. When we take action on the things that truly matter deep in our hearts, when we move in directions that we consider valuable and worthy, when we clarify what we stand for in life and act accordingly, then our lives become rich and full and meaningful, and we experience a powerful sense of vitality. This is not some fleeting feeling—it is a profound sense of a life well lived (see http://www.theatlantic.com/health/archive/2013/08/meaning-is-healthier-than-happiness/278250/). And although such a life will undoubtedly give us many pleasurable feelings, it will also give us uncomfortable ones, such as sadness, fear, and anger. This is only to be expected. If we live a full life, we will feel the full range of human emotions.

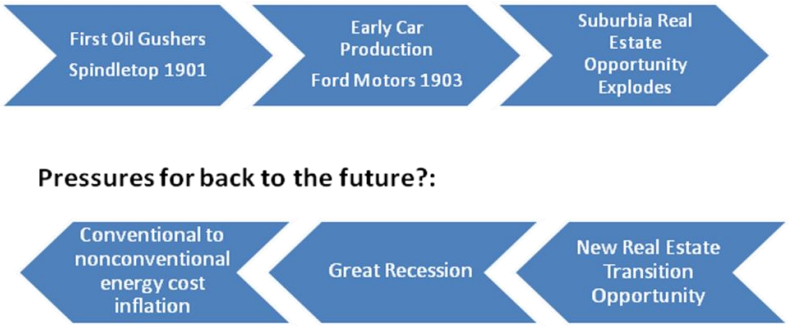
What is the last line of every fairytale? You got it: '...and they lived happily ever after.' And it is not just fairytales that have happy endings. How about Hollyweird movies? Don't they nearly always have some sort of feel-good ending where good triumphs over evil, love conquers all and the hero defeats the bad guy? And doesn't the same hold true for most popular novels and television "programs"? We love happy endings because society tells us that's how life should be: all joy and fun, all peace and contentment, living happily ever after. But does that sound realistic? Does it fit in with your experience of life?

We live in a feel-good society, a culture thoroughly obsessed with finding happiness. And what does that society tell us to do? To eliminate 'negative' feelings and accumulate 'positive' ones in their place. It is a nice theory and, on the surface, it seems to make sense. After all, who wants to have unpleasant feelings? But here is the catch: the things we generally value most in life

bring with them a whole range of feelings, both pleasant and unpleasant. For example, in an intimate long-term relationship, although you will experience wonderful feelings such as love and joy, you will also inevitably experience disappointment and frustration. There is no such thing as the perfect partner and sooner or later conflicts of interest will happen.

The same holds true for just about every meaningful project we embark on. Although they often bring feelings of excitement and enthusiasm, they also generally bring stress, fear, and anxiety. It's pretty well impossible to create a better life if you're not prepared to have some uncomfortable feelings and if peak fossil fuels is a reality, than the resulting necessary revolution will hugely contribute to uncomfortable change and feelings but the best adapted, of course, will excel. As near impossible as it is to predict what the outcomes of this change will be, several authors have put forward their efforts. Unfortunately, all too much of it is depressing reading, but some show great opportunity and in fact great fulfillment as many changes we face promise to recover what we have lost.

Regenerative, Resistance Center, "Industrial Ecology" Opportunities



The data strongly indicates to us that we are amid a tipping point transition. Such periods present unparalleled opportunity for those few willing and able to think it through and successfully navigate the transition. If you asked the marketplace before Henry Ford's innovations, they likely would have stated they needed faster horses. Henry Ford saw the opportunity afforded by the age of abundant, cheap fuel and seized it. Unparalleled energy surplus', the advent of mass numbers adopting cars led to the middle class, the American dream and the result for real estate was a flourishing of suburbs. One can be certain that many, and perhaps the largest landlords of the day, missed the transition, thinking all but the richest are renters, or perhaps they thought that the fad of suburbs wouldn't last or what have you. There is a natural reason this phenomenon of overlooking such change and transition persists, most of us naturally leverage our learning and experience from the past to assist us in predicting what we think will happen in the future...so if you have never seen a car work, why would you think it would transition society. Furthermore, even the most clairvoyant futurist would be hard pressed to have connected the dots of cheap oil to cars – to a massively larger middle class – to the real estate opportunity of the resulting suburbs, early in the trend. Does the economic environment and energy tipping point we are at, require us to think about reversing some aspects of the industrial age? Will 100% renewables really be able to save us in time?

The prices of oil, coal, natural gas and uranium have all risen dramatically since the 1970's. So, the question is, what effects will this trend continue to have and where will the opportunities emerge? One thing is for certain…because we really love our standard of living and wish to keep it, we will look to technological miracles to assist in doing just that. Ages do not end abruptly. Everyone does not just wake up one day and say, 'This isn't working – we must change'…quite the contrary. When faced with challenges of this magnitude, the vast majority of people and institutions try harder to maintain the status quo. More questions than answers emerge in what technology solutions will work and what the adoption timeframe and energy mix will be.

In 2008, automobiles represented the largest single oil product consuming capital stock, with 136 million autos consuming 4.9 million barrels per day, or 25 percent of total US liquid fuel consumption. A recent US Department of Transportation study showed that one half of recent model cars will remain on the road over 13 years later. If applied to model year 2010, over one-half of the vehicles made in 2010 will still on the road in 2023, and a measurable number will still be on the road 2036. At normal replacement rates, consumers would spend an estimated $2 trillion (2008 dollars) over the next 10-15 years to replace just one-half of the automobiles now on the road. Many shrug off high oil prices and peak oil and say we will just go to electric cars – there…that's fixed. The fact is, these and other transformations might be achieved, but they will likely take a long time

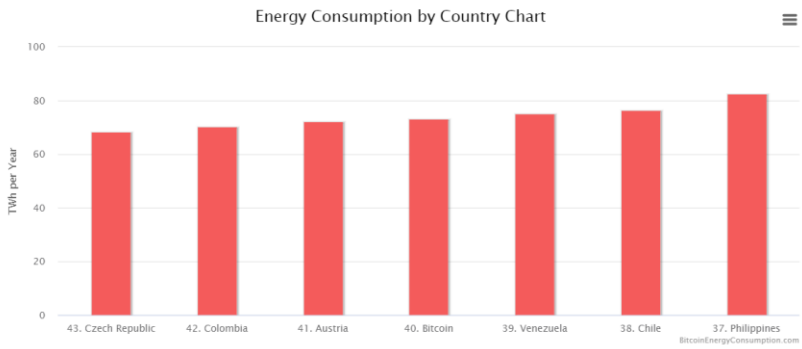
and vast sums of money in a healthy economy, before significant national or world-scale change is achieved. Then again, perhaps the new model will not be to own cars but Uber or Cars2Go or living close to work and walking or telecommuting. The Green New Deal is certainly trying to force much of this upon us quickly. Some of it is good and a good deal of it appears very much like the re-imposition of feudal systems. We must fight for freedom, obviously!

Because energy affects everything, thinking through all the ripples is a yeoman task. Perhaps one thing can help us though, if we are a student of history. The age of fossil fuels has only been with us about 150 years and the rest of human history was without fossil fuel, but people did leverage the sun, wind and hydro energy and had done so for a very long time. We are going to continue to see a period of decades that fossil fuels remain supplying most of our energy needs but absorbing an escalating percent of operating costs or income, as supply will struggle to meet demand. A fevered search will be on, at some point, to supplement with practical alternative technology solutions. As a best guess, perhaps the future we will see is some mix between the 1970's energy crisis and life in the early 1900's, with the Internet and telecommuting thrown in. What does that look like?

Consider the phenomenal growth of the Internet over the past years – many of us spend hours a day plugged in. Between 2000 and 2007, global Internet usage grew by over 250 percent, but few of us have thought much about how much electricity it takes to power all this interconnectivity and the implications that it raises. Today, estimates of the electricity needed to support the Internet range from 3 percent to 5 percent of the total electricity load in the United States, and in the same range for the world. This includes all our PCs, all the data centers and servers, all the electronic commerce, all the search engines—in short, all the myriad ways we access and share information and communicate online. That may not seem like a lot, but when you consider the rate of growth of Internet use, doubling worldwide every four to five years, conservatively, think again. A 2007 report by the U.S. Environmental Protection Agency confirms that the energy usage of servers and data centers alone doubled between 2000 and 2006. Researchers had previously calculated that U.S. servers and data centers already use more electricity than all the TVs in the country combined. This means that within ten to fifteen years, if this growth continues, electricity to support the Internet will exceed the electricity used to light all the homes in the world. According to a study conducted for the New York Times data centers used 30 billion watts worldwide in 2012 – the equivalent of 30 average sized nuclear power plants. As the price of computing power steadily falls, we are at the point where the cost of powering and cooling large computers and servers will be more than the cost of the hardware itself.

As mainstream media and governments put forward that climate change is the formidable foe to slay, and therefore shifts negative attention onto fossil fuels, most forget about the internet— yet it is the very tool being used to organize action on climate change. Yet this very same tool is becoming one of our worst emitters of greenhouse gases (see How The Internet Is Killing The Planet) . Every time we use data, it is contributing to the destruction of the planet. And this is before experts heralded technical marvels such as much greater robotic automation, electric cars, bitcoin mining and the internet of things have come anywhere close to their much-praised anticipated positions in the stratosphere. We have discussed and debated how quickly and at what cost (environmental as well as investment capital, if ever, solar and wind can catch up to supply current electricity demands, let alone these predicted epically compounding, exponential demand increases. This is not about optimism or pessimism - it is about gauging reality and having a realistic plan to manage reality, for the few willing to ask questions and seek data that answers those questions.

If Bitcoin were a country, it would rank as shown below.



Bitcoin electricity usage

According to the **bitcoin** energy **consumption** tracker at Digiconomist, **bitcoin** currently consumes 66.7 terawatt-hours per year. June 18, 2019

Quebec had been looking for more electricity customer consumption but now Quebec has put a quota on bitcoin mining use of electricity see https://news.bitcoin.com/quebec-allocates-300-mw-energy-quota-for-crypto-mining/.

Cannabis cultivation generates $6 billion in energy costs each year, and uses about 10x more power per square foot than a standard office building.

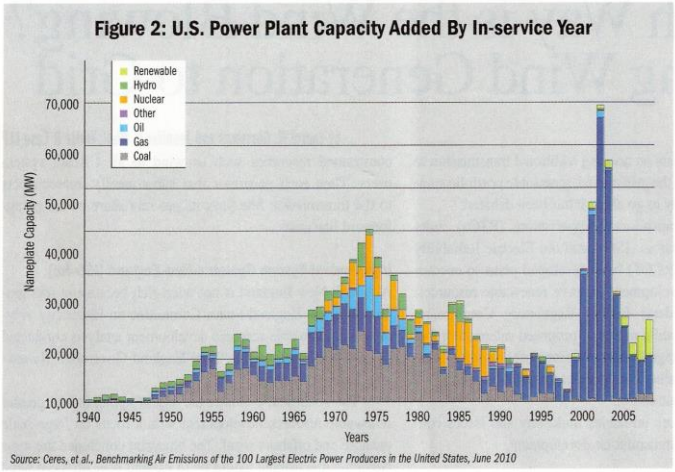
In Denver, 4% of all electricity goes to cannabis cultivation. Total power consumption in the cannabis sector has nearly tripled since 2013.

In 2017, about 1 mWh went towards cannabis cultivation—but projections have that figure rising to 2.79 mWh by 2022, an increase of 162%.

Compared to business or residential use, energy demand in cannabis grow operations is staggering. The average household in Boulder Country, Colorado uses about 630 kilowatt hours (Kwh). A grow house of 5,000 square feet, by comparison, uses 41,808 kWh—roughly enough electricity to power sixty-six homes.

Such massive growth of demand leads us to the adage of the energy world and that is – low prices are the cure for low prices. And so in 2022 we have seen that in spades and increasingly we are seeing energy rationing initiatives the like of which we have never seen. We expect this to be very much in the mix going forward… Information is a great source of power, the internet has been an amazing equalizer and now we are seeing unprecedented censorship and rationing.

> "All truth (change) passes through three stages. First, it is ridiculed. Second, it is violently opposed. Third, it is accepted as being self-evident" Arthur Schopenhauer



Source: https://www.zerohedge.com/markets/were-living-borrowed-time

The impacts the Industrial Revolution have had on quality of life are undeniable. As industrial expansion continued into the twentieth century, life expectancy in the industrial world roughly doubled, literacy jumped from 20 percent to over 90 percent, and benefits hitherto unimaginable sprang up in the form of products (from private cars to iPods), services (from air travel to eBay), and astounding advances in medicine, communication, education and entertainment. With this kind of success, it is little wonder that the side effects of the Industrial Age success story went largely ignored. Besides, for most of us, the endless litany of environmental and

societal crises is overwhelming, both emotionally and cognitively. It is no wonder that so many simply "turn off" when confronted with another story of climate-change-related severe weather, water shortages or toxic waste. The first problem to deal with is simply "How do I take all of this in without frying my circuits?"

> One glass of orange juice, for example, contains the equivalent of two glasses of oil, if you include transportation costs.

For some 2 billion years, life has flourished on earth based on one source of energy: solar radiation, the same energy that powers a forest, a prairie, a marine ecosystem or a caterpillar. By contrast, 90 percent or more of human used energy within the Industrial Age Bubble comes from burning fossil fuels.

Choices that reinforce the extractive "take-make-waste" economy are based on a set of assumptions, beliefs and ways of seeing the world that we have developed over time that have by now, become deeply embedded in modern society. For example: • Energy is infinite and cheap. • There will always be enough room to dispose of all our waste. • Humans can't possibly alter the global environment. • Humans are the primary species on earth; others are less important, and many are irrelevant. • Basic resources such as water and topsoil are unlimited. If limits or problems are encountered, markets and new technologies will reallocate financial resources so we can continue with our current ways of living and working. • Productivity and standardization are keys to economic progress. • Economic growth and rising GDP are the best way to "lift all boats" and reduce social inequities.

By contrast, life beyond the Bubble will be based on choices reflecting very different beliefs, assumptions and guiding principles, such as: • Zero to landfill. Everything, from cars and iPods to office buildings and machine tools, is 100 percent recyclable, remanufacturable or compostable. • We are borrowing the future from our children; we have to pay it back. Our first responsibility is to leave a healthy global biosphere for our children, their children, their children's children, and so on. • We are only one of nature's wonders. We are just one of the species that matter, and we all depend on each other in ways we cannot even imagine. • Value the earth's services; they come free of charge to those who treasure them. Healthy ecosystems are precious and must be treated as such.

A sustainable future will entail collective creating of every imaginable sort. It will involve bringing into existence, over time, a new energy system, new types of buildings and transport and new ways to dramatically reduce waste and toxicity—based on new products, new processes for making things and new business models. But in many cases, returning to old ways such as rail transport.

For example, what began as the idea of building the "most environmentally friendly car dealership in the world" evolved into the Green Zone: a block of businesses, incorporating Carstedt's car dealership, a McDonald's restaurant and a gas station (gasoline and biofuel, naturally), that would be as energy-efficient as possible. They designed systems interconnecting the businesses (i.e., excess heat from the restaurant kitchens was piped directly to heat the car dealership and the filling station). Overall energy use was cut over 80 percent from comparable developments. The concept of fitting together different businesses in an integrated design where waste by-products in one become resources for another is known as "industrial ecology," and does indeed work like a forest. There were several showplaces of integrated complexes in Europe, most notably one in the city of Kalundborg in Denmark. But these were large manufacturing complexes. Carstedt and Nyquist's Green Zone was a cross section of smaller "everyday" businesses.

When asked why he robbed banks, the infamous Willie Sutton responded simply, "Because that's where the money is." If global carbon emissions were currency, most of the "money" could be found in the power plants powering our office buildings, malls, hotels, factories, apartment buildings and private homes. The greatest consumers of energy today — and, in turn, the largest contributors of greenhouse gases — are within our commercial, industrial and residential buildings. Heating, air-conditioning, and electricity for what the industry calls "the built environment" accounts for 40 percent of greenhouse gas emissions in the United States (almost 60 percent globally), almost twice the emissions of the automotive sector. Obviously, the built environment represents a high-leverage point for anyone looking to create energy systems suited for life beyond the Industrial Age Bubble. And yet few sectors present more difficult challenges for change.

The building industry is highly fragmented and the competitiveness — and even suspicion — between different competing interests is, for most veterans in the industry, just part of the way the business works. "There was often an adversarial relationship among the three main parties in any major project: the owner/developer, the architect and the contractors," says Bob Berkebile, the founding chairperson for the Committee on the Environment, created in 1990 within the American Institute of Architects (AIA). Developers, for example, "tend to set their budget for total building costs as low as possible to maximize their profit on the project. Architects, engineers and construction firms then compete to maximize their share of the fixed budget." And so what you end up with is buildings that have the cheapest heating and air-conditioning systems, as opposed to the most efficient — despite the fact that a higher-priced, more efficient system would save the owner money in the long haul

(and be better for the environment). The net result is often a suboptimal conventional design that wastes resources and has double or triple the operating costs of green buildings — costs that are passed on to occupants indefinitely. Those occupants may have their own goals — including comfort, healthy workers, productivity and lower operating costs — but typically they have no involvement in the development process and relatively little influence over these factors (and costs) once the building is completed.

The first USGBC meeting occurred in Washington, D.C., in 1993. About ten people were present. Most of them were already friends, and all had links back to companies that might support them. For example, Rick Fedrizzi, who became the founding chairperson of USGBC, was an executive with Carrier, a heating and air-conditioning equipment supplier. Although their backgrounds varied, the group members found that they shared a simple core vision: transforming how buildings get built. They discovered for themselves the first principle of building genuinely shared visions: It takes time, and along the way, engagement is worth much more than superficial agreement. As more people became involved, the group discovered one important area of agreement early on: Market-based forces were much more powerful than legal or government action in spurring innovation and genuine commitment. "We realized that the voluntary response of the marketplace — generated by people's understanding that there were better ways to build buildings now, and it was in everyone's best interests to do it — was more powerful than imposing any kind of regulation," says Hartzfeld. "This idea of market-based transformation became a second key founding idea."

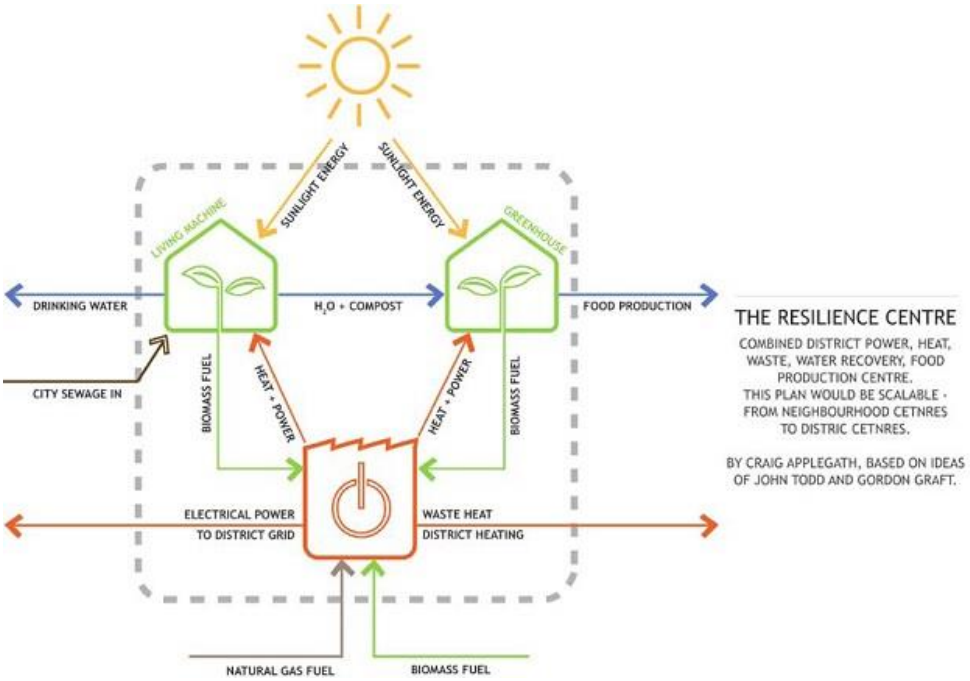
This aim to tap collective intelligence and build collective ownership helped to gradually forge a strong, unified group. But it also took a long time. Agreeing on the initial LEED criteria turned out to be a four-year process.

"In retrospect, it's crazy to think that a small group of people could think about transforming a whole industry that represents 8 percent of the U.S. GDP, but that's exactly what we had in mind."

With the introduction of the LEED certification system in 2000 came an explosive growth in the organization, and today it has become a cornerstone of green building. By mid-2007, over 7,500 buildings were registered with LEED worldwide, up from just 635 in 2002. The value of green building construction starts was expected to exceed $12 billion in 2008. In addition to the energy and cost savings, studies have documented improved employee productivity and health, decreased absenteeism and improved morale from working in green buildings. Although still voluntary, LEED certification is becoming an industry norm. In December 2006, the Washington, D.C., city council passed a bill requiring private developers to follow the LEED standard; the city of Boston similarly revised its building codes for all private buildings over 50,000 square feet. Other states and municipalities have followed suit. From 2000 to 2006, membership in the USGBC grew tenfold, to more than 10,500 organizational members, with over 38,000 professionals certified in the LEED rating system and several hundred thousand people engaged in intense collaboration to design, build and monitor green buildings in North America and globally. Today, the GBC has more than seventy regional chapters and projects in forty-one countries.

As the LEED program has become more popular, its requirements have become more stringent. Yet the cost of meeting these more-demanding standards is also falling with growing experience and know-how: The total cost of designing and building LEED-certified buildings now averages less than a 1.8 percent premium over conventional buildings, an up-front investment more than offset by significant savings in energy and other operating costs.

Reflecting on these trends, Berkebile says, "The bar is continually being raised: Improvements in energy efficiency have gone from an average of 25 percent to over 70 percent reductions in energy use compared to conventional buildings. A next generation of 'living' (regenerative) buildings is coming — buildings that produce more energy and clean water than they use, and function more like trees and forests. The first of these will likely be designed and built in the next three to four years, as scores of design teams are now intent on achieving this 'living building' goal in projects that they are working on right now." For example, there is an enormous amount of solar energy that can be captured, used and stored in well-designed structures, year-round in most settings.



EITHER WE ALL HANG TOGETHER OR WE'LL HANG SEPARATELY This famous line of Benjamin Franklin's was used to entreat squabbling American colonists to join in fighting for independence. But it describes equally well our situation today. No one entity alone—no individual government (local, state, regional or national), corporation, or NGO — can address the sustainability issues we face. No one has sufficient resources. No one has sufficient understanding. And no one has sufficient credibility and authority to connect the larger networks of people and organizations that real change must engage.

Many executives still see the world from an Industrial Age point of view: They see the largest and most important circle as the economy, with society, energy and the environment as much smaller domains within.

Businesses need to wake up to the simple fact that "the economy is the wholly owned subsidiary of nature, not the other way around." Similarly, there can be no healthy economy without a stable and vibrant social order — just ask businesspeople trying to do business in corrupt, lawless or extremely poor societies.

As we consider the challenges we are starting to believe that ensuring a healthy commons may require, developing an effective management commons must come first. For example, the U.S. Green Building Council's LEED certification system represents, in effect, a new shared body of knowledge, experience and tools for continued innovation in design, construction and operation of green buildings and communities. In this case, the total system quality of building — energy use, water use, waste, quality of air, light, and so on — is the commons being managed, and the LEED system is the management commons overseeing it. Why do we call LEED a commons? Because thousands of designers, architects and builders have a stake in the LEED system working and continually improving. In effect, it is a management commons. This is why diverse professionals and firms collaborate through sharing best practices, design breakthroughs and discoveries that, in turn, get built into progressively more demanding LEED standards. They all have a stake in making the LEED system work and in continually improving it. This is now snowballing into further development of the market, as building occupants spread the word of significant improvements in energy efficiency, cost of operation and the health and productivity of people who work in such buildings, which drive demand for more green buildings and new investment in still-stronger standards. This is what we mean: A commons has been created to manage the commons.

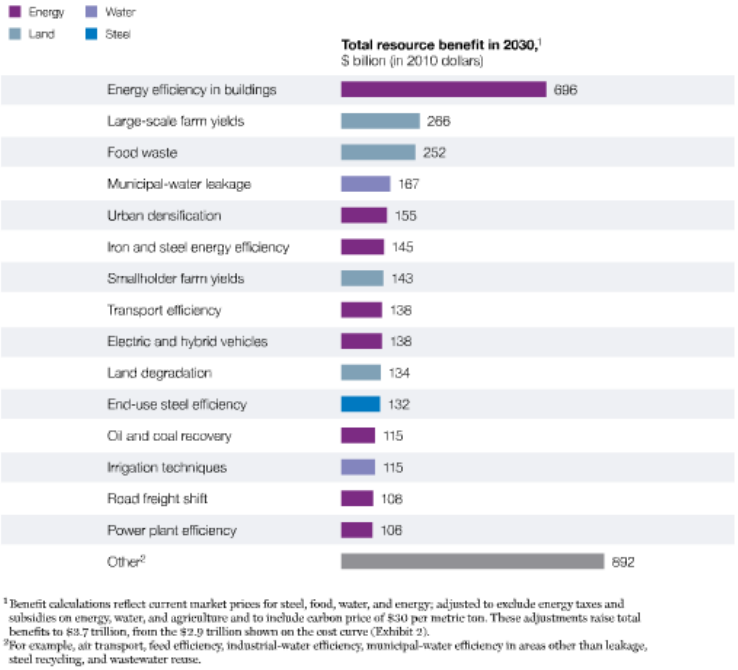
All these collaborative efforts are in their infancy. As more people realize that the core challenges of the Big Three global systems — energy and transportation, food and water, and material waste and toxicity — cannot be solved in isolation, these collaborations will spread and become more sophisticated, as people and groups combine systems thinking and skills in collaborating across boundaries. We are just starting to appreciate the level of collaborative systems-thinking skills that will be needed, but there is no doubt this is where real leverage for the future lies.

According to a McGraw-Hill Construction Trends report, the value of green building construction starts exceeded $12 billion in 2008. As Greg Kats points out, the small additional capital investment (now less than 2 percent and shrinking) to build a green

building instead of a conventional one, typically has a return on investment (ROI) of 40 percent per year over the life of the building. This rate of return is rising steadily as energy costs escalate and the prognosis data pointing to the peak energy tipping point indicates will be the case going forward! Rail against it at your peril! Adopting best practices sooner rather than later is the opportunity!! Equally important is addressing the fact we cannot remotely consider rebuilding everything. Retrofitting the built environment is of paramount importance!

Exhibit 4

Fifteen areas of opportunity represent 75 percent of the resource prize.



[1] Benefit calculations reflect current market prices for steel, food, water, and energy; adjusted to exclude energy taxes and subsidies on energy, water, and agriculture and to include carbon price of $30 per metric ton. These adjustments raise total benefits to $3.7 trillion, from the $2.9 trillion shown on the cost curve (Exhibit 2).
[2] For example, air transport, feed efficiency, industrial-water efficiency, municipal-water efficiency in areas other than leakage, steel recycling, and wastewater reuse.

"To cherish what remains of the Earth and to foster its renewal is our only legitimate hope of survival" *Wendell Berry*