



EDITORIAL

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Higher education: the quest for the sustainable campus

I was confronted with a profound dilemma as an undergraduate engineering student at the University of New South Wales in Australia in 1992. I had been taught that our planetary life-support systems were in a state of alarming decline by an institution that operated as if what the faculty was teaching was irrelevant. Lights were left on in empty overcooled classrooms, recycling bins were nonexistent, lawns were maintained using pesticides and herbicides, diesel trucks spewed fumes as they passed on their way to drop off chlorine-bleached virgin paper. This disconnect was very alarming to me. While it was obvious that universities should play a leading role in teaching and researching sustainability issues, I wondered how it could be possible to make widespread institutional changes to meet the demands of environmental sustainability when it was not even being done in the very university sector where these ideas were being promulgated. If universities would not change, then who can and who will, I wondered? To a growing number of people, the idea of teaching sustainability without demonstrating it is highly problematic. It is also widely believed that the ability of the higher education sector to reform its own practices is an important indicator of humankind's ability to address the global environmental imperative across all sectors of society. These sentiments have helped fuel what is now referred to as the campus sustainability movement, a movement dedicated to transforming our campuses into living laboratories for the demonstration and practice of environmental sustainability.

I have participated in this movement over the last 18 years, working with dozens of different universities around the world as a campus sustainability professional and as a member of a variety of related professional networks, as well as a lecturer in change management for sustainability. In 2000, I was recruited to found and direct Harvard University's Green Campus Initiative (now the Office for Sustainability).¹ Over a nine-year period, I teamed up with a large number of talented people across the institution,

including my former academic and administrative co-chairs, Professor Jack Spengler and Tom Vautin, and together we worked to grow this initiative into the world's largest green campus organization, and one of the most influential. Harvard received the highest green campus ranking in such 2008 publications as the Princeton Review Green Rating Honor Role, the Sustainable Endowment Institute Green Report Card, and the Sierra Club Top 10 Green Schools. What we experienced and discovered in this fertile period in arguably the most complex, decentralized, and politically charged campus in the world, warrants much reflection. With this in mind, I recently resigned from my role as director to open up time to write, teach, and reflect with others to gain a better understanding of the many challenges and opportunities that lie ahead in the now thriving campus sustainability movement. It is my hope that sharing some of these thoughts, in their early stages, may help motivate related discussions and further exploration.

The campus sustainability movement emerged in the early 1990s and has since gone through two evolutionary waves. The first was spent envisioning and articulating the need for campuses to incorporate all sorts of innovations to reduce overall environmental impacts. We imagined campuses filled with green buildings, renewable energy systems, local organic food, organic landscaping, enriched native biodiversity, low-pollution transportation systems, bicycle paths, onsite rainwater-storage tanks, grey and black water-treatment systems, socially invested endowments, green chemistry practices, zero solid waste laboratories, green cleaning products, and low greenhouse gas (GHG) emitting campus utilities, along with many more ideas.

Throughout the 1990s and early into the new millennium, campuses around the world experimented with various green campus projects, and we can now find examples of almost everything on the green campus wish list. However, along the way some of us started to notice that while universities were amassing project successes in a piecemeal fashion, they were not achieving the kind of deep organizational transformation many of us now see as fun-

¹ See <http://www.green.harvard.edu>.

damentally necessary (Sharp, 2002). For example, it was not uncommon for an institution to construct a showcase green building project one year only to revert to conventional building design in later projects. The single success had not actually reformed the building approval and design *processes* within the institution. Some universities would publicize specific energy conservation projects such as lighting retrofits one year while adding air conditioning to those same buildings the following year. These universities were achieving project successes without institutionalizing energy-intensity requirements to place limits on the energy used per square foot. Other universities placed grandiose and expensive recycling bins in public places while allowing waste generation to escalate, creating an isolated success with no comprehensive waste-reduction plan.

In recognition of the need to go beyond showcase-project successes, sometime around 2003–2004 the movement entered its second wave, applying more pressure and pushing for larger public commitments, dedicated staffing investments, and some kind of specific sustainability governance structure, typically in the form of a university committee with staff, student, and faculty representation. These efforts were aimed at moving the university sector beyond the little victories of single projects, toward sustained progress aimed at reaching larger environmental goals, supported by a professional capacity that could ensure ongoing progress. During this period, some important groundwork was laid in a relatively short timeframe, both in the United States and abroad. According to a National Wildlife Federation Campus Ecology Survey (NWF Survey) conducted in both 2001 and 2008, 65% of the 1,068 schools that responded in 2008 had some form of written commitment to address environmental sustainability or stewardship (or at least had a plan in place to create one), compared to 43% of the respondents in 2001. The 2008 data also showed that about 50% of participating institutions had sustainability committees in place and 51% “have staff or administrators responsible for leading sustainability issues” (NWF, 2008). Fewer than 2% of the schools surveyed in 2001 had sustainability committees and almost three-quarters of the new campus sustainability positions were created since 2003–2004.

In 2007, the American higher education sector had approximately 285 construction projects underway that had been certified under the United States Green Building Council’s (USGBC) Leadership in Energy and Environmental Design (LEED) program (USGBC, 2007). At the time, this accounted for about 10% of LEED projects nationally. In 2009, Recyclemania, the most popular campus-recycling competition in the country, had 500 universities

competing, and the winning campus achieved a very impressive 78% recycling rate.² According to the association for the Advancement of Sustainability in Higher Education (AASHE), between mid-2007 and March 2009, over 620 presidents of colleges and universities in the United States endorsed the American College and University Presidents Climate Commitment (ACUPCC) that obliges signatories to achieve climate neutrality within a timeframe of their own choosing.³ This pledge will require these educational institutions to avoid additional GHG’s that may result from future growth, to reduce GHG emissions from existing operations, and to mitigate any remaining emissions by investing in carbon offsets, offsite renewable energy projects, and other measures. Collectively, these colleges and universities represent over 30% of the United States’ student body.

The latest NWF Survey also showed that staff, faculty, and student-advocacy groups have been equal champions of the movement, debunking a common misconception that it was primarily student driven. Faculty have stepped up to participate in new governance structures to oversee ongoing efforts; students have continued to press for greater commitments; and staff members have worked hard to prove the cost effectiveness of a variety of initiatives.

Throughout the 1990s and up until fairly recently, the view of colleges and universities was that greening their campuses would simply cost too much, taking precious funds away from teaching and research. It is only recently that our institutions are finally realizing that an enormous amount can be achieved either at no added cost or within a very reasonable payback period. It took around five years for my team to change the prevailing mindset at Harvard University, resulting in a sea change in the level of participation across the campus. We reformed age-old assumptions by implementing a slew of cost effective building projects, purchasing changes, and behavior-change programs that generated over US\$6 million a year in energy and waste reduction-related savings. Harvard University was not the only institution learning this lesson. The 2001 NWF Survey showed that only 9% of respondent schools said that cost effectiveness was a driver in implementing initiatives, but by 2008 the figure had risen to 24%. This represents an important shift away from the paralyzing assumption that greening the campus costs too much and does not generate any financial return. This shift has been especially critical in sustaining green campus activities during this challenging economic downturn.

² See <http://www.recyclemania.org>.

³ See <http://www.presidentsclimatecommitment.org/html/commitment.php>.

While the movement's first and second waves have been key stepping-stones, they have not produced the breadth, depth, and pace of change that is necessary. Most global environmental problems are escalating at an exponential rate, and despite the last fifteen years of effort, the campus sustainability movement has not yet succeeded in achieving wide-scale transformation of college and university campuses into models of sustainable practice. To increase its effectiveness, the campus sustainability movement must now turn toward organizational change management, basing its strategies on a much more sophisticated understanding about how universities (and other large organizations) actually function so we can begin to unearth the enormous opportunities for increased innovation and transformation, adopting a systems-thinking perspective to steer an effective course forward.

Perhaps the most important legacy of the movement to date is the discovery that universities (and most large organizations) operate with a substantial degree of unconscious habit and irrationality and that very few people, at even the most senior levels, actually know how they truly function. This is in part the result of the compartmentalization inherent to large hierarchical organizations. The separation of different disciplines, arenas of responsibility, and tiers of management generally prevent people from understanding the broader context or the overall systems that operate across the institution. The fact that few individuals understand the broader institutional context, its systems and behaviors, has dire consequences for our efforts to navigate toward sustainability. This is because the demands of sustainability are system-wide and involve changing organizational culture, behaviors and the entire institutional context.

Despite our best efforts, experience shows us that planning and decision making are not always rational, and policy implementation does not necessarily follow a logically cohesive pattern that is consistent over time. Moreover, at times the components of the institution do not behave or interact in a predictable or even understandable manner. Compartmentalization, territorialism, complexity, risk aversion, and hidden drivers, to name just a few such dynamics, sometimes conspire to undermine even the most sensible ideas. Despite this, the institution depends upon its ability to appear more rational and self-aware than it sometimes is. I believe that there is a deep institutional culture of denial at play to sustain a myth of rationality, which in turn prevents us from engaging in the depth of institutional analysis necessary for navigating toward sustainability.

So far, the campus sustainability movement has been catering to the ideal of organizational rationality, writing up sustainability master plans, establish-

ing new goals and indicators, adopting annual environmental reporting requirements, and so forth, as if there is a purely rational, conscious organization to take them up. Meanwhile, no attention is being directed toward the more complex, irrational, and unconscious life of the institution, allowing it to lurk under the surface as an ever-present threat to progress. To be clear, I am not advocating that rational planning and management processes do not have a critical role to play, just that they must be supplemented with a more sophisticated approach that works to diagnose and reform the very nature of our organizations. This effort must address everything from governance structures and decision-making processes, change management, finance and accounting practices, hidden institutional drivers and compartmentalization, engagement, capacity building, systems thinking and leadership.

New governance models and decision-making processes must be created to enable effective interdepartmental, interdisciplinary, and multitier engagement in the campus sustainability enterprise. At the executive level of our institutions we need a distributed model of ownership, accountability, and control that would bring vice presidents of finance, human resources, facilities, development, government and community relations, academics, and other departments into a shared state of responsibility and collaboration. Currently, universities do not do well with interdepartmental and interdisciplinary decision-making processes because, for one thing, their success depends upon transcending institutionalized habits of territorialism involving powerful personalities and significant complexity. Instead of addressing these challenges we commonly see our organizations structure the responsibility and leadership for sustainability under just one group or department. In the long term this can create a variety of undesirable tensions and issues resulting from a lack of effective coordination and integration. Developing new governance structures and decision-making processes that distribute and coordinate ownership and responsibility for the campus sustainability agenda requires the leadership of university presidents and other senior executives.

One way our educational institutions can greatly advance their campus sustainability efforts is to better comprehend the emerging role of the campus sustainability professional. The work of enabling the entire university to achieve continuous progress toward sustainability is a professional function not yet well understood. The typical university today might consider employing just one person to coordinate, communicate, and project manage sustainability across the entire campus, generally someone with no change-management skills, structured to report up

through the facilities department. Despite their best efforts, passion, and commitment, most of these professionals are quickly overburdened and are without the skills, structure, or staffing level to achieve the necessary broad-reaching institutional engagement and transformation. What we are just starting to realize is that our organizations need to make a sizable staffing investment in a change-management function to drive organization-wide progress toward sustainability. The organizations that make this investment are able to achieve remarkable efficiencies and improvements right across the campus, producing financial and organizational returns that exceed the required investment. Without properly staffing and structuring this important change-management function, even the most progressive universities may become bogged down in a variety of destabilizing factors—political, financial, human resource, technological, or otherwise.

What does this sustainability change-management function look like and what does it do? To use the analogy of the large ship, this change-management function, in the form of a team of dedicated professionals, acts as “the rudder on the rudder,” engaging a critical mass of the university community to steer itself toward a new course. The central role of the sustainability change-management team must be as a resource and catalyst to ignite people right across the university, to take initiative in everything from green building design and operations, renewable energy, environmental purchasing, recycling and waste reduction, green cleaning, alternative fuels, green office practices, green laboratory practices, organic landscaping, and GHG reduction. The structure and skill set of this change-management team must be appropriate for fostering engagement, capacity building, leadership, ownership, communications, and continuous improvement across the entire institution at all levels of management. It needs to have a very senior reporting relationship within the organization, reporting to the President or next in command to ensure legitimacy and enable access to all groups across the institution.

Over many years, I have observed that the common belief that people are innately adverse to change is not generally true. People are not resistant to change, they are opposed to instability, and they simply assume that change equals instability. When people experience stable processes of change they generally thrive on the experience and will readily embrace more change. Furthermore, by having enough positive change experiences, people often undergo a personal transformation, shifting from being passive participants to becoming leading agents of ongoing innovation and continuous improvement in the organization. For this reason, fostering stability during

the organizational change process is a key function of the sustainability change-management team because it enables an organization to establish a culture of stable innovation and transformation across the campus. To achieve this stability, the change-management team must be able to engage in sophisticated ongoing institutional diagnostics, creative problem solving and pre-emptive action to address a wide variety of real or perceived risks and barriers. Sources of potential instability that may need to be diagnosed and addressed can include fears of negative reputational impacts, financial approval limitations, managerial backlash, capacity gaps, time pressures, and technological failures, among others.

At Harvard University, I needed to build a sustainability change-management team of 24 full-time campus sustainability professionals to carry the enormous workload associated with supporting wide-scale engagement, ownership, and leadership across a very decentralized, complex, and politicized campus of 40,000 staff, faculty, and students. Our funding model included a 20% contribution to our overall budget from the President’s and Provost’s Offices. The rest of our annual funding was sourced through an entrepreneurial business model that targeted a variety of projects and programs that generated ample savings from reduced energy and waste costs (over US\$6 million per year after six years of work) which in turn was used to justify ongoing investments in our sustainability change-management team. I started small and grew the team and the related number of projects at an average rate of 30% each year for eight years.

Our institutions freely use the mantra of the “business case” to challenge and scrutinize the viability of anything new without addressing the fact that in many cases the business case is being sabotaged by poorly designed finance and accounting structures. Colleges and universities are incurring enormous additional costs by failing to reform these practices to enable good business practice to flourish. For example, institutional accounting structures separate capital budget management and operating budget management, and they rarely allow for operational savings to be captured and reinvested. It is not clear how this has evolved, but it occurs in almost all large organizations. This division results in capital budget managers resisting the expenditure of any extra money, even when the operation savings are extraordinary. At the same time, the operating budget managers commonly do not have enough access to funds for ongoing efficiency improvements. Even if operating managers do manage to fund efficiency improvements to produce operational savings, they are rarely allowed to capture and reinvest these savings for further improvements. Instead, they will often see

next year's operating funds reduced to reflect this operating cost reduction, hardly a reward for a job well done.

The pathway to campus sustainability requires ongoing piloting and experimentation. Operational savings (costs avoided) can be an ideal source of capital for these pioneering activities. Experience shows us that the first time we do something new, it generally takes more time and costs more money, but that through repetition, time and costs are often reduced by streamlining processes and improving capacities. After some repetition we come to understand the true recurring costs and savings associated with the new activity, to the point of being able to budget accurately. I saw this process at work many times at Harvard, but perhaps the most compelling example was in relation to our green building efforts. When we first started to use the USGBC's LEED green building standard in 2001, we were told by many architects and engineers that we could expect to pay 5–10% more for our buildings. After five years of piloting LEED projects across the university, building internal capacities, and streamlining the overall process, Harvard was able to achieve its first LEED platinum renovation, the highest possible green building rating, at no added cost to the project. Other LEED Silver or Gold projects on campus were down to less than 1% additional cost with payback periods of eight years. To get to this point of efficiency, we had to first invest in the piloting and learning process. Unfortunately, most institutions do a very poor job of allocating annual funds for pilot projects and valuing the related learning processes. Others expend their resources on external consultants only to be left without any internal capacity for streamlining and embedding new practices. Because of this tendency, innovation, efficiency gains, and continuous improvement in general, are sporadic at best. Capturing and reinvesting potential energy and waste savings into future pilot projects and in internal capacity building are ways organizations can stimulate new levels of innovation without drawing down funds from other areas of the university.

At Harvard, we worked to overcome many of these finance and accounting impediments by implementing a US\$12 million revolving loan fund that was available to anyone with a conservation project that could achieve a payback period of five years or less. Within seven years, building and facilities staff had borrowed over US\$8.5 million to fund over 200 projects, including lighting upgrades; heating, ventilation, and air conditioning (HVAC) improvements; building-commissioning projects; and occupant behavioral change programs (encouraging people to switch equipment off, recycle more, and generally do their part). The average payback period for the first

200 projects we funded was just three years. Over time, I worked to broaden the scope of the Green Campus Loan Fund to fund feasibility studies, investments in metering, onsite renewable energy projects, and innovation in renovation and construction projects. To approve proposals, we established an advisory committee of facility managers that met each month to review applications. The revolving loan-fund model is clearly a successful strategy that many organizations have since replicated. However, the deeper lesson is that we should stop creating the ongoing need for revolving loan funds—by structurally connecting capital and operating budgets and institutionalizing life-cycle costing, a well-established methodology for calculating upfront and future operating costs relating to different decision-making options. I also believe that our organizations should capture and reinvest savings that result from successful resource conservation and waste-reduction efforts as routine practice to fund dedicated annual innovation budgets for financing pilot projects and ongoing efficiency upgrades. These are necessary next steps to enable the kind of good business practices, innovation, and continuous improvement our institutions need.

Beyond the finance and accounting arena, a variety of other hidden institutional drivers also exist within our organizations, posing a danger to all sorts of well-intentioned efforts. For example, some educational institutions engage in energy-purchasing contracts based on volume consumption. Under the terms of such arrangements, if the institution consumes less power, the unit price goes up, a disincentive for pursuing aggressive conservation. Others operate central utility plants (producing steam, chilled water, or electricity) that employ a business model dependent upon keeping as many people using their services as possible. They have a basic operating cost for maintaining infrastructure and staffing that is separate from the cost of fuel consumed. This base operating cost can be up to 50% or more of the energy bill received by the customer. Under this arrangement, any effort to remove a building from this central service to use an onsite renewable energy system like solar thermal or ground source heat pumps, for example, is likely to encounter resistance from the campus-utility team. This is because if they lose any of their campus customers, they have to pass on more of the base operating cost to their remaining users, which in turn can lead to a cascading loss of customers. At one campus I am familiar with, the steam plant used a condensate return-metering system that discouraged some building managers from repairing steam traps that had blown open. A blown steam trap wastes large amounts of steam and reduces the condensate that returns to the plant, result-

ing in a lower heating bill for the building. The cost of the wasted energy gets distributed across all bill payers as a “general line loss” fee. If the building managers were to spend money to fix their own steam traps, the extra condensate return would result in a higher bill for them and a slight reduction for everyone else, hardly an ideal financial incentive structure. In these cases, and many more just like them, the institution is actually incentivizing particular individuals, groups, or components of the broader system to optimize their own particular outcomes regardless of the overall system inefficiencies. To date, our universities have been slow to identify the existence of such underlying drivers. Going forward, we clearly need to actively diagnose the larger systems at play in our organizations, including the more submerged and complex dimensions.

Just as our organizations may be harboring submerged drivers that can effectively sink innovation efforts, individuals may also be harboring attitudes and feelings that can impede real engagement and learning. In many organizations a culture of private disengagement has taken hold in certain campus populations, typically as a response to a lack of bottom-up consultation or general engagement regarding everything from budget development, training, and advancement processes to operational decisions. Because of this feeling of exclusion, I have noticed there is often a systematic lowering of expectations and a withdrawal of creative energies and self-initiative from the workplace. People put their heads down, do their jobs, and nothing more. Some common sentiments are, “I’ve had ideas for how we could improve things for years, but no one listens and so I don’t bring it up any more,” or “They put this new system in but no one knows how to maintain it properly,” or “No one’s ever explained the bigger picture to me before so I’ve never thought about it.” For any organization that is serious about making real progress toward becoming environmentally sustainable, having a culture in which these sentiments have taken root presents a profound impediment.

People are our greatest resource and, because the pathway to campus sustainability requires such wide sweeping and ongoing innovation and continuous improvement, our institutions must become learning organizations with the vast majority of people working in a state of public engagement and life-long learning. Most organizations have a long way to go before their community has evolved to this point. One of the most effective ways to foster engagement and learning across our institutions is through the use of peer-to-peer forums. During my time at Harvard, we experimented with dozens of different peer-to-peer models, working with building operations staff, kitchen personnel, residential students, facility man-

agers, executive level managers, laboratory users, administrative staff, and more. We consistently found that structuring peers of the same social or professional group or managerial tier to engage with one another in a shared process of discovery, competition, teaching, and learning was extremely effective in tapping unprecedented effort and stimulating real learning. Peer-to-peer models of engagement are more costly to coordinate, but they produce savings well in excess of the investment, and they far outperform the common approach of having the “expert” or “authority” simply tell people what to do.

The basis of this success is tapping into innate human cognitive drivers and tendencies, something our organizations often fail to do. Cognitive research shows that approximately 95% of what we do is unconscious and the brain is constantly working to free up its 5% of conscious reserves by converting new behaviors into unconscious habit as quickly as possible (see, e.g., Bargh & Chartrand, 1999). In the institutional context, there is fierce competition for these conscious reserves, and often the process of developing new habits needs ongoing support. By creating an ongoing learning forum in which people are socially engaged with a group that they identify with and interact with frequently, we address two key learning challenges—attention and habit conversion. I now believe that connectivity between similar management tiers is just as important as the connectivity that exists up and down the chain of command. That is to say, horizontal flows of information, influence, and engagement are as important as vertical flows. This works at the very senior levels of our institutions right down the chain of command. When people ask how 620 university presidents across the United States publicly agreed to achieve climate neutrality, my answer is through the very skillful use of peer-to-peer influence. Once several presidents signed, advocates successfully leveraged this circumstance to catalyze others to do so, capitalizing on either a feeling of confidence in joining with others or a sense of risk in being left behind if they did not sign up.

So far I have talked about a number of ways in which we can achieve a new level of innovation and transformation toward campus sustainability. What remains to be discussed is how we can steer our course of innovation and transformation forward. Herein lies perhaps our greatest challenge, the task of adopting a systems-thinking approach to continuously diagnose and determine our path forward. Without taking a systems-thinking approach, universities may end up achieving significant progress in one environmental impact area while inadvertently increasing impacts on other planetary life-support systems. For example, substantial gains in greenhouse gas reduction may be achieved at the expense

of biodiversity by using biofuels implicated in deforestation practices. Similarly, metered reductions in particular impacts may be undone by unmonitored activities elsewhere in the organization. For example, green building successes and GHG reductions may be completely negated by additional emissions resulting from campus growth, endowment-investment strategies, research activities, or travel emissions from study-abroad programs. Not only is a systems-thinking approach necessary for avoiding these risks, it is essential for discovering the big opportunities.

I believe that our educational institutions are ripe with prospects for significant impact reductions at no added cost. Many of these gains can be found via a life-cycle costing approach that considers long-term costs and benefits. Many more opportunities can be discovered by thinking about larger systems instead of separate components. For example, universities could switch to 100% post-consumer recycled paper at no added cost if they simultaneously adopted double-siding practices for all printers, copiers, and publications. Dining facilities could increase local, fair trade, and organic options at no added cost if students would agree to reduce the diversity of meal offerings and eliminate food waste. At Harvard, I worked with a graduate student to investigate a systems-thinking approach to reducing building-related GHG emissions. In our case-study, a 120,000 square foot residential building built in 1959, we were able to show on paper that by investing in energy efficiency, capturing those savings, and reinvesting them in other GHG-reducing activities, over a twelve-year investment period the net present value cost for achieving climate neutrality (zero net GHG emissions) for that one building would be just US\$6,000 in today's dollars.

Systems thinking presents us with such a profound challenge because it forces us to confront the way in which university functions are compartmentalized into divisions, units, departments, disciplines, and tiers of management. While this approach enables a good degree of control and accountability up the chain of command, it also ensures that the whole system is rarely considered when decisions are made. Whether it is the campus-energy system, purchasing, transportation, waste, or water system, there are numerous structured disconnects between all of the relevant stakeholders, with little or no effort to transcend these separations at critical planning times. All effort is directed toward optimizing single parts of the system, even at the expense of the institution overall. At one university I worked for an entire new campus was under development, but we were still unable to get the utility planning and the building-design teams to collaborate on downsizing the associated utility plant to reflect a commitment to more

energy-efficient buildings. The architects did not want to answer to the utility-planning team's requirements and the utility-planning team was preoccupied by the concern that the client would blame them, not the building designers, for any shortfall in utility provision. In one of the most ironic examples of how the culture of separation endemic to our organizations makes it so hard to make real progress, a particular green building renovation project was tested to see if it was tightly insulated enough to pass the required blower door test to become ENERGY STAR rated. It was discovered, after the fact, that the group conducting this test used a tracer gas called SF₆, which happens to have a GHG potency of over 25,000 times that of carbon dioxide. It was only used in very small amounts; however its potency meant that even these small amounts were problematic.

We will not be able to realize the benefits of systems thinking until we address the separations of our universities. To think about systems effectively you need to bring the people that represent each of the system components into the room, that is, all of the key individuals who represent the system must engage in conversation before you can understand and identify system-level opportunities and implications. The nature of this conversation must advance beyond a dynamic of territorialism and component optimization toward a dynamic of deep collaboration and engaged interdisciplinary thinking. To this end, the people must be effectively incentivized and facilitated from beginning to end to strive for shared success and to generate team-based problem definition and solution development. To date, we have very few examples of effective systems thinking being achieved in our universities, but recognition of its importance is growing.

We now need to usher in the third wave of the campus sustainability movement, an era focused upon addressing the irrational and unconscious aspects of our institutions to foster a new organizational capacity for innovation and transformation, steered by a systems-thinking perspective. It must be led with authority and influence, exerted by presidents and executives, middle managers, and grassroots champions. We need leaders with a sober, realistic, and sophisticated grasp of how our institutions truly function, and a more accurate assessment of how much we can depend upon pure rationality and when we must address the less rational, unconscious, and more complex nature of our organizations. We need leaders who are willing to face the risks and opportunities that will arise by engaging in conversations that explore the very distribution of power, the architecture of decision-making processes, and the nature of governance, in pursuit of a new level of shared ownership and interconnection across all necessary disci-

plines, management tiers, and administrative functions. We must work to strengthen bottom-up and horizontal collaboration, continuous learning, and capacity building. We need to enable a systems-thinking approach to steer the course toward campus sustainability. Only by ushering in this next wave in the campus sustainability movement will we manage to navigate the next era of the long and complex journey to bring our institutional impacts down to an equitable share of what the planet's life-support systems can support.

References

- Bargh, J. & Chartrand, T. 1999. The unbearable automaticity of being. *American Psychologist* 54(7):462–479.
- National Wildlife Federation (NWF). 2008. A National Report Card on Sustainability in Higher Education. Washington, DC: National Wildlife Federation. <http://www.nwf.org/campusEcology/docs/CampusReportFinal.pdf>.
- Sharp, L. 2002. Greening campuses: the road from little victories to systemic transformation. *International Journal of Sustainability in Higher Education* 3(2):128–145.
- United States Green Building Council (USGBC). 2007. LEED Registered Projects. <https://www.usgbc.org/ShowFile.aspx?DocumentID=2313>. April 28, 2008.

About the Author

Leith Sharp has eighteen years of experience in greening universities around the world. She has consulted and presented to over 100 organizations and is on the governing committees and editorial boards of numerous organizations, including the Association for the Advancement of Sustainability in Higher Education and the *International Journal of Sustainability in Higher Education*. Leith has received numerous awards for her work including a Churchill Fellowship and Young Australian of the Year, NSW Environment Category. From 2000 to 2008, Leith was the founding director of Harvard University's Green Campus Initiative and led the creation of the largest green campus organization in the world, taking Harvard to the forefront as a global leader in campus sustainability. Under her leadership, Harvard achieved over 50 LEED building projects (mostly gold or better), instituted a US\$12 million revolving loan fund that achieved an average return on investment of 30%+, and implemented wide-scale engagement in occupant behavioral change, onsite renewable-energy projects, GHG reduction commitments, alternative fuels, green cleaning, environmental purchasing, and much more. Leith is currently engaged in a variety of writing, teaching, speaking, and consulting activities. She has an ongoing affiliation as a visiting scholar with the Harvard School of Public Health and continues to teach organizational change management for sustainability and green building design through Harvard's Extension School. Leith has a bachelor's degree in engineering (environmental) from the University of New South Wales (Australia) and a master's degree in education (human development and psychology) from Harvard University. She welcomes feedback and can be contacted via lsharp@hsph.harvard.edu or leithsharp@yahoo.co.uk.