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Critical Path Issues on the Way to Carbon Neutrality
By Wendell C. Brase



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Students, faculty, staff, and benefactors of most colleges and universities want to reduce the carbon footprint of their institution. Many have pledged their commitment to this goal by signing the [American College and University Presidents' Climate Commitment](#) (ACUPCC). Even those college and university business officers who have not signed the ACUPCC are planning reduce their footprint, although they have questioned whether carbon neutrality is a feasible or affordable goal, or even whether the right tools and policies are in place for a bold effort to succeed.

This is an overview of the tools, resources, and public policies that colleges and universities need to markedly reduce, or neutralize, their carbon emissions. Business officers do not need another impassioned admonishment that “it doesn’t really cost anything,” if they would just make a commitment and get moving. To make progress, a climate action plan needs to be embedded in sound business logic and a policy environment that removes obstacles that raise risk and thwart success.

The General Roadmap to Carbon Neutrality

Every institution that has made a commitment to reduce its carbon footprint has taken steps to characterize and understand the overall size and component parts of its footprint. Most institutions that have completed this basic, initial step have come to realize the daunting challenge they face to reduce carbon emissions, especially as the task becomes dramatically more difficult beyond the first 15 percent to 20 percent.

The first problem typically encountered is that the institution’s carbon footprint is not static, but growing. Most states with



The Donald Bren School of Environmental Science & Management, at UC Santa Barbara

A lighting retrofit project in 2009 is remarkably different than the lighting retrofit project of 1990.

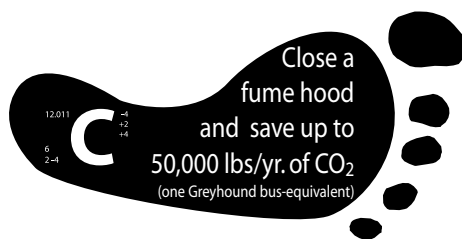
In 1990, retrofitting T-12 fluorescents with T-8 lamps and electric ballasts, and installing an occupancy sensor typically saved 40 percent carbon and energy, with a simple payback of three to four years.



Today, a retrofit project entails a complete lighting *redesign*—typically with new fixtures, re-spacing of fixtures, installation of task lighting, and circuits zoned to fine-tune daylight harvesting and occupancy control. The payback period for this type of project is six to nine years, but the carbon reduction may exceed 50 percent.

emission-reduction timetables do not adjust for growth, nor does the ACUPCC normalize for growth, because the ultimate goal is carbon *neutrality*. However, despite limited enrollment growth plans, many colleges and universities have ambitious capital aspirations to address unmet needs and to enrich physical resources. An institution expands its carbon footprint even when it constructs new buildings to [Leadership in Energy and Environmental Design](#) (LEED) gold or platinum standards, although the impact is less than it would be absent these green standards.

The next realization is that energy-efficiency retrofit projects offer the most certain and immediate opportunity to reduce an institutions’s carbon footprint. Such projects are well understood from a technical and financial standpoint, and can be funded via energy savings, if certain price and performance measures can be assured. However, high GHG savings goals must be realized for an energy retrofit program to play a major role in a campus’ climate-action plan. Rather than aim for 20 percent efficiency improvements, business and facilities officers must set the bar much higher: 30 percent to 40 percent GHG savings. If an institution has done little in the way of energy retrofit projects beyond relamping, replacing motors, and installing occupancy sensors, this figure could reach 50 percent.



Reminder sticker placed on UC Irvine laboratory fume hoods

Almost every college or university that aspires to reduce its carbon footprint understands the efficiency advantages of onsite

renewable energy, which avoids the transmission and distribution losses (and associated tariff costs) of remote renewable power. On the other hand, business officers also are aware of the barriers to financing onsite renewable power, including low existing energy prices (i.e., avoided cost); geographic and climatic factors that vary widely among colleges and universities across the United States; price/performance ratios for renewable technologies that have not yet reached break-even feasibility; economy-of-scale limitations and less optimal geography of many onsite renewable installations compared to offsite renewable power; and, in some states, an incentive subsidy structure that favors residential-scale or utility-scale renewable installations while providing fewer incentives for institutional-scale projects. Even institutions that benefit from sunny or windy sites may find it difficult to meet more than 5 percent to 10 percent of their carbon reduction goal by installing onsite renewables (although notable exceptions do exist).

Most colleges and universities plan to influence the carbon emissions behaviors of students, faculty, and staff by persuading them to: close fume hoods (see UC Irvine reminder sticker above), waste less food, conserve water, eat foods with

lower inherent carbon footprints, recycle more, drive less, enable computers' "sleep" feature, tolerate wider thermostat "comfort zones" by dressing for comfort, and several dozen other resourceful behaviors that extend well beyond "turning off the lights." Behavioral-based reductions in the carbon footprint are desirable from a cost and scale standpoint; they cost little and the impact extends to thousands of people across the campus community. Since an institution's green dining, transportation, and waste management programs depend on changing individuals' choices and behaviors, it makes sense to combine these initiatives when projecting the potential impact of greenhouse gas (GHG).

The remaining, staggering problem that eventually will land on the chief business officer's desk—even with an aggressive, successful, committed effort at reducing carbon emissions, and even in the absence of growth—is that it may be difficult for a college or university to reduce its carbon footprint by more than 50 percent. Perhaps 35 percent of reduction will be through energy retrofit projects; 10 percent through transportation measures, a sustainable dining program, waste stream reduction, and campuswide behavior changes; and 5 percent through onsite renewable energy. Carbon neutrality requires addressing the remaining 50 percent, plus any growth in the footprint.

Most institutions struggling with a climate action plan do not favor procurement of carbon offsets, except as a last resort. They would prefer to buy renewable power directly, although the potential problems with this strategy are worrisome. Since ACUPCC signatory institutions plan to attain carbon neutrality, they need to ultimately procure 100 percent renewable power, which is a far greater percentage than utilities will be providing.

California Lighting Technology Center

Although sited at UC Davis and funded by the California Energy Commission, the California Lighting Technology Center (CLTC) provides design and product application resources of value to colleges and universities nationwide.

The CLTC has developed laboratory, classroom, office, and parking illumination retrofit designs that typically reduce energy consumption and carbon emissions 50 percent or more. A lighting retrofit program is highly scalable, since these space-types tend to be repeatable and consistent across campuses, and because illumination is ubiquitous, not only throughout the buildings but also parking facilities, roads, and pathways.

Strategies that Employ Speed and Scale

One of the greenest actions a four-year college or university can do is to increase the percentage of students residing on campus. Converting commuters to residents, and then providing low-carbon transportation for campus residents (in coordination with discouraging automobile use), has a remarkable, immediate impact on an institution's carbon footprint, especially when the campus' transportation system extends to a "no commuter zone" encircling the campus. Even campuses that lack the land or the demographics to support student housing can work with local planning commissions and transportation systems to zone rental housing appropriate to the student market along transportation corridors that service the campus.



Palo Verde II Student Apartments, UC Irvine LEED Gold

Some campuses have turned to third-party housing developers in order to increase housing stock without having to raise rents as much as they would need to if they built new campus housing financed through revenue bonds. These developers can keep costs down by building large-scale projects, even though the conventional business model for campus housing may favor smaller projects due to the impact on average rents. Third-party student housing is comprised of apartments, which may enable the existing, revenue-bond housing program to focus on residence-hall bed spaces. Some of the greenest student apartments now being constructed are third-party housing developments.

Concurrently, a massively scaled-up energy retrofit program is just as important as reducing student commuters' carbon footprint. Both of these programs yield big carbon reductions within a few years, rather than decades, thus enabling institutions' climate action plans to achieve aggressive five-year and 10-year milestones for GHG reductions. Many business officers and facilities managers understand the scale an energy retrofit program requires to address the commitment to climate neutrality, but few CEOs and governing boards comprehend the magnitude.

Role of the Chief Business Officer

The role of the chief business officer (CBO) will change as institutions tackle the problem of reducing their carbon footprint. Just raising the bar and talking up the importance of sustainability will not suffice. While the business officer could delegate and oversee from a distance the typical energy conservation projects a decade ago, facilities managers today need specific guidance and support from the CBO as they ramp up their efforts:

- CBOs need to understand that typical energy retrofit projects will entail six-to-10 year paybacks in institutions that already have harvested the low hanging fruit, rather than the two-to-five year paybacks of the past.
- CBOs must understand and support the fact that a portion of the projects' utility savings will need to be reserved to pay the highly skilled staff needed to maintain, adjust, recalibrate, monitor, and continually commission the building of increasingly sophisticated systems in terms of sensors, digital logic, and fine tuning. This continuing investment will be necessary to sustain the performance and guarantee the payback of sophisticated building energy systems.
- CBOs need to engage the problem of balancing two competing goals: protecting user safety versus reducing the carbon footprint. Strategies to address the latter problem, such as reducing illumination or ventilation and exhaust rates, can affect safety if carried too far. CBOs no longer can delegate safety to environmental safety staff and reducing energy to facilities staff, and then forgot about these areas. CBOs need to manage this trade-off, and not merely assume that if facilities and safety staff are communicating, the trade-off issues are being resolved.
- CBOs need to provide leadership to ensure that risks associated with more finely tuned building systems are evaluated based on data and evidence, rather than dogmatic application of criteria that originated when energy was considered "essentially free," and "carbon footprint" was unheard of.
- Design professionals, such as mechanical engineers and security lighting experts, may defend status-quo practices because the risk of variance from established standards may increase their professional liability. Colleges and universities may need to get involved in a new activity: influencing building codes, standards, and regulations.
- CBOs need to understand that large-scale carbon emissions savings may be attainable—perhaps 30 percent to 40 percent—but large-scale investment also will be required over a sustained, five-to seven-year program.

What Every CBO Needs to Know About their Campus' Carbon Emissions

Test your knowledge of key campus sustainability indicators by answering these [25 questions](#). You are not alone if you can't answer them all without doing some digging.



- Two types of scales need to be exploited: central plant and infrastructure efficiencies, which scale across an entire campus; and small improvements that can be repeated hundreds of times, such as extending a lighting prototype campuswide.
- Energy retrofit programs need to encompass “smart” sensors and controls that provide continuous commissioning of laboratory facilities, consistent with Labs21 best practices; complete lighting retrofits consistent with the low-carbon prototype designs developed by the California Lighting Technology Center; “greening up” information technology consistent with ideas being advanced by EDUCAUSE and the Silicon Valley Leadership Council; and all 24/7, demand control, and daylight-wasting opportunities, campuswide.
- CBOs may need to “provide cover” for facilities staff when they adjust illumination levels, install motion sensors in private offices, cut the hot water in restrooms, install occupancy controls on restroom exhaust fans, install HVAC setback features on facilities that traditionally have been considered 24/7, and broaden the “comfort band” settings for heating and air conditioning.
- Priorities need to be set, since most facilities organizations are not able to carry out both a large energy retrofit program and a renewable energy program simultaneously. In nearly all institutions, the greatest impact will stem from placing the initial priority on an aggressive energy retrofit program.
- CBOs need to provide leadership to ensure a team approach to sustainability that engages not only facilities management, but also design and construction services, environmental health and safety, procurement, information technology, environmental planning, housing, food services, and transportation services.
- CBOs need to assist facilities management in understanding and applying a more sophisticated financial planning perspective for energy retrofit projects than was required for the smaller, simpler projects of the past.

Overall, the increased perception of risk from challenging entrenched standards and methodologies, as well as the need for cross-departmental collaboration, requires the CBO to take a more active role in managing risk and ensuring that organization boundaries do not create obstacles to achieving program objectives.

Renewable Power

To bridge the gap to carbon neutrality (after feasible energy retrofit projects are completed and behavioral changes are established), most colleges and universities favor renewable power on campus and direct procurement of renewable power, with purchase of offsets or carbon emissions credits providing the means of last resort to attain carbon neutrality. This preference extends beyond the immediate problem that the form, availability, and price of procured carbon mitigation are unknown at this time. Higher education institutions have a strong preference for solving the problem rather than buying their way out.

Whether colleges and universities can play a major role in expanding the nation’s renewable power base depends on needed changes in the policy and regulatory environment. Consider these 10 pivotal facts:

1. Most higher education institutions want a greater percentage of renewable power than investor-owned or municipal utilities will be able to provide.
2. Although onsite renewable power is preferable to remote renewable power, most colleges and universities physically will not be able to generate the desired amount of renewable power on site.
3. The alternative of purchasing “green power” (if available in some viable form) is not financially feasible when the price is substantially greater than conventional, grid-provided “brown” power.



Photovoltaic installation at California State University, Dominguez Hills

4. Although some utilities may meet institutions' renewable power needs, campuses also need the option of procuring power from large-scale, offsite renewable power installations, through such vehicles as joint powers authorities, nonprofit cooperatives, purchasing consortia, or for-profit renewable power developers.

5. Such arrangements are thwarted in many states by public utilities commission rules that do not allow economic "wheeling" of power from remote installations to campuses.

6. Colleges and universities can provide financially stable conditions for third-party renewable power installations by entering into long-term power purchase agreements—a considerable advantage.

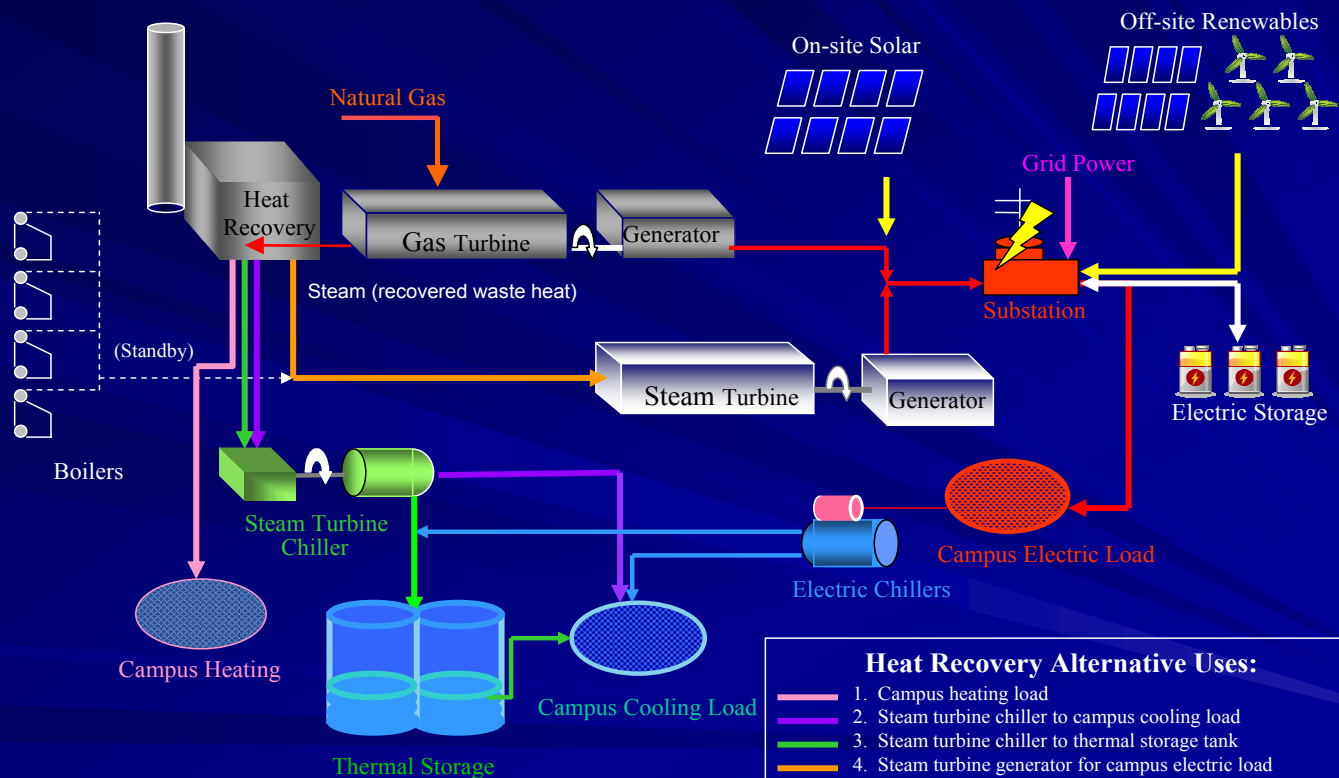
7. Most colleges and universities, and even their professional associations, do not have the specialized legal and technical expertise to navigate through the regulatory maze

of roadblocks deterring third-party or cooperative renewable power installations; to wheeling such power to institutional users; and to integrating onsite renewables, other distributed generation, and offsite renewable power with utility-provided base load and backup power. These rules have been influenced by powerful utility lobbyists and attorneys, and by ratepayer advocacy groups that fear potential disadvantages of accommodating the interests of large customers.

8. Moreover, the regulatory environment for renewable power that crosses state lines becomes even more complex.

9. The impediments to renewable power for colleges and universities are part technical and part economic, but overwhelmingly regulatory. Ironically, some states are adopting ever higher goals and accelerated timetables for the reduction of greenhouse emissions, while failing to address roadblocks under state control that are likely to thwart the achievement of environmental goals.

Low-Carbon Campus Energy Infrastructure





10. Colleges and universities are trying to anticipate whether and how to participate in a carbon emissions market, as a strategy to help leverage their climate action plans. A transparent market system with regulations and standards is necessary for efficacious participation by higher education institutions. A cap-and-trade system will provide more opportunity for such participation. The alternative model of project-based voluntary offsets is less transparent, more complicated, lower valued than the “mandatory” carbon market and, with its high transaction costs, more expensive.

What Colleges and Universities Need to Increase Renewable Power

To play a significant role in developing renewable power, colleges and universities need:

- The right to have an energy services (direct access) provider, a municipal or investor-owned utility, or a joint-powers authority deliver renewable power from remote installations to campus loads.
- Reasonable tariffs to wheel renewable power. A federal or state policy to subsidize renewable power wheeling by exacting a greater tariff on nonrenewable power would help to stimulate more renewable generation.
- Competition among renewable energy generators for procurements from colleges and universities that have the ability to enter into long-term, direct-access contracts.
- A direct-access market that will remain viable over the lifespan of 20-year procurement agreements.
- Streamlined regulatory and environmental review processes for renewable power installations and transmission, to reduce the inherent cost of risk that otherwise will create insurmountable obstacles to launching such projects.
- Ability to procure variable back-up power without excessive penalties, to augment and efficiently manage a varying campus mix of onsite renewable power, onsite distributed power and energy storage, and offsite renewable power.
- A federal mandate to remove regulatory roadblocks to competition among, access to, and financing of renewable projects that can serve consortia of nonprofit campuses.
- Tax neutral incentives that do not favor either for-profit or nonprofit renewable power generators, so that colleges and

universities do not have to favor or create particular business models to take advantage of tax incentives. (In other words, the same subsidies, tax breaks, and incentives should be available to for-profit generators, ESCOs, nonprofit cooperatives, and renewable power installations owned by nonprofit institutions.)

Finally, colleges and universities with central plant chillers and chilled water distribution need sizeable thermal storage systems that can function as managed buffers to renewable power variations and exploit the availability of nighttime wind power and transmission capacity. In the future, other energy storage technologies also may become cost effective. Due to variability of renewable energy, time-of-use price variations, and the need to balance renewable power with other onsite and offsite generation sources as part of a campus “smart grid,” energy storage is a key component in a climate action plan. Campuses with existing thermal storage will have a head start. Even better, a central plant that combines cogeneration with a large thermal storage capacity can manage output to complement variable renewable power sources—most notably, wind power procured at night.

The Emerging Carbon Market

Whether, or under what conditions, to sell carbon emissions credits is a decision with ethical as well as financial consequences. Colleges and universities know that selling their carbon reductions in any form that enables the Earth’s overall carbon emissions to increase will be viewed as ineffectual, if not unethical. However, in the presence of a carbon cap, a market system that transfers funds from those who do not (or cannot) reduce carbon emissions to those who are able and willing to do so merely enables the subsidized latter group to leverage their efforts. This fosters overall economic efficiency in the process as everyone looking at the marginal unit of carbon emissions decides whether to buy or sell. Thus, if colleges and universities can market their carbon reductions without fear of exacerbating the global problem their carbon-neutral commitment aims to address, they surely will exploit this subsidy to implement more carbon-reducing projects sooner and deeper than absent such a subsidy.

Although a carbon cap system simplifies the ethics and the mechanics of selling carbon emissions credits, a case can be made for using such revenues even without a cap-and-trade system to fund renewable or energy conservation projects that would not be feasible, and thus not pursued, without



the subsidy realized from the sale of carbon attributes. In such cases an investment is made that benefits the Earth's emissions footprint, and the fact that the investment would not have materialized without the subsidy of emissions credit sales makes the issue of who gets "credit" secondary to the net environmental benefit.

Similar logic pertains to the reallocation of carbon credit revenues from fully feasible projects to carbon-reducing projects that otherwise would be financially infeasible. Selling carbon attributes—whether renewable energy credits, carbon credits, carbon offsets, or some other form of GHG mitigation yet to emerge—is a temporary strategy that will ultimately have to cease in order for an institution to claim carbon-neutrality, presumably when the subsidy is no longer needed to enable financial feasibility.

Revenues derived from the sale of the carbon-reducing attributes of renewable energy retrofit projects may represent a significant opportunity in a market that will place a premium price on efficacious carbon emissions credits. Colleges and universities have a distinct advantage in this emerging market due to their track record of good facilities management practices, stewardship, and data integrity—in contrast to questionable and unverifiable products now tainting this unregulated market.

A complexity with carbon markets is that the rules have yet to be determined, and how they are implemented will have considerable bearing on institutional decisions, since today's assumptions may not be valid in the future. For example, the assumption that carbon credits will continue to be available for resale on an annual basis might change. The rules could be modified so that once sold, an institution might have to buy back the credits if it wanted them in the future. In that case, it would not be wise to base a pro-forma on keeping the credits beyond a finite period of time.

Economic and Financial Drivers and Constraints

Several economic issues already have been discussed:

- The importance of focusing first on an energy retrofit program of the scale to achieve at least 30 percent overall reduction in an institution's carbon footprint
- The potential value of initially deriving revenues from the carbon benefits of (otherwise) noneconomic projects to render them viable
- Institutions' need for competitive renewable energy options beyond utility-provided power to procure up to 100 percent renewable power as needed to attain carbon neutrality
- The need for a viable direct-access market, particularly for competitive renewable power

Any institution that proceeds down a path that first tackles all of the cost-feasible renewable energy projects and on-site renewable projects will reach a juncture where the next phase of such projects is financially infeasible—when net savings do not meet debt service over a reasonable term. When this occurs depends on the marginal cost of procured energy (i.e., the avoided cost), which will differ remarkably among institutions and across different regions of the country. The onset of project infeasibility may be deferred by subsidies, tax breaks, and other such incentives, as well as by price/performance improvements of both energy conserving and renewable technologies. These basics are understood by every CBO.

Subsidies, rebates, tax advantages, and the like also vary by location. And the decision of whether to wait until the price/performance ratio of a renewable product or technology improves probably will weigh in favor of first focusing on energy retrofit projects, although subsidies may be reduced as prices fall or performance improves. Although these factors add dimensions of complexity, they are not the most difficult ones to evaluate.

The pivotal policy decision that college and university presidents will be pressured to address essentially has to do with adjusting the assumptions in the cost-benefit evaluation of a proposed project—most likely, a renewable energy project needed as the next major step toward a campus' carbon neutrality. The question may come down to whether, and when, to incorporate projections of higher priced utility-provided power into the feasibility analysis, a reasonable assumption since costs will rise steeply for utilities under mandates to increase renewable power content. Clearly, this assumption will



have a significant effect on any present value analysis, which should project time-weighted avoided costs at the *margin* (the last unit of power that otherwise would be procured). The corollary issue will be whether to pursue a project with positive net present value even though it does not initially break even.

Assigning either an expected price or a “social cost” to carbon significantly alters a present-value analysis. If the assumption is that carbon offsets can be sold efficaciously, or if a project will avoid the necessity to *procure* carbon offsets to meet a milestone in the campus’ emissions plan, those factors would have a profound effect on a project pro forma. Thus, either a presumed benefit of selling carbon attributes or avoiding the cost of buying them can be factored into a present-value analysis. Since carbon market valuations are impossible to predict, this constitutes more of an assigned social cost than a real financial projection.

For some institutions, tax-exempt financing may provide an opportunity to reduce the net cost for output from a renewable energy project. Municipal utilities have used tax-exempt revenue bonds to fund the pre-purchase of electricity or natural gas output from producers, lowering their overall cost while providing the certainty of demand and cash flow to make the projects viable.

Debt service can be structured so that it escalates over the term of the bond, thus providing predictable cost escalation that presumably will be less than that of procured power. Using such a financing tool lowers the cost of capital and reduces the risk, and thus the expected profit, of the developer. However, the pre-purchase of a renewable project’s entire output would not be prudent, since the developer/operator needs a sufficient incentive to ensure both the initial and sustained performance of the project. Moreover, appropriate remedies need to be structured into a project so that a viable asset is demonstrated before a pre-purchase transaction is completed, and such that a viable asset reverts if the developer fails to maintain the condition and output of the installation.

This business model also needs a sufficient flow of funds to utilize available tax advantages, and of course it must meet tax code and legal requirements. Extension of this model to colleges, universities, and other credit-worthy institutions that are interested in reducing their carbon footprint may require changes in the federal tax code. These opportunities should be fully explored and pursued since this model offers alternative energy producers access to cost-effective capital that often represents the largest hurdle to project implementation.

Clearly, a business model that utilizes a tax-exempt bond to finance pre-purchased power adds complexity, yet simpler models may not produce desired results. This model transfers to institutions the risks of projecting and using the expected value of future offset sales or the cost avoidance of buying offsets if the institution does not attain its carbon-reduction milestones, as well as escalation expectations regarding procured power cost avoidance. In fact, most renewable energy projects will not prove feasible—at least until price/performance attributes improve—unless all the tools and strategies that have been discussed are utilized and institutions internalize certain risks on the basis of environmental principle, rather than applying a business-as-usual financing model.

In addition, some risks may be moderated and economies of scale may be realized by large renewable projects that are sized to serve an entire consortium or purchasing cooperative of institutional renewable power customers. Sale of carbon benefits (offsets or other attributes of carbon emissions reductions that may be marketable in the future) should be seen as a risk-reduction strategy, rather than prime factors in a business model. As such, carbon attributes can be sold for an indefinite time as needed to attain feasibility, because the value of future offset sales is unknown.

Conclusion

In making a commitment to carbon neutrality, colleges and universities have embraced a daunting, admirable, and sobering challenge. No time can be wasted on small-scale solutions (except those that telescope across entire populations or all facilities). Major, comprehensive, long-term investments will be required, starting with an energy retrofit program that aims high: 30 percent reduction in the carbon footprint within five years.

While the energy retrofit program and, equally important, expansion of student housing are underway, the CBO, president, and governing board need to:

- manage expectations regarding the scale of solutions required and the long-term financial commitment needed to move an institution all the way to carbon neutrality;
- engage the issue of whether to assign a tangible value to the full social costs of carbon reduction;
- determine what risks are worth taking in view of the agreed-upon social costs and environmental objectives;



- specifically consider whether carbon-reducing projects that do not initially break even but nonetheless project a positive net present value will be supported.

The governing board may need to reaffirm its commitment to carbon neutrality and decide which major track to pursue in order to close the carbon gap that remains following an aggressive energy retrofit program: develop renewable power or procure carbon remediation in whatever market may emerge. Due to the emergence of new technologies, energy conserving retrofits will never be “completed”; however, carbon neutrality will not be achieved solely through efficiency improvements or even net-zero new construction.

If development of renewable energy is the preferred strategy, CBOs, CEOs, and governing boards will need to determine whether they can assume, manage, and mitigate the risks inherent in the following strategies to move renewable power from the infeasible to the feasible realm.

- Assume (for a project pro forma) that the price avoidance associated with foregone procured energy will ramp up at a much steeper rate than energy prices have escalated over the past several decades.
- Count on the emergence of a viable carbon market system that can be exploited to help subsidize development of renewable energy projects.
- Organize a purchasing consortium, joint powers agency, or cooperative that can aggregate and manage the renewable power procurements of a sufficient number of institutional buyers to realize economies of scale.
- Find feasible solutions to regulatory and economic problems of wheeling power from offsite renewable power installations.
- Formulate a power pre-purchase agreement that can be financed through revenue bonds and structured in a way that avoids or manages counterparty risks.

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The same financial assumptions regarding utility power price escalation and avoided carbon mitigation costs or derived carbon attribute sales should also apply to longer-payback energy retrofit projects. This may shift the transition point between energy retrofit and renewable energy projects, a trade-off that will occur at different times for different institutions, and should be cross-checked by ranking project alternatives on the basis of GHG reductions per dollar invested.

Finally, even after all these strategies and inherent risks are woven into a feasibility analysis and an action plan, it may be necessary to ask students to support a “green leverage fee” to cover any remaining feasibility gap. Using such a student fee to bridge the gap, rather than fund the entirety, will leverage students’ green fees across more carbon-reduction endeavors.

The management of expectations about the scale and difficulty of carbon-neutral plans, as well as the need for new and risk-tolerant business models that will be necessary to make early progress, will fall onto the shoulders of the chief business officer. To observe that the Presidents’ Climate Commitment will change the role of the CBO would be a gross understatement. On the other hand, CBOs tend to like macro problems that have an important social benefit and place their institutions in a leadership position in terms of environmental stewardship. CBOs have learned to be resourceful in finding pragmatic solutions to idealistic goals embraced by the academy.

One prediction seems certain: No college or university will make a significant dent in its carbon footprint—much less attain carbon neutrality—without the sustained leadership of a proactive, relentlessly determined chief business officer.