

# Franklin & Marshall College Climate Action Plan

## Plan for sustainability and long-range plan for climate neutrality at Franklin & Marshall College

At Franklin & Marshall College our mission is to foster a deep interdisciplinary understanding of sustainability and environmental concepts, both theoretical and practical, to nurture innovative and creative leadership strategies, and to broaden an appreciation of the natural world throughout our campus community.

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## **INTRODUCTION**

Franklin & Marshall College (F&M) is dedicated to excellence in undergraduate liberal education. Our aim is to inspire in young people a genuine and enduring love for learning, and to teach them to explore and understand the natural, social and cultural worlds in which they live. In so doing, the College seeks to foster intellect, creativity, and character in its students so that they may live fulfilling lives and contribute meaningfully to their occupations, their communities, and the world. We strive to educate our students on the impact their decisions can have on the earth's climate and resources.

Franklin & Marshall College is one of the oldest institutions of higher learning in the United States, founded in 1787 with a generous financial contribution from Benjamin Franklin. Franklin & Marshall is committed to environmental stewardship. In April 2007 under the leadership of President John Fry the College made a commitment to sustainability by signing the American Colleges and Universities Presidents Climate Commitment. For Franklin & Marshall this important step demonstrates the dedication toward the continued progress in the College's sustainability efforts.

This Climate Action Plan is a collaborative effort that includes faculty, staff, trustees, alumni and students. Franklin & Marshall's Sustainability Task Force and the Environmental Action Alliance (EAA) were instrumental in the College's decision to sign the commitment. Continuing efforts are led by the Franklin & Marshall College Sustainability Committee, Associate Dean of the Faculty, and Associate Vice President of Facilities as well as EAA. Students have played a vital role by active participation on subcommittees and writing portions of the Greenhouse Gas Emissions Summary Report for the ACUPCC. As we move forward our students will continue to be instrumental in furthering the College's commitment to sustainability and attaining the goal of carbon neutrality.

Franklin & Marshall's commitment is right for economic, educational, and ethical reasons, and we view this plan as a turning point for increased efforts and success in stewardship and environmental education. The community of Franklin & Marshall College will work to protect and sustain the environment through curricular programs, management of facilities and instructional activities that embody the belief that a sustainable society and science are inextricably linked in understanding humanity's place in the contemporary world.

## **SUSTAINABILITY TASK FORCE AND SUSTAINABILITY COMMITTEE**

Sustainability challenges us to change the ways we think, act, and interact—collectively and individually. The College has a responsibility to encourage change in itself and in all its members to secure the long-term wellbeing of our community and world. To live up to its stated mission "to foster in its students qualities of intellect, creativity, and character, that they may live fulfilling lives and contribute meaningfully to their occupations, their communities, and their world", the College must model the behavior and attitudes that we want to instill in our students.

The task force and committee's charge, amplified by the Beyond Green report, was to recommend programs and actions that achieve tangible progress toward community education and climate neutrality. This commitment extends from greenhouse gas reduction to preventing pollution of natural resources, and increasing the academic components of environmental stewardship and sustainability. The Beyond Green report drafted by the Associate Dean of the Faculty was presented to the F&M community.

### **Beyond Green-Report Recommendations**

- Reduce Franklin & Marshall College's carbon emission by 100% by the year 2030 with the goal to achieve climate neutrality within 20 years. Franklin & Marshall will reduce its energy consumption and pursue the development and use of renewable energy sources.
- Develop programs to raise awareness and encourage conservation by all members of the community.
- Continue to develop and grow recycling and composting programs for campus.
- Develop an academic program that includes faculty from across the curriculum, two interdisciplinary majors and extensive student-faculty collaborative research, coupled with extracurricular initiatives.
- Continue to use Leadership in Energy and Environmental Design (LEED) guidelines for design in new construction and major renovations.
- Use space on campus as efficiently as possible, which directly affects the central plant operations and energy consumption.
- Create a website that summarizes our current initiatives and communicates our mission and is a resource of information and links to sustainability.
- Further develop the Wohlsen Center for the Sustainable Environment as a centralized location for a myriad of student, faculty, and staff activities focused on sustainability and environmental stewardship.
- Establish a scholars and faculty funds for research focused toward green technology, environmental stewardship and sustainability.
- Establishment of an Scholar/Artist/Musician in resident position that will supplement and enhance established discipline at the College, but serve as an

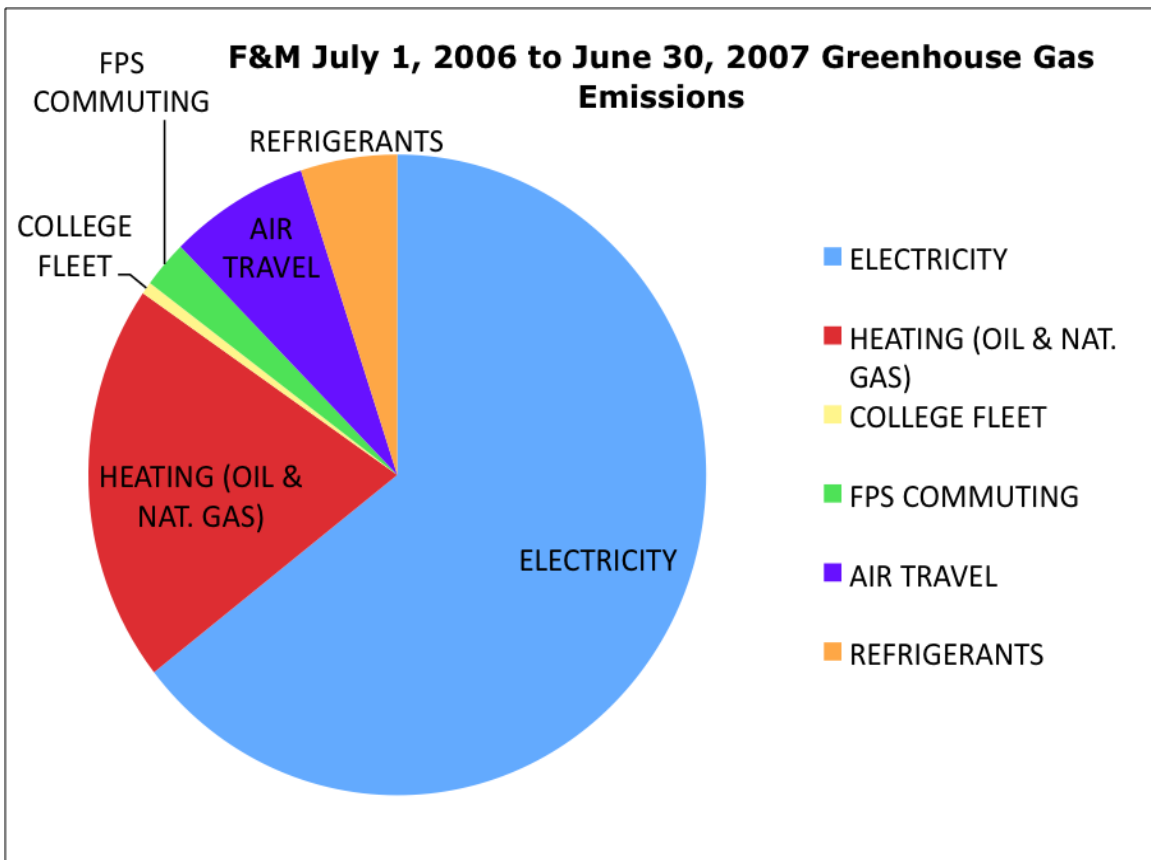
interdisciplinary link between sustainability and environmental stewardship and the scholarly focus.

- Establish a research field station.
- Establish a “Green Spheres of Influence” which are zones where the College’s expertise and guidance would help local residents and businesses become more sustainable and environmentally savvy.
- Manage the Caroline S. Nunan Arboretum and other landholdings to maximize their potential to store carbon, while ensuring their health, sustainability and contribution to the educational mission.
- Increase patronage of local farmers for produce and other food goods.

## CAMPUS EMISSIONS

Franklin & Marshall College completed its first carbon inventory in 2007 establishing an annual baseline of 20,997 metric tons carbon dioxide emissions.

This baseline is broken down by, 74.5 percent of greenhouse gas production from the facilities use of electrical and heating fuel, 7.3 percent from air travel, 5 percent from refrigerants and 2.4 percent from employee commuting with the remainder from college vehicles, solid waste and fertilizers.



**ZERO EMISSIONS GOAL**

Carbon neutrality is the long-term goal for Franklin & Marshall College. This will require time; resources and the development of new technologies to reach our goals. Interim goals, measured from the baseline year of 2007, have been established to help the college move toward climate neutrality.

**PROJECTED CARBON EMISSION LEVEL FOR FRANKLIN & MARSHALL COLLEGE WITH CLIMATE ACTION PLAN**

	Year	MTCO <sub>2</sub> e
Baseline	2007	20,997
25% decrease	2015	15,748
25% decrease	2020	10,499
25% decrease	2025	5,249
Carbon Neutral	2030	0

**PROJECTED CARBON EMISSION LEVEL FOR FRANKLIN & MARSHALL COLLEGE WITHOUT CLIMATE ACTION PLAN**

Baseline	2007	20,997
8% increase	2015	24,776
10% increase	2025	26,876
10 % increase	2035	28,976

The actions needed to achieve the reductions planned through 2015 are outlined in this report. Plans beyond that timeframe will be developed as technology and resources become available to the college with the intent of the proposed target date for carbon neutrality of 2030. The primary focus of the plan includes affirmation and implementation of policies that encourage conservation and result in energy efficiency and physical improvement to buildings and equipment that result in less energy being consumed.

Franklin & Marshall College plans on focusing resources directly on reducing the College’s carbon footprint by implementing tangible actions on campus. The expectation is to maintain renewable energy credits and carbon offsets at current levels, and consider purchasing of carbon offsets at each project milestone date.

## **GREEN POLICIES**

### **TANGIBLE ACTIONS**

As an ACUPCC signatory we have initiated two tangible actions to reduce greenhouse gas at Franklin & Marshall College: implemented a Sustainable Building Policy and Energy Star Policy. The purpose of these policies is to demonstrate the College's commitment to environmental, economic, and social stewardship, to yield cost savings through reduced operating costs, to provide healthy environments for students, faculty, staff and visitors, and to contribute to the College's goal of protecting, conserving, and enhancing the region's and State's environmental resources.

The Sustainable Building Policy commits F&M to designing and constructing college buildings to the Silver LEED standards developed by the U.S. Green Building Council. All new facilities over 5,000 gross square feet and major capital renovations costing more than 50% of building replacement value shall meet and acquire a LEED Silver rating at a minimum. The decision to pursue actual certification will be made on a project-by-project basis. Building in a sustainable manner at the Silver certification level is typically an increase of 1% - 5% to building construction cost. These costs, however, will result in savings for the institution many times over the initial investment. A recent study completed for the State of California estimated the cost savings to be ten-fold over the life of the building.

The second policy implemented by the college is that all products, appliances, and equipment purchased or leased by Franklin & Marshall College shall be Energy Star qualified. In areas where guidelines are not available the most energy efficient products are to be sought. ENERGY STAR is a government-backed program helping businesses and individuals protect the environment through superior energy efficiency. ENERGY STAR sets high efficiency standards for certain types of appliances and certifies products that meet or exceed those standards. Because ENERGY STAR certified products offer a substantial reduction in energy use, they are a wise investment, reducing costs and negative environmental impacts.

New technologies will be used by F&M as they emerge to help accelerate our timeline toward carbon neutrality. Since new energy-efficient technologies are certain to emerge over the coming decades, the plan also positions Franklin & Marshall College both to take advantage of these new technologies and to actively participate in their development.

Franklin & Marshall is dedicated and is deeply committed to implementing green actions. Since the 1980's recycling has been a part of campus life. Recently we have added geothermal heating and cooling to our campus infrastructure, constructed several LEED Silver buildings, and solar energy is being implemented into our

energy supply. Franklin & Marshall has been purchasing renewable energy since 2004 and has grown its purchase of renewable energy to over 30% of its power.

## FACILITIES MANAGEMENT

Franklin & Marshall College Facilities Management practices are routinely reviewed and modified to develop best practices for operations that are environmentally sensitive and have minimal impact on the environment. The priority is to reduce or eliminate damage to the environment and assist in reducing F&M's direct and indirect emissions.

Throughout its history Franklin & Marshall College has used sustainable practices. These include use of local products and vendors for the campus as a whole. The management of College buildings and grounds management has been sensitive to impact on the local environment as well. Located in the Chesapeake Bay Watershed, F&M understands the environmental challenges in the region and continues to manage, operate and maintain its facilities and grounds in a manner that minimizes its environmental impact both locally and globally. Controlling the number and the size of buildings on campus and the amount of pavement reduces the College's carbon footprint and storm water runoff. Our campus is adopting a landscape master plan that mandates a pedestrian campus and builds on a growing bike program. F&M will seek to reuse existing space, eliminate excess square footage, and maintain a pedestrian campus to avoid expansion of pavement.

## ENERGY STANDARDS

Our goal when renovating existing buildings will be to reduce annual average energy consumption by 25% per gross square foot of space. New buildings will be designed to achieve maximum energy efficiency.

Whenever available, new appliances and other electrical equipment on campus will be Energy Star compliant contributing to the goal of reducing electricity by at least 1% per year.

Replacing existing incandescent exit signs with LED signs will save approximately 333KWh per year per sign. Given there are approximately 500 signs on campus; this will save 166,500 kWh per year (approximately 1% of total electricity consumption).

## HEATING AND COOLING GUIDELINES

Facilities Management has adjusted heating temperatures for campus offices to 67 to 69 degrees for the hours of 7 a.m. to 5 p.m. and 50 to 55 degrees between 5 p.m. and 7 a.m. Weekend temperatures will remain between 50 and 55 degrees. Classrooms will be set for 67 to 69 degrees from 7 a.m. to 4 p.m. and 50 to 55 degrees from 4 p.m. to 7 a.m. Residence Halls will continue at the current 68 to 70 degrees setting. In the warmer seasons, air conditioning temperatures will be set for 76 to 78 degrees for the same time periods. (Research areas will not be impacted, and will continue to be maintained per lab and equipment specifications.)

These guidelines will be modified to support preservation requirements for archival material and artwork, and to support specific educational and athletic programs that require different environmental requirements.

## ENERGY REDUCTION INVESTMENTS

### RENEWABLE ENERGY

Wind and solar energy are a vital part of the plan to become carbon neutral. Franklin & Marshall College has investments in wind and solar systems and will continue to expand and use this technology to directly impact our carbon efforts on campus. Through the installation of additional systems the goal is to reduce carbon emissions, nitrogen oxides, and sulfur dioxides. The design of the new solar array installed on campus is to produce 39,000 KWh of electricity each year, preventing the emissions of 81,400 pounds of carbon dioxide, 128 pounds of nitrogen oxides, and 508 pounds of sulfur dioxide. The goal for purchasing wind is to offset annually 373,000 lbs of carbon dioxide, 520 lbs of nitrogen oxides, and 2060 lbs of sulfur dioxide. Over time we intend to grow this program to a 1% reduction annually. New arrays will improve these numbers to provide a significant impact to carbon reduction.

- Continue to increase electrical energy purchases that are wind, hydro and future alternative sources for electrical generation.
- Strategically plan and incorporate solar arrays across campus to continually grow our solar dependence.

### LIGHTING UPGRADES

F&M will continue to integrate emerging technologies into our plan to reduce energy consumption for exterior and interior lighting. The goal is a 1% reduction annually saving 170,000 kWh per year eliminating over 356,000 lbs of carbon dioxide, 498 lbs of nitrogen oxides and 1,970 lbs of sulfur dioxide.

- Partner with EAA performing a light bulb exchange each semester that offers the community an opportunity to swap out an incandescent light bulb for a fluorescent light bulb.
- Plan and install a new lighting program across campus including exterior light upgrades to LED or fluorescent fixtures. Replacing standard T12 fluorescent lamps and magnetic ballasts with T8 lamps and electronic ballasts in classroom and office buildings. A 2003 study done on the feasibility of "relamping" just one of the main classroom and faculty office buildings on campus estimated that this action would save 89,635 kWh per year (approximately 0.5% of total consumption).
- Manage lights with controls such as motion sensors, timers and computer programs.
- All renovation projects include changing out old lighting to new higher efficiency fluorescent light.

## BUILDING HEAT AND ENVELOPE IMPROVEMENTS

Renewal and replacement renovation projects that reduce energy consumption in campus buildings as well as strategic plans for moving the campus in its first phase towards carbon neutrality have been identified and are listed as follows:

- Re-roof buildings to include installation of higher “R” factor insulation as well as reflective roof membrane.
- Build HVAC tracking so that we can operate our buildings more efficiently saving considerable amounts of energy.
- Purchase more green products to increase our green cleaning program.
- Purchase ‘Energy Star’ rated appliances.
- Ensure all copiers across campus must be energy star rated.
- Purchase supplies and materials that are used to maintain the campus from local businesses.
- Use low VOC paints on campus.
- Investigate the viability of vegetative roofs for new and remodeled buildings.
- Investigate continued Brownfield redevelopment projects.
- Move campus toward improved storm water management.
- Incorporate geothermal HVAC systems when possible.
- Install motion/occupancy sensors strategically in buildings.
- Replace boilers that supply heat and hot water to the entire main campus with new higher efficient system.
- Replace the main chillers for campus for a new more energy efficient system.
- Run exchange programs to provide compact fluorescent bulbs in exchange for incandescent bulbs.
- Advance our efforts towards carbon neutrality by using advances in Green Technology.
- Increased recycling program by expanding the number of collection stations.
- Implement a community garden program.

Additional energy and building retrofit projects, including conversion of electric resistance heat to more efficient and carbon friendly systems, will be identified and completed to further reduce energy consumption and help meet carbon reduction goals.

## CONSERVATION

Ongoing recycling programs will result in a 10 percent annual improvement in the College’s carbon footprint, avoiding 90 tons of carbon emissions annually. These programs include:

- Researching implementation of a campus-composting program.

- Leaving all leaf litter and grass clippings on our lawn areas and mulched in place to act as a natural fertilizer for the soil.
- Installing low flow sinks, toilets and showers campus wide to reduce water consumption.
- Participating in Recyclemania which is a program where colleges compete to see who recycles the most materials from their solid waste stream.
- Running public information campaigns to promote the use of compact fluorescent bulbs, turning off lights, computers, printers, etc, and general conservation.

### FLEET AND TRANSPORTATION

Franklin & Marshall College is working to create a pedestrian campus through its landscape master plan. This plan involves replacing large inefficient vehicles with smaller, more fuel efficient models. Vehicle replacements over time are targeted to reduce gas consumption by 20% by 2015.

- Enhance campus bike program that allows for easy transportation throughout the F&M community.
- Modify fleet of vehicles, especially vans that increases the frequency for car-pooling rather than individual trips to a central location.
- Phase out use of large trucks for smaller more energy efficient vehicles.
- Continue shuttle program to transport students around the community.

### CARBON SEQUESTRATION

Franklin & Marshall College has the unique opportunity to reduce its carbon footprint through the reforestation of College-owned land. Further studies will need to be done to determine the viability of this option.

### AIR TRAVEL

The major air travel component for Franklin & Marshall College is the study abroad program as well as Admissions and Advancement programs. Faculty, staff and students attend conferences on a yearly basis, and travel for research and fieldwork. This is an unavoidable part of academic and collegiate programs. Our goal is to gradually reduce emissions through the use of technology in the form of video conferencing to reduce air travel.

## FUEL PURCHASING

As Pennsylvania faces deregulation of the energy sector, the College's ability to purchase renewable energy from the national grid will improve. Development of purchasing guidelines will enable us to further reduce carbon emissions on campus to help us meet our carbon neutrality goals. The goal is to purchase electricity from hydroelectric plants or wind farms that produce electricity with less carbon impact.

- We want to enhance our existing bio-diesel fuel oil program.
- We want to explore alternative fuel sources for the operation of campus boilers as technology improves.

## **EDUCATIONAL EXPERIENCES**

At Franklin & Marshall College our mission is to foster a deep interdisciplinary understanding of sustainability and environmental stewardship concepts and topics, both theoretical and practical, to nurture innovative and creative leadership strategies, and to broaden an appreciation of the natural world across our campus.

Our mission embodies the belief that sustainability and stewardship, as informed by the social sciences, humanities, and natural sciences, are inextricably linked in understanding humanity's place in the contemporary world.

## **PROGRAM AND POLICY DEVELOPMENT**

### **Establish a Science Advisory Board**

Franklin & Marshall College will work to establish a Science Advisory Board consisting of faculty and administrators to work collectively on issues pertaining to the establishment of a conservation area at Baker Campus, and to provide input to policy and program decisions about land use at Baker Campus and the Millport Conservancy.

### **Wohlsen Center for the Sustainable Environment.**

The Wohlsen Center for the Sustainable Environment is a centralized location for a myriad of student, faculty, and staff activities focused on sustainability and environmental stewardship. It opened in October 2009.

### **Establish Wohlsen Scholars and Faculty Funds for Research**

The College will work to establish the Wohlsen Scholars Program and build a budget for faculty funds and research focused primarily at Millport Conservancy but not limited to it exclusively. If the College's proposal to the Cargill Foundation is successful we hope to use the draw off of the endowed stock returns to fund a small number of student scholars, similar to the Hackman scholars, perhaps named the Wohlsen Scholars or Cargill Scholars. At least initially, the Cargill grant contains funds to help faculty establish their research at Millport.

### **Research**

Continue with moderate level of course laboratory and research involvement at Millport Conservancy.

### **Director of Sustainability and Environmental Stewardship**

The College has recently hired a Director of Sustainability. The director has a Ph. D. and teaches two courses relating to sustainability and environmental stewardship each year. This person organizes faculty workshops/individual sessions on

increasing sustainability and environmental stewardship themes into our academic program, helps coordinate the Wohlsen Scholars and Faculty Grant program, designs and implement innovative co-curricular programming, (modeled on our Philadelphia Writers House and CLAS programs), establishes close links with Admissions and College Communications to ensure that the College's progress and innovation is widely understood and well publicized, and works with student groups (EAA and Fair Trade Café), in addition to other duties as needed.

### **Sustainability Committee**

The committee is comprised of:

4 faculty members; 4 student members (one from each class year); the Director of F&O or designee; the Director of Sustainability and Environmental Stewardship (Committee Chairperson); Dean of Students or designee; Director of Dining Services or designee.

Regular guests to the committee meetings may include:

- The Scholar/Artist/Musician-in-residence
- The Associate Dean dealing with Sustainability/Wohlsen Center/Millport issues
- The Millport Liaison and Sustainability Coordinator

The Committee's responsibilities include:

- Providing the President with recommendations for future initiatives;
- Selecting the winner of the annual Sustainability Grant;
- Selecting the theme of Sustainability Week;
- Working on the Climate Neutrality plan;
- Coordinating campus wide outreach;
- Establishing student-faculty leadership teams for sustainability and environmental stewardship innovation
- Working with faculty on curriculum development.

### **Scholar/Artist/Musician-in-residence position:**

Franklin & Marshall believes that it is important to include academic disciplines beyond the natural sciences into sustainability and environmental stewardship. This inclusion promotes creative and innovative ways of bringing sustainability to all members of the campus community. This position supplements and enhances established disciplines at the College, and serve as an interdisciplinary link between sustainability and environmental stewardship and the person's particular scholarly focus. The position rotates on an annual basis through the visual arts (including theatre, film, and dance), musical arts, and other disciplines. The aim of this position is to strengthen and solidify ties between sustainability and environmental stewardship (including the Wohlsen Center) with disciplines beyond the natural sciences. Duties and responsibilities associated with this position include teaching, giving at least one public lecture, reading, performance, or curating an exhibit per semester, and leading some kind of workshop or seminar for faculty on how the

person's disciplinary expertise links to sustainability and environmental stewardship in a curricular sense.

### **Staff Council**

Staff Council has been established whereby members of the College's professional staff can work with the Associate Dean on College initiatives that may be relevant to their area's of expertise.

## **LONG TERM INITIATIVES**

### **Establish a curricular program of workshops**

Establish a curricular program of workshops, individual faculty sessions, and field-oriented seminars that provide suggestions, support, and guidance for integrating sustainability and environmental stewardship across the College's academic divisions.

### **Establish a research station or field station**

Establishment of a research station or field station at Millport Conservancy or Baker Woodlands where classes and researchers can work in a laboratory setting on site, field equipment can be housed, and long-term monitoring databases can be kept going year-round. Establish an F&M 'homestead' at Baker Campus or Millport Conservancy where moderate scale gardens produce some food for the campus and/or for the local food banks and shelters. If this were to occur at Millport Conservancy, student(s) +/- a faculty or staff person could potentially live at Millport Conservancy for a semester and earn course credit for a program of study that included 'farming' the homestead. Potentially, the research station and homestead would be completely integrated.

### **Establish "Green Spheres of Influence"**

Establish "Green Spheres of Influence" that radiate out from the Franklin & Marshall College campus to encompass the James Street Improvement District and City Life areas, eventually spreading farther into the city and township. The "Green Spheres of Influence" would be zones where F&M expertise and guidance would help local residences and businesses become more sustainable and environmentally savvy.

## FINANCIAL IMPLICATIONS

It is clearly impossible to make accurate detailed predictions regarding the financial costs or attractiveness of GHG mitigation projects 10 or 20 years into the future. Indeed, the overall governance structure of the Climate Action Plan (CAP) is designed specifically to avoid the need for such predictions. Rather, the CAP is premised on, and gains its assurances of economic feasibility from, an assortment of general long-term trends that are likely to continue more or less unabated, combined with a variety of uncertain but likely events that – if and when they occur – will amplify those trends.

Major long-term trends that are expected to continue into the future include rising conventional energy prices (especially fossil fuel prices) and gradually decreasing capital costs for clean renewable energy technology. Likely – although unknowable – events include the development and commercialization of new energy efficiency and generation technologies and the imposition of some form of cost for emission of GHGs (be it a national or global cap-and-trade system, a “carbon tax”, the effects on utility rates of the existing Regional Greenhouse Gas Initiative, or other similar initiatives).

Combining these various factors, a general pattern emerges by which energy conservation (infrastructure upgrade and behavioral modification) projects are financially attractive in the immediate term, energy efficiency projects (major demand-side technology shift, such as all-electric vehicles or passively heated buildings) become attractive in some middle term, and supply-side projects range from middle-term (*e.g.*, biomass conversion of the existing steam station) to longer-term (*e.g.*, wind power or solar photovoltaic) attractiveness.

In order to assure F&M’s ability to take advantage of attractive project opportunities as they develop, the College must establish a stable long-term funding stream. Beginning in fiscal year 2011 and extending at least until climate neutrality is achieved, F&M will strive to provide CAP-designated capital funds. Funding levels would need to be accelerated annually during the period from 2011 until 2022 and then remain constant (adjusting for inflation) for the duration of the program. The level of funding committed would be in concert with the timeline intended to achieve F&M’s GHG reduction targets.

One of the key determinants of economic feasibility for any energy conservation, efficiency, or substitution (supply-side) project is the price of energy itself. While F&M’s Climate Action Plan is projected to continue through fiscal year 2030, reputable energy price predictions are available only through 2030; predictions vary as to the extent of likely price increase even in the shorter period. Still, there is no reason that energy price trends over the next two decades should somehow

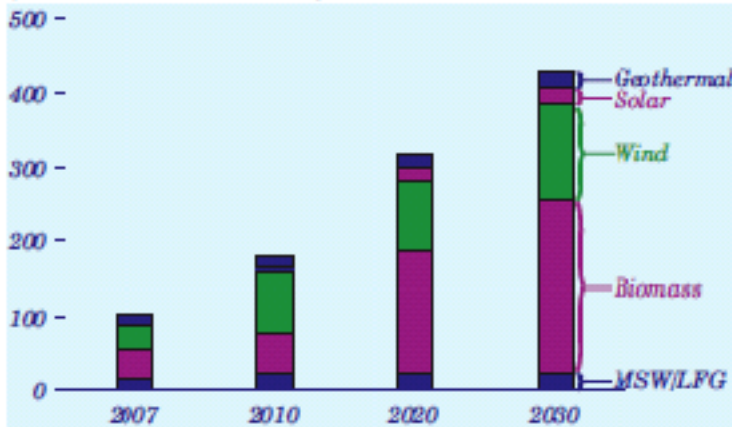
reverse at the end of that period, and, while specific predictions vary, all reputable predictions share an expectation of significant price rises for conventional energy into the future.

Two respected institutions charged with publishing predictions of future energy pricing are the Energy Information Administration of the US Department of Energy (EIA) and the Comptroller of Public Accounts for the State of Texas. (Texas generates significant tax revenue from its production of fossil fuels, so energy pricing has significant state revenue and policy implications.)

Based on these and similar projections, it seems safe to assume that energy costs over the next 20 years, even at a constant purchase volume, will increase on the order of 50-100 percent. Linear extrapolation, then, yields a likely increase by 2050 of 75-150 percent. And even these projections may be too conservative, as demand for natural gas may well expand out of proportion to global economic growth due to developed countries' desire to decrease GHG emissions and other pollutants worldwide.

Over the same two decades, capital costs for renewable generation of electricity are projected to fall. The Energy Information Administration projects that renewable generating capacity will more than double between 2010 and 2030, as shown:

**Figure 60. Nonhydroelectric renewable electricity generation by energy source, 2007-2030 (billion kilowatthours)**



Source: [http://www.eia.doe.gov/oiaf/aeo/pdf/0383\(2009\).pdf](http://www.eia.doe.gov/oiaf/aeo/pdf/0383(2009).pdf)

As renewable energy capacity is expanded and the enabling technologies mature, capital costs will decrease by EIA estimates:

### **Projected Reduction in Capital Costs (2006\$/kW) from 2010 to 2030 (%)**

Biomass (19%)	Hydro (11%)	Landfill Gas (6%)	Wind (12%)	Solar PV (25%)	Solar Thermal (28%)
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Data source: [http://www.eia.doe.gov/oiaf/aeo/pdf/0383\(2009\).pdf](http://www.eia.doe.gov/oiaf/aeo/pdf/0383(2009).pdf)

Forecasting has allowed F&M's CAP to incorporate energy conservation projects and supply side projects to offset costs as well as reduce carbon.

## **FINANCING PLAN**

In order to assure F&M's ability to take advantage of attractive project opportunities as they develop, the College must establish a stable long-term funding stream. Beginning in fiscal year 2011 and extending at least until climate neutrality is achieved, F&M will strive to provide CAP-designated capital funds. The projects will also be funded from the annual budget using renewal and replacement funds. F&M will also work with state and federal agencies to obtain funding. Funding levels would need to be accelerated annually during the period from 2011 until 2022 and then remain constant (adjusting for inflation) for the duration of the program. The level of funding committed would be in concert with the timeline intended to achieve F&M's GHG reduction targets.

## **TRACKING PROGRESS**

Franklin & Marshall College will track its progress toward carbon neutrality through regular inventories of its carbon emissions and review of environmental programs to ensure they meet intended objectives.

Specific metrics include:

- Total carbon emissions from inventory updates
- Dashboard elements
  - Gross square foot per student – density factor
  - Carbon emissions per student
  - Carbon emissions per gross square foot – density factor
  - Energy expended (btu) per gross square foot
- Building Thermal Conductance Measurement
- Energy use levels needed to meet carbon emissions reductions by 2025

## **CONCLUSION**

Franklin & Marshall College's Climate Action Plan is designed as an integrated strategy. The plan achieves a workable balance among GHG reduction through conservation and efficiency projects (both infrastructure projects and behavioral efforts); generation of clean, renewable energy from a variety of sources; research to advance the state of a number of sustainability-related technologies and practices; a long-term funding stream designed to support both on-campus GHG mitigation and – as required – the eventual purchase or other funding of GHG offsets; and education, awareness and intentional involvement to keep members of the campus community engaged in the College's sustainability initiatives.

The issue of community engagement – particularly student engagement – was a key consideration throughout the development of the CAP. As a signatory to the PCC, Franklin & Marshall is committed to eliminating its net emissions of greenhouse gases and therefore its measurable contribution to global climate disruption. On a more significant level, however, our attainment of a climate neutral campus is the least important aspect of our efforts. The modest contribution a thousand-acre campus can make to climate change mitigation pales in comparison to the impacts our graduates will have, collectively and over the coming decades, as they take their places in an increasingly global society.

Thus, Franklin & Marshall's Climate Action Plan is designed not just to create a climate neutral and sustainable campus, but also to actively promote climate leadership on the campus, which in turn will promote global sustainability.

## **ACKNOWLEDGEMENTS**

Many individuals dedicated their time to developing this plan and the platform for Franklin & Marshall College's sustainability investments.

President John Fry provided the leadership and courage to make the commitment to sustainability on behalf of Franklin & Marshall College.

Carol deWet, Associate Dean of Faculty was instrumental in providing the strategic direction for the academic plan that gives direction for development of an academic program focused on sustainability and the Beyond Green Report.

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