

SUSTAINABILITY 2020 METRICS FRAMEWORK

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EXECUTIVE SUMMARY

In August, 2012, a task force made up of GMC faculty, staff and a student was charged by Provost Bill Throop with developing a draft set of metrics for measuring our progress toward achieving authentic sustainability and identifying major implementation initiatives to achieve that goal. Over an eight month period, the Task Force conducted research, held discussions, and consulted with members of the community to clarify the Sustainability 2020 objective and develop a measurement framework. The purpose of this document is to share the thinking from that process and to solicit further input and comments from the greater GMC community. We hope that this will be a living document that will continue to evolve over time.

Questions, concerns, and ideas for achieving progress toward the goal of authentic sustainability should be brought to the Sustainability 2020 Steering Committee, chaired by Provost Bill Throop. The Steering Committee formed in September of 2013 and meets once a month to coordinate data collection efforts, review proposals for moving the College forward, and review documents that propose to modify the plan or the metrics.

The metrics outlined here are just one part of an overall process for assessing our progress towards achieving authentic sustainability. As we work on improving this metrics framework going forward, we will work with the GMC community to establish specific 2020 targets for each of the metrics we develop; we have not attempted to do that here. We are also not outlining in this document the implementation steps needed for GMC to achieve its 2020 objectives. That planning process will be an ongoing effort coordinated by the steering committee. We have outlined in Appendix 1 a draft plan for implementing the metrics proposed in this paper. In Appendix 2 we share our early thoughts about targets.

Achieving authentic sustainability

Our starting point in defining sustainability is the well-known definition of sustainability by the Brundtland Commission: “meeting the needs of the present without compromising the ability of future generations to meet their own needs: (WCED, 1987, p. 43). This definition requires us to leave the world better than we found it, or as we put it last year (GMC, 2012): “To achieve authentic sustainability, we must begin to give more than we take in three areas: Natural Capital, Social/Human Capital and Financial Capital.” These capital stocks represent the resources humans have available at any given point in time to support a high quality of life within a healthy biosphere. Sustainability thus requires maintaining or growing these resources over time so that future generations have at least the same capability to thrive that we do.

This starting definition of sustainability is closely connected with the concept of human well-being, a subject of much research and debate. We have taken a comprehensive approach, incorporating both objective and subjective measures of well-being into our framework.

Before proposing an initial set of six to eight metrics in each of the capital areas, we attempt to define more carefully the notion of *authentic* sustainability. The fact that our GMC community does not (and should not) exist in a vacuum complicates the task of assessing our progress. We are embedded in unsustainable systems, which are largely beyond our control. These economic, social, and ecological systems constrain our options and limit our ability to achieve some ideals of sustainability. Our aim is to create a practical model for authentic sustainability which can serve as a guide to other communities and organizations. We believe global, social, and economic systems must undergo a profound paradigm shift. Since we cannot predict the dynamics of this shift, our assessment of Green Mountain’s sustainability will inevitably involve multiple uncertainties. To address such uncertainties requires a

pragmatic approach: We can only judge our progress based on those outcomes we can control and understand. In defining authentic sustainability in this way, we can still hold ourselves to an objective criterion — creating more good than harm — while allowing for the possibility that outside events and unknown factors may cause global resource stocks to decline. These considerations have helped us arrive at a more formal definition of authentic sustainability (see next section), but they also suggest that assessing our progress will, in the end, require judgment. We propose six guiding principles for our assessment and communication:

- Transparency
- Resilience
- Narrative credibility
- Social justice
- Engaged community
- Ongoing reassessment and improvement

We see *achieving* such an authentic sustainability not as an endpoint, but rather as a significant milestone on a continuing journey. Ultimately, for us to claim that we have achieved authentic sustainability, we will need to tell a compelling story with integrity. That story is a critical part of the closed-loop process we propose to assess our progress and guide our actions going forward.

Social/Human Capital

Green Mountain College has been in the business of enhancing aspects of social/human capital for 179 years. It is at the core of our mission, as it is for all educational institutions. The transition to sustainability will require us to emphasize further some forms of social/human capital, such as health/wellness and diversity/inclusion. We propose that the following seven human/social metrics plus the alumni impact metric constitute our primary measures in this area:

Human Capital

The capability of individuals to reach their full potential and advance institutional goals:

- Health and well-being
- Personal Development
- Grit

Social Capital

The capability of a community to work together to create a better shared future:

- Trust
- Associations
- Diversity and inclusion
- Effectiveness of Telling Our Story

Alumni Impact

The impact of a GMC education after students graduate:

- Impact of education on students' lives and students' impact on the world

The College's progress on each metric will be determined largely by surveys of students, faculty, and staff, typically administered every two years. We will also survey members of the Poultney community, though less frequently, to assess the College's impact on the town's social/human capital. In addition to surveys tailored to the metrics, the College will use an array of secondary measures from NSSE, SSI, and demographic data collected by the office of institutional research.

On most of the metrics, we will gauge progress primarily by comparing the change in means and medians over time to determine whether we have net positive impact on the relevant elements of social/human capital. We will also compare the distributions and ranges of responses. On some metrics, e.g. the health and wellness metric, which includes financial well-being, progress will also be

determined by relative positive change in the least well off. Social justice, which is a key component of social capital, is determined in part by the distribution of elements of social/human capital.

We have selected these metrics in part because our survey of the scholarly literature indicates that they capture important dimensions of social/human capital as these are reflected in a college setting. We believe that making progress on these metrics is likely to be correlated with making progress on both the financial and the natural capital metrics. Thus, by enhancing elements of human and social capital, we are likely to also promote important financial indicators as well as increase student success.

Financial Capital

Financial capital is essential for us to achieve our mission and to be resilient through economic shocks. We propose that the following seven clusters of metrics constitute our primary measures for financial capital:

- Enrollment-related metrics
- Revenue/expense metrics
- Financial resilience metrics
- Affordability metrics
- Compensation and equity metrics
- Economic impact metrics
- Built environment metrics

The College's progress on each metric will be determined largely by annual benchmarking based on end-of-year fiscal results. We have selected many of these metrics in part because they are standard ways of measuring fiscal health of institutions used by the US Department of Education and by NEASC. We also believe these to be the most revealing for multiple audiences regarding the resilience of the College and its ability to compete effectively in an increasingly competitive marketplace for students. The importance of some metrics is underscored by our sustainability-focused mission, e.g. our impact on the local community and our compensation and equity metrics.

On most of the metrics, we will gauge progress primarily by comparing the change in absolute numbers to determine whether we have net positive impact on financial capital. There will be some tradeoffs between different financial metrics, so we will focus on longer-term trajectories, not simply net positive impact in each year.

We believe that making progress on these metrics is likely to be correlated with making progress on both social and the natural capital metrics. For example, economic resilience is likely to increase health and well-being and reduce stress in many areas of the College. We will need funding to reduce negative environmental impacts and advance environmental sustainability; this will require progress on one or more financial metrics. We are acutely aware that there are many ways to measure the financial sustainability of an institution. The College will continue to use numerous other financial measures to gauge its overall health and sustainability.

Natural Capital

Natural capital became a focus of the College in 1995, when the College adopted the environment as a unifying theme in the curriculum and co-curriculum. We have become a national leader in this area, but a great deal remains to be done to achieve authentic sustainability. We propose that the following four clusters of metrics constitute our primary measures for natural capital:

- Emissions & energy-related metrics

- Biodiversity & ecosystem health metrics
- Waste-related metrics
- Indirect impact metrics

The College's progress on each metric will be determined by data collected and analyzed by students, faculty, and staff on an annual or bi-annual basis. Authentic sustainability requires that we minimize negative impacts on natural capital and achieve overall a positive impact.

We have selected these metrics because we believe that they represent the main areas in which GMC impacts natural capital. They also demonstrate the potential for measuring our net impact on environmental systems at local, regional, and global scales.

DEFINITIONS AND OVERVIEW

Matt Mayberry & Jensen Morgan

Sustainability and Well-being

In the spring of 2012, the Green Mountain College Board of Trustees, Faculty Council, Student Senate, and Staff Assembly approved the Sustainability 2020 strategic plan. The objective of that plan is: “Through innovative education and research, Green Mountain College will achieve *authentic sustainability* by the end of this decade.” Our starting point last year was the well-known definition of sustainable development by the Brundtland Commission: “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p. 43). Over the past 25 years, ‘sustainability’ has taken on many meanings (Toman, 1992; Vucetich & Nelson, 2010). To many it implies sacrificing today for the sake of our descendants, but we embrace the view that we can flourish today *and* leave the world better than we found it. We had this in mind last year when we inserted the term *well-being* into our version of the Brundtland definition to describe the objective of Sustainability 2020 as “creating new models of human well-being that do not deprive future generations of the opportunity to share in that well-being” (GMC, 2012). This recasting of the Brundtland definition challenges us now to define well-being and find suitable approaches for measuring it.

Human well-being has been the subject of much research and debate, but generally it falls into two broad areas: subjective and objective well-being (Forgeard et al, 2011; Ryan & Deci, 2001). We discuss each below.

Subjective (hedonic) well-being

Subjective well-being (SWB) has been described as “all the things that are important to how we think about and experience our lives” (Rath & Harter, 2010, p. 137). Diener (2009) defines SWB as including pleasant affect (emotions), lack of unpleasant affect and life satisfaction. Various surveys have been designed to measure life satisfaction, happiness or SWB; these evaluative forms of well-being require subjects to self-assess the quality of their lives, usually over a period of time. Kahneman (1999) extends the concept of SWB to include what one experiences in daily life and uses experience sampling as an additional measurement approach. While no single survey captures all the elements of these models, the Gallup Well-being Finder (Rath & Harter, 2010) does include a variety of subjective well-being questions that incorporate both major SWB constructs (see www.wbfinder.com). See the Social/Human Capital Metrics section for a further discussion.

Subjective (hedonic) measures have been criticized as unreliable indicators of human well-being because they rely on self-reported evaluations of mental states rather than an objective assessment of the living conditions that provide people with the opportunity to thrive (Dodds, 1997). Research has also shown that happiness is a moving target, resulting in what has been called the “hedonic treadmill,” in which our expectations increase over time as we improve our circumstances (see Kahneman, 1999 for a discussion). SWB measures may also be difficult to interpret during times of change and adaptation since human struggle and anxiety are a natural part of our learning process (Schein, 1993). Thus, SWB alone may be an unreliable indicator of human progress in a world transitioning to sustainability.

Objective (eudaimonic) well-being

Aristotle’s concept of *eudaimonia* makes the distinction between satisfying human desires (hedonism) versus achieving the kind of life outcomes that are possible when individuals reach their full potential. He asserted that “true happiness is found in the expression of virtue — that is, in doing what is worth doing” (Ryan & Deci, 2001, p. 145). Sen (1993) and Nussbaum (2011) argue that what is essential for such an objective well-being is creating a just society where everyone has access to the capabilities

needed for humans to flourish. Nussbaum's list of capabilities includes life (duration); bodily health; bodily integrity (freedom of movement, safety, choice); senses, imagination and thought; emotions; practical reason; affiliation; other species (animals, plants, the world of nature); play (recreational pursuits); control over one's environment (political, material). This list of capabilities bears a strong resemblance to Maslow's (1954) hierarchy in which basic needs at the bottom of the pyramid (physiological needs, such as food and water) must be satisfied before those at the top can be satisfied (self-actualization, or "to become all you can become").

We incorporate objective well-being measures into our framework by making the connection between the capital stocks (natural, social/human, financial) and the capabilities humans need to thrive. Our assumption is that by regenerating these stocks ("giving more than we take") we enable both ourselves and future generations to have the capabilities needed to live more fulfilling lives. Second, we incorporate subjective measures of well-being into our framework by including them in the human capital stock. This is in line with the field of positive psychology, which asserts that our sense of well-being is an asset that can help us flourish (Seligman, 2011). In doing this, however, we must take care not to blindly interpret indications of "struggling" (lower SWB) during periods of change as evidence that sustainability is not being achieved. Assessing the well-being for our community will require taking a long-term perspective and telling a credible story about our journey. This leads us now to consider what we mean by *authentic* sustainability.

Authentic Sustainability

So far we have given a general account of what it is for humans to live sustainability, but we haven't specified how this applies to a specific organization or community seeking to create a model of sustainability in the context of unsustainable global systems. Our approach is pragmatic: to hold ourselves to an objective criterion — creating more good than harm in those areas we can control and understand — while allowing for the possibility that outside events and unknown factors can still cause global resource stocks to decline. Thus, even if the overall CO₂ level in the atmosphere continues to rise—despite GMC being carbon neutral — we would still claim to have a net positive impact on the atmospheric CO₂ stock. This approach suggests a criterion for authentic sustainability at the institutional level that can help us judge our impact on a global scale: If everyone else achieved our results in terms of net positive impacts, would the world be sustainable?

By combining these ideas so far, we arrive at a formal definition of authentic sustainability:

A community *C* is *authentically sustainable* during a period *t* if and only if:

- a. the stocks of natural, social, human, and financial capital within *C*'s control are increasing over *t*
- b. continuing the activities of members of *C* for multiple generations beyond *t* will likely further maintain or increase each of these stocks, and
- c. during *t*, *C* achieves a level of impact on each of these stocks such that if everyone had that impact during *t*, human society would have the capabilities to thrive for multiple human generations within the carrying capacity of the planet (all else being equal).

While this definition provides a more precise account of authentic sustainability it does not highlight the importance of human judgment in the assessment of authenticity. According to the Webster online dictionary (www.merriam-webster.com), the definition of authentic includes: "worthy of acceptance or belief as conforming to or based on fact <paints an *authentic* picture of our society>." The notion of *worthy of acceptance* is important here since it is highly unlikely that sustainability can be proven with a

single set of metrics, no matter how comprehensive. We will attempt to show convincingly that our positive impacts outweigh our negative ones in each capital area across our range of metrics. Nevertheless, because we will be comparing pluses and minuses across non-substitutable quantities, there will always be room for doubt about the overall balance. It is also highly unlikely that any community will achieve monotonic non-decreasing capital stocks in all areas simultaneously in a manner that can be sustained over the long term. At times, trade-offs between different forms of capital may even be necessary for the good of the whole.

Our judgment of authentic sustainability will be guided by the following six guiding principles:

Transparency

Even a model sustainable community will have its ups and downs. Sustainability does not mean perfection. It does mean being willing to share our progress, both good and bad, openly across our community, and where appropriate, with the outside world. While this risks unfair criticism from outsiders, we see it as an essential part of helping to create a model of a sustainable community that others can learn from.

Resilience

Short-term decreases in stocks may occur due to external forces outside our control or because trade-offs are needed in the short-term to make things better for the long-term. Resilience is the ability to bounce back from setbacks and continue moving forward. Therefore, authentic sustainability cannot be measured purely at a single point in time; it requires assessing patterns of resilience. Resilience also implies that stocks are kept above critical minimum levels needed to ensure future capabilities are maintained.

Narrative credibility

We do not believe there to be a single “sustainability index” that captures the holistic characteristics of a sustainable community. In assessing our progress, then, we will also need to tell the story of our journey to sustainability, including those things we are unable to measure, and the struggles of our journey as well as the triumphs. The story will also need to give a dynamic depiction of the interdependences between human, social, natural and financial capital and how strengthening all four has led to a more holistic well-being for the community and beyond.

Incorporates social justice

Since stocks are aggregations, they represent the average impacts of our actions on a diverse collection of people in the community. Simply requiring non-negative impact for aggregated human and social capital stocks isn't enough to guarantee a just outcome; some members of the community could be made worse off even while the average quality of life improves. Authentic sustainability must include a strong measure of social justice, where we narrow the opportunity gap within our community as well as beyond (Rawls, 1971).

Engaged community

To be authentic, sustainability must be more than a list of projects to be completed, or a series of add-ons to the academic or co-curricular agenda. Sustainability must become embraced by the community as a *way of life*. Members of the community must be engaged directly in the work of sustainability and participate directly in the decisions that impact their lives. Community buy-in is imperative.

Ongoing reassessment and improvement

Authentic sustainability also requires continuously striving to improve — looking critically at our own performance and making adjustments as needed to move forward. This brings us back to the criterion

of transparency: We must be willing to be open about not only what we are doing well but where we can do better.

Achieving authentic sustainability

We see *achieving* sustainability not as an endpoint, but rather as a significant milestone on a continuing journey. We must be able to reach the point by the end of this decade where we can say we are on a sustainable path: where our impact is net positive, and where we are on a trajectory that supports continued improvement, and where we have the resources needed for resilience.

Ultimately, for us to claim that we have “achieved” authentic sustainability will require us to tell a compelling story with integrity. We will have to show a net positive impact on stocks using a representative, though incomplete, set of metrics. We will make a sincere effort to review all important impacts, but we can’t possibly know everything about our global or long-term impacts. In cases where it may not be possible to avoid negative impacts (i.e. use of non-renewable resources or toxic man-made materials), we will need to set specific targets and show that we are on a path to eliminate their use as quickly as is feasible.

We have been aggressive in attempting to measure our environmental and social impacts beyond our campus boundaries. The educational services we provide can be viewed as part of a longer value chain, including our upstream suppliers as well as the downstream impacts of our graduates. Our metrics include early attempts to quantify the impacts of our purchasing decisions (e.g. embedded energy in food). We also attempt to chart new territory by assessing the impact of our environmental liberal arts education on the carbon footprint of our alumni. This follows similar approaches used in industry such as Life Cycle Assessment (LCA). This type of comprehensive environmental impact analysis is new for higher education and will require significant development work.

While our metrics framework has been organized around the three categories of capital (natural, social/human, and financial), these categories do not have rigid boundaries; they are interconnected. There are synergies between them as well as trade-offs since decisions in one area often affect the others (e.g. building a biomass plant to preserve natural capital requires financial investment). While we have attempted to group the metrics in a reasonable manner, several of the metrics could easily have been assigned to a different category (e.g. Affordability metrics could have been classified under Human Capital). In the end, the exact categorization of metrics isn’t as important as understanding their relationships.

Figure 1 below depicts the three forms of capital as contributing equally to authentic sustainability (and thus human well-being). This should not be taken to imply that human well-being should take priority over the health of the biosphere, including other living species. Ultimately, natural capital (including biodiversity) determines our long-term survival and ability to thrive. Rather, this framework represents our pragmatic approach in establishing a model for institutional sustainability. For GMC, such a model (in today’s world) requires that we strengthen our resource stocks in all three areas to remain viable as an institution while contributing to long-term human well-being. We still assume in this framework a cautionary and respectful stance towards nature, in which we acknowledge that the intricacies of the biosphere extend beyond those parts that provide us with ecosystem services.

A Closed-loop process

Metrics are just one part of a closed-loop process we will need to assess our progress and guide our actions going forward. Such a process includes:

- ensuring that essential data is collected and validated
- analyzing the data for trends across all domains
- comparing results with targets and milestones
- telling a holistic story about our progress
- adjusting our actions going forward based on what we learn

In addition, we will seek to follow our guiding principles for authentic sustainability throughout this learning process (see Fig. 1).



Fig. 1 A closed-loop process to guide progress toward authentic sustainability

In addition to the metrics we outline in this paper for each of the capital stocks (social/human, natural, financial), the story we tell about our progress must also include a cultural assessment of our community. This can include “meta metrics” that compare our *actual* progress in each of the capital areas with *perceptions* of our progress. It can also include survey assessments that track how the knowledge and beliefs of our community change over time as we progress with our transformation (see the Social Capital metrics section).

Reaching our objective by 2020 will also require oversight to ensure that the closed-loop process above continues to work effectively and that the community is engaged in all steps of the process. Such oversight could be provided by a steering committee made up of community representatives, including students, faculty, staff and administration.

Creating a closed-loop measurement system will be an important part of implementation planning for Sustainability 2020, but we will not address it further in this paper. We focus here primarily on the metrics framework itself. In the following sections we outline a proposed set of metrics for each of the capital areas that we believe are necessary to characterize our community’s trajectory of authentic sustainability.

HUMAN AND SOCIAL CAPITAL METRICS

Aaron Witham and Bill Throop

We propose that the following seven human/social metrics plus the alumni impact metric constitute our primary measures in this area:

Human Capital

The capability of individuals to reach their full potential and advance institutional goals:

- Health and well-being
- Personal Development
- Grit

Social Capital

The capability of a community to work together to create a better shared future:

- Trust
- Associations
- Diversity and inclusion
- Effectiveness of Telling Our Story

Alumni Impact

The impact of a GMC education after students graduate:

- Impact of education on students' lives and students' impact on the world

Each metric will be briefly explained and justified below. The College's progress on each metric will be determined largely by surveys of students, faculty, and staff, typically administered every two years. We will also survey members of the Poultney community, though less frequently, to assess the College's impact on the town's human and social capital. In addition to surveys tailored to the metrics, the College will use an array of secondary measures from NSSE, SSI, and demographic data collected by the office of institutional research.

The metrics described below are identified by the general topics to be surveyed, not by specific survey instruments. We will need social scientists on staff to help us tailor national survey items to our context and create reliable surveys that can be used effectively with our populations.

Human Capital

Health and Wellness Index

The human capital of an organization depends in part on the health and wellness of its members, because these measures tend to be correlated with employee development and productivity. Sometimes human capital is distinguished from, and correlated with health capital, but we will treat the latter as an element of human capital (see Bleakley, 2010 assessed at <http://popcenter.uchicago.edu/pdf/arec18.pdf>). The Gallup-Healthways Wellbeing Index has been used nationally and internationally to measure multiple dimensions of wellness, including life evaluation, emotional health, physical health, work environment, healthy behavior, and access to basic necessities. It is being used at a few colleges, though not as part of a measure of human capital as far as we know. Since developing a cross-college emphasis on health and quality of life is a key initiative of the strategic plan, we need a metric to determine how the College culture reflects this emphasis.

The well-being index includes the Cantril Self-Achieving Scale (Cantril, 1965), which assesses where one stands on a ladder which represents the range of best to worst possible lives. Survey respondents assess their position on the ladder now and what they anticipate regarding their position on the ladder in five years. This provides a measure of subjective well-being, which we think is an important part of

human capital. The Index also accounts for a range of other dimensions of human capital as perceived by those taking the survey. These include the following:

- During the last thirty days, for about how many days did poor health keep you from doing your usual activities?
- I have the resources I need to do good work every day.
- I have too much stress in my life.
- I feel safe drinking the water and breathing the air in my community.

Grit Scale

(Duckworth et al., 2007; Hollenbeck et al., 1989; Lufi & Cohen, 1987; James, 1907)

Passion and perseverance in pursuit of a goal – now commonly called “grit” – is an important virtue in those who aim to promote social change and to advance the sustainability transition. It is also correlated with life success. Psychological research has increasingly found that intelligence is a weaker predictor of achievements than previously thought (Terman & Oden, 1947; Hough, 1992). For example, even studies in the 1940s began to find that perseverance and self-confidence more effectively predict individuals’ success as professors, lawyers, and doctors than IQ (Terman & Oden, 1947). Duckworth et al. (2007) argue that the most prominent element of the non-cognitive predictors of achievement is a characteristic they call “grit.” Closely related to the concept of self-efficacy (Bandura, 1977), grit is individuals’ ability to maximize their skills in pursuing their goals, regardless of setbacks or the limits of their intelligence (Duckworth et al., 2007). A validated way of measuring grit is through Duckworth et al.’s grit scale, which includes a series of 8 or 12 statements. It was written to be applicable for both adolescents and adults, and non-specified environments, such as work or school. Respondents are asked to provide their level of agreement with the statements through a five-point Likert scale.

Correlates: As a predictor, grit relates to success in academic pursuits, as it is strongly correlated with higher GPAs (Duckworth et al., 2007). Grit is also a strong predictor of success in a rigorous summer training program at West Point military academy, and in the long, arduous Scripps national spelling bee in 2005 (Duckworth et al., 2007). But, can Green Mountain College affect such a seemingly inherent trait? The answer is probably yes, as Duckworth et al. (2007) found that grit can be strengthened through education. Moreover, in experiments where children were praised for their efforts rather than their intelligence, they became “energized in the face of difficulty” and earned higher grades over the next two years than the ones praised for intelligence (Mueller & Dweck, 1998). Green Mountain College could attempt to affect grit by providing more opportunities for students, faculty, and staff to engage in entrepreneurial projects and stronger feedback loops on project evaluation. We recognize that achievements should still be an important part of evaluation, but that its importance could be scaled back. In a later study, Blackwell and Dweck (2007) designed an experiment where struggling seventh-graders were taught about how learning can create new connections in the brain that lead to success. The experimental group achieved marked increases in grades after the event, suggesting that Green Mountain College may also be able to affect students’ level of grit through the design and implementation of our curriculum, campus activities, and staff training on how to approach students.

The grit scale includes questions like the following:

- I have overcome setbacks to conquer an important challenge.
- I have difficulty maintaining my focus on projects that take more than a few months to complete.
- I am a hard worker.

Personal Development

Personal development is a broad metric that attempts to measure a range of items that lead to a meaningful life, having a productive career, and building a more sustainable society.

- a. Real world problem solving/critical thinking/creativity
- b. Systems thinking/sustainability skills and knowledge
- c. Entrepreneurial skills, including leadership, economic analysis, and grit
- d. Breadth of knowledge – appropriate to liberal arts education for students and appropriate for advancing college goals for faculty and staff
- e. Depth of knowledge in areas of primary expertise – majors for students, specific job responsibilities for faculty and staff

Many of these items have roots in the literature on intellectual capital, which often encompasses employees' competence and attitude toward fostering their company's success, as well as the processes and structure that the company uses to support this development (Edvinsson & Malone 1997). The items proposed in this section reflect the value in traditional intellectual capital measures, but also reflect the importance of creative spirit, ability to comprehend complex issues, and real world problem solving skills that are needed for both employees and students to make meaningful contributions to the world while living fulfilling lives.

Correlates: Researchers have found that when people with creative potential are provided the appropriate support and given challenging tasks, they can produce more creative work (Oldham & Cummings, 1996). Those same workplace variables are correlated with retention and overall job performance (Oldham & Cummings, 1996). Creativity may also be a function of relationships with coworkers, rewards, evaluation, goal setting, spatial configuration in the workplace, and support for self-efficacy (Shalley et al., 2004).

Many authors suggest that fostering intellectual development among employees correlates with increased market value for a company, a stronger customer base, and the ability to continue surviving in the future (Chen et al., 2004; Edvinsson & Malone, 1997; Luthy, 1998). The OECD (2012) finds a strong link between level of formal education and well-being in countries around the world. Other authors find correlations between formal education and life satisfaction (Adams, 1971; Light et al., 1985). Even when education is broadly defined to include informal intellectual development, it has been linked to a general sense of happiness or well-being (Michalos, 2007).

Student personal development is measured by a wide range of data sources that Green Mountain College already collects, such as ELA assessments, NSSE, and SSI. Data from these existing surveys will be examined within the framework of the content areas listed above. An additional survey will measure the personal development of staff and faculty.

Survey questions will not only attempt to assess how well people are developing in the target areas listed above, but also if they are being provided with adequate opportunities and support for development (e.g. adequate training, opportunities for creativity, opportunities to further work-related education, opportunities to support personal interests in the pursuit of knowledge, etc.). Most of the questions will likely ask respondents to indicate their agreement with statements by using a Likert scale. Statements may include the following:

- My skills are used well in my work on campus
- The campus facilities are appropriate for my needs
- The College provides an environment that fosters entrepreneurship

- I am broadening my sustainability skills and knowledge through College events, trainings, and everyday work duties

Social Capital

Associations/“Ties”

(Paxton, 1999; Wasserman and Faust 1994; Breiger 1974)

Associations or ties are the basic building blocks of social networks (Knoke & Yang, 2008; Scott, 2009). They may be defined as the connections between people representing any of the following: exchange of information, talking on the phone, sending emails, spending leisure time together, or engaging in friendship with one another. More connections between people indicates dense social networks and dense social networks are associated with higher social capital in many studies (Putnam, 1995; Coleman, 1988), especially networks that bridge structural holes between groups (i.e. creating connections where there were previously gaps) (Burt, 2000).

We’re proposing to measure the associations among students, faculty, staff, and town members with a method that closely resembles Paxton’s (1999) model based on a survey asking people about the number of evenings they spend with others. Paxton stresses the importance of measuring not only ties within one’s own community, but ties with other communities. We would aim to use similar questions and hope to achieve high numbers of interactions, indicating a robust social network. The quality of these ties or interactions is also important, and it will be captured in the next metric that examines how much people trust each other. Quality of ties may also be measured by the context of the associations. For example, some surveys ask respondents to indicate how often they volunteer or attend meetings that have an obvious benefit to the college community. Such a measure will not assess the upstream and downstream impacts of college operations on the social capital of distant peoples, but we will continue to use secondary measures such as fair trade purchasing to assess such impacts.

Correlates: A higher frequency or density of ties between people may indicate network strength and an increased ability for people to help each other reach their goals, share information, or gain resources (Coleman, 1988; Burt, 1992). We recognize the inherent tradeoffs in increasing the density of a network, as denser networks may also force people to compromise more, limiting individual autonomy (Sandstrom & Carrlson, 2008; Rowley, 1997). The composition of a network also poses tradeoffs: heterogeneous networks may be good for inspiring creativity, but limiting for efficiency, while homogeneous networks may yield the opposite (Sandstrom & Carrlson, 2008). Despite these tradeoffs, all else being equal, the majority of scholars claim that denser networks with more frequent interactions are preferable because of their ability to provide a public good to network members by connecting members to valuable resources and information.

Potential survey questions may be adapted from Paxton’s (1999) model or the Social Capital Community Benchmark Survey (2002), and could include the following:

Paxton’s (1999) model survey questions:

- How often do you spend a social evening with someone who works, lives, or goes to school at Green Mountain College?
- How often do you spend a social evening with someone from the Poultney area who does not work, live, or go to school at Green Mountain College?
- How many times in the past twelve months have you attended a campus event, or activity?

Trust

(Paxton, 1999; Colquitt, Scott and LePine, 2007)

Trust scales measure an important component of social capital (Paxton, 1999), which is related to the efficiency of collaborative enterprises. Coleman (1988) describes trust as the extent to which people have confidence that obligations will be repaid after interactions. Other things being equal, when members of a group have high degrees of trust in each other, their transactions tend to be smoother and more efficient; low trust groups tend to require a range of regulatory and self-protective measures that increase transaction costs. The trust scales used in Paxton (1999) measure both interpersonal trust and trust in institutions; they also look at trust within a group and between different groups (e.g. within the student body and between members of the student body and people in town).

While there is a robust literature on levels of trust in the U.S. and across cultures, we have not found trust scales focused specifically on college environments. Thus we will need to adapt a standard measure of trust to meet our needs. These will contain such items as the following:

- Generally speaking, would you say that most people on campus can be trusted, or that you can't be too careful in dealing with people?
- I see myself as someone who is generally trusting.
- Please tell me how much you personally trust each of the (following) institutions:
 - Student government
 - The faculty
 - The administration
 - Townspeople

Diversity and Inclusion

(Roberson, 2004; Thomas and Ely, 1996; Cox, 1993)

The diversity and inclusion metric measures the range of demographic differences (e.g. race, religion, sexual orientation, political value system, etc.) represented in an organization and the effectiveness with which those differences are utilized to advance the organization's mission. Diversity and inclusion are an integral part of the social capital of an organization which serves an increasingly diverse clientele and needs to harness the creativity embedded in multiple perspectives and bring it to bear on organizational issues.

We propose to measure diversity and inclusion with demographic data about students, faculty, and staff that are already collected by the College and with a survey that includes a subset of the items used for the studies described in Roberson, 2004 (accessed at <http://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1011&context=cahrswp>). These include survey items related to diversity and inclusion training, leadership commitment to diversity, respect for differences, shared commitment to organizational goals, representation of different demographic groups, equal access to opportunity, and collaborative conflict resolution processes. We will need to refine the list of items and do a pilot survey this spring, which may lead to further refinement.

We may also choose to add some items from the Miami University Diversity Awareness Scale (Mosley-Howard, 2011). This scale was created for the higher education context and has established reliability and validity. It focuses on personal attitudes, emotions, and beliefs regarding diversity rather than on the inclusiveness of a campus culture. It includes items such as:

- I recognize the privileges I might enjoy because of my race, class, gender, sexual orientation, lack of disability, etc.

- I am aware of my own culture and ethnicity.
- I check myself to see if an assumption I am making about a person is based on facts, not stereotypes about a group.

Finally, the survey instrument must include questions about how well GMC is engaging diverse political philosophies in discussions in and out of the classroom. Small schools like GMC can sometimes be dominated by one prevailing ideology. A healthy liberal arts environment will foster discussion from various value systems.

Effectiveness of Telling the Story of Authentic Sustainability

In order to assess how effectively members of the College community are telling the story of progress toward authentic sustainability, the interpretation of that story among the College community and the outside world needs to be assessed. Three questions identify different aspects of an effective institutional narrative. First, do the audiences perceive progress toward the goal of authentic sustainability? Second, do the audiences identify with the goal of authentic sustainability and strategies for achieving it? Third, are the audiences personally engaged in helping the College achieve authentic sustainability? Ultimately, progress will depend on a high percentage of the population perceiving progress, identifying with the goal, and personally engaging in activities to achieve the goal. This understanding and ownership represent a mobilization of the College's social capital.

Understanding and ownership within the GMC community in response to implementation of the strategic plan is a key element of the community's social capital. They signify a shared understanding of and motivation to pursue the common goal of authentic sustainability. Resources from the community are more readily available for the social network as a whole to pursue a common goal when self-understanding and self-appreciation for that goal are present.

Similarly, enhanced external understanding and a shared belief in the value of GMC's activities also benefits the College's effort to achieve authentic sustainability. Social capital within a community does not exist in a vacuum. Rather, social capital is also a function of ties or associations with other people and institutions outside of a community. The external perception that Green Mountain College is progressing toward goals that benefit people beyond their immediate community may result in outsiders sharing useful resources with the College, reciprocating useful partnerships with the College, or spreading the word that the College is worth positive attention. But, even beyond the benefits of reciprocity with the outside world, Green Mountain College also wants to share the model of authentic sustainability in situations where no obvious benefits accrue to the College because it wants the model to benefit society at large and for elements of it to have a positive ripple effect as multiple institutions adopt portions of it and share those elements with others.

Measuring the effectiveness of telling the story internally (among the GMC community):

Survey questions administered every two years will be used to assess changes in the effectiveness of telling the story internally. Questions will assess whether or not progress is being perceived, how much people identify with the goals, and how engaged they are in helping those efforts.

Perception of progress could be measured by the following questions applied to each of the capital stocks (social/human, natural, and financial):

- If social capital is defined as the amount of trust and associations between people, what do you think the general level of social capital at GMC is? (very high, high, medium, low, very low)
- Over the last two years, do you feel the social capital stock of GMC has... (increased substantially, increased some, stayed the same, gone down, gone down substantially)

Level of buy-in to the goals or implementation process of the strategic plan could be assessed with the following type of question:

- To what extent do you identify with the goal of authentic sustainability and GMC's strategies for working toward that goal? (a lot, some, not much, not at all)

Level of engagement in the process could be assessed with the following type of question:

- To what extent are you personally working to achieve authentic sustainability at GMC? (a lot, some, not much, not at all)

Measuring the effectiveness of telling the story externally (to the outside world):

To measure the effectiveness of telling the story externally, we propose the formation of a focus group consisting of town, state, national, and international sustainability experts, as well as people not well versed in sustainability. This approach seems more useful than a survey because a national or international survey would likely not yield a large data set and the data will likely be skewed. It also seems more useful in that it would provide detailed information about perceptions, rumors, and suggestions for improving communication. This focus group would convene during the eighth year of the plan at a minimum, and may also convene during the fourth year.

Impact of Alumni

Impact of Alumni on Social & Human Capital

We recognize that our most significant impacts on the world likely occur when our alumni leave Green Mountain College and carry-out their lives, using the experiences and skills they gained from their education to affect the world around them. We also recognize the effect a GMC education has on the personal well-being of our graduates. In an effort to understand how significant these impacts may be in the social/human capital domain, we propose a short addition to the standard alumni surveys that the Office of Institutional Research carry out. Questions may encompass some version of the following and would likely have Likert scale answers:

- How strong a sense of community do you have with others in your area?
- To what extent are you involved in increasing the social, economic and/or environmental sustainability of the communities/organizations of which you are a member?
- To what extent do you feel the majority of your life activities are meaningful? Or how satisfied are you with your current lifestyle?
- Do you have enough money to live comfortably now?

In an effort to estimate the impact of a GMC education on global natural capital, we propose a modeling methodology for comparing the carbon intensity of our alumni per unit of their income to the average American's carbon intensity per unit of income. For more on this methodology, please see the alumni impact section under Natural Capital Metrics.

FINANCIAL INDICATORS FOR SUSTAINABILITY 2020

William Throop & Sharon Hoffman

We propose that the following seven clusters of metrics constitute our primary measures for financial capital:

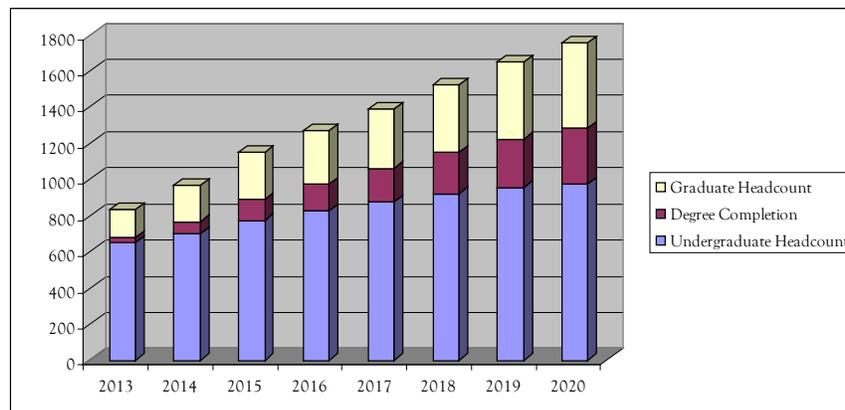
- Enrollment-related metrics
- Revenue/expense metrics
- Financial resilience metrics
- Affordability metrics
- Compensation and equity metrics
- Economic impact metrics
- Built environment metrics

Each metric will be briefly explained and justified below. The College's progress on each metric will be determined largely by annual benchmarking based on end-of-year fiscal results. We have included two graphs to illustrate the kinds of trends we are projecting, based on projections from the eight-year plan budget. The specific numbers will be updated as we revise our projections based on current performance.

Enrollment-related metrics

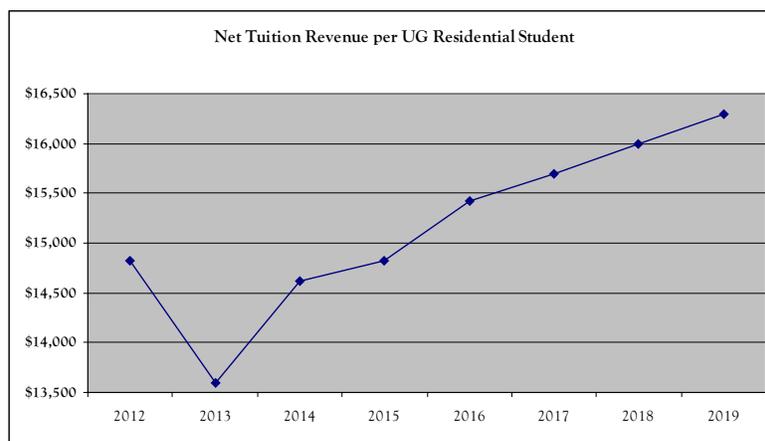
Total enrollment – residential and online

Although diversification of revenue streams is a key goal of our plan, enrollment will continue to be the primary revenue source for the College. Thus, our financial sustainability will depend on how successfully we can build enrollment. One focus will be building the undergraduate residential student body to 1,000. This increase will create greater resilience to external shocks. It will enable us to provide more programs to attract and retain students, while supporting our small community feel. The residential college will remain at the heart of operations. As part of its affordability initiative, the College aims to expand its online programs, building on the success of its online masters programs. These programs enable us to reach students who cannot come to Poultney. In most cases, they will be less costly than residential programs, and they will return revenue to support the residential programs and increase resilience in the face of changing demographics. The total enrollment metric tracks the undergraduate and graduate online and residential enrollments. It provides a primary indicator of the health of the institution.



Net tuition per student revenue – all programs

Enrollment must be partnered with net tuition to provide a picture of the revenue the College has to fund the bulk of its operations. This metric illustrates how much revenue the College is generating on average per student in UGR, UG online, and graduate programs. This metric can help the College to determine future tuition and discount rates. From 2000 to 2010, net tuition per UGR student increased annually as we have maintained our price position relative to our peers. Since 2010, the need to increase affordability and remain competitive with our peers has led us to increase our discount. Our projections show modest decrease in UGR net tuition per student early in the plan and then modest increase later in the plan. As our total UGR cost (tuition, fees, and room and board) exceeds \$40,000, we need carefully balance affordability with providing the funds to meet plan objectives. Currently we do not have significant discounts for our online programs.

**Revenue/expense metrics***Total Revenue/total expense*

One basic measure of the fiscal sustainability of an organization is its ability to preserve its financial assets over time, leaving as much or more for the next generation. The standard way of accomplishing this is by generating more total revenue during a period than one's expenses over the period. Sometimes however it is wise to invest more during one time to enhance revenue later. Green Mountain begins its plan with such investment with the view that the returns will exceed expenses by ever greater amounts during the last five years of the plan.

Revenue from UGR, graduate, degree completion/expenses by program

There are three distinct sources of tuition revenue indicated by the enrollment metric – undergraduate residential programs, online graduate programs, and online degree completion programs. Each program generates substantially different revenues due to differences in enrollments and tuition costs. The purpose of this metric is to determine the revenue generated by each area and the total expenditures in that area, resulting in a “profit” or loss for that program.

Total funds raised/fundraising expenses

While the institution primarily relies on tuition revenue, it also raises funds for operations and for special projects and capital expenses. The \$10,000,000 capital campaign that is a center piece of the plan will fund infrastructure improvements that will help to build enrollment. Strengthening fundraising enables the College to achieve its goals while enhancing affordability.

Camps and conferences: Revenue/expenses

The strategic plan calls for optimizing the use of the campus and facilities year round. We are adding to our successful summer MMLA program three additional weeks of academic camps. Our net revenue from camps and conferences will be used to assist affordability measures.

Financial resilience metrics*Total net assets*

The total net assets metric is a measure of the College's overall balance sheet. If achieving sustainability involves having net positive impact financially, then this metric is our single best guide to our annual impact on the College's financial worth. This is what we leave financially for those who come after us. Green Mountain College saw financial hardship during the late '90s and early '00s, which resulted in negative net assets. Since then, our total net assets have steadily increased, with a significant increase at the end of 2007 when we completed a comprehensive fundraising campaign. For each of the ten years preceding 2012 we produced a surplus, which has increased our net worth. The recent recession has resulted in a slight reduction of net assets.

Primary reserve ratio

The primary reserve ratio measures the availability of expendable net assets to cover expenses. It is calculated by dividing expendable net assets (total assets minus restricted assets and capital assets) by total expenses. The higher the ratio, the better the college can withstand a financial shock, such as lower enrollments. We dramatically increased this ratio over from 2000 to 2010. A positive ratio was achieved in 2007 and reached a peak in 2009.

Affordability metrics*Total cost of UGR/total financial support per UGR student*

Increasingly colleges are charging prices that fewer students can afford to pay. These charges are based on steadily increasing operating costs and low gains in efficiency. Sustainability requires that on average students are able to acquire a Green Mountain education without so burdening themselves with debt that they cannot lead decent lives. One response to this is to increase financial support for students through institutional grants, Pell grants, SEOG, and opportunities to earn money at the College. This metric assesses the total cost for a student to attend Green Mountain College compared with the total average amount of financial support available per student. The goal is to achieve a narrow enough gap between the two so that enough students are attracted and retained to enable the College to accomplish its mission. We do not measure the online programs in this measure because they are priced in ways that are more affordable.

Percent of need met

This metric determines the amount of need demonstrated through submission of the FASFA and the average percentage of need met through institutional grants, Pell grants, SEOG, and work study. The FASFA enables the College to calculate the expected family contribution based on a family's income, assets, and number of children in college. It is calculated annually for our entering classes. We can increase the average percent of need met either by increasing the available financial aid or by having more students who can cover a greater portion of college costs, thereby enabling us to distribute more aid toward those with demonstrated need.

Compensation and equity metrics

Increase in salary (2012-2020) faculty and staff

Economic sustainability depends on our being able to attract and retain high quality employees that enhance the College's intellectual capital and enable it to meet its financial goals. Currently salaries are low compared to other baccalaureate institutions. The College aims to raise salaries while also being mindful of the negative effect that may have on affordability, which can be mitigated by increasing efficiency.

On standard accounts of social justice, two criteria involve financial measures. The first is that the lowest paid employees are paid enough to live decent lives, and the second is that compensation is allocated fairly. Multiple variables affect the fairness of the distribution of compensation including need, merit, equity, and market rates. The College aims to balance these variables, and thereby to approach market rates for compensation given our rural location, while minimizing the gap between the compensation of those at the top and the bottom.

Economic impact metrics

Economic impact on Poultney/economic impact on region (100 mile radius of college)

The town of Poultney is a critically important partner in achieving sustainability 2020. As the College grows, it hires more local employees and spends more locally, thereby benefiting the town economically. An increasing number of our graduates remain in the area and start businesses that add to the College's economic impact on the town. At the same time, enhancing the vibrancy of Poultney as a college town helps the College to attract and retain more students. This positive feedback loop can be partly assessed by measuring the annual economic impact that the College has on the town. Since many employees live outside the town and spend money elsewhere in the region, it makes sense to calculate total economic impact on the region. For purposes of defining the relevant region, we suggest using a 100 mile radius, which accords with some measures of local food purchasing and captures most of the impact of our employees.

Economic impact of investing

The College invests its endowment largely through mutual funds. The socially responsible investing (SRI) committee works with the CFO to make recommendations regarding the impact of investing; currently 15% of investments are in an SRI fund. This committee will evaluate the impact of investment decisions and makes recommendations for changes. As part of the Billion Dollar Green Challenge, \$30,000 of the endowment is invested in a green revolving fund. The campus sustainability council monitors the impact and savings of projects funded by this mechanism.

Built environment metrics

Capital investment/depreciation

The financial sustainability of an institution depends on making targeted investments in facilities and information technology that offset depreciation and have a positive impact on achieving its mission. The strategic plan calls for making significant capital investments that enhance enrollment and education, in part with funds raised through a capital campaign.

Over the last decade, the College has spent approximately \$1,000,000 per year on capital projects. Additionally, in 2009 – '10, the College made an investment of approximately \$6,500,000 to build a biomass plant and renovate SAGE Hall. This promised to reduce annual operating costs, enhance the

student experience, and increase sustainability by reducing CO₂e emissions. It was paid for by refinancing the College. These investments have increased our annual depreciation to approximately \$1,300,000 per year. The depreciation will be more than offset by investments in built capital projected by the plan. Thus, the plan calls for leaving the built environment better than it was in 2012. Since these investments will result in part from a major fundraising campaign, we anticipate the ratio of investment to depreciation to vary from year to year, as some projects are completed and new ones are planned.

NATURAL CAPITAL METRICS

Kenneth Mulder, Steve Letendre, Jim Graves, Meriel Brooks, & Sarah Mittlefehldt

Natural Capital

Natural capital is premised on the notion that the biophysical world has value that traditional economic models often fail to account for. Natural capital comprises the sum total of natural resources and systems that contribute to human welfare, many of which are critical to human existence (Costanza et al., 1997; Howarth and Farber, 2002). Natural capital stocks serve as the basis for ecosystem services such as erosion control, carbon sequestration, and water filtration (see de Groot et al. 2002 for a typology). Many of these services are not captured by traditional economics—they are free until we lose them.

The importance of natural capital to human wellbeing has been demonstrated by efforts in the field of ecological economics to assess its value. Robert Costanza led a study to estimate the value of the world's ecosystem services and natural capital. The results of the study were published in the journal *Nature*, which conservatively estimated the value of the world's ecosystem services and natural capital to be \$33 trillion US dollars annually (Costanza et al. 1997). This recognition of the economic value and intrinsic worth of natural capital stocks is essential to GMC's vision of how best to address our use of natural capital moving forward toward our Sustainability 2020 goal.

It is important to note that because of the complexities and systems dynamics inherent in ecosystems, many scientists believe that the services provided by natural capital cannot be replaced with built systems. Herman Daly (1991) argues that natural and human-made capital are in fact complementary—losses in either one ultimately mean a reduction in our capacity to meet our needs and wants. This has led to the concept of strong sustainability which requires the maintenance of natural capital stocks, a precondition which we also assume for authentic sustainability.

Currently many of the earth's natural capital stocks have been depleted to a point at which the services they provide are significantly impaired. Indeed, many posit that we have exceeded the earth's carrying capacity implying that critical stocks are in decline that will ultimately reduce the size of the human population the earth can support (Wackernagel and Rees 1994). For this reason, authentic sustainability requires that Green Mountain College eliminate its negative impacts upon natural capital stocks and contribute to the restoration of important stocks that are in decline.

Assessing Our Impacts upon Natural Capital

Figure 1 shows the primary natural capital stocks we believe GMC is impacting arranged by geographical location relative to campus. The diagram also shows to whom the benefits of these different stocks accrue (light green vs. dark green) and whether they are impacted directly through on-campus emissions or resource usage (red line) or only indirectly through consumption. Note that the light green stocks also have benefits accruing to the GMC community, but the benefits are more diffuse and shared by a much larger community.

An important distinction is to be made between nonrenewable stocks which, once depleted, will not be available for future generations to utilize to meet their needs (e.g. fossil fuels) and renewable stocks which recharge within a timeframe relevant to humans (e.g. timber production or waste absorption). Herman Daly (1991) describes a management framework for these distinctive forms of natural capital. Specifically he argues that nonrenewable resources be used at a rate no greater than that at which renewable substitutes are being developed, while renewable resources should be used at a rate that is equal to or less than the rate at which the resources regenerate.

In an effort to be consistent with this framework while being able to conservatively assess when authentic sustainability has been reached, we define the following as a goal for GMC's impacts upon natural capital:

- For non-renewable stocks, GMC should steadily reduce its impact until such time as it becomes apparent that sufficient renewable substitutes have been developed before 2020;
- For renewable stocks, GMC should steadily reduce its impact until evidence emerges to show the stock is no longer in decline.

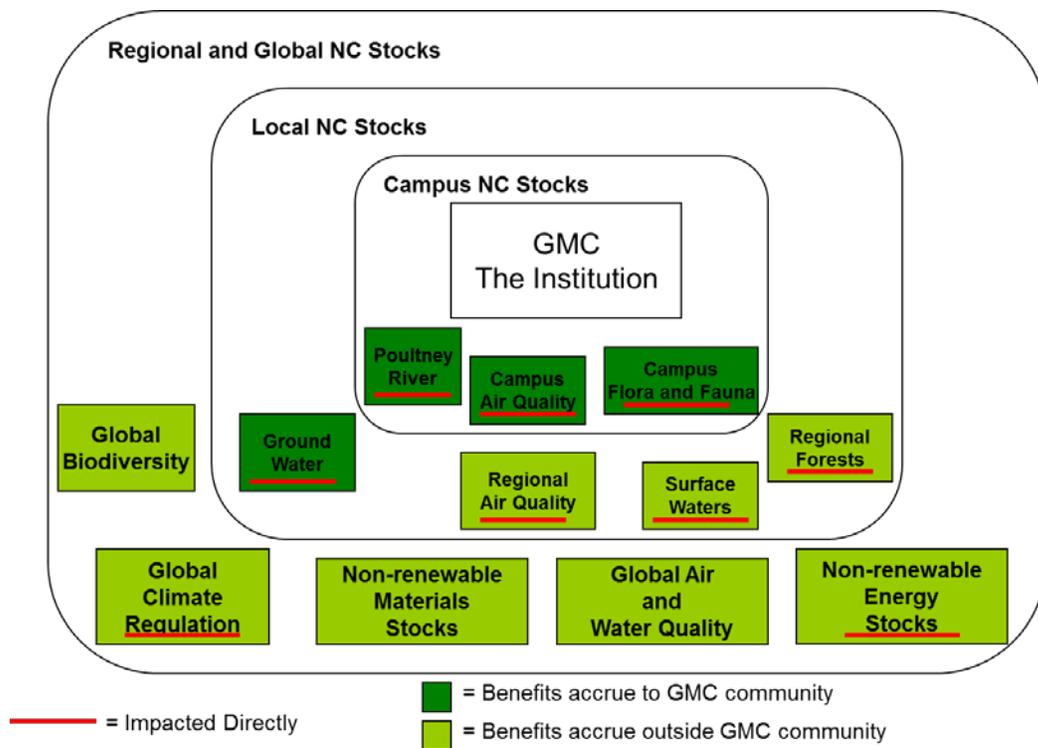


Figure 1. Natural capital stocks impacted by GMC

In order to capture a representative range of kinds of natural capital, we propose nine metrics categorized into four groups by impact: emissions and energy-related metrics, biodiversity and ecosystem health metrics, waste-related metrics, and indirect impact metrics. With the last group, we

believe we are the first college in the country to attempt a broad assessment of the impacts related to our purchases. We are confident that this suite of metrics will enable us to assess when GMC has reached a point of neutral or positive impact upon the environment by 2020.

Emissions & Energy-Related Metrics

Metric 1: Annual Carbon Dioxide Equivalent Emissions in Metric Tons (Scope 1, 2, and limited Scope 3)

As an institution, sustainability requires that we achieve climate neutrality, whereby our activities do not increase the stock of greenhouse gases (GHGs) present in the atmosphere. In 2007, Green Mountain College signed the American College and University President's Climate Commitment (ACUPCC). Our 2009 "Climate Action Plan" called for the College to accelerate its drive to climate neutrality achieving the goal in 2011. A stable climate is one of our most endangered and critical natural capital stocks, and we recommend that we continue to use the methodology Green Mountain has adopted for prior GHG inventories to continue to assess our impact upon our global climate.

Note that the current GHG inventory encompasses limited "Scope 3" emissions, accounting for faculty and staff commuting, off campus student commuting, and air travel associated with travel courses. Broader accounting of our Scope 3 emissions takes place in the Indirect Impact Metrics (Metrics 7-9).

Metric 2: Annual Use of Fossil Fuels from Stationary and Mobile Sources of Campus Owned Assets in Gallons

One of the most important non-renewable stocks to human welfare and development is our stock of fossil energy sources. Indeed, energy consumption is strongly correlated with many measures of human development (Giampietro et al. 1997). To preserve the capabilities of future generations, it is imperative that renewable stocks be developed to replace non-renewable stocks. The campus has already made significant investments in passive and active solar systems as well as in other systems (e.g. wind and animal power).

We will track our direct consumption of fossil fuel sources on campus as well as by the campus-owned fleet. This data is already being tracked as part of the carbon inventory. This metric should decline steadily through investments in renewable energy systems and efficiency as well as through a decline in general consumption.

Biodiversity & Ecosystem Health Metrics

Metric 3: Campus Biodiversity and Ecosystem Health Index

The ecosystems directly under our management provide a wide variety of ecosystem services including habitat maintenance for thousands of species, gas and climate regulation (e.g. cooling and cleaning of

campus air), biological control (e.g. pest regulation on campus and on farm), food production, spiritual and aesthetic values, and recreation, just to name a few. Many of these services are directly correlated with ecosystem health and on-campus biodiversity (ECC 2000). For example, plant community diversity is linked to the rich diversity of insect consumers not seen on invasive non-native plants (Tallamy 2007), and pest control in agriculture is an ecosystem service derived from a diverse web of consumer species (Vandermeer et al. 2010).

The college will develop a suite of biodiversity and ecosystem health indices that will correlate with the provision of valuable ecosystem services such as the aesthetics and recreation associated with the Poultney River as well as important aspects of ecosystems that do not directly benefit us now, or whose loss will not harm us soon (Raudsepp-Hearne et al. 2010). The indices can be easily and periodically updated by trained teams of students and will be compared to their baseline values over time to estimate our net impact on our ecosystem stocks.

The data collected in this process will be maintained through publicly accessible narratives, databases, and maps of the natural capital of the college. Resources will include working species lists by land cover type, documentation for species of concern, curricular programs such as the Campus Flora Project and the GIS course, extra-curricular initiatives such as the BioBlitz (2012), and management goals and policy. In general, the indices will encompass all of the approaches addressed by the Global Strategy for Plant Conservation (CBD 2002) and the Sustainable Sites Initiative protocol (SITES, ASLA 2009).

Metric 4: Regional Biodiversity and Ecosystem Health Index

The College campus is embedded in a broader ecological matrix to which we contribute both positively and negatively. The College will monitor its impact on surrounding ecosystems in addition to on-campus ecosystems. For example, in 2011, the College began working with the Hubbard Brook Research Institute on the Poultney Woodshed Project. The goal of the initiative was threefold: 1) to promote the college's commitment to carbon neutrality by finding a local, sustainably harvested supply of biomass for the new co-generation plant; 2) to promote the local forest economy by helping to develop a market for low-grade wood products; and 3) to promote a community-based energy movement in rural Vermont. By the 2012-2013 heating season, the College ensured that well over half of woodchips burned on campus were being sourced locally.

Another way in which the College affects regional biodiversity and ecosystem health is through the native plant nursery. The nursery was created in 2012 to provide native plants grown from local seed sources that will be available for restoration and vegetative buffer plantings in the Lake Champlain Basin. Some of the goals of the native plant nursery are to increase participation of residents, farmers, and municipalities in the effort to reduce phosphorus and contaminants while increasing ecological diversity and improved water quality.

To assess the impacts of the biomass plant, the native plant nursery, and similar projects on regional natural capital stocks, we propose that the College monitor indicators of regional ecosystem health in areas affected by College activities and thereby provide on-going assessment of natural capital stocks in those areas. The College will collaborate with regional partners to address their most important

ecological and management-oriented questions, and with community partners to develop socially and politically appropriate metrics.

Waste-Related Metrics

Metric 5: Total Waste Diversion Rate

Waste production impacts many ecosystem services including resource consumption and pollutant generation. GMC has recently made significant progress in this domain. From FY 2012 to FY 2013, waste diversion rates increased from 28.3% to 38.1%. To reach authentic sustainability by 2020, the College will establish protocols that address and measure waste diversion during clean-ups, renovations, and new construction, as well as improving every day collection of waste from normal campus activities. Efforts will include brainstorming creative ways to change the consumption behavior of students, staff, and faculty so that less waste is created in the first place. An initial target for sustainable use of natural capital stocks is to exceed a diversion rate of 50% by 2020 for all on-site campus wastes. We recognize that a simple waste diversion rate does not tell the whole story, as not all waste has an equal impact on the environment. Therefore, we outline targets in the next metric for specific types of waste.

Metric 6: Tonnage & Percentage of Total Tonnage for All Waste Categories Currently Tracked

The College has been working to reduce the amount of waste produced on campus. In 2011 the College implemented an electronic waste recycling program, and in the following year the College started a zero-sort recycling system to promote more comprehensive recycling on campus. To build on the early successes of waste recycling efforts and assess our impacts downstream, the Campus Sustainability Office will work with students to measure the amount of waste being produced on campus including recycling, cardboard, total compost, ash, ash-landfilled, electronic waste, reuse programs (e.g. Green Move out/Move in days), and solid waste landfilled. The goal will be to reduce our net waste to zero tons through a combination of our diversion rate of 50% of all on-site campus wastes plus offsets purchased. This will also provide a relatively straightforward and yet meaningful way for students to participate in promoting authentic sustainability on campus.

In summary, we propose that by 2020, we will have an overall waste diversion rate of 50%, which will put us on a trajectory of 100% diversion by 2050. For electronic waste and zero-sort waste, we aim for a 99% diversion rate by 2020 because the environment does not absorb these items on a human timescale, so their impact is long-lasting and the embodied energy in them cannot easily be transformed into new material unless it is recycled. We will measure progress toward the e-waste and zero-sort goals by periodic (every two years minimum) waste audits carried out by classes with some guidance from the sustainability office. The overall diversion goal is already collected by the sustainability office.

Indirect Impact Metrics

Metric 7: Impact-weighted Campus Purchases

The purpose of this metric is for GMC to accept responsibility for the impacts upon natural capital associated with the supply chain of the goods and services it purchases — so-called Scope Three impacts (WRI.1). To be authentically sustainable, ecological costs (and benefits) associated with GMC's operations cannot be externalized solely because the source of these ecological impacts is not on GMC's campus. This metric will capture efforts that reduce our impacts by reducing our overall consumption and by seeking out suppliers who are similarly seeking to reduce their impacts. While this metric would not include GHG emissions or embodied energy in food as those are broken out as separate metrics, it would encompass: fossil energy use, particulate air pollution, hazardous waste production, toxic releases into water and air, water withdrawals, and land use.

Impacts in these areas would be estimated using production coefficients derived from national Economic Input-Output Life Cycle Assessment models. These coefficients would provide estimates for various ecological impacts per unit of good or service purchased by GMC (e.g. toxic releases per \$1000 of paper product purchased.) When combined with campus purchasing records, we will be able to estimate total impacts related to our purchases and consumptions. Relative weights for different impacts will be determined through a Multicriteria Decision Analysis (MDA) process. This will entail a collaborative process aimed at determining the relative impacts of various negative ecological flows. This process takes into consideration current science regarding the levels of different natural capital stocks as well as our community perspectives on the relative values of different stocks. Resultant coefficients would provide a quantitative assessment of relative values of different impacts. The full methodology is available in a separate paper; please contact Kenneth Mulder for a copy of this methodology.

Metric 8: Embodied Energy in Campus Food Purchases

Agriculture and the U.S. food system have a significant impact on natural capital in the U.S. and globally. These systems consume fossil fuels, water, and other non-renewable stocks and have significant impacts on renewable natural capital stocks such as water quality, climate regulation and habitat. Many researchers agree that, "Out of all human activities, agriculture has arguably been the source of greatest human impact on the environment" (Heinberg and Bomford, 2009, p. 5) something that most likely applies to GMC.

The energy embodied in food is generally correlated with the ecological impacts of agriculture and the food system beyond just the consumption of non-renewable energy supplies. For example, the production and application of nitrogen fertilizers is one of the most impacting aspects of agriculture, resulting in the contamination of ground water and hypoxic zones around the world, including the Gulf of Mexico dead zone, which is over 1000 square miles (NOAA 2012). Meanwhile, fertilizers can account for a third or more of the energy used in agricultural production (Pimentel and Pimentel, 2006). We will

use this fact to assess the overall impact of our food system through its embodied energy. The methodology for this metric will mirror the methodology for Metric 7.

Metric 9: Scope 3 Carbon Emissions Associated with Campus Purchases

To account for various emissions, developed protocols frequently call for industries to report emissions from their direct production enterprises (e.g. facilities and operations under their direct control, referred to as Scope One emissions) as well as emissions that are created in the process of production of purchased energy (Scope Two emissions, (Huang et al. 2009, WRI.1)). However, research shows that an average of 74% of an industry's greenhouse gas emissions is generated as its Scope Three emissions, that is the indirect emissions that results from upstream and downstream activities in the industries supply chain (Huang et al. 2009; Matthews et al., 2008). With few exceptions (e.g. energy and cement production), industries, including higher education, have a much higher impact on natural capital through their purchases than through their direct activities.

Not counting indirect emissions provides a perverse incentive to outsource production activities. For example, under current accounting, the campus appears less sustainable if dining services purchases less food from outside because the campus farm has increased production. Tracking indirect emissions also gives a more realistic picture of gains made through investments in infrastructure such as biomass heating where wood chips have no Scope One or Two emissions but do have Scope Three emissions related to their harvest and transport. Scope Three carbon emissions that are not captured by the current carbon accounting methodology — those associated with purchased goods and services — will be tracked using the same methodology as for Metric 7 and reported separately.

Additional Comprehensive Natural Capital Metric: Alumni Impact Assessment

Authentic sustainability necessitates a cradle-to-grave assessment of the ecological impacts of Green Mountain College's educational mission. Metrics (1) – (6) assess the direct impacts of GMC on natural capital. Metrics (7) – (9) assess the upstream impacts as well as the downstream impacts of our consumption. However, missing from this analysis so far is a downstream assessment of the impact of our primary product—the education of our students. When upstream and indirect impacts are taken into consideration, practically no economic endeavor has a neutral or positive impact upon natural capital. We anticipate the indirect impacts such as GHG emissions related to our consumption will be significant. We view this as making an ecological investment in our students. Similarly, we anticipate that the positive ecological impacts of our students will be significant and exceed the investment made in them during their time at GMC.

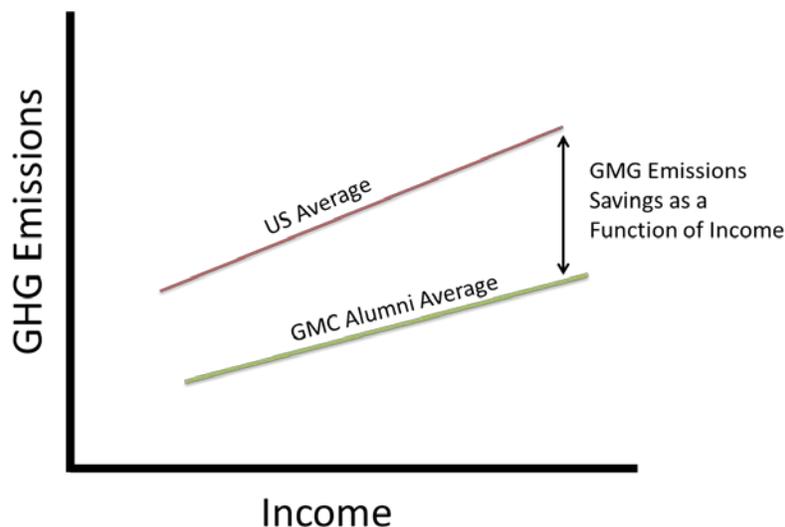
This positive impact will come in two forms. First, we anticipate that our alumni will have personal ecological footprints that will be substantively lower than what they would have been as a result of the skills and awareness they have gained at GMC. By becoming environmentally-aware, critical thinkers through the ELA program, our students leave GMC more aware of their potential for ecological impacts and more equipped to pursue life styles that reduce that impact.

Second, many of our students will go forth to be ecological change agents. Through their professional work and community involvement, they will have the ability to have “knock-on” effects upon their ecological economies. Some of these actions, by influencing the levers that ultimately lead to societal change, we anticipate will have significant impacts on the ecological footprint of our collective community.

While it would be ideal to assess both of these forms of downstream impacts, the latter is methodologically significantly more complex. The former, however, we believe we can assess through collecting data from our alumni that allow us to compare their GHG emissions per unit income to their predicted analysis based on a statistical model. In particular, data for individual carbon footprints from Canada show that GHG emissions and income are strongly correlated (Mackenzie et al, 2008). We are using GHG emissions as a correlate for broader impacts upon NC. This will only give an incomplete assessment, and as data becomes available and the methodology develops, we anticipate incorporating other impacts upon NC as well.

We will be testing to see if there is a statistical difference in the relationship between income and individual GHG emissions for GMC alumni versus other Americans. Because we anticipate that an above-average proportion of our alumni come to GMC with a propensity for rural living, we shall also control for geographical location. Both income and geographical location are predictors of individual GHG emissions that we do not believe GMC influences relative to other paths our students may have followed.

Assuming that after controlling for location, we see a low GHG emissions response to increased income in our alumni, we can then estimate the carbon savings relative to their income and claim this as a credit against our upstream impacts.



As data becomes available, both GMC alumni data as well as available data on the determinants of individual GHG emissions, this assessment will be supplemented by a broader statistical analysis aimed at accounting for the endogeneity between choosing to come to GMC and the potential for future

climate impacts. We also plan to incorporate data on individual experiences at GMC in an effort to identify what aspects of a GMC education might be important in leading to reduced ecological impacts.

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Appendix 1. Metrics Implementation Plan—First Draft

SOCIAL/HUMAN CAPITAL METRIC IMPLEMENTATION

1. By the end of spring 2013, a draft set of survey instruments for all the social/human capital metrics will be forwarded to the provost.
2. During fall 2013, the provost and the “steering committee on progress toward sustainability 2020” will secure approval of the surveys by cabinet, consult with social science faculty, and designate a social science point person or team for administering the surveys.
3. The point person will secure any necessary IRB approvals.
4. In late January or early February 2014 and every two years thereafter, the surveys will be administered as a batch to students in *Voices of Community*, *Dimensions of Nature*, and *A Delicate Balance* during a class period. We might call the week during which this happens “Sustainability 2020 Week,” and it may be an opportunity for faculty to discuss in their classes, where appropriate, the strategic plan.
5. The anonymous survey data will be collated and reviewed in several social science classes. These classes will also draw preliminary conclusions based on these data, in comparison with any available prior data. The data and preliminary conclusions are then sent to the person(s) in charge of administering the survey and the steering committee on progress toward sustainability 2020 for review before being sent to cabinet.
6. The results of the survey will be shared with the community as a progress report on the strategic plan, either at a community conversation or through some other campus-wide presentation that is planned or at least guided by the steering committee.
7. The steering committee will consider the survey results, solicit the input of the cabinet, and then make recommendations for broad actions other offices and groups across campus can take to strengthen social/human capital.
8. In the spring of 2015, 2017, and 2019, the steering committee will find one or more classes to administer a subset of the surveys to groups in Poultney. These classes will collate the data and make recommendations based on the survey data for strengthening social/human capital in the town. The steering committee will then consider those recommendations and solicit input from cabinet about how to turn the recommendations into broad actions that will increase social/human capital in the Poultney area.
9. All data will be summarized in institutional research reports published in summer 2015, 2017, 2019, and 2021.
10. In 2019 – ’20, the steering committee will review the full set of data and construct a narrative that explains the sequence of survey data and the actions the College has taken to strengthen social/human capital. On the basis of this narrative and data set, the committee will make a recommendation to cabinet regarding the extent to which the College has achieved net positive impact on social/human capital.

FINANCIAL CAPITAL METRIC IMPLEMENTATION

1. Every two years starting in 2013, during the summer, the director of institutional research, aided by members of cabinet, will produce a report to the steering committee that summarizes achievements and identifies areas of improvement on the metrics associated with financial capital.
2. The steering committee will use the report to brainstorm broad actions the College can take to strengthen financial capital.
3. The steering committee will then disseminate the report to faculty, staff, and students during the following academic year along with action steps that the College is taking to strengthen financial capital.
4. Courses may use portions of the data to illustrate economic dimensions of sustainability. Offices and groups on campus, such as the green job corps, may review their performance in light of achievements on financial metrics.
5. During the years in which the College does not produce a formal institutional research report, data on performance regarding many of the metrics will still be collected and utilized to assess progress and guide further action steps.

NATURAL CAPITAL METRIC IMPLEMENTATION

1. During fall 2013, the provost and the “steering committee on progress toward sustainability 2020” will consult with natural science faculty and designate a natural capital point person or team for overseeing the collection of data for the natural capital metrics, monitoring the quality of the data, and implementing projects designed to enhance on-campus biodiversity and ecosystem health. We recommend that a one-course faculty release be authorized for this position.
2. Implementation of specific metrics:

Emissions & energy-related metrics

1. Annual carbon dioxide equivalent emissions in metric tons (Scope 1, 2, & some limited Scope 3)
 - a. Green Mountain College has been tracking greenhouse gas (GHG) emissions since 2007 on a biannual basis. This inventory is ongoing under the auspices of the Sustainability Office, and no additional organizational infrastructure is necessary to gather this data.
2. Annual use of fossil fuels from stationary and mobile sources of campus owned assets in gallons
 - a. The consumption of fossil fuels to support campus activities is data collected as part of the GHG inventory.
 - b. Historically, a number of classes have contributed to the development of GMC’s GHG inventory. During the spring 2013 semester, one student group in RED 3120 (Renewable Energy: Technology & Applications) will gather data on total fossil fuel use on campus. In addition, the group will develop a “road map” of what a 100% fossil fuel free campus looks like, with specific recommendations to meet our sustainability 2020 goal.

Biodiversity and ecosystem health metrics

3. Campus biodiversity and ecosystem health index
 - a. Spring 2013: The faculty in natural sciences will be asked to identify existing data sets and new data needed to develop an ecosystem health and biodiversity metric for campus lands and a detailed description of the methodology by the end of the spring 2013 semester.
 - b. Natural science faculty will be asked to identify courses during the 2013-2014 academic year that could be used to collect and analyze data for the proposed metric.
 - c. Fall 2013-beyond: Natural science faculty will begin to collect data with their courses.

4. Regional biodiversity and ecosystem health index
 - a. Spring 2013: Students in Forest Policy & Management will make recommendations to the College about ways to measure the impacts of the biomass plant on different aspects of regional biodiversity and ecosystem health.
 - b. Spring 2013: Students in Forest Policy & Management will also present preliminary qualitative data on the perceived impacts of the biomass plant. These recommendations and interviews will help us better understand what is possible and realistic regarding our procurement of woodchips to fuel the biomass plant and its impact on regional biodiversity and ecosystem health.
 - c. Spring 2013-beyond: Natural science and natural resource management classes will be identified to help implement these metrics going forward.

Waste-related metrics

5. Diversion rate for Poultney campus & diversion rate for the whole college (Poultney & Killington)
 - a. The Sustainability Office will continue to monitor and report diversion rates on an annual basis.

6. Tonnage & percentage of total tonnage for all waste categories currently tracked—recycling, cardboard, total compost, ash, ash-landfilled, electronic waste, Green Move out/Move in, and solid waste landfilled.
 - a. The Sustainability Office will continue to monitor and record tonnage & percentage of total tonnage for all waste categories on an annual basis.

Indirect impact metrics

7. Impact-weighted campus purchases
 - a. To facilitate the methodological development of this metric, two linked courses will be offered in Fall of 2013.
 - i. A six-credit applied ecological economic research course in Environmental Input-Output Life Cycle Assessment for Institutional Sustainability in Higher Education. This course will:
 1. Develop the methodology and framework for assessing the environmental impacts of campus purchases.
 2. Work with the business office to develop a streamlined purchase recording process that will enable all purchases to be converted to impacts.
 3. Develop the heuristics to interpret this data with the goal of reducing our campus impact.

4. Provide potential definitions of sustainability with regard to indirect impacts.
 - ii. A three-credit sociological research course in Applied Multicriteria Decision Making that will:
 1. Assess the different impact categories in order to tell their “story” to the broader community.
 2. Develop a framework to share these stories with the GMC community and receive their input on the relative value of these impacts.
 3. Derive the impact weightings by impact category so as to reflect the values of the GMC community.
 - b. Spring of 2014 will be a trial and assessment period for the implementation of this metric.
 - c. The metric will be fully implemented for the 2014-2015 fiscal year.
 8. Embodied energy in campus food purchases.
 - a. Initial evaluation of this metric will be part of the EIO-LCA process for metric 7, as national average data for embodied energy in our food purchases will be part of that data set.
 - b. The first initial year of reporting taking place in fiscal year 2014-2015.
 - c. In Fall 2014 an applied ecological economic research course in Food and Energy will be held. This course will:
 - i. Derive embodied energy estimates *for all* food purchases in the dining hall.
 - ii. Develop a streamlined system for linking embodied energy coefficients to Chartwells product ordering forms.
 - iii. Work with the Farm and Food Project to develop energy labeling for different food products.
 - d. Spring of 2015 will be a trial and assessment period for the implementation of this metric.
 - e. The metric will be fully implemented for the 2015-2016 fiscal year.
 9. Scope 3 carbon emissions associated with campus purchases
 - a. This data for this metric will be gathered as part of the EIO-LCA process for metric 7 and only needs to be broken out separately.
3. The Natural Capital point person will develop a cohesive reporting framework designed to efficiently gather and integrate the various metrics and facilitate annual updating and reporting.
 4. The results of these metrics will be shared with the community as a progress report on the strategic plan, either at a community conversation or through some other campus-wide presentation that is planned or at least guided by the steering committee.
 5. The steering committee will consider the survey results, solicit the input of the cabinet, and then make recommendations for broad actions other offices and groups across campus can take to strengthen natural capital.
 6. All data will be summarized in institutional research reports published in summer 2015, 2017, 2019, and 2021.
 7. In 2019 – ’20, the steering committee will review the full set of data and construct a narrative that explains the sequence of survey data and the actions the College has taken to strengthen natural

capital. On the basis of this narrative and data set, the committee will make a recommendation to cabinet regarding the extent to which the College has achieved net positive impact on natural capital.

Appendix 2. Metrics Targets—First Draft

HUMAN/SOCIAL CAPITAL TARGETS

We have considered a range of mechanisms for setting targets on human and social capital including using national benchmarks and using community assessment of targets (e.g. stakeholder perceptions of the sustainability of a metric score). Several features of these metrics make it very difficult, conceptually, to justify a particular target. For example, in health and well-being and in intellectual capital, there is a range of sub-metrics and it is not clear that setting an overall target for the overarching metric meaningfully addresses the sub-metrics. Intellectual capital includes students' achievement and faculty/staff development; these would have quite different targets. Levels of achievement/development that are sustainable will depend in part on standards we set that are independent of sustainability.

In general, we believe that meaningful targets can only be set for the social/human capital metrics/sub-metrics after baseline data has been collected and the stakeholders have an opportunity to review potential targets with a full understanding of the trade-offs that are inevitable between targets in different areas. We believe that it will be easier to identify areas where the College is weak with respect to social and human capital and hence unsustainable, than it will be to set ideals for performance. The former may be a preferred approach to these metrics.

FINANCIAL CAPITAL TARGETS

We already have targets for some of our financial capital metrics including enrollment-related metrics, revenue and expense metrics, and some affordability and compensation metrics. We can use national benchmarks for financial resilience metrics. For our economic impact metrics and our built environment metrics, we will need to do studies to assess where we are and then make decisions regarding reasonable goals in these areas. At a minimum for the capital investment/depreciation metric we should be investing in facilities at a rate greater than depreciation and at a rate which chips away at deferred maintenance. We must balance progress in this area with affordability, however.

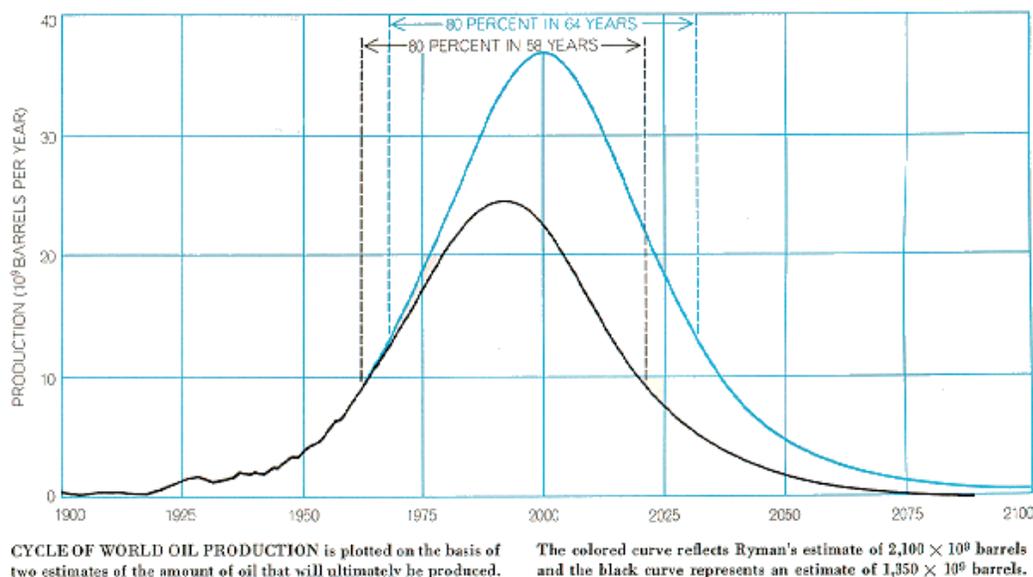
NATURAL CAPITAL TARGETS

Metric 1: Annual Carbon Dioxide Equivalent Emissions in Metric Tons (Scope 1, 2, and limited Scope 3)

We will continue to use the IPCC's standard for carbon neutrality. We will strive to maintain our status as being carbon neutral through the continued use of investments in efficiency and conservation, renewable energy, and offset programs.

Metric 2: Annual Use of Fossil Fuels from Stationary and Mobile Sources of Campus Owned Assets in Gallons

We will ensure that the College's use of non-renewable sources declines at a faster rate than the rate of decline in global fossil fuel production as estimated by models based on the Hubbert Curve, which is used to predict the production of oil over time at several spatial scales. If the rate at which we reduce our fossil energy consumption through efficiency and the adoption of renewable energies is greater than the rate at which our fossil fuel-based energy production declines, we can claim that we are reducing our reliance on fossil resources at a sustainable rate. If other institutions were to follow a similar path, we would see greater global alliance with the Hubbert Curve. Note that for this metric we will only be tracking on-campus petroleum-based fuel consumption as very little fossil fuel inputs are used for electricity production in the region and the fact that studies suggest that petroleum is the fossil fuel mostly likely to reach a global peak in production within the 2020 timeframe.



Metric 3: Campus Biodiversity and Ecosystem Health Index

We will have a net neutral, or net positive impact, on campus biodiversity and ecosystem health. We will first work to establish baseline data and use ecological indices to measure our progress toward this broad goal.

Metric 4: Regional Biodiversity and Ecosystem Health Index

We will have a net neutral, or net positive impact, on regional biodiversity and ecosystem health. We will first work to establish baseline data and use ecological indices to measure our progress toward this broad goal.