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Environmental Management Accounting as an Innovation Driver

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Humanity has rarely faced the enormous problems we face today. These include resource shortages, pollution and global climate change. Most will affect everyone on earth negatively. These failures to manage resources sustainably are driven by Ignorance, Greed, Desperation and Stupidity but underlying them all is the problem of poor accounting. Environmental and sustainability accounting (ESMA) can help address many of these causes and lead toward a more prosperous, enjoyable and sustainable future.

Environmental management accounting is a rapidly evolving area of management, accounting and finance that can help companies and organizations improve their bottom line, reduce risk, and facilitate innovative solutions to changing resource constraints, regulations, and public pressure (Rikhardsson et al., 2005; Schaltegger et al., 2006; Bainbridge 2006). Environmental and social accounting can also be used to evaluate the effectiveness of policies, regulations and incentives. Although business school curriculums are gradually adding courses and training in environmental accounting it still lags far behind the relatively thin offerings in ethics. And most current managers have had little or no exposure to the professional practice of sustainability accounting.

The basic premise of environmental and social accounting is that conventional accounting practices and existing operational and financial management within organizations obscure environmental costs, risks, benefits and opportunities. As A. C. Pigou noted in 1923, the market will not work well if it ignores external costs. By clarifying inputs, outputs and impacts, environmental and social accounting can help companies and organizations improve efficiency and develop innovative solutions to changing resource constraints, regulations, and public pressure (Antheaume, 2004; Bainbridge, 2009a). True cost accounting can also be used to evaluate the effectiveness of policies, regulations and incentives. Widely accepted in Europe, partly because of mandates, it receives much less attention in the U.S., but I would argue that for managers and business students to succeed in the increasingly competitive global workplace they need to understand both the potential management benefits of environmental and social accounting, and the legal requirements and mechanisms for undertaking and reporting for management, finance and policy.

The potential and often realized benefits of environmental accounting include:

Operational issues

- Improved internal reports
- Improved external reports
- More accurate and complete costing and pricing

- Improved profitability through:
  - Improved efficiency
  - Discovered opportunities for cost savings
  - Discovered opportunities for new processes
  - Discovered opportunities for new products and services
- Competitive advantage
- Improved employee moral and health
- Better recognition of environmental impacts, risks and liabilities
- Better understanding of social impacts, risks and liabilities

External benefits

- Improved stakeholder relations
- Reputation building
- Societal benefits
- Environmental benefits

Consider just global climate change

Although there can be improvements in the value proposition from true cost accounting across any organization, we can perhaps better understand the value for attacking large problems by looking at the global challenge of climate change. Here we can clearly see how improved accounting makes a difference. The causes of global warming are many, complex and interrelated but most of the global warming gases can be directly related to human activity. The key gases for global warming include: carbon dioxide, methane, ozone, CFCs and nitrous oxide (UCAR, 2009). Carbon dioxide is added to the atmosphere from fossil fuel combustion, deforestation by fire, burning agricultural residues, mine fires, and other activities. There has been a 31% increase in CO_2since 1750, with 270 billion metric tons added by humans. CFCs (freons) are released by leaks in air conditioners, refrigerators, freezers. They were also once widely used as solvents and cleaners. Methane is released from leaks associated with fossil fuel extraction and transport, straw decomposition in wet rice fields, cows, landfills, termites and other sources. There has been a 151% increase in methane in the atmosphere. Nitrogen oxides are created by fossil fuel and biomass combustion. The atmospheric level has increased 17%, but local ecosystem impacts are much more significant than global impacts (Bainbridge, 1997). Other concerns include sulfur oxides from fossil fuels, and resulting global warming and acid rain.

Improved models and understanding are helping to refine estimates, but much is still uncertain about the global atmospheric system. The IPCC estimates (depending on human response) suggest increases in global average air temperature of from 2-11°F [1.1-6.4°C] by 2100. But the average is not likely to be as important as local and regional changes, expected to be considerably higher. Local changes this large or larger have already been observed. Extensive monitoring in Alaska has demonstrated a spring air temp average increase over the last 30 years of 3.5°+F (Alaska Climate Research Center, 2009).

Along with increasing air temperatures we will see additional ocean temperature increase. A recent rise in coastal Peru seawater temperatures at Piura of 10°+F has led a colony of fur seals to leave the Galapagos to settle on the coast (Collyns, 2010). Storminess and storm intensity are predicted to increase. There will be big changes in growing season, changes in snow pack and glacial melt due to warmer winters, and often catastrophic ecosystem damage. There will also be hot summers, with more deadly heat waves and a growing demand for more air conditioning—leading to more CFC releases and more fossil fuel burning.

Solving this problem will take a major change in thinking and management and improved accounting will be critical. After a more than 30 year career in resource management I am convinced that *Environmental and Sustainability Management Accounting* (ESMA) is the most critical step to sustainability (Bainbridge, 2009b). Improved environmental and social accounting helps raise awareness, improves understanding and highlights areas of ignorance. It also corrects pricing and sends a direct market signal for sustainability. Improved accounting also makes it clear that additional research is worthwhile, and it is *an innovation driver.* Environmental management accounting helps develop a better understanding of true costs and cost information drives innovation much more effectively than regulations, although recent regulations requiring emissions reporting help make the case for ESMA to companies and organizations (Europa, 2010; Obama, 2009; ARB, 2010). Direct to pocket book costs lead to more rapid change and a focus on innovation rather than simply meeting the minimum.

Better accounting leads to change

Better cost accounting will drive change (with what we already know) and innovation (with many evolving opportunities). The most obvious driver will be increased costs for electricity, natural gas, oil and other fossil fuels. If true costs were paid for electricity every building owner, renter or leaser would care about good design, construction and operation. They would demand more efficient buildings. And utilities would explore building upgrades as an offered service – including heating/cooling/light -- not just electricity or natural gas. This will be critical to remodel, repair and upgrade the existing building stock.

Energy costs for electricity will often double or triple (Bainbridge 2004). This is enough to bring change. European countries have worked to include external costs thanks to the ExternE project (ExternE, 2008). Denmark has been most thorough, but Germany does a good job, while the U.S. continues to subsidize non-renewable fuels (a nation run by fossil fools). As a result the average cost per kwh in the U.S. is 11¢, versus 21¢ in Germany and 39.6¢ in Denmark (IEA, 2009; 2006).

Buildings are responsible for almost half of the global warming gases in the U.S. (Architecture2030, 2010). Energy costs and building economics are very distorted by subsidies, perverse incentives and regulations (including utility rules going back to the depression of the 1930s), but true cost accounting can still drive rapid change. The current building inventory could not have been made more inefficient and unhealthy if prizes had been given (McDonough and Braungart, 2002). First costs and profits are minimized leading to high operating expenses and large lifecycle cost (Bainbridge, 2002). This has led to annual energy costs in the U.S. of $76 billion for residential heating and cooling and $68 billion for heating, cooling, ventilating and lighting commercial buildings. As large as these costs are, they are still less than the lost productivity and health costs associated with unhealthful and uncomfortable spaces. The potential cost of poor indoor air quality has been estimated from $43-258 billion a year for the U.S. (Fisk, 2000).

With proper attention to sun, climate, comfort and health building energy use for space conditioning can be cut 90% (Haggard and Bainbridge, 2009). The potential savings in energy could reach $130 billion a year if we did everything right. The improved productivity and health would add a similar amount for potential savings of $260 billion a year. At current interest rates we could invest more than $30 trillion to fix our buildings. This is about twice the current financial bailout – but the difference would be that we would have solved a problem instead of papering over a failed system and delaying a crisis.

When do we start?

Now! We need to reduce impacts quickly. This will demand increased and improved accounting and reporting. These changes can increase profitability, comfort and security. Initially institutions benefit most because they more commonly own and build their facilities. The possibilities can be seen in a daylit, naturally ventilated, passive solar heated and microclimate cooled synagogue in San Luis Obispo California that uses 82% less energy than California's strict energy code requires. It cost no more to build than a conventional building because the synergistic design eliminated the need for central HVAC saving $160,000 dollars for solar upgrades (Haggard et al., 2008).

And energy is not the only concern. The embodied energy and sustainability of materials also should be calculated. The CBD synagogue uses straw bale walls that provide super-insulation at low cost and are durable, fire resistant and control sound (Bainbridge, 1986, 1993; Steen et al., 1994). They are also local and have very low embodied energy. Straw bale building also eliminates field burning, and by removing straw from wet fields reduces methane emissions from rice straw rotting in wet fields (Steen et al., 1994). It also sequesters carbon (Bainbridge and Haggard, 2009). Thirteen million tons of rice straw are produced in the U.S. each year, enough for 650,000 new homes. Wheat, oats, barley, rye and other straws also good and may be more locally appropriate.

Building design

Effective passive solar design can eliminate the need for heating and cooling, ventilation and much of the lighting (daytime) needs for all types of buildings (Bainbridge, 1979; Haggard and Bainbridge, 2009; Haggard et al., 2009). Although I have advocated super-insulated passive solar homes since 1980 (Bainbridge, 1980) the Reagan revolution killed solar in America as the fossil fools took over and continued subsidies for fossil fuels and nuclear power. But Germany, encouraged by higher energy prices and concerns over energy supply security, finally began to take passive design seriously in the 1990s (PassivHaus, 2009). Passive solar architecture can provide comfort and security even when the power grid is down.

Including external costs in energy pricing is necessary but not sufficient. We also need to consider external costs of building materials, design choices and equipment and the costs and risks of ecotoxicity and biodiversity losses. We need to understand the economic incentives and disincentives that reward bad behavior- studies at the Rocky Mountain Institute found virtually all of the actors in commercial development were rewarded for doing the wrong thing (Lovins, 2005).

ESMA challenges

The challenge we face is getting **True Cost Accounting** into annual reports and accounting procedures. This is being encouraged by sustainability screens and indexes such as FTSE4Good, the Dow Jones Sustainability Index, and others. The Global Reporting Initiative also has promoted much better and more complete analyses. But it is a challenge in a down financial environment. However, the value proposition is good and studies show that the proactive companies are doing better than those that are reactive (Thayer, 1995; Lorton, 2008). We also face the very complex challenge of improving value estimates for ecological and social external costs and risks. This takes research and long term monitoring. Many questions, such as the cost of nitrogen pollution remain largely unstudied.

Many of the most important factors in ESMA are related to government policy and current incentives, subsidies and barriers to sustainable practices. These are often crafted by special interest groups that resist transparency and responsibility. And finally we face the challenge of educating accountants, business managers, CFOs, auditors, financial advisor, engineers, ecologists and policy makers about the value of ESMA. The case can be readily made that ESMA is needed for businesses of all sizes and types, institutions, government agencies, departments and operations, nonprofit organizations and policy makers and politicians.

Join the effort

We should begin reshaping our educational programs to provide business students with a solid grounding in environmental and social accounting and true cost economics (Bainbridge, 1985; Bainbridge 2009a,b). We also need to reach out to existing managers with continuing education programs. At the same time we should encourage our brethren in environmental and ecological sciences, social science, medicine, health policy, and engineering to include more courses in economics and management. Engaging the IT community is particularly important to bring the information rich technology needed for efficient data analysis and reporting (Bainbridge and Naert, 2007). And we should try to engage our campus communities in sustainability initiatives, including environmental and social cost accounting (Bernheim et al., 2003; Bainbridge, 2007).

We can also drive change by examining the often perverse incentives and traditions in promotion, retention and tenure that discourage the interdisciplinary work needed to address sustainability concerns, new incentives to encourage applied rather than "academic" research, and problem definition rather than problem solving. EMAN can help generate pressure to create a new Sustainability Citation Index to credit researchers and faculty who tackle these important, but time consuming and challenging interdisciplinary issues (Baumann, 2002). We can also work to make research more accessible on-line to help students and faculty access the latest research. We can also make a difference by joining and participating in related professional organizations, like IFA and ISAR, that are active in these areas, including the professional accounting societies, the International Society for Ecological Economics, the International Society for Industrial Ecology and the emerging societies for sustainable management such as ISSP. If we are not at the table, our voices will not be heard.

One of the weakest areas of business management in the U.S. and around the world has been environmental and sustainability accounting and that is something we can and must help correct! Become an active member of EMAN. Participate in local sustainability programs and environmental and social cost accounting efforts. Develop and promote ESMA skills and support ESMA efforts around the world. Assist efforts to improve accounting for external costs and risks related to ecological and social impacts in every sector of the economy and support sustainability reporting using Global Reporting Initiative protocols and including ESMA and true costs (Morhardt, 2000; GRI, 2010).

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Web links

Accounting for Sustainability	www.accountingforsustainability.org
Environmental Management Accounting Research and Information Center	www.emawebsite.org (currently offline)
Environmental Management Accounting Network-EU	www.leuphana.de/umanagement/projekte/eman/eman-europe
International Federation of Accountants	www.ifac.org
Global Reporting Initiative	**www.globalreporting.org**
US Society for Ecological Economics	www.ussee.org/v2/
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