Chapter 4. True Cost Accounting (from Rebuilding the American Economy 2009)

Call a thing immoral or ugly, soul-destroying or a degradation of man, a peril to the peace of the world or to the well-being of future generations; as long as you have not shown it to be "uneconomic" you have not really questioned its right to exist, grow, and prosper.
—E. F. Schumacher (1973)

The failure of the current U.S. economic system is in a large part a failure of accounting. An accurate understanding of businesses, governments, and resources must include an estimate of all financial, environmental, and social costs. Many of these costs are not currently counted and are described as "external" costs. That does not, however, make them any less real. When moving from financial to environmental to social costs, challenges increase in determining costs. The data needed for complete true cost reporting is rarely available, but as my old mentor, Tod Neubauer, used to say, "it is better to be crudely right, than precisely wrong." At this moment, the price of virtually all goods is precisely wrong.

Although the costs of many environmental and social problems are often not well understood by anyone in the world, it is usually possible to develop crude estimates from national or international sources, industry reports, university and research center studies, or careful detective work. Using local and specific information is better; however, it may be too costly to develop for a sole proprietor, small firm or organization. While aggregated or estimated costs can be used, the uncertainty should be noted. Improving the understanding of true costs should be one of the major goals of U.S. society and of the world community.

Nitrogen pollution, for example, causes extensive ecosystem disruption and loss of species diversity (Figure 4.1). High nitrogen additions year after year caused diversity in grass plots to decline by 90 percent from 28 species to 3. With a small increase of nitrogen, diversity at first increased, but then dropped steadily from 28 to 11 species, a decrease of 60 percent. This highlights the need for long-term studies of the effects of nitrogen pollution and other ecotoxic materials. A typical five-year study would have categorized the low level of nitrogen pollution as a beneficial impact. In addition to the deliberate addition of nitrogen to the grass plots, there was also some atmospheric deposition of nitrogen from pollution sources nearby, which was not measured and which undoubtedly contributed to the decline in diversity even on the "zero" nitrogen added plots.

One of the adverse effects of nitrogen pollution is an increase in invasive alien species. Offsetting even low levels of nitrogen pollution to combat these invaders with selective herbicide spraying may cost hundreds or thousands of dollars per acre per year and will cause collateral damage from the herbicide leaking into the environment. Even with careful suppression of weeds, key species may be lost and the cost of reintroducing or protecting them can be considerable.

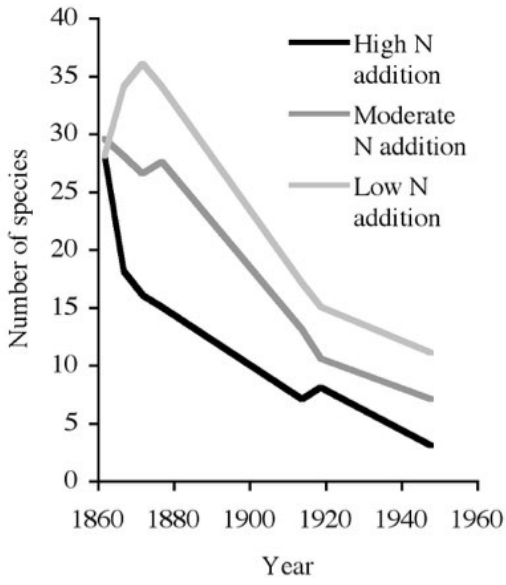

Figure 4.1. Ecotoxicity from nitrogen

Seemingly unimportant leakage of materials as "harmless" as nitrogen and phosphorus can entail high external environmental costs. With more toxic and hazardous materials in the environment, the costs and long-term impacts are even greater and more destructive, extending to thousands of years for radioactive waste products.

The solution for calculating costs and benefits more accurately is better research. While this effort is underway, estimates at the national or international level can be used to work back to local costs. Ideally these costs will be refined and managed by government and nongovernmental organization (NGO) database developers so that accountants, sustainability report writers, and data mining software can find them easily.

Increasing efforts to improve and refine true cost accounting are already bearing fruit. Many companies have discovered new opportunities to reduce waste, pollution and pollution control costs, improve process management, and correct internal accounting flaws that have in the past led good products to subsidize bad ones.

True cost accounting has the potential to:

- Improve profitability
- Reduce risk and liability
- Improve employee moral and health
- Lead to better decision making
- Highlight opportunities for cost savings
- Identify opportunities for new processes
- Uncover opportunities for new products and services
- Add competitive advantage
- Improve stakeholder relations
- Build reputation
- Improve internal and external reports
- Lead to more accurate and complete costing and pricing
- Provide value to the community and society at large
- Offer environmental benefits at the local, regional, and global level

These potential benefits of true cost accounting are encouraging increased commitments to environmental and social accounting within the academic world as well as in traditional financial and management accounting, policy accounting, and environmental management accounting, particularly in Europe. In a recent Internet analysis, I found that European accountants were forty-five times more likely to address external costs than American accountants. This, however, will soon change.

One of the first steps toward true cost accounting has been an effort to develop and report organization sustainability. The best of these reports include true cost estimates. These reporting efforts have been very helpful, whether authors were working under the Global Reporting Initiative or regional or national guidelines. Growth in the number of sustainability reports has been quite rapid, with more than 10,000 now prepared annually worldwide. Despite this growth, sustainability reporting and accounting remain in their formative stages.

Governments, NGOs, companies, and professional associations have adopted a wide range of environmental accounting approaches and methods to more accurately evaluate financial performance, improve operations, compare strategic planning alternatives, and drive innovation. One primary challenge is how far to extend the boundaries of the analysis. Most analysts have been very conservative, limiting costs as much as possible. It is better to extend the boundaries to create more complete accounts. For example, should a company count the impacts of employees commuting to work? I believe so, because their commutess are determined in large part by where the company chooses to locate and how the company supports activities such as carpooling, telecommuting, bicycling to work or using public transit.

To validate true cost account estimates it is helpful to cross-check them against whatever data is available. Use Old Mother Common Sense to check calculations. Do they sound reasonable? If not, check assumptions and look for errors of magnitude. Try to be as inclusive as possible, using the lists in Appendix C to look for possible impacts and costs.

Research on environmental and social costs is desperately needed and companies and NGOs will have to play a major role in undertaking and funding needed research because governments, constrained by budget problems from unsustainable decisions in the past, are not likely to do so. Special interests have crippled and controlled environmental and social cost research in recent years, which has led to efforts by parts of the U.S. government to deny the effects of global warming, acid rain, social inequity, health risks and many other problems.

The lack of funding is illustrated by the 2008 budget for the National Science Foundation's Long-Term Ecological Research Network (LTER). The current funding level is considerably less than many professional ballplayers earn each year, and less than half the money one oil giant recently invested in campaign's to discredit global warming research. LTER is a model program comprised of more than 1,800 scientists and students who investigate ecological processes over long temporal and broad spatial scales as well as promotes synthesis and comparative research across sites and ecosystems and among other related national and international research programs. Companies and industrial organizations should also help sponsor this type of external cost research.

The focus of a sustainability report will depend on the audience and the goals. They typically include financial, environmental, and social cost information.

Financial costs

Internal financial costs and benefits are generally available for companies, organizations, and even government agencies. Data on publicly traded companies is most readily available. Much is now available on-line and annual reports may be relatively complete and understandable. In some cases information may not be transparent or complete, as companies and organizations try to cover up fraud or reckless speculation. Outside accountants are often captured by the companies they oversee and organizations they work for in the classic trap of "Tell me what I want to hear, or you are fired."

Government accounts are often very confused and difficult to unravel. These numbers are sometimes accessible on-line or through public freedom of information requests. At times the opaque nature of accounts is a deliberate attempt to obfuscate, but it is often simply a legacy issue, with overlapping antiquated control systems and no one really monitoring the costs. After all, it is OPM—other people's money. Outside auditors are intended to provide some confidence in financial reports, but enough examples of problems exist to show that the level of confidence can never be very high. Cross-checks and comparisons within an industry can help reveal misstatements or errors, whether accidental or deliberate. And if it seems too good to be true, it probably is a fabrication or fraud.

For example, someone might want to find an estimate of the total annual agricultural subsidies in the United States to better estimate the costs of their products. The federal government, however, does not provide this information in an accessible format. Fortunately NGOs such as the Environmental Working Group have worked hard to make some of this information available, including payments received by town; however, even direct payments to farmers for some crops can be challenging to find, and indirect subsidies are much more difficult to unravel and determine (Table 4.1).

Table 4.1 Subsidy types for agriculture

Direct crop subsidies
No charges for external costs
Marketing assistance
Countercyclical payments
Price supports (causing consumers to pay above world market price)
Crop insurance (enabling farmers to take more risks)
Disaster assistance
Conservation reserve payments
Water project subsidies
Energy project subsidies
Pollution abatement subsidies
Tariffs and trade barriers
Agricultural research subsidies
Tax and investment credits
War fighting to keep oil prices lower

The $300 billion farm bill is muddled and often incomprehensible, with countervailing programs and confusing budgets and details. The best estimate for all agricultural subsidies for the United States is in the range of $50–$100 billion a year. Interestingly, this estimate is not much above a Brazilian estimate of $47 billion, which was developed as part of a critique of U.S. subsidies that harm small farmers and producers in many other nations. The current cost of price supports alone to U.S. consumers is estimated at about $12 billion per year by the Organisation for Economic Cooperation and Development.

The wide range of estimates for many indirect subsidies reflects the difficulty of unraveling all of the subsidies. The massive meat recall of 21.7 million pounds of meat in 2008 for possible contamination led to costly taxpayer funded payments to some of the groups who had purchased the recalled beef, including many schools. The federal government stepped in because the meat packer had gone out of business. Yet another free rider on the backs of the taxpayers, taking profits but not accepting risk.

Financial reports in developing countries are even more suspect. The shadow economies of developing countries often average about 40 percent of the official economies, and can go much higher. In China, many firms are reported to maintain three sets of books—one for taxes, one for potential investors, and one for operational purposes. Similar problems are occasionally encountered in the U.S. and Europe.

Financial cost data is often of limited value because costs are not tied to causes. Historically, environmental health and safety have been treated as overhead costs, with no relation to products, actions, or processes. This effectively subsidizes bad products with profits from good products. Activity- or enterprise-based accounting is essential. Costs should be taken to the product, service, or

process level to improve profitability. Applying Jack Welch's 10 percent rule for culling people to culling bad products might prove to be a very effective strategy once true cost accounting improves.

Environmental Costs

Environmental costs are even more difficult to estimate as a result of poor understanding of the impacts of pollution. This is a problem for addressing and preventing the effects of global warming, and even more of a problem for preventing nitrogen pollution and pollution from other ecotoxic materials. Environmental costs estimates will often be crude, but are still instructive. (For more detail, see Chapter 6.)

Environmental costs should include the full range of impacts on the environment, from air and water to biodiversity and global change. They should include the effects of pollution, resource depletion, and ecotoxicity as well as other impacts on nature's services, natural capital, and resource availability. Disruption of flyways, migratory paths, and other habitat-related concerns should also be addressed. Impacts may be local, regional, or global.

Although many impacts are little studied and poorly understood, some estimates may be available. In general, costs are severely underestimated because economists prepare them with inadequate input from ecological scientists and restorationists. The growing number of successful restoration projects adds some detail to cost; however, even the best, most costly restoration efforts are generally poor approximations of the original ecosystem.

Forum for the Future worked with AlcCo, a £600 million a year alcohol producer in the United Kingdom, to develop an environmental cost estimate (Table 4.2).

Table 4.2 AlcCo Environmental Costs 2003

AlcCo Environmental costs	Million Pounds
Impacts to air	
Energy	0.4
Transport	0.8
Production	0.1
Impacts to Land	0.2
Impacts to Water	0.2
Total annual external costs	1.7
Restoration or avoidance cost	4.5
Subtotal	6.2

The costs included road transport, factory emissions, farm operations, and water, chemical, and fertilizer use. Cost estimates used were £6 per ton for carbon, £5000 per ton for nitrogen oxides (NO_x) and sulfur oxides (SO_x). For AlcCo, the environmental costs are significant (approaching annual profits). If the carbon impact fee is increased from £6 to £20 per ton, the environmental costs would exceed current profits of about £5 million.

There are also external benefits that a company might count and include on the books. Forest holdings, farmland, and natural areas provide many public benefits that should be calculated, including air purification and oxygen production by plants, flood control, water collection, and water purification. A company might buy and restore land to create a healthy forest to help balance their books. For example, the Vatican is planting forests to offset its carbon impacts on global warming.

Social Costs

Estimating social and benefit costs is even more challenging than estimating environmental costs. Much of a society's wealth is measured through its citizens. Are people happy? Hopeful? Well educated? Healthy? Various indicators of social well-being can be measured, but costing them is challenging. Health care costs are counted, but the value of being healthy is more difficult to measure. The cost of treating obesity can be estimated, but the true costs of limited activity, suffering, and impacts on others are larger and not commonly addressed. The value of satisfaction with work is also rarely addressed. However, if you have ever lived in a family where a worker hated his or her job, you can understand the high costs of dissatisfaction.

The psychic stress and resulting health costs of those who work yet who cannot meet the needs of their families are also high and rarely addressed. The outsourcing of manufacturing has created enormous social costs in the United States that have been left uncounted. Today, a seamstress in parts of Asia may earn only 30¢ per hour with no benefits. In the United States, a comparable worker might have been paid $12 per hour plus benefits, or about $15 per hour, until the job was outsourced. The labor cost abroad may be less than 3 percent of the cost of labor in the United States; however, the overall cost savings are much less when transportation and export–import costs are factored in. As energy prices rose in 2008, the advantages of offshoring dropped significantly and companies began reconsidering manufacturing in the U.S. True cost accounting would accelerate this process. The great labor price advantages in China have faded, and 30,000 companies in China were expected to go out

of business in 2008 because they were no longer price competitive.

Milton Friedman and the "Greed is Good" economists says go where the costs are lowest (i.e., places with no labor rights or environmental protections). A critique of this school of economics by French students called it autistic economics. They suggested that economists from the Chicago school of economics, strongly influenced by Friedman, have behaved like an autistic person with superior numeracy skills but no social skills. Or simply unclear or uncaring about the impact of their beliefs on people, families, and communities. It was not surprising that Milton Friedman worked with Chile's dictator Pinochet after the U.S. helped overthrow the legally elected leader.

Social cost estimates can be straightforward for some products and services, but very difficult to determine for others. Forum for the Future developed a social cost estimate for AlcCo by using the national estimates of the social cost of alcohol (Table 4.3) and by working through the supply and distribution chain cost percentages and percent of total sales to arrive at AlcCo's share (Table 4.4). Forum for the Future did not consider social benefits. Limited use of alcohol, however, adds some health and social interaction benefits and can help build communities so I have included an adjustment.

Table 4.3. Social Costs of Alcohol in the U.K.

U.K. social cost of alcohol	Billion pounds
Health care costs	1.7
Crime and antisocial behavior	7.3
Lost productivity	6.4
Human and emotional suffering	4.7
Total	20.1

As a quick check, the population of England in 2006 was 61 million. The government estimate of the social cost was approximately £300 per citizen, which seems plausible. The social costs of AlcCo dwarf the environmental costs by a ratio of more than 10 to 1. There are also social benefits from the jobs for AlcCo's workers and suppliers. However, even if those costs were added, AlcCo and all other liquor companies would probably go out of business if true costs were also counted.

Table 4.4. AlcCo's Share of Social Cost and Benefit

AlcCo's Social costs	Million pounds
£20.1 billion X 3.5% (AlcCo market share)	700
Less alcohol tax spending £100 million	600
Responsibility 50% consumer, AlcCo share	300
AlcCo share of retail 19%, so £300m X 0.19	(57)

Bent, 2006

AlcCo's Social benefits	
Health and relationship benefits	+5
Subtotal social cost	(52)

Improved social cost accounting is also critically important for reforming food production. In this case, costs are transferred to the taxpayer and to future generations to achieve the lowest price at any cost. Government subsidies make matters worse, as usual. Subsidy programs help the richest get richer and put smaller operators out of business. Rewritten regulations have even enabled some people who are living in subdivisions to get subsidies for farming, because crops were once grown on the same land.

Subsidies have helped make bad foods cheaper and driven up the cost of fruits and vegetables and more healthful meats. Subsidies for corn and soybeans amount to an estimated 10 percent discount on the cost of feedlot and industrial meat production, reducing the cost of less healthy meat from rangeland and generating serious pollution problems. In response to the severe pollution impacts associated with factory farms, funds are now available through the Environmental Quality Incentive Program to help reduce pollution—another perverse subsidy that transfers external costs to the taxpayer.

Subsidies for corn have made corn sweeteners much cheaper than sugar. There is growing evidence, but no proof, that corn sweeteners do not provide the same sense of satiation that regular sugar does, and so people eat and drink a larger volume of products with corn sweeteners. Because they are inexpensive and help foods look better longer, corn sweeteners are in virtually every food or drink product. I know, because I am allergic to corn and have to read labels carefully. I can assure you that it is as hard to find a food that does not have a corn sweetener as it is to find shoes that were not made in China. It is very likely that subsidies and corn sweeteners are playing key roles in the obesity epidemic.

If the costs of obesity are counted, the social costs of agriculture increase substantially. The current annual cost of obesity in the United States is estimated to be about $90 billion. If, however, the future cost stream of obesity were factored in, the annual cost would be much higher.

Sixty-five percent of obesity costs occur after age 65, many of which are paid for by Medicare.

Obesity problems result in part from subsidies to agriculture that favor corn, wheat, and soybeans. This drives their prices down and makes corn-based sweeteners and oils cheaper and fast foods less costly to produce. Subsidized low cost grains and beans make it cheaper to run feedlots that fatten beef using grass. This increases harmful fat content and reduces the levels of beneficial omega-3 oils in the meat. These all contribute to the fattening of America. If only 20 percent of the costs of obesity were assigned as a public cost, $20 billon per year may be added to the cost of agriculture.

The pesticides in foods also help keep store prices lower and drive true costs higher (Table 4.5). Spraying chemicals is cheaper in the short term than converting to organic farming practices, although after a transition period the differences may actually be small and may favor organic production with lowered input costs. Widespread and repeated chemical applications ensure that 60 percent of fruits and 40 percent of vegetables in American markets typically have some poisonous residue. Monitoring is weak, particularly for imported foods, and so it cannot be accurately determined what a typical consumer will get in his or her diet. The chemicals, however, can be found in our blood when we test for them, with more than 200 chemicals found in babies' umbilical cord blood, twenty-one of which were pesticides.

Table 4.5. Selected External Social Costs of U.S. Agricultural Production, 2002 (millions)

Damage to human health (pathogens)	
Cost of illnesses caused by common	
Food-borne pathogens	375.7 (L)
Cost to industry to comply	
with HACCP rule	40.7–65.8 (L)
Subtotal	416.4–441.5
Damage to human health (pesticides)	
Pesticide poisonings and	
related illnesses	1009.0 (C)
Subtotal social cost:	1.84–1.89

*Production type causing main impacts: crop (C) or livestock (L). *Tegtmeier and Duffy, 2004.*

Although many chemicals are carcinogenic or toxic, the health risks are uncertain because most have not been researched carefully. Also, interactions between chemicals are almost never looked at, but are recognized as potential problems. In a time when more and more university funding for research comes from industry, it is not surprising that careful and comprehensive research on the health impacts of pesticides has not been done, but this will likely prove to be very costly for future generations.

Social costs for health are typically the largest costs engendered by current agricultural operations. In many cases the costs involve diseases that will require a lifetime of treatment and that can run to the tens or hundreds of thousands of dollars per person, not including personal suffering and the costs to family and friends. While many of these costs are paid for by personal insurance or as out-of-pocket expenses, the state and federal government often assume a large share of the costs. Other social costs are paid in suffering by immigrant workers with no access to health care.

The social costs of past agricultural practices are still being paid as well. Although slavery was officially abolished more than 140 years ago, and racial segregation more than 40 years ago, the costs of slavery in agriculture are still being paid. These include costs for both health and justice. There is, for example, a growing recognition that some of the health problems and costs affecting the African American community today are probably related to the slave trade and slavery. It has been suggested that the high prevalence of obesity and diabetes in African American women may in part reflect the advantages a conserving metabolism would have during the horrific voyages across the Atlantic. Women who were slender or who had a faster metabolic function were more likely to die. Over several generations of poor and inadequate diet doing hard labor in the U.S., this effect would have been reinforced. The annual health costs of past agricultural practice related to slavery might be $5 billion a year for the American health care system.

The prolonged degradation of the community and family as a result of slavery and the equally pernicious Jim Crow period that followed, lasting into the 1960s, created many other problems that continue to this day. The defiant, independent, and intelligent slave was most likely to be beaten to death or hung. Families were broken up and women assumed responsibility for their children with little help from a father figure. Slavery and its aftermath have led to a situation where one in three African American males between the ages of 20 and 29 in

the United States was under some form of criminal justice control in 1995. An African American man born in 1991 had a 29 percent chance of being imprisoned during his lifetime, compared to a 4 percent chance for a white man.

The social cost of incarceration had risen to $40 billion by 2000, with a disproportionate share of African American men imprisoned. Nonviolent offenders, mostly drug related, made up more than half the cost as those with limited opportunities for legal jobs created their own opportunities outside the law. California's investment in state universities increased 15 percent from 1984 to 1994, while the cost of prisons increased 209 percent. Based on the social and health impacts over time, it seems fair to include an annual slavery cost of $10 billion dollars annually to agriculture. More detailed research may raise the cost significantly.

Legacy costs of American agricultural practices also include the long-term impacts of the banana companies' machinations in Central America. The current annual costs for military aid to Colombia, for example, are also a legacy cost of agriculture. The FARC rebel movement has its roots in opposition to the ruthless behavior of the United Fruit Company, which was supported by the U.S. government. One of the most shameful involvements of the U.S. government around the world, the banana companies incited more than 30 U.S. interventions in Latin America, including toppled governments and assassinations. The U.S. military was called in several times to break strikes by workers seeking improved working conditions and wages. All were done to provide the lowest price bananas possible, no matter how high the cost. The social costs borne by the people of Colombia, Guatemala, Honduras, and other former banana republics are probably in the tens of billions of dollars per year. A conservative estimate of $1 billion is just slightly more than the current U.S. military and drug aid programs for Colombia.

It is also appropriate to consider the costs of illegal immigration in the United States. More than half of the farm workers in California are estimated to be illegal. A majority of the more than 12 million illegal immigrants now in the U.S. started by working in agriculture. The billions of dollars now expended on health care and education for illegal immigrants and some of the cost for immigration enforcement should be, in part, costed to agriculture. Using illegal immigrants to plant and harvest agriculture was and is, like slavery, a way to get the lowest price at any cost. The costs of illegal immigrants are challenging to determine, but are estimated at between $10 and $90 billion dollars a year by different groups. The loss of money from the economy from remittances to other countries should also be considered. In 2004 this was $25 billion just to Mexico. Considering the multiplier effect of lost economic activity to the U.S, economy may exceed $50 billion a year.

These social costs of agriculture highlight the importance of making the right decisions, because long-term costs for failures and mistakes can be staggering and may continue for generations. The current blindness to the long-term costs of environmental contamination, global change, biodiversity loss, decreasing antibiotic effectiveness, and loss of nature's services and natural capital are likely to lead to losses of trillions of dollars each year for future generations, just as the failure of slavery has cost trillions of dollars over the past 200 years.

Improving Environmental and Social Accounting

Much more detailed, interdisciplinary long-term environmental and health systems research is needed to better understand the external costs of business operations. Research must also be expanded on industrial and agricultural production systems to better understand the costs of the damage they create.

Table 4.6 is an example of a review of the environmental costs of agricultural production in the United States that could be used to help provide a preliminary per acre cost for farm inputs for any company that utilizes agricultural products until more detailed estimates can be prepared. The pollution costs are, in part, related to agricultural subsides for grains and soybeans, which make industrial production of meat cheaper by concentrating waste streams and making water treatment more costly for towns and cities downstream.

These estimates neglect many of the costs that should be considered. One cost is the value of the soil lost by erosion, which is estimated to be $26 billion per year. Land lost to soil salinization is also a costly aspect of current farming systems, with a loss of value reaching perhaps $1 billion annually. A significant portion of the costs of national toxic cleanup efforts involves farm chemical producers and former disposal sites at a cost of many hundreds of millions of dollars each year. Loss of biodiversity is also not included, which would also total in the billions of dollars. The loss in ecosystem services is incomplete, and the agricultural impacts on recreational opportunities and tourism are only partly covered. A conservative estimate might be a cost of $2 billion for

these problems; however, it could easily turn out to be between $10 billion and $50 billion.

Table 4.6. Selected Annual Ecological Costs of U.S. Agricultural Production, 2002 (millions)

Damage categories	Costs
Damage to water resources	
Treatment of surface water for microbial pathogens	118.6 (L)
Facility infrastructure needs for nitrate treatment	188.9 (C)
Facility infrastructure needs for pesticide treatment	111.9 (C)
Water Subtotal	419.4
Damage to soil resources	
Cost to water industry	277–831.1 (C)
Cost to replace lost reservoir capacity	241.8–6044.5 (C)
Water conveyance costs	268–790 (C)
Flood damage	190–548.8 (C)
Damage to recreational activities	540.1–3183.7 (C)
Cost to navigation: shipping damages, dredging	304–338.6 (C)
Instream impacts: commercial fisheries, preservation values	224.2–1218.3 (C)
Off-stream impacts: industrial users, steam power plants	197.6–439.7 (C)
Soil Subtotal	2,242.7–13,394.7
Damage to air resources	
Cost of greenhouse gas emissions from cropland	283.8 (C)
Cost of greenhouse gas emissions from livestock production	166.7 (L)
Air Subtotal	450.5
Damage to wildlife and ecosystem biodiversity	
Honeybee and pollination losses from pesticide use	409.8 (C)
Loss of beneficial predators by pesticide applications	666.8 (C)
Fish kills due to pesticides	21.9–51.1 (C)
Fish kills due to manure spills	11.9 (L)
Bird kills due to pesticides	34.5 (C)
Ecosystem Subtotal	1144.9–1174.1
Environmental Subtotal:	3.9–15 billion

*Production type causing main impacts: crop (C) or livestock (L). *Tegtmeier and Duffy, 2004*.

For example, the growing dead zone in the Gulf of Mexico is believed to be primarily a problem caused by nutrient and pesticide runoff from farm fields in the Mississippi River drainage area (Figure 4.2). This dead zone was six times as large as Rhode Island in 2007, is increasing year by year, and is causing ecological devastation and adverse impacts on fisheries. Dead zones are also showing up off river systems in other areas of the world, largely from overuse and misuse of fertilizers and pesticides, one of the many neglected external costs of high-input agriculture. The fishermen whose lives and livelihoods are disrupted by these dead zones should be compensated by the farmers and farm chemical manufacturers.

Figure 4.2. Growing Ecotoxicity in the Gulf of Mexico

The food system uses from 10-20 percent of the energy consumed in the United States, and is responsible for a comparable share of global warming gases. The environmental costs are about four times the amount listed in Table 4.2, because only 20 percent of the energy for the food system is used directly in agriculture. A true accounting of the environmental costs of energy use in agriculture would probably add another $2 billion. Although the Energy Information Administration suggests that current U.S. subsidies for energy are $6 billion per year, with almost half for oil, coal, and gas, a more careful analysis by critics estimates that the cost is likely somewhere between $40 billion and $69 billion each year. If this is true, then the energy subsidy for the food system would be about $5 billion annually.

Subsidies for water include direct and indirect payments and savings as well as the much larger external costs of ecosystem damage and destruction. The subsidies for water used on farms in California are estimated at $400 million per year. Nationwide the total may be in excess of $1 billion.

The environmental costs of food production are not restricted to the United States. As more food is imported, more damage is done elsewhere. The banana plantations that supply America's tables ravage and damage the

environment by destroying virgin forests and by using massive pesticide applications to combat severe disease problems. An estimated $1 billion per year can be added to the environmental costs of agriculture for bananas alone. Pesticide use in China to produce food exports at the lowest price at any cost should also be counted. The health costs of melamine-contaminated food from China should also be added.

The total external environmental cost of agriculture in the United States may be about $50 billion per year. I suggest that an annual cost of from $100-200 per acre for external costs might be appropriate. If this per acre cost were applied to tobacco production (a fairly costly crop to grow in terms of pesticides and erosion) in the United States, the result would be a net environmental impact cost of about $35-70 million. Like growing grain for alcohol production, this is insignificant compared to the social cost of about $167 billion for cigarettes (primarily related to health costs). Some old school economists have argued that cigarettes offer a benefit to Society, because smokers die sooner and therefore use fewer government benefits.

Improved True Cost Accounting

Table 4.7 is a summary of the true costs to include on the balance sheets for AlcCo and for the U.S. agricultural industry. Neither looks particularly attractive as an investment with accounting of true costs.

Table 4.7. AlcCo and U.S. Agriculture Accounts

AlcCo	Million pounds
Ecological costs	(6.2)
Social costs	(52.0)
Current profits	+7.4
Net	(50.8)

U.S. agriculture	Billion dollars
Subsidies, direct and indirect	(50–100)
Ecological costs	(41–52)
Social costs, including obesity and legacy costs	(46)
Cost of illegal immigrants	(20)
Subtotal	(157–218)
Net farm income	+70
Annual loss	(87–148)

The overall picture is not quite as bad as it looks. Both AlcCo and the U.S agricultural system offer many benefits in terms of work and support for families throughout the value chain. And some farms protect natural capital and nature's services. The estimates in Table 4.7 should be refined and improved through additional research. Specific attention should be given to subsidies, which are particularly important as well as challenging to unravel. For example, a study of sugar subsidies showed that they cost taxpayers $800,000 for each job saved. Many of the environmental costs will require basic and applied research.

A good company, organization, or nation needs to understand its accounts to know how it is doing. While social costs dominate for many products and services, for others the environmental costs will be equally disproportionate. While the adverse impacts of coal-fired power plants include many health costs, these are probably eclipsed by ecosystem damage costs over many hundreds or thousands of square miles.

More detailed company and sectorial analysis can help provide averages and approximations of both environmental and social costs. The work could be done by colleges and universities through a wide range of disciplines, preferably with multidisciplinary teams. University training still lags far behind the need for environmental accounting, and slightly behind the demand. Very few opportunities currently exist in most ecology, business, or engineering curricula for the integrated accounting approach this new field demands. Integrated sustainability accounting will have to surmount the usual obstacles to interdisciplinary studies. Revisions to university curricula and continuing education as well as more detailed and user-friendly Web resources will also help improve the value of true cost accounting.

Professional societies and accounting and educational organizations can also help by advocating creation of a new Sustainability Citation Index to credit researchers and faculty who tackle these important, time-consuming, and challenging interdisciplinary issues. An effective sustainability index would also make international research more accessible.

Certified or chartered accountants do much of world's financial accounting, including preparing financial and tax statements and performing audits, and are often focused on investors, lenders, and regulators. True cost accounting will become an increasingly important part of their work, as is already the case in Europe. Training will have to be changed to provide the appropriate skills and understanding for these

professional groups. Continuing education programs can bring working professionals up to speed.

A new emphasis on activity-, product-, and enterprise-based accounting will also improve management accounting, which can improve allocation of overhead and environmental and social costs to specific operations. Improved process-flow mapping, integrated substance chain management, and material flow analysis will help to better account for inputs and outputs as well as identify costly nonproduct outputs. Governments and advocacy groups can use true cost accounting to help develop and review the effects of policies, incentives, and regulations on the performance of companies, industries, and nations. Although all fields of environmental accounting are rapidly developing, the focus has generally been on management applications.

True cost accounting is developing rapidly and improving decision making around the world. Modest investments in improved accounting can lead to significant gains in profitability, enhanced corporate image, and reduced liability. This new level of accounting, however, demands new skills and tools as well as more integrated accounting across department and division lines within companies and the inclusion of all stakeholders.

Ecology programs, business schools, environmental science programs, health programs, engineering and design programs, and all of professional organizations need to embrace this new challenge and opportunity. These topics and problems are often well suited for undergraduate and graduate projects and analysis.

The world tomorrow will find a new corporate function—true cost accountant (Figure 4.3). He or she will work hand in hand with the financial and sustainability departments to ensure that the organization is maintaining accurate and complete account information. This work will require field and information technology skills as well as traditional accounting training. True cost accounting will also create the need for forensic true cost accountants, certified true cost accountants, and independent true cost accountants for verification and certification of reports. Many of the new jobs in true cost accounting will also be for policy development by NGOs and governments.

When true cost accounting is applied, resource use and adverse impacts can be reduced by 50 percent to 90 percent in most sectors and the comfort and security of citizens will be improved. True cost accounting can help create a healthier, more prosperous, more secure, and less wasteful society.

Accounting for a 300,000 acre wildfire in San Diego. Who is responsible? Who pays?