

Embedded carbon

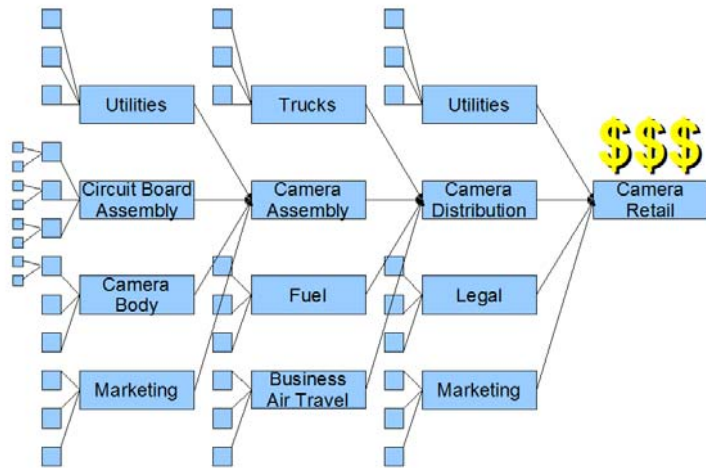
Recently I read an article in the Economist magazine about trade talks between the European Union and China (see picture). The intent of this example is not for you to take sides on the issue, but to introduce the concept of “embedded carbon.” Almost every product you buy has some embedded carbon. If you buy a banana, it has embedded carbon. The banana doesn’t actually have extra carbon in it, but because the banana had to be shipped from a faraway place, the purchase of that banana drove someone to release carbon into the atmosphere.

trade fight with China. An EU deal to reduce carbon emissions is due to be agreed later this year, and it will impose big costs on European industry. At a summit in March there were demands for action against imports from countries that do not impose binding limits on carbon: some called for “green” import tariffs, others for making foreigners buy EU emissions permits.

Yet Chinese voices offer a counter-argument. If China is emitting ever more carbon, that is partly because it has become the workshop of the world. A hefty chunk of Chinese emissions (estimates of 30% or more are bandied about) is “embedded” in goods that are exported, often by multinational companies. In other words, many Chinese factories are really emitting European (or American) carbon. The likely response from EU leaders

The supply chain problem

Unfortunately, we don’t know how much carbon is released into the atmosphere as a result of us buying a product. Figuring out the environmental impact of a product is currently incredibly difficult. When you buy a product, let’s say a camera, the camera manufacturer buys other products that enable it to make the camera you bought. The other manufacturers buy more products and this process keeps on going. Quickly, the number of organizations involved in making that



one product number up into the thousands. There is currently no good way of understanding the environmental impact of a product that accounts for all the major parts of the supply chain. This is the problem I would like to solve. *If I buy a product or if I don’t buy a product, there will be a difference in environmental impact. That difference is the environmental impact that this product is responsible for.* We should have a way of understanding what that difference is. Unfortunately, to understand that impact, we would have to understand the environmental impact of every organization in the supply chain as it relates to that product. This is a very difficult problem because of the number of organizations involved. However, a single individual or group of people understanding the impact of one organization is very realistic.

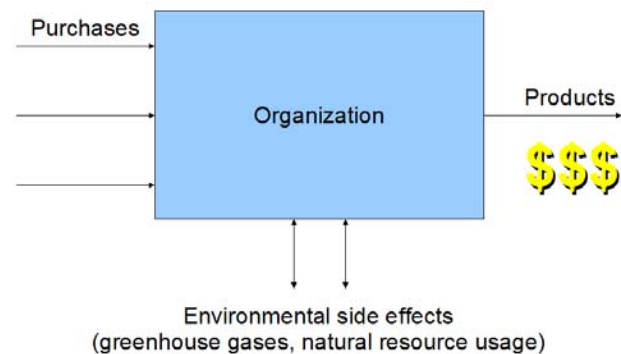
An army of experts

What we need to be able to analyze a supply chain are a few experts who understand each organization and will analyze the environmental impacts of that organization. This means we need an army of experts. Fortunately, there is a company out there that has paved the way in getting armies of experts together to collaborate: Wikipedia. *If we can apply Wikipedia's concept of having many volunteers contributing expertise, we might be able to solve the environmental pricing problem.* In our case, instead of writing encyclopedia articles, people would fill out information about some company in a supply chain.

Analyzing the supply chain

We will use a model that assumes that the thing driving production is a consumer's purchase. On a small scale, this is often not true, but I think it is a safe assumption to make on a large scale. When you purchase a product, let's say, a can of Coke, you first give your money to a store. That store has many costs involved with running. Things like electricity, salaries, and advertising. Each cost can be traced to the next organization down the line, let's say, a distributor. Then we can analyze the costs for the distributor in the same way, and also at every step, analyze environmental factors. The distributor runs trucks which release CO2 into the atmosphere. The computer will look through the whole supply chain, and at each step, tally up environmental side effects. Side effects can be the amount of CO2 released into the atmosphere, or the number of trees cut down. When the computer is done looking at the whole chain, you will be given a report of the environmental side effects. Side effect variables don't even have to be limited to environmental issues. Some people might be interested in where a product was made. That would be just another variable as far as the computer is concerned. The only reason to put a limit on the number of variables is so that people won't get confused with too many variables.

Any one organization will have inputs, outputs, and side effects that will need to be filled out by the experts. Inputs are products that the organization buys. Outputs are products it sells to other organizations. Side effects are the environmental consequences of making a product. Since this information will not be complete for many things that can be bought, there will have to be placeholder organizations to fill in the gaps. If you don't know where your power is coming from, there can be a generic power company that has some average values for the inputs, outputs, and side effects. As experts define the organization's information more precisely, the environmental impact data for products will converge on a more correct solution.



The end user experience

There are a few different ways people could use this system. The most obvious is to have a web page with a search engine style interface where a person could search for a product they are considering

buying. The search results would give that person an environmental score for the product. Now, every individual might care about different issues. One might care about global climate change and others about pollution in their city's air. The users should be able to define what they care about and how much by defining a set of "weights." Each weight is a number that will get multiplied by a side effect result and added to a total score. *With this system, an end user can get a single number that represents their own custom environmental score for the product that they purchased.* However, not everyone will be an expert and want to make a set of weights. For this, we can have endorsed weights. These are a set of weights defined and endorsed by some group of experts. You could imagine some environmental organizations having sets of weights that they endorse. That way the end user just has to decide who their favorite environmental group is.

With camera-enabled cell phones capable of GPS positioning, it may be possible to make a cell phone application that scans UPC bar codes and gives a score for a product. This way a person could do some comparison shopping. Should they buy a bottle of Coke or a can? It will be useful to put the power in the hands of consumers in this way.



Some retailers or manufacturers might want to label their products. This system can provide the information needed for labeling. With the current trends toward "green" marketing, this has the potential to catch on.

Another use of this application would be for companies in the supply chain to optimize their own purchasing and work practices for environmental variables. The application should make it easy to trace through the supply chain to find where the problems are.

This application could also be used for general environmental education. It should eventually be a one stop shop for information about products' environmental impact for consumers. The system can also include forums where people can discuss the issues and maybe wiki-like pages for information relating to the various products, organizations, and environmental issues.

Economic researchers could use this as a tool that would enable them to trace money down a supply chain.

Who will fill out this information?

Who will make up this army of experts? Most likely, not people working for the companies involved. That would involve potential proprietary information being released and/or misinformation. Instead, the experts would have to be mostly people who are familiar with a specific industry and who can make educated approximations of the information needed. There could possibly be legal issues if people make proprietary information public. This is something that needs to be looked into.

Currently, there are many people out there doing the work of figuring out environmental impacts of organizations. When the impacts have been calculated, the organization might implement some energy efficiency procedures, but often the information will then get thrown out. This database will be able to collect information so that it no longer goes to waste and there will be collaboration to make information more accurate.

But how accurate will the final result be?

Usually, the first criticism of this idea is the potential inaccuracy of the information, so let me address that. First, understand that the environmental impact scores that this system will produce will not be perfect. As time goes on, they will converge to a more correct solution, but will never be perfect. But perfection is not needed for this system to be useful. So, what is “useful?” Well, I would define “useful” as being better than what we currently have. What do we currently have if we want to find the environmental impact of an item? You could either take a few months to do some research and come up with an approximate answer, or you could search around for articles people have written about the environmental impact of a related item. The article you find will probably not be exactly the product you are looking for and it may not give you the answer in the units you are looking for. The article will most likely have been written by a small group of people and have many large inaccuracies, as it is very difficult for a small group of people to understand a full supply chain.

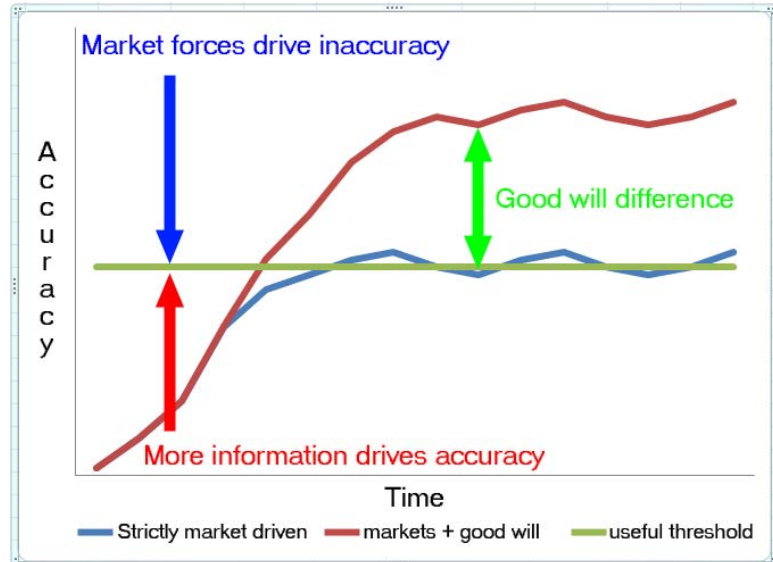
If this environmental pricing application gets developed, that same group of people should be able to do the same analysis, but this time inside the application’s framework. Therefore, the results you get should be no worse. They should, however, be much more accurate as a result of all the other groups of experts filling out information and discussing it. If it is still so inaccurate that you see a problem with it, you can change it to be more correct. The general answer to the accuracy question then is that the accuracy will be significantly better than what we currently have.

Another accuracy issue people frequently bring up is changing prices in markets. Every day prices for different items fluctuate and people wonder if this idea is invalid as a result. If the information in this database only got updated once a year, or even every 5 years, it would still be useful. So, while fluctuating prices will introduce inaccuracy, it will not be a show stopper.

Why will people tell the truth when filling out this information?

There is no single silver bullet solution to this, but we can use technology in our favor here. We can look at things like having an online identity, social networks, logging people’s actions, discussion forums where people can justify their numbers, and statistical automated policing. Wikipedia asks people to use references to sources of information, and we can do the same. These are just a few ideas and I’m sure other ideas will come up. One thing that cannot be done is that official industry people cannot get preferential treatment for their company. This will incent dishonesty and could cause frustration among others who have been shut out. If we want to have an official system, we could possibly run a separate database alongside the main one with all of the official numbers in case companies want to use them for marketing.

We can also look at dishonesty as it relates to usefulness. When the system just starts out, it will not be very accurate, and so it will not be very useful. At this point, there is no financial incentive for dishonesty. It is only when the system gets to the point where it is accurate enough to be useful that people will start using it to drive purchasing decisions, creating a financial incentive for dishonesty. If we look at this in a strictly market driven way, the system will reach an equilibrium at



the level of accuracy where the system is just barely useful. However, this is just looking at information vs. market forces. It is not modeling the force of people's goodwill. People's goodwill will move the accuracy higher, taking the system farther into the useful zone.

Another thing that will help the accuracy is better policing with time. An organization that is trying to falsify information will have less ability to scale compared to the number of people who can report that organization's false information.

How will this make money?

Profitability can easily compromise the integrity of the system or make a disincentive for people to contribute. For that reason, this project would be most effectively implemented by a non-profit, donation-based company. However, once the database has been sufficiently filled out, it may be possible to sell the information in ways that would not discourage the average user from using the system.

Getting to the root of the problem

Consumer purchases of products are the driving force behind much environmental damage. Unfortunately, supply chains currently blind people to their contribution to many problems. Instead of hearing about a product's problems, you will hear people blaming corporations for environmental damage. But those corporations are run by people and, even more importantly, are driven by people's purchases of products. It is currently so difficult to understand the supply chain that environmental problems tend to be measured by industry. Measuring by industry is useful, but it is only one part of the equation. Once we are able to solve for the root of the problem, we will be able to make significant progress.
