

# STRATEGIES FOR CARBON NEUTRALITY<sup>1</sup>

Richard Conlin<sup>©</sup>

Seattle hopes to become the world's first climate-neutral city. It's no small task: The City must account for, and reduce, the carbon footprint of everything from transportation to trash for hundreds of thousands of people. Moving from a carbon-based economy to a carbon-neutral economy requires a sophisticated array of strategies. There is no magic bullet—no single simple solution—that will get us there, and every approach has limitations. There are a variety of ways to characterize the types of strategies—I will draw from several different approaches to paint a picture of what I see as the six options.

## 1. Efficiency Improvements

This is the most readily accessible, and builds on many technologies that we already have experience with. At its simplest, it involves taking steps like insulating buildings and improving the mileage performance of vehicles. These are often so cost effective that we save money by implementing them, and yet our legacy of cheap energy has caused us to neglect them. Let's take automobile gas mileage as an example of the steps that could be taken.

Our legacy of cheap energy has caused us to neglect efficiency. For many years, the American automobile fleet actually decreased its fuel efficiency. Partly this is due to shifting to larger cars, but there was also a basic neglect of easy technological fixes—and this is one of the reasons that the American auto companies lost so much market share to leaner overseas competition. The easy fixes must be followed by a more sophisticated approach, including moving towards smaller vehicles, hybrids, and all electric vehicles. There's no reason we can't cut vehicle carbon emissions in half or more and save money too.

## 2. Redesign

Improving efficiency necessarily involves design improvements, but at some point a threshold is crossed requiring redesign of both the component part and the system it operates in. Shifting to electric cars is an example—while the vehicle operations may dramatically reduce the emissions, it is also necessary to set up charging stations and generate the needed electricity. If we can implement a charging network and develop renewables as the source for the electricity, the carbon benefits of moving to this technology could be enormous. It's important to keep in mind, however, that even electric cars will generate carbon emissions in their manufacture, in maintaining the roads they travel on, and in developing and operating even a renewable based energy system. Again, there is no panacea, but there could be very substantial benefits with the right system design.

## 3. Shifting Modes

Keeping with the automobile as the example, another step towards reducing emissions would be to reduce the number of automobile trips people take. Shifting to bicycles, walking, and transit will greatly reduce carbon emissions (although not eliminate them, especially the embedded carbon in developing and operating transit systems). In addition, reducing the necessity for trips can be an even more productive option. Telecommuting generates much less carbon than

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actually going to a workplace; delivering a quantity of packages to a neighborhood is much less carbon intensive than everyone going to the store and returning home. And developing compact communities, where employment, housing, shopping, and recreation can be accessed with greatly reduced transportation miles, can be very effective.

Unlike efficiency improvements, which are often invisible to the user, or even redesign, which usually requires system changes, mode shifts can require both changes in individual behavior and changes in social and economic systems. And these can be easy (liking walking a short distance instead of driving), or very complex (like redesigning urban areas and adding transit systems, or reconfiguring work and school assignments and patterns to reduce travel).

#### **4. System Thinking**

Redesigning whole systems is the most challenging change strategy, but this kind of rethinking will be necessary. A good example is the food system. The food system and agriculture generate somewhere between 15 percent and 20 percent of America's carbon emissions (depending on the study and what it counts). American food travels an average of 1,500 miles from farm to plate. Then there is the processing, storage, marketing, and shopping involved, not to mention the embedded carbon in each element of this system. Growing food at home can reduce a whole array of emissions; emphasizing local food has similar impacts; no-till and organic practices generate other reductions. But none of these by itself will achieve a dramatic reduction in carbon in the food system—there has to be a complex array of approaches that looks at the system as a whole, takes apart each component, takes into account the social, environmental, and economic dimensions of change, and slowly turns the ship around towards a less carbon intensive system. The carbon reduction comes, not from a single element, but from all of the changes being done together.

#### **5. Carbon Sequestration**

These four types of strategies must all be implemented in order to achieve significant carbon reduction. We must work on all of them, and all will take time to achieve. But even together, they will not reach the carbon neutral goal. That will likely require a fifth strategy—taking carbon out of the atmosphere. Some scientists are working on sequestration strategies (like injecting carbon into underground storage) that have all kinds of issues or risks, but there are also very practical sequestration strategies around agricultural practices and forest restoration that can be implemented, and will have to be.

#### **6. Carbon Offsets**

Finally, let me mention a sixth strategy: carbon offsets. Essentially this involves buying someone else's carbon reduction in order to balance the carbon we are generating. Offsets can be helpful in the near term, by supplying capital for energy conservation measures that would otherwise not be realized, but in the long run they are not going to solve the problem. Unless they truly involve buying sequestration, offsets cannot be part of a long range carbon neutrality strategy. That's a quick summary of the tools we have available to us. Before digging into the details of how to use them, the next article will focus on **adaptation**: what we must do to address the fact that climate change is already happening.