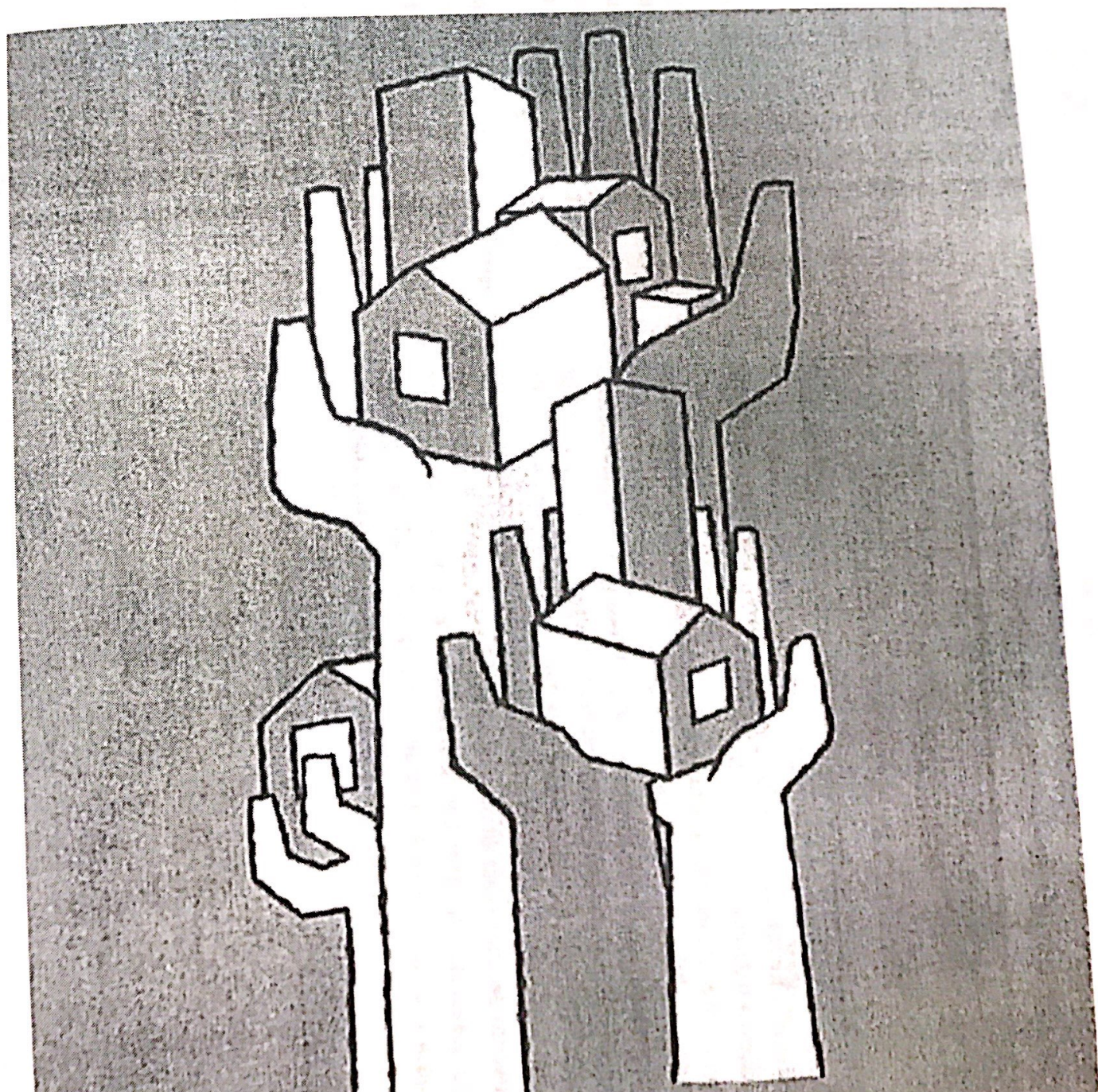


What Can Communities Do?

By Rob Hopkins



Bank has done something to control the economy, you'll also see that the economy must have done something to affect the Federal Reserve Bank. When someone tells you that population growth causes poverty, you'll ask yourself how poverty may cause population growth.

THINK ABOUT THIS:

If A causes B, is it possible that B also causes A?

You'll be thinking not in terms of a static world, but a dynamic one. You'll stop looking for who's to blame; instead you'll start asking, "What's the system?" The concept of feedback opens up the idea that a system can cause its own behavior.

So far, I have limited this discussion to one kind of feedback loop at a time. Of course, in real systems feedback loops rarely come singly. They are linked together, often in fantastically complex patterns. A single stock is likely to have several reinforcing and balancing loops of differing strengths pulling it in several directions. A single flow may be adjusted by the contents of three or five or twenty stocks. It may fill one stock while it drains another and feeds into decisions that alter yet another. The many feedback loops in a system tug against each other, trying to make stocks grow, die off, or come into balance with each other. As a result, complex systems do much more than stay steady or explode exponentially or approach goals smoothly—as we shall see.

— TWO —

A Brief Visit to the Systems Zoo

The ... goal of all theory is to make the ... basic elements as simple and as few as possible without having to surrender the adequate representation of ... experience.

—Albert Einstein,¹ physicist

One good way to learn something new is through specific examples rather than abstractions and generalities, so here are several common, simple but important examples of systems that are useful to understand in their own right and that will illustrate many general principles of complex systems.

This collection has some of the same strengths and weaknesses as a zoo.² It gives you an idea of the large variety of systems that exist in the world, but it is far from a complete representation of that variety. It groups the animals by family—monkeys here, bears there (single-stock systems here, two-stock systems there)—so you can observe the characteristic behaviors of monkeys, as opposed to bears. But, like a zoo, this collection is too neat. To make the animals visible and understandable it separates them from each other and from their normal concealing environment. Just as zoo animals more naturally occur mixed together in ecosystems, so the systems animals described here normally connect and interact with each other and with others not illustrated here—all making up the buzzing, hooting, chirping, changing complexity in which we live.

Ecosystems come later. For the moment, let's look at one system animal at a time.

About the Author

Rob Hopkins is the originator of the *Transition Town* concept, which promotes community-driven responses to peak oil that focus on cooperative effort to meet basic needs as sustainably and close to home as possible; in just a few years, his work has inspired an international movement of hundreds of communities. He is co-founder of the Transition Network and author of *The Transition Handbook: From Oil Dependency to Local Resilience* (2008). He is a trustee of the Soil Association (U.K.), the winner of the 2008 Schumacher Award, and a Fellow of Ashoka International. Hopkins is a Fellow of Post Carbon Institute.

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613 4th Street, Suite 208
Santa Rosa, California 95404 USA

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Wellhead and Tailpipe

Why We Keep Fueling the Fire We Want to Put Out

IN SOME WAYS, CLIMATE CHANGE is actually quite simple. We find fossil fuels. We dig and pump them out of the ground. We process them and sell them. Then we burn them. The waste gases include carbon dioxide, which traps the heat in the atmosphere that leads to global warming. There is, of course, much more to it than this—other gases, sources, and sinks—but this is the basic carbon cycle, which represents the majority of the problem and appears in every textbook and informs every policy.

So, there is a chain, or, if you prefer, a pipeline. At the one end is exploration, development, and production—what I will call the *wellhead* (a term which will include the minehead). And at the other end is the sale and then combustion that leads to emissions—what I will call the *tailpipe*. Policies to manage climate change should, one would think, consider interventions at both ends and all stages in-between.

However, they do not. The focus on tailpipe gases and disregard for wellhead fuels has been the single most important factor in all government and policy framings. Radical environmentalists alone have attempted to connect two issues that, in the minds of most mainstream experts, operate in entirely independent realms. This does not, on its own, explain why we ignore the risk of climate change, but it does explain

the fundamental disconnection that works through all narratives and policies on the issue.

It explains how a climate science funding body can subsidize exploration by oil and gas companies, and how the Science Museum in London can have a display on climate change funded by Shell. It explains how Norway, the world's eight largest exporter of oil, can see itself as a champion of action on climate change. It explains how President Obama, speaking as usual in the first-person plural, can boast in a 2012 presidential debate that "even as we're producing more coal we're producing it cleaner and smarter, same thing with oil, same thing with natural gas" and then, just a few months later, say, "We need to act, but we can't just drill our way out of the energy and climate challenge."

It explains how Hillary Clinton, who calls the climate crisis "the chief threat of the 21st century," could visit Norway in June 2012 to negotiate U.S. access to the nine hundred trillion dollars in Arctic oil reserves. Her internal dissonance came to a head on June 2. She started the day with a trip on a scientific research vessel to see the melting Arctic—an experience she described as "sobering." Back on land, after a lunch of local seafood delicacies, she went straight into a roundtable attended by the CEO of Norway Statoil and the country director of ExxonMobil to plan the expansion of Arctic oil production.

In Britain, energy and climate change are combined into one government department leading to simultaneous action to reduce emissions and to boost oil production. One month the Minister of Energy and Climate Change brags about the allocations of new licenses to release twenty billion barrels of oil around British coasts. The next month the Minister of Energy and Climate Change announces an ambitious plan for the government to reduce its emissions by 10 percent.

Although many campaigners would regard such inconsistency as evidence of the hidden influence of oil corporations, policies to deal with other global problems—even those with powerful vested interests—never ignore production in this way. Fisheries are managed through fishing rights and production quotas. Illegal logging is prevented through permits and forest management. And to take a notoriously wicked problem, it would be unthinkable for drug policy to ignore production, which is why the U.S. government spends nearly two billion dollars per year on international control measures. If, as George W. Bush said, we are addicted to oil, then a policy on climate change that ignores production of

fossil fuels is like a policy on drugs that ignores the poppy fields, cocaine labs, smuggling networks, and dealers and focuses exclusively on the addicts.

In fact, when compared with these other examples, it makes even *more* sense for climate change policies to include production. Two-thirds of the world's oil production is produced by just ten oil companies or, to look at it another way, by just ten countries. Representatives from every one of them could comfortably sit around a single conference table. There would be enough space left over for a couple of extra delegates from China and the United States, which between them account for two-thirds of the world's coal production. This was self-evident to the economist Thomas Schelling, who won the Nobel Prize for his work on negotiation theory. Schelling regards climate change policy to be an "awfully complicated hodgepodge." To him, the answer seems very straightforward: "The way to simplify this is to put the cap on the fossil fuels, not on different industries—a cap on oil and gas at the wellhead, a cap on coal at the minehead," he says. When I asked him why he thought that no one has ever proposed doing this, he said, "I don't have any good theory except to say that hardly any leading politician in the U.S. manages to speak truthfully and candidly about the subject of climate change."

Robert N. Stavins, a professor of business and government at Harvard University, agrees. He supports the model of emissions trading but argues that the precedent should have been the trading model applied during the 1980s to phase out leaded gasoline, which focused on the lead content in gasoline (the fuel input) not the exhaust (the tailpipe output). According to Stavins, the cheapest and most enforceable system is to tax the carbon content of the fuels.

So, I wondered, when had the governments and experts working on the international process weighed up the various options for policy interventions and decided that the best basis for national and international policy was to regulate and trade gases and ignore the fossil fuels that produce them?

The answer is that this discussion has never taken place.

The science of climate change has only ever been concerned with greenhouse gases and their potential impacts. In 1990 the Intergovernmental Panel on Climate Change (IPCC) produced the first tables of national greenhouse gas emissions, which then became the basis of the international negotiations. However the IPCC had no remit to produce tables of

national fossil fuel production. Sir John Houghton, the founding chair of the IPCC, sees no difference between the fossil fuels that are produced and the greenhouse gases they later become. "Of course," he says, "they are all part of the same thing." The problem, he told me, is that "talking about the source of fossil fuels would have moved us from the science arena into the policy arena. Because of the pressure we were under, we needed to be squeaky-clean, maybe too clean, but we needed it to be that way."

In his fourteen years chairing the IPCC Science Committee, Sir John could not recall a single proposal or debate about controlling production at the wellhead. "It's a pity that it never has been addressed, but it is not a science question. It is a policy question."

Except that it was never discussed in policy circles either. Jeremy Leggett, a former oil industry geologist who later became the senior climate campaigner for Greenpeace International, has attended the international climate negotiations since 1990 and sat in on every major policy discussion. Yet he could not recall a single instance when anyone formally proposed a policy that would constrain the exploration and development of new sources of oil, gas, and coal. "Looking back," he says, "I think it was a missed opportunity that we did not make this argument earlier."

"Nor," he adds, "was there any point at which the oil companies or producers actively generated this approach. It just happened to be the zeitgeist that this was how the problem was approached and this just happened to be in the interest of the oil companies."

Leggett's observation is important. Of course, there were very powerful national and commercial interests protecting fossil fuel production. Attempts to limit wellhead production would have been bitterly resisted. But there were no fights, no struggles, no backroom deals. There did not need to be because it was never discussed.

Jennifer Morgan has dedicated most of her working life to following the climate negotiations. She headed the delegation for the World Wildlife Fund throughout the Kyoto negotiations and has led campaign teams in every negotiation since 1994. Like Leggett, she could not identify any point at which a decision was made to focus on tailpipe emissions. She tells me that "it has just been assumed for a very long time." Morgan and Leggett agree that campaigners and negotiators alike were trying to get the best deal they could on the terms that were available to them—and these were only concerned with the tailpipe.

And so everyone fought bitterly over the mechanisms for sharing,

controlling, and trading tailpipe emissions. The science was only concerned with gases. The international process had taken all of its precedents from previous policies to control and trade gases. From the very outset fossil fuel production lay outside the frame of the discussions and, as with other forms of socially constructed silence, the social norms among the negotiators and policy specialists kept it that way.

Consequently, the narratives surrounding the environmental impacts of fossil fuels became divorced and disconnected. Narratives around the impacts of oil, gas, and coal production become concerned with health, safety, and compensation for localized environmental damage. Narratives around climate change become concerned with emissions, energy demand, efficiency, consumer lifestyles, and global climate impacts.

In spring 2010 there was a perfect opportunity to bring these two drifting stories back together again. Senators John Kerry and Barbara Boxer were holding intensive negotiations to redesign a climate bill for a vote in the U.S. Senate. To maintain the political momentum, mainstream environment organizations were running the largest and most expensive public outreach campaign ever held on climate change. And then, on April 20, BP's *Deepwater Horizon* oil rig exploded and spilled four million barrels of crude oil into the Gulf of Mexico.

The result should have been a godsend for climate advocates: a media-driven outrage about dirty fossil fuels at exactly the time that legislators were considering an even greater crisis caused by the pollution of those same fuels. This perfect storm of synchronicity happens only once in a campaigner's lifetime.

Only there was no room for making these connections because the U.S. climate bill, following the lead of the international negotiations and the acid rain emissions trading, was entirely concerned with tailpipe emissions. In return for their involvement and support, oil, gas, and coal companies had been offered generous emissions allowances and increased exploration rights. Three weeks before the explosion, as part of a grand bargain to get a climate bill through the Senate, President Obama had announced plans to open up 167 million acres of the Atlantic coast for oil drilling.

So there was no means to connect the narratives—although grassroots groups like the Sierra Club tried valiantly to do so. *Deepwater Horizon* became all about local impacts and corporate health and safety—with a compelling enemy narrative centering on the slippery and evasive performance of BP CEO Tony Hayward.

The more radical environmentalists have always tried to make the connection between wellhead and tailpipe. Patrick Reinsborough of the Oakland-based Center for Story-based Strategy sees this as part of a wider vision of an inclusive movement for social justice. "There is now a new political space opening up," he told me, "in which we see that the problems are fossil fuels, and people who have been on the front lines of fighting fossil fuels are the obvious people who should be on the front line fighting for solutions."

The battle over the Keystone XL pipeline and the movement mobilized to demand divestment from fossil fuel companies are also determined attempts to reframe the issue of climate change in terms of wellhead. A pipeline not only has the proximity of a visible struggle but it also gives tangible form to the transmission of carbon from stored reserves to emissions.

But the problem remains—as with the language and images of climate change as a whole—that for as long as radical activists are the only ones making these connections, their arguments may be marginalized and disregarded.

So, I suggest, the separation of wellhead and tailpipe was not primarily the product of corporate lobbying or global power politics—although these have played a role. It can also be understood as an extreme error of judgment resulting from cognitive error and flawed categorization. Scientists categorized climate change as a tailpipe issue because production was considered a political issue that was outside of their domain. Policy makers then categorized climate change as a tailpipe problem because they drew on recent available experience that suggested viable solutions for tailpipe problems. Confirmation bias and a socially constructed norm of disattention finished off the job.

Because climate change is multivalent and wicked, it can have multiple interpretations but exists only in the form that people choose it to have. This means in turn that it does not exist in the form that they choose to ignore. Production controls are not debated, because they simply don't exist within the debate.

After twenty years of negotiating around emissions, we are now in a bizarre situation. Most Western governments have established programs to subsidize the increasing production of renewable energy, biofuels, and—with less success—nuclear power. And they do so while encouraging, and usually subsidizing, ever-larger investments into exploring and developing new fossil fuels.

PRELUDE

How we behave in the world is profoundly influenced by how we experience the world, which is profoundly influenced by how we perceive the world, which is profoundly influenced by what we believe about the world.

Our collective behavior is killing the planet.

It's not altogether irrelevant, then, to ask what sorts of beliefs (perceptions, experiences) might be leading to these destructive behaviors, and to ask how we can change these beliefs such that we will stop, not further, the murder of the planet.

We have been taught, in ways large and small, religious and secular, that life is based on hierarchies, and that those higher on these hierarchies dominate those lower, either by right or by might. We have been taught that there are myriad literal and metaphorical food chains where the one at the top is the king of the jungle.

But what if the point is not to rule, but to participate? What if life less resembles the board games *Risk* or *Monopoly*, and more resembles a symphony? What if the point is not for the violin players to drown out the oboe players (or worse, literally drown them or at least drive them from the orchestra, and take their seats for more violin players to use), but to make music with them? What if the point is for us to attempt to learn our proper role in this symphony, and then play that role?

—DJ, Northern California, January 2016