

nistic, and technological research to build the alternatives that would move toward an ecologically sustainable planetary civilization.

In addition, during events like Hurricane Sandy, the media could help in not cooperating in the reproduction of amplification spirals of moral panic. It is one thing to report truthfully and in a timely fashion, and a quite different matter to use discourses that can spread scenes of states of exception, in which the values of survival are the ones that prevail, which can lead to desperate action that often complicates the situations more, increasing our vulnerability as individuals and communities. For example, they should discourage panic buying instead of promoting it, and stimulate solidarity and not insecurity and mistrust among people, sharing and not hoarding

of resources, and facilitate interaction and neighborhood cooperation instead of people isolating themselves. ■■■

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#### NOTES

<sup>1</sup> Hippolyte Delehaye, *The Legends of the Saints: An Introduction to Hagiography* (London: University of Notre Dame Press/Longmans, Green, 1907), <http://archive.org/details/legendsofthesaints012977mbp>.

<sup>2</sup> Karen Armstrong, *The Great Transformation* (New York/Toronto: Alfred Knopf, 2006).

<sup>3</sup> Stanley Cohen, *Folk Devils and Moral Panics* (Abingdon, Oxford, UK: Routledge, 2002).

<sup>4</sup> *Ibid.*, p. 9.

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## Climate Change, Infrastructure, and the Promethean Myth

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**T**here is no technology without a negative social, economic, and/or environmental impact. This is the case whether a new automatized process displaces the use of labor in a particular economic sector or the more intensive use of solar panels drives up the demand for certain materials like cobalt or cadmium, often located in social and environmentally sensitive areas.

Indeed, benefits of technology might exceed negative side effects, but this requires finding the mechanisms to use part of these benefits to compensate negative impacts. The quest for social and economic development since the industrial revolution may be summarized in this way: it is not only

a struggle to improve general living conditions (for example, health, education, or gender equality), but also a struggle to palliate the negative effects of our own efforts to achieve development goals.

In our times, innovation and technology are often understood by the layman as “new artifacts,” but we are thinking of technology in a broader sense. Strictly speaking, technology does not only refer to new artifacts (e.g., the bicycle, the car, the solar panel, the smart phone, etc.). Technology and technological change also refer to human activities, to new knowledge, and to new ways in which existing knowledge is applied.<sup>1</sup> Thus, for example, the artifacts, methodologies, and strategies chosen to face the challenges of climate change include particular technologies (like wind farms and solar panels); new ways to think about existing ones (for example, hydro-electrical dams to reduce greenhouse gas emissions); and assess-

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ment tools to decide which projects are appropriate and which are not (like strategic environmental assessment, or SEA).

What kind of technologies—in the broad sense—have we adopted to face the challenges of mitigation of and adaptation to climate change so far?

Infrastructure and all the technologies that this word entails is definitely part of the answer. When we talk about mitigation, inevitably we think of wind farms in La Venta, Oaxaca, and other places in the country; hydro-electrical plants in Chiapas and other states in Southeastern Mexico; new forms of transport in Mexico City and other urban areas, just to cite a few examples. When we talk about adaptation, inevitably we think of new dikes to control floods in Tabasco, Veracruz, and even the Riviera Maya; or channels to move water from one basin to the other (for example, the Cutzamala System or plans to take water from states in the South to states in the North of Mexico).

Promoting and expanding infrastructure has been part of the general strategy Mexico has chosen to face the challenges of climate change. Although it is difficult to argue that infrastructure has not been integral to promoting economic growth through more efficient and less costly connections, and to solving particular development problems such as water scarcity and waste management, Mexico runs the risk of becoming the victim of and suffering the consequences of the Promethean myth. That is, the myth that technology can be used to overcome any problem facing humanity, including those related to climate change and to the environment in general.<sup>2</sup>

#### THE PROMETHEAN MYTH AND CLIMATE CHANGE STRATEGIES IN MEXICO

Like any mythical narrative, the Promethean myth entails assumptions, actors, and metaphors. The main assumption is that human knowledge and creativity will always be enough to overcome any problem. In this view, “nature does not exist... as anything more than a store of matter and energy,”<sup>3</sup> and therefore, it is something malleable that does not pose an obstacle

—that is, the real obstacle is human creativity. A key metaphor is that the world is mechanistic, and this involves the assumption that it can be fixed just like a clock or any other machine when it stops working. Moreover, it can be fixed forever, no matter how many times it breaks, *ad infinitum*.

The main actors are the experts who have the necessary knowledge to fix the world. Engineers, economists, and other technicians who can state climate change problems in a linear one-way route of thinking:

- 1) identify the problem (whether it be floods, emissions, water scarcity, deforestation, of mobility);
- 2) analyze and assess different alternatives *ex ante*;
- 3) choose the most appropriate, mainly according to accepted criteria of technical feasibility and economic efficiency;
- 4) assess *ex post* and, if something went wrong, correct and start again.

The most obvious danger of the Promethean myth lies in its one-dimensional account of the world and its radical optimism regarding the positive aspects of technology and the power of human knowledge and creativity. Is this not what some experts and politicians in Mexico and in other countries are professing when they say that projects and strategies to achieve climate change mitigation and adaptation can be valuable “win-win” solutions?<sup>4</sup>

When we talk about “win-win” solutions in the context of climate change, we are usually referring to projects that can be beneficial in two ways: they solve pressing environmental problems and, at the same time, they constitute significant opportunities to foster economic growth and generate business opportunities. In other words, the radical optimism of the typical Promethean myth is reflected in two assumptions. First, since there are positive environmental effects at the national or global levels (for example, reduction of greenhouse gas emissions), we forget that the so-called win-win solutions may entail environmental effects at the regional and local levels. Second, since they also generate economic benefits at the macro level, we forget that they may cause other social impacts worth considering.

Recent experiences in Mexico show the problems that may be caused by an unchecked Promethean posture. For example, it is worth remembering the emergence of social movements that have successfully organized to oppose the implementation of particular infrastructure projects. This is the case of

many dams (for example, La Parota in Guerrero or El Zapotillo in Jalisco) intended to produce electricity (therefore reducing Mexico's dependency on fossil fuels and reducing greenhouse gas emissions) or to supply water to regions and cities that face chronic undersupply of this resource, one of the most pressing challenges in the context of adaptation to climate change.

A dam constitutes the archetypical example of how a project promoted in the name of development, social wellbeing, national pride, and/or any other abstract principle may face widespread opposition from society due to the environmental and social impacts that it causes locally. One of the most serious impacts is the forced resettlement of communities that live near the planned reservoir. Under extreme circumstances, if forced resettlement is not planned and not executed adequately, it could entail the breach of a broad set of human rights including the right to personal security, to recognition before the law, to a community life, to own property, to have information, etc.

Yet, there are other technologies that entail negative local impacts that are less serious and have also encountered social opposition. Wind farms in the region of Tehuantepec, for example, have been contested by communities claiming that the compensations received for their land are unfair compared to the magnitude and benefits of these infrastructure projects. In the context of Mexico City, efficient means of transport such as the new subway line or the rapid transit bus system (Metrobús), which reduce emissions and accidents and improve commuting times, have also faced opposition based on potential environmental effects locally or on the displacement of existing sources of employment.

It is not possible to generalize and place all infrastructure projects in the same category. Some projects are not appropriate and can be labeled as "bad" for development, even during early conceptualization stages, because they are badly designed and are not the best technical alternative. Other projects have social and environmental costs that are excessive or unfairly distributed. Moreover, "being appropriate" is a relative concept that depends on many factors, including how urgent the problem is that it intends to solve, the availability of other policy alternatives, the overall costs and funding



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sources, and specific side effects, among other considerations. At the same time, given the complex and multifarious implications of many infrastructure projects, the "right" alternative depends on the specific weight assigned to different evaluative dimensions and development goals (for example, economic growth, environmental sustainability, or social and environmental justice).

Ultimately, the final goal of an infrastructure project is irrelevant; whether it targets climate change or seeks to address more general infrastructure needs, it always faces these kinds of dilemmas and difficulties. Forced displacement is equally problematic if caused by an airport or by a wind farm; ecocide is equally objectionable if caused by a dam to supply water for large transnational agribusinesses or by a hydro-electrical dam that legitimately reduces CO<sub>2</sub> emissions.

Infrastructure itself is a desirable and necessary means to achieve certain social and economic development goals. No doubt Mexico needs more wind farms, more efficient urban transport, more water treatment plants, and more landfills, just to mention a few examples. No doubt some of these technologies may also contribute to climate change mitigation and

adaptation. However, when the projects are justified through win-win discourses and other Promethean dreams, policy makers and experts in general run the risk of minimizing and obviating certain negative side effects. They run the risk of displacing problems rather than solving them.

#### PROMETHEAN “GREEN” INFRASTRUCTURE AND THE CHALLENGES AHEAD

Policy makers may run the risk of considering without distinction that *all* infrastructure projects are “green” and contribute to climate change goals. In this extreme, every dam, water treatment plant, landfill, or transportation initiative would be considered beneficial and an integral part of mitigating or adapting to climate change. Even highways might enter into this category if they reduce transportation times and distances and thus, CO<sub>2</sub> emissions! Pemex’s efficiency projects might also be labeled as part of mitigation strategies even if they only serve to improve productivity.

The proliferation of this kind of policy oxymorons has already been a danger in past administrations,<sup>5</sup> and it will be again during the administration of President Enrique Peña Nieto (2012-2018). As the new president gave his opening speech talking about passenger trains and other means of transport, telecommunications, and energy reforms, it seemed clear that infrastructure will again be a top priority for the federal government. This is not bad news *per se*. However, his announcements point to the above-described Promethean approach, which leaves aside many environmental and social implications that should also be considered.

Take the proposal of reactivating passenger trains. It is indeed a win-win solution as it could potentially promote economic development and reduce emissions by replacing the use of cars. It could even have other positive side effects such as contributing to decentralizing the population and economic activities from Mexico City to the “crown of cities” surrounding it.<sup>6</sup> However, it is not clear whether passenger trains would use new or existing rights of way. Depending on the concrete executive projects in each case, passenger trains could have environmental and social impacts worth considering. In some cases, the right of way will make the difference between the project being possible or not.<sup>7</sup>

Another example is the initiative to build a 520-kilometer-long channel to take water from the Pánuco Basin to the city of Monterrey. Although this project was originally ana-

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lyzed—at least— during the past presidential administration, Peña Nieto already expressed his sympathy with it and desire to go ahead. Unfortunately, regardless of whether this aqueduct solves water problems in Monterrey and flooding problems in Veracruz and could represent significant business opportunities for construction companies, such large infrastructure would pass through four states of Mexico, potentially causing unforeseen social and environmental impacts.

#### THE NEED FOR NEW TECHNOLOGIES (IN THE BROAD SENSE OF THE WORD)

A critical view of the overconfident Promethean ideas and discourses that permeate Mexican policy debates is useful for shedding light on certain paradoxes and challenges, but is not necessarily the best way to come up with concrete proposals. If Promethean stances are irresponsibly optimistic, radical skepticism can easily be conducive to inaction. At the end of the day, we are dealing here with a familiar challenge: we want to promote development but this also demands we find ways to palliate the negative effects that accompany our own efforts to achieve development goals.

It is fine if Mexico needs infrastructure, and it is fine if infrastructure is considered a key component of our efforts to achieve climate change mitigation and adaptation goals, but we should leave behind simplistic win-win concepts and recognize that many of these initiatives might actually be win-win-lose alternatives. Like with any other development problem, technology may be part of the answer. However, a narrow definition of technology, understood as artifacts and constructed environment, is insufficient. We need a broad definition of technology as the rational process to create the means to an end.

What are the available means for achieving infrastructure projects that are more just, both socially and environmentally? What new technologies have we designed in Mexico to deal with local environmental impacts and to prevent widespread social discontent?

We have a few but they are clearly insufficient. Environmental impact statements are one example, but this tool is easily corrupted; it lacks professionalization at the local level; and even more important, the process does not grant enough importance to social impacts, particularly when a project entails forced displacement. Thus, we need new assessment technologies to screen impacts comprehensively and imaginatively and new social technologies that leave room for the point of view of different stakeholders; to implement social accountability tools to reduce corruption among project promoters; to modify a project before it is launched; to compensate those communities that will inevitably suffer negative side effects, particularly those who are vulnerable (women, children, and the aged); and to condition funding sources for those initiatives that have unacceptable costs.

Some of these are already in use in other countries. This is the case of “social licenses to operate,” resettlement action plans, and operational rules that have been drafted by international agencies like the World Bank, which have had long and painful experience with these kinds of issues.<sup>8</sup> Others will require a sort of Promethean creativity before they are invented or before they are adapted to the Mexican context. We cannot talk of win-win solutions until we have these other tools in hand. ■■■

## NOTES

<sup>1</sup> Wiebe E. Bijker, “Why and How Technology Matters,” in Robert Goodin and Charles Tilly, eds., *The Oxford Handbook of Contextual Political Analysis* (Oxford: Oxford University Press, 2008), pp. 681-706.

<sup>2</sup> John Dryzek, *The Politics of the Earth*, 2<sup>nd</sup> edition (Oxford: Oxford University Press, 1997).

<sup>3</sup> Dryzek, op. cit., p. 49.

<sup>4</sup> One example is Mario Molina who has stated, “If we adopt the appropriate measures, Mexico could —without sacrificing economic growth— enjoy sustainable development, guaranteeing our wellbeing and the wellbeing of future generations, and contributing as well to solve a world problem of utmost importance.” See INE and PNUD, *Impactos sociales del cambio climático en México* (Mexico: INE/PNUD, 2008).

<sup>5</sup> It is noteworthy that Semarnat’s (the Ministry of Environment and Natural Resources) *Programa especial de cambio climático, 2009-2012* already considers this kind of projects as part of the mitigation and adaptation to climate change (MACC) strategies that Mexico should launch.

<sup>6</sup> The “crown of cities” refers to the main urban centers surrounding the Mexico City Metropolitan Area, which have a strong functional relationship with it, particularly economically. These include Pachuca, Toluca, Querétaro, and Cuernavaca, and other minor towns.

<sup>7</sup> In fact, one of the main reasons why the infrastructure program of President Felipe Calderón (2006-2012) did not achieve all its goals is precisely because of the difficulty of negotiating rights of way, in particular for new roads and highways.

<sup>8</sup> See, for example, World Bank, “OP 4.12 —Involuntary Resettlement,” 2001, <http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTOPMANUAL/0,,contentMDK:20064610~menuPK:64701637~pagePK:64709096~piPK:64709108~theSitePK:502184,00.html>. [http://picturesstatic2.reuters.com/Doc/RTR/Media/TR3\\_UNWATERMARKED/A/C/E/4/RTR1NCCY.jpg](http://picturesstatic2.reuters.com/Doc/RTR/Media/TR3_UNWATERMARKED/A/C/E/4/RTR1NCCY.jpg)

# What Is the Carbon Footprint? Impacts on Mexico

Ruth Zavala Hernández\*

## DEFINITION OF THE CONCEPT

Although the term “carbon footprint” has only recently come into use, it is more and more common among specialists and

the general populace as a result of the importance that climate change has taken on worldwide. But, what does it mean? Generally speaking, we can say that it is the calculation of all the greenhouse gas (GHG) emissions that a product, service, event, company, person, or state generates directly or indirectly, produced mainly by burning fossil fuels like oil, coal, and natural gas.

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