ACCESS TO ABUNDANT CLEAN energy and access to water are probably two of the major challenges that humanity will face in the future. Societies are having trouble creating the conditions for adequate energy supply to take place and defining public policy to address the problem.

Defining an energy public policy means developing a framework of ideas with which to face and act upon the energy problem. In practice, it means developing the laws, regulations, decisions, plans, and actions to guide energy advance. Usually, individuals, groups of people, and private and public organizations interact to influence formation of the energy policy, with a final course of action decided upon by the government.

The definition of an energy public policy is very much conditioned by concrete energy supply conditions, public opinion, historical events, and economics. It will therefore vary from country to country, from continent to continent, and from the developed to the developing world (see Figure 1). Although a public policy is meant to deal with long-term objectives, often it is born after an energy crisis, and the policy is plagued with opportunistic initiatives.

Energy public policies have evolved over time and reformed the energy industry, with governments usually focusing their policy actions on the electric power industry. It is easier for governments to define energy policies and assign responsibilities to the power sector instead of assigning them to the transport sector, a large consumer of energy. Power is more institutionalized and easier to control than millions of citizens using individual transportation. So, it is no surprise that it is the electric power industry that has been most affected by changes in public policy and therefore structured and restructured repeatedly over time.

As indicated, energy policy emphases vary widely, as do the courses of action and, in particular, the responsibilities assigned to both the private and public sectors. Discussions arise worldwide on what institutional energy framework to follow and how to achieve a balance between market models in which private companies compete freely and regulatory models with strong government intervention and direction. The energy industry was at its dawn developed by private investors. In many nations, governments took over from the 1940s to the late 1970s, followed by a return to a private emphasis in the 1980s and 1990s, coupled with broad economic liberalization reforms, which defined market-based mechanisms for energy supply and technology choice. Public policy was to be defined by the markets, with governments disengaging from the energy sector. The environment started to change again around 2000, when world conditions refocused attention onto energy supply security and climate change. The role of the state grew stronger again, with hybrid market-regulatory approaches being experimented with.

Energy public policies are at present directed essentially by four main objectives: having sufficient energy supply for societal needs, achieving security of supply, attaining an affordable energy provision, and accomplishing all this in a sustainable balance with the environment. Today, energy policy, particularly in the developed world, is heavily driven by concern about climate change.

**figure 1.** Total primary energy supply 2006 (source: www.iea.org).
The discussion is again about the best framework with which to achieve those objectives and what role governments should play. Should governments try to plan the future shape of energy supply and the future technologies and fuels to use? Or should they concentrate on setting energy market rules, aiming at protecting the end consumer? Should they focus on clearing externalities, particularly on emissions, and setting adequate price schemes? The need is for a definition of a strategic role for government in the energy field.

We invited authors worldwide to provide us with a sample of how energy public policies are being defined around the globe. We wanted to illustrate how different countries and regions of the world define their public policies in relation to future energy development, with particular emphasis on electric energy (Figure 2). We asked the writers to assess the role of governments in forcing certain orientations or in indicating paths for development and to discuss the responsibilities of the different agents. And we were curious about how broader sustainable environmental objectives are reconciled with the need for an abundant and economical energy supply. The objective of this special issue is to recognize the challenges inherent in defining a public policy, based on specific experiences. We hope this may be useful for third parties. Two regional views are provided first (Europe and Latin America), followed by three country-specific case studies (the United States, the United Kingdom, and India).

José Sierra and Ignacio Pérez-Arriga introduce us to energy policies in the European Union. They observe that paradoxically, in spite of the strong energy dimension of the first European treaties and of the relevance of energy for the European economy, until very recently it has been difficult to identify a common European energy policy. They explore the reasons why it is so difficult to achieve such a common policy, among them the conflict between the economic efficiency of a European energy market and the reluctance of states to lose their national energy sovereignty in an environment of high dependence on fuel imports, which at the EU level will move from 50% to 70% in the coming years. They highlight the recent (and speedy) European approval of the so-called “green package” for 2020, which aims to reduce greenhouse effect gas emissions globally by 20% as
compared with 1990, to improve energy efficiency by reducing energy consumption by another 20%, and to have renewable energies globally represent 20% of final consumption. They discuss the dilemma of the free market versus regulation extensively and argue that tensions and ambiguities will always exist regarding the fuzzy borderline between them. But the authors assert that in the energy sector, these must be seen not as opposing but as complementary forces.

Sebastian Mocarquer, Luiz Barroso, Hugh Rudnick, Bernardo Bezerra, and Mario Pereira discuss the need for a balanced approach to energy policy in Latin America. They assert that energy policy is necessarily different in Latin America than in the developed economies of Europe and the United States. The countries in this region still do not satisfy the energy needs of much of their populations, which often have to rely on burning wood for heating and cooking. Therefore, the additional policy objectives of social justice and social equity become relevant. They remind us that Latin America was the pioneer worldwide in the introduction in the early 1980s of market approaches to the energy sector, after a long period during which the state drove major energy infrastructure development. Nevertheless, different supply crises have shaken the market’s foundations, and many governments are intervening in an attempt to stimulate investment for energy supply. They wonder whether energy public policy definitions in the region are being overly fueled by the concerns of the affluent societies of the Northern Hemisphere, such as climate change. The contribution of Latin America to global warming is almost nil, so that burdening these countries with subsidies for renewable energies overlooks the fact that they have more urgent needs for social investment, particularly with respect to poverty reduction.

Stephen Holland and John Neufeld provide us with a historical overview of the evolution of government policy and the structure of the U.S. electric power industry. They indicate that few U.S. industries have been as directly affected by public policy as has electric power. From its beginning, the industry that provides the United States with electric energy has been at the center of shifting public debates over its structure and the form of its ownership. New policies drastically affecting the industry have been adopted in response to serious problems. Those policies, however, either failed to address other problems that became more severe or created new, unintended problems. New policies were then adopted to again restructure the industry, and the cycle repeated itself. The authors assess how major economic crises have conditioned a much greater federal involvement in the electric utility industry. This article will be valuable background information for the many IEEE engineers who have often discussed the need for U.S. restructuring of the power industry. At the same time, it offers the view that
other radical changes have also taken place during the industry’s long history, such as the establishment of the state commission system, the breaking up of the holding company, and the federal government intervention.

Goran Strbac, Charlotte Ramsay, and Rodrigo Moreno share their view of an energy policy for a sustainable power system in the United Kingdom. They indicate that the United Kingdom’s political agenda is increasingly characterized by a concern for the impact of carbon emissions on the global climate, which has meant new directions in energy public policy, reflected in 2008 with the formation of a government department with an explicit remit for energy: the Department for Energy and Climate Change. They examine the historic focus of U.K. energy policy on regulated markets, how this has adapted to challenges since privatization, and how it is now responding to the challenges of achieving a low-carbon sustainable energy system. They conclude that the United Kingdom is shifting away from the pure liberalized approach to energy of the 1980s and towards a hybrid model that will combine strategic direction provided by the government with markets designed to facilitate implementation of efficient solutions. Various fundamental reviews are under way to prepare the networks, which were primarily designed to support bulk conventional generation, for a significantly new environment.

Finally, Arjun Gupta and Jayant Sathaye assess the many challenges in India’s power sector. They tell us that India is riddled with large electricity and peak power shortages and at the same time is not endowed with large primary energy reserves in keeping with a growing population and increasing energy needs. Baseline projections suggest that the situation will become even worse. They describe various government initiatives aimed at overcoming these problems: stimulating competitive investment in generation and transmission, subsidies for rural electrification, and developing renewables to achieve a sustainable energy supply, among others. They argue that India ranks globally in the top five countries with maximum renewable power capacity.

We thank the authors for their valuable contributions. We, as engineers, can contribute much to the public policy discussion, as we are aware of the present and upcoming technologies and systems that will shape future energy supply. There are many opportunities for us to add to this discussion, and the overviews provided in these five articles can help us better understand where those opportunities will surface.