



## BOOK REVIEWS

*A SMART ENERGY POLICY: AN ECONOMIST'S RX FOR BALANCING CHEAP, CLEAN, AND SECURE ENERGY*, by JAMES M. GRIFFIN. (New Haven: Yale University Press, 2009) 193 pages, ISBN 978 0 300-3 14985-2 hardback.

Written for the non-economist but interested citizen, this book is one of the very best contributions in the exposition of the necessary tradeoffs that we as a country face in dealing with our energy future. Griffin makes it clear early on that there is no such thing as a free lunch and that to meet the trinity of goals stated in the title, we will have to compromise, face likely higher costs, and adjust our approaches and lifestyles. He notes the urgency of dealing with energy issues in the context of climate change and at the same time brings historical understanding and perspective given his thorough comprehension of US energy policy over the last four-plus decades. He is, moreover, exceptionally conversant with current environmental issues as they relate to energy decisions and policy. His is a calm and thoughtful voice on energy economics and policy that needs to be heard.

Griffin begins with an Introduction (An Overview from 30,000 Feet) that states his main objectives and conclusions. Six well-crafted chapters follow. In order, these are The Three Conflicting Goals of Energy Policy; The End of Cheap Oil?; Oil Security in an Increasingly Insecure World; Climate Change and the Search for Clean Energy; Climate Change and the Difficult Search for Institutions and Politics; and finally, A Smart Energy Policy.

The Introduction is a very basic read. It points out that in the author's view, US energy policy is "fatally flawed both in the *process* by which problems are identified and in the *solutions* that are chosen," with the result that the groups that are most vocal determine the myriad solutions proposed. Griffin points out that there are "inherent conflicts" in the attempt to realize cheap, clean, and secure energy, as the cheapest are often far from the cleanest, and the cleanest are far from the cheapest and limited in their applicability. The most secure, however measured, may be neither clean nor cheap. As a result, we have an energy policy that has evolved historically where some laws promote clean energy, others promote cheap energy, and others aim for secure energy, with little internal consistency in the specific legislation as applied to the two other goals.

These observations on conflicting energy-policy goals are not new. How to deal with them is something that Griffin as an economist is exceptionally good at doing. The key for him is getting the prices right for the various energies, to foster the kind of consumer and producer responses that will lead to a consistent energy outcome, and one far better than the current one composed of a plethora

of special subsidies and tax credits to win the “beauty pageant” for alternative fuels. He recommends taxes and a price-based energy policy. By that he means a combination of an oil-security tax and a carbon tax per ton of emissions to reflect the true social cost of energy use, thus limiting the potential for the Congress to pass legislation designed “to enrich particular private-interest groups.” His energy taxes would be revenue-neutral, offset by reductions in income and payroll taxes and increases in the earned-income tax credit. His oil-security tax proposal is firmly grounded in the notion that nations tend to under-invest in security since any one country cannot capture all the benefits of greater security. His proposal for a carbon tax, rather than a cap-and-trade regime, suggests that such a tax “establishes an observable price society is willing to pay for abatement,... and avoids the potential problem of uncertain and highly fluctuating prices of emission rights,” while at the same time it fosters a more level playing field for the development of new technologies. His carbon-tax proposal envisages a 4 percent per year tax increase above the overall inflation rate, with the result that the tax doubles in 18 years and quadruples in 36 years. This tax proposal is, in his view, a powerful incentive to a changed and complete turnover of long-lived energy-consuming equipment, as consumers and businesses have the lead time to make the necessary adjustments and introductions of new technologies.

The first chapter on the three conflicting goals of energy policy notes that US energy-policy history has been marked largely by “pork-barrel politics and an absence of imagination.” Griffin then proceeds to identify cheap, clean, and secure energy as the relevant goals of energy policy. Subsidies of various kinds appear to make energy cheap, but they are not the answer. How much are we as a society willing to pay to achieve these three goals? That is a difficult question for our citizens and the policymaker to answer. Griffin notes that the failure of existing energy policy is its inability to come to grips with this question.

In his second and longest chapter (40 pages), *The End of Cheap Oil?*, Griffin examines nine reasons for the oil price spikes of 2004-2006, including growth in Chinese demand, OPEC capacity limits, refining bottlenecks, shortage of low-sulfur diesel products, declining value of the dollar, greedy private oil companies, financial speculation, allegations of peak oil production, and OPEC support of prices. A basic issue is whether markets can be trusted to deliver cheap energy, and he suggests that no one of the nine reasons is particularly to blame – finger-pointing and blame-laying is largely useless – and that market prices signal scarcity and promote adjustment, even if the outcome is not necessarily cheap energy.

He then reviews the oil-market history since 1950, enunciating the role of market forces or their stultification since that date. In this review, he does a huge favor for the general reader who is probably largely unaware of how the international oil market developed over time as private international oil companies were either nationalized or forced out of equity participation in foreign producing countries from the 1970s. Continuing to focus on oil, he looks at the four key influences on long-term oil prices, which have always been and will continue to be world GDP growth rates, OPEC’s willingness and capability to expand pro-

duction and production capacity, the long-run price elasticity of demand for oil, and non-OPEC supply responses from both conventional and non-conventional sources. He concludes that while not perfect, markets have indeed worked well, but have been only fair at producing *cheap* energy. He notes that given the differences in short-run and long-run price elasticity of supply and demand, “price volatility is to be expected” and that there is little the government can do to counter price volatility without its short-term fixes leading to “deleterious long-term consequences.” He returns to the trio of goals, noting that a perceived era of high petroleum prices clearly changes the implications for achieving the goals of clean and secure energy, which could lead to more coal use with concomitant higher emissions.

In his third chapter, *Oil Security in an Increasingly Insecure World*, Griffin in just over 30 pages examines the geopolitical landscape of oil trade, comments on the economic ramifications of supply disruptions, notes the confusion on the topics of oil independence and petro-nationalism, and captures the “bathtub theory” of global oil trade and security. Noting that energy security primarily concerns oil focused on flows from the Middle East, Griffin suggests that the old Soviet-era paradigm that oil security is a foreign-policy problem no longer holds and that the US faces real constraints in what it can do to stabilize the Middle East. He notes four popular misconceptions pertaining to achieving oil security and proceeds to eviscerate them:

- “Oil independence would completely immunize the United States against the effects of an oil supply disruption;
- If oil independence is not possible, it is vital to import crude oil from secure countries;
- Special bilateral deals with oil exporters to lock up supplies provide a secure source of supply during disruptions;
- Emergency price controls can immunize the economy against the effects of a supply disruption.”

The first three capture the notion of petro-nationalism, which he defines as “the use of the coercive powers of the state to override the market...to gain... strategic advantage.” These are based on the false premises that the world will run out of oil with no substitute readily available (ignoring the role of price and technology in expanding supplies), and that markets are fragmented such that disruption effects are felt locally (ignoring that the oil market is a worldwide one and disruptions anywhere will affect prices everywhere). Bilateral deals can easily bow to market forces, where oil will flow to its most valued uses in the event prices rise. He correctly disagrees with the final point, citing the US price-controls experience of the 1970s as well as the post-Katrina hurricane time frame, where price controls or prohibition of “price gouging” during price shocks prevent the proper functioning of markets, which use prices to allocate scarce supplies to high-value uses.

Recognizing that oil-security issues need to be addressed on a worldwide level, he uses a bathtub analogy. He suggests that on a world basis many faucets

of oil flow into the global bathtub, while at the same time consumption draws oil out from the many drains of that same bathtub. Markets are the facilitators, as expectations of price changes lead to changes in inventory holdings. This occurs even without an official government Strategic Petroleum Reserve as an additional input faucet providing an insurance policy for emergencies. To enhance oil security through policy, Griffin suggests a multi-country security tax, thereby promoting worldwide oil conservation, fostering substitutes, and reducing import dependence. What size tax? He cites studies that estimate a tax of \$0.21 per barrel to over \$9 per barrel. Without international cooperation on such a tax, its burden would fall completely on the US. Emergency supplies are useful to have, while subsidies to products prices are counterproductive, encouraging demand, not limiting it.

In *Climate Change and the Search for Clean Energy*, Griffin offers a general discussion of “the science, economics, and engineering issues involved in climate change.” He notes that there is no perfectly clean energy without some negative attribute. The search for clean energy is largely a result of worries about carbon emissions and their impacts on climate change and global warming. Griffin states the need for careful benefit-cost analysis of carbon abatement and has no respect for those who would ignore such analysis, for in so doing they will not get the prices right now or in the future. He cites numerous studies that stress the uncertainties and gaps in knowledge of quantifying the benefits of carbon abatement and on addressing both the market and non-market damages from climate change.

While more is known about the costs of carbon abatement than the benefits, he notes that there is not as yet one dominant technology, and thus no magic bullet. Citing studies by the Electric Power Research Institute (EPRI) and Stanford University’s Energy Modeling Forum, he concludes that in the future we are likely to see a variety of alternative technologies to be used to address containing CO<sub>2</sub> emissions. His preferred least-cost strategy is to impose a carbon tax that rises over time at the rate of social discount, “causing abatement efforts to be much more intensive at higher tax rates in the future than in the present,” thus encouraging the development of new technologies. Griffin cites numerous research efforts that suggest that a carbon tax in the initial range of \$3 to \$7.35 per ton of CO<sub>2</sub>, rising over time, would affect long-lived investment (as the current capital stock is replaced) and drive the economy toward a low-carbon future.

In *Climate Change and the Difficult Search for Institutions and Policies*, Griffin shifts to a consideration of the political realities of winning international cooperation on global warming. Here the difficulties are legion, since all countries are not affected equally, interest in a problem that may not have serious impacts for decades is hard to marshal, steps taken to abate *emissions* may take years to contribute to lower CO<sub>2</sub> *concentrations* in the atmospheres, carbon-free energy is likely to cost substantially more than energy costs today, and poor countries may value economic growth far more than they do clean energy.

Griffin then reviews the Kyoto Protocol in both theory and practice, focusing on the four basic tenets of “universal participation, binding emissions targets and timetables for compliance, integrated emissions trading, and compensation of

developing countries to ensure their participation.” In theory, the tenets seem laudable, but in practice they have had serious defects, not least because of the absence of the US, China, and India as signatories, the lack of enforcement, and difficulties with the compensation to developing countries. Griffin suggests alternatives to Kyoto as we know it, which include limiting participation to a small group of high-CO<sub>2</sub> emitting industrialized countries and terms of greater accountability.

He feels that the prospects are promising for international cooperation in the developed world, and that there are means to bring along China and India to participate, which was not the case in the original Kyoto agreement. The methods of reaching the goals would include a command-and-control approach on energy-consumption standards, for example, subsidies for alternative fuels, tradable emissions standards, or a carbon tax. With an economist’s dissection of the first three, showing their costs outweigh their benefits, Griffin comes down favorably on a carbon tax. What this means to all of us is that the cost of energy will rise, and we must adapt, but at least we are likely to get the prices right as we move to a lower-carbon future world.

In *A Smart Energy Policy*, Griffin reiterates that balancing cheap, clean, and secure energy objectives will require major technological breakthroughs. That said, despite the uncertainties of the future, a number of alternative technologies are under consideration. But traditional technologies are generally cheap, and it takes a long time for new technologies to make significant commercial inroads into markets. Here emerges the role for policy, to push us a bit further, and these include the oil-security tax and the carbon tax. The former achieves oil security by reducing consumption (or by increasing the amount of secure oil in the mix). The latter establishes a price that society is willing to pay for CO<sub>2</sub> abatement and projects it over time for optimal investment decisions. Griffin concludes that getting the prices right essentially involves two numbers, the appropriate carbon tax and the appropriate oil-security tax. Both will reflect the true social cost of the use of fossil fuels, and will at the same time induce energy conservation and spur the development of alternative technologies.

So, the choices remain ambiguous, but prioritizing is a must, and costs and benefits are associated with any decision. Those who stress cheap energy will be unsettled by Griffin’s policy recommendations. Those who favor clean energy need to look carefully at the costs and benefits of the choices he sets out. These may not be the only ones to be considered, but he has laid down the gauntlet and asked his readers to consider and decide. One may argue about what is the right rate for a carbon tax or the right rate for an oil-security tax. That is a later step – what we need to establish is how we shall proceed to meet the triplet of goals he states. He demolishes the canards of energy independence and restates the Daniel Yergin comment that “Secession from the world (oil) market is not an option.” We as a country will have to learn to live with the constraints and policy goals we face. These are unlikely to be cheap, and we have to recognize that fact. This book follows in the tradition of Morry Adelman and others who have cautioned on government trying to run energy markets – they do best left alone with a basic

legal framework for operation. Griffin's book is a major contribution to the current debate and evaluation of energy policy and is to be commended greatly to all readers with an interest in the subject. I await this book in paperback form to assign to my energy students.

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***ANALYTICAL METHODS FOR ENERGY DIVERSITY AND SECURITY***, Edited by MORGAN BRAZILIAN and FABIEN ROQUES. (Amsterdam: Elsevier, 2008) Hardbound, 364 pages, ISBN-13: 978-0-08-056887-4.

Governments and regulators often advocate a well-diversified power generation mix in every expansion plan. The implicit assumption is that diversification provides a hedge against adverse movements in the different markets as well as in other risk factors. On the other hand, most traditional planning tools cursorily treat uncertainties (e.g. in the demand or the hydro inflows) if any and, therefore, lead to a more technologically homogenous system that most experts would consider as optimal. Clearly, a more systematic approach was needed. Shimon Awerbuch, recently deceased, pioneered the use of financial portfolio theory for generation-expansion analysis. This book, which is both contributed to by him and dedicated to him, elaborates on these issues.

The book bundles together fourteen contributions from scholars from areas including academia, government agencies, and consulting firms with training ranging from conventional economics to engineering. Many are from multi-discipline energy programs. The focus is on Mean-Variance Portfolio (MVP or Markowitz) theory, but there is also a significant amount material on real-options theory. Many, but far from all, of the authors are economists familiar with risk analysis and management tools used in the financial sector. The editors have divided the book in three parts dealing with the different analytical approaches to value diversity, the application of MVP theory to generation planning, and a mixture of novel applications to the power sector respectively. They are preceded by a general introductory chapter written by the editors that provides a short review of the literature, issues, and techniques subsequently discussed in the different chapters.

The first chapter by Andy Stirling, an archaeologist by training, is on "multicriteria" analysis of renewable electricity. It considers much more general risks than the rest of the authors, focusing on uncertainty (in the Knight sense) as opposed to quantifiable risk. The drawback is in resorting to qualitative approaches or, not wholly equivalent but closely related, heuristic risk and diversity

measures. Although it makes an interesting reading, it lies somehow outside of the main stream of the book.

Chapter 2 by Mark Bolinger and Ryan Wiser of Lawrence Berkeley National Laboratory deals with one of Awerbuch's favorites, namely, deployment of relative expensive renewable power plants as a hedge against fuel-price volatility. The point of view is that of a welfare-maximizing planner. The same techniques can be also used by a power company when deciding investments, as shown in chapter 3 by the editors. In any case, MVP theory does not capture the dynamic aspects of the companies' investment process that can be analyzed by using options theory in chapter 4 by William Blyth of Oxford Energy Associates.

The second part, which starts with chapter 5 by Awerbuch and Spencer Yang, tries to shed light on the efficient frontier of the EU power mix in 2020 where fuels and carbon prices and biomass costs are the main risk factors. Chapters 6, 7, and 8 have similar aims, focusing on the Netherlands, Scotland and Ireland respectively with each author a renewable energy specialist coming from the country considered. The writers predictably conclude that low-carbon (wind and maybe nuclear) technologies should be more widely deployed than in the amounts suggested by cost-optimization models, but they also provide quantitative estimates of the involved cost-risk trade-offs. I wonder if capital-cost volatility could affect, or even partially reverse, this finding. The section ends with chapter 9 by two American economists, Christiaan Hogendorn and Paul Kleindorfer, on renewable resource credits. No quantitative statements are done, rather a theoretical model is proposed and some policy recommendations derived from it.

The third and last part starts with chapter 10 by Boris Krey and Peter Zweifel, on efficient frontier computation for the USA and Switzerland. They contribute a more sophisticated analysis of the correlation structure of the risk factors (roughly the same ones treated in chapters 5 to 8). Chapter 11 by Roques, David M. Newbery and William J. Nuttall applies the theory to the analysis of the portfolio of a generation company in a liberalized market, providing interesting insights in its behaviour and its possible inconsistency with the optimally social investment decisions. Chapter 12 by Min Liu and Felix F. Wu deals with contracting in successive markets in order to reduce risk exposure. Chapter 13 by Serhiy Kotsan and Stratford Douglas is a first step in extending MVP to the spatial domain, by considering generation investment in several nodes of a given network (i.e. no transmission reinforcements). Finally, in chapter 14 by Dutch economists Adriaan van Zon and Sabine Fuss an interesting exercise of extending the MVP approach to the dynamic investment problem is made.

I think that this book should be read by anyone seriously interested in generation investment. An added bonus is that most contributors have clearly made an effort to clearly explain the issues without the advanced knowledge of economics, or other disciplines for that matter. That should facilitate its dissemination among all interested professionals. A parallel research line almost absent in the book's referenced literature is that of expansion models designed inside the engineering tradition. Although often economically naïve, they are in many

aspects extremely sophisticated. Blending of these traditions is, in my view, a task still to be done. I have remaining doubts about whether the book should have had a more focused approach on MVP theory and its extensions.

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