

## Book review

### **Turning numbers into knowledge: mastering the art of problem solving**

Jonathan G. Koomey, August 2001, 221 pages, 27 illustrations, 10 cartoons, trim 7 × 10”, price \$34.95 hardcover, ISBN 0-9706019-0-5

Modern industrial culture exalts efficiency, but when it comes to policy-making in the face of controversy and persistent uncertainty, one paradox almost always obtains: the more efficient the political process, the less effective the resulting policy. Powerful policy—policy that critical stakeholders and mass publics embrace as legitimate and authoritative—flows from a wonderfully inefficient process of public conversation, debate, and accommodation. Like that heated argument over politics in the neighborhood bar or the dinner-table dialogue on household expenses, collective conversation about issues that matter expands the public mind while engaging its creativity, and throws light on those dark places where narrow interests would congregate. Robust public participation in the policy-making process creates the kind of citizen that good policy requires. As [Hempel \(1996\)](#) reminds us in *Environmental Governance*, “it may be tempting, in the interest of time, to dispense with citizen education and community-based democratic deliberation and somehow construct the kind of enlightened authoritarian government that can act decisively on behalf of environmental protection and restoration”. But “such forms of friendly ‘eco-fascism’, in the name of sustainability, are themselves unsustainable”, for they do little to cultivate public sophistication and private accountability upon which wise policy and its effective, consistent implementation finally rests.

In this view, then, public participation is a powerfully transformative process. Take citizens who do not know much about power-plant siting, for instance, put them in the middle of a public debate about where to locate a thermal-electric facility, and they will come out of the process more appreciative of the nuances of the field than anyone would think possible. Yet, is this always (or even usually) the case? Are vigorous practices of community-based participation any better than elite-driven decision-making if the citizens doing the deliberating are unable to make sense of complex issues in ways that, at the very least, lead to good questions of policy architects? Surely some critical threshold of citizen understanding and engagement exists, below which public participation in the policy process becomes little

more than a pooling of ignorance and accumulation of prejudice. In these unhappy settings, well-organized interest groups can manipulate public sentiment with ease, typically through the distortion of accepted facts and viable choices. Policy makers, forced to sort out the mess, are too often reduced to selecting from a set of second- or third-best policies and obliged to staff eleventh-hour campaigns to set the record straight. Technopolitics scholar [Sclove \(1995\)](#) likely had this scenario in mind when he observed that a majority of VCR owners are too befuddled by their machine to correctly set its clock, and then asked if these same citizens could be counted on to productively participate in policy processes characterized by complexity, uncertainty, and controversy.

The answer, of course, is not to dismiss as utopian the hope for meaningful citizen participation in the work of policy design and implementation. Down that path lies piecemeal, largely ineffective policy dominated by narrow interests, not to mention a growing and corrosive cynicism about the value of meaningful citizen participation to the making of complex policy. Instead, scholars and practitioners of the policy-making process are better served by asking, repeatedly and with force, how the public’s ability to engage complex policy issues can be continuously bolstered and renewed—and then fostering, in ways consistent with their professional and personal position and interests, such capacity building.

In this project of taking public participation seriously, where would readers of *Energy Policy* turn for information and inspiration? One obvious source of citizen capacity is the secondary and higher education classrooms, and a growing literature offers a window into how classroom work can cultivate the skills of public participation. In their heralded *Where’s the Service in Service-Learning?*, [Eyler and Giles \(1999\)](#) show how “service-learning” in higher education acclimates students to the demands of citizenship in a technically complex world. [Reeher and Cammarano \(1997\)](#) go further by describing, in their *Education for Citizenship*, an array of ideas and innovations in political learning at the college level. And, in [Maniates’s \(2002\) \*Encountering Global Environmental Politics: Teaching, Learning, and Empowering Knowledge\*](#), 14 teacher-scholars outline specific ways in which university students and teachers, working together in the classroom, can develop the capacity and passion for engaging technically complex and potentially

overwhelming challenges of energy and environment. Policy makers whose own work depends, directly or less so, on the ability of citizens to constructively participate in the policy process will find any of these books useful as a gateway to the larger literature.

Citizens cultivate their participatory skills in less formal ways, though, and the diligent policy maker should be aware too of these possibilities. Chronicles like Lappé and Lappé's (2002) *Hope's Edge* or guide-books such as the Rocky Mountain Institute's *Community Energy Workbook* (Hubbard and Fong, 1995) imagine the community as the classroom, and have successfully inspired regular citizens to roll up their sleeves and engage in the hard but fulfilling work of expanding their technical, scientific, and democratic competencies. And accessible paperbacks like Shenk's (1998) *Data Smog* and Huff's (1993) *How to Lie with Statistics* offer sound advice and prudent caution to the citizen-activist who would wade into the data-infested waters of technical controversy.

As important as these publications (and the literatures they represent) are, they suffer from a grave deficiency: they say little about how one might best go about organizing, analyzing, and framing—with integrity—the quantitative data that permeate the energy policy-making process. This should not surprise. The idea of drafting a “citizen's primer” that speaks to the best strategies for filing important data, offers tips for writing engagingly about technical issues, or elaborates a process for drawing elegant insights from messy data sets is enough to intimidate most author-analysts. Yet, after years of work, Dr. Jonathan Koomey, a Staff Scientist and Group Leader at Lawrence Berkeley National Laboratory in Berkeley, California, has produced a volume (*Turning Numbers into Knowledge: Mastering the Art of Problem Solving*) that fills the breach. It deserves the attention of policy makers everywhere who understand the broad value of effective public participation but have suffered through too many public hearings dominated by a well-intentioned but quantitatively illiterate (and ultimately ineffective) citizenry.

A major figure in the energy-efficiency research and policy community, Dr. Koomey (2001) could have written a book for policy elites on the arcane details of energy analysis and policy-making. Instead, with *Turning Numbers into Knowledge*, he chose to craft a volume that speaks to the neophyte: the beginning citizen-activist, the advanced undergraduate and beginning graduate student, the lay community researcher, the person taking an entry-level job in policy-making and looking to make a difference. Remarkably, the book also has much to say to the accomplished policy practitioner. Koomey's democratic sensibilities and his intuitive sense of the yawning gaps in the current literature are to be applauded.

The book encompasses 38 chapters divided into five parts: Things to Know, Be Prepared, Assess Their Analysis, Create your Analysis, and Show your Stuff. The early chapters (in “Things to Know” and “Be Prepared”) highlight the importance of examining one's beginning assumptions and framing ideologies. They also provide a tight overview of the practice of science and the peer review process, and then shift to practical matters like the architecture of an effective office filing system, the important data sources in the field, and strategies for making productive use of one's time. These topics may seem mundane (“a book that talks about office filing systems?”, one may ask), but Koomey carves through them with a prose style both engaging and informed. And why, after all, must young policy analysts and emerging citizen activists learn these tricks of the trade the hard way, through trial and error, as did undoubtedly so many of us now working in the policy realm?

All this is set-up, though, for parts three and four of the book (“Assess Their Analysis” and “Create your Analysis”), which stand as the intellectual core of the volume. It is here that Dr. Koomey brings to bear his decades of experience as an energy-policy analyst to teach his reader how to “do” analysis. Unlike other authors, though, who would quickly plunge their readers into the details of various standard techniques of data mining and crunching, Koomey asks his reader to first become practiced in parsing the analysis of others. It is as if, in his own professional life, he has grown tired of analysts whose accomplished command of a narrow set of powerful analytic techniques remains untempered by the talent to see a problem from multiple vantage points (a “beginner's mind”, Koomey writes) in search of its simplest, most elegant solution. Cartoons, real-world anecdotes, web links, portions of actual data sets, published analyses of energy choices, in-text links to other portions of his book, and lively prose: Dr. Koomey employs them all to push his reader towards an intuitive ability to read tables and graphs with a sharp eye; distinguish facts from values in technical debates; recognize degrees of uncertainty and reliability in quantitative analysis, especially when they may be hidden from view; and sift through media images and highly processed survey data for kernels of credible insight. Clearly, *Turning Numbers into Knowledge* is first and foremost about fostering agile analytic skills, independent of specialized command of any single analytic tool.

Once finished with the tough business of getting its reader to think analytically, *Turning Numbers* turns to the more straightforward work of outlining the pros, cons, and nuances of the dominant analytic tools in the field. Eleven of the book's 38 chapters focus specifically on how to uncover hidden or difficult-to-find data (and why such detective work is especially important), create

consistent data comparisons, judiciously employ the methods of model making and forecasting, frame narratives that highlight the most important data at hand, and proceed analytically in the face of contentious debate and persistent uncertainty. Readers searching for a meticulous description of the inner workings of model-building or statistical analysis will need to read beyond *Turning Numbers* to find the detail they seek—but their subsequent analysis will nevertheless be well-served by a close reading of Dr. Koomey's book.

The closing chapters of *Turning Numbers* (Part Five: “Show Your Stuff”) offer valuable advice and specific tips for presenting technical information to diverse audiences. For many readers, especially more seasoned analysts who are revisiting their skills of public presentation, this section alone is worth the price of the book. Throughout these final pages, however, as in many chapters of his book, Dr. Koomey struggles to speak at once to three principal audiences—the advanced undergraduate, the new policy analyst, and the seasoned professional. Sometimes, what he has to say is immediately relevant to only one or two of these audiences; at other points, his insights speak with power to all three. This unevenness in implied audience is sometimes distracting, and a better book might have imagined a narrower readership. In the end, though, this is a small deficiency. By explicating in accessible *and* challenging detail the nuts and bolts of “critical thinking” and illustrating the essentials of quantitative analysis, Dr. Koomey has provided a great service. His book deserves to be widely read and shared, especially by those who take seriously the fragile yet critical role of

an informed citizenry in increasingly complex democratic societies.

*Note:* Data files and information sources discussed in the book, as well as sample chapters, reviews and ordering information are available at [www.numbersintoknowledge.com](http://www.numbersintoknowledge.com)

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