

## New Initiatives in North American Energy Cooperation<sup>1</sup>

By Joseph M. Dukert\*

In June 2002, the Natural Resource Ministry of Canada and the energy secretariats of the United States and Mexico took a giant *symbolic* step (and a smaller but useful *substantive* step) in the evolution of a more effectively integrated continental market for natural gas, electricity, oil, and related technology. Exactly one year after the formation of a North American Energy Working Group (NAEWG), they released a joint document entitled *North America: The Energy Picture*.

Although this document is available on the websites of all three energy departments (in English, French, and Spanish)<sup>2</sup> and a more comprehensive version is already in the planning stage for publication next year, it has attracted relatively little attention. It has not yet received nearly as much analysis and commentary as it merits, either inside or outside government – although more should come at the next North American Conference of the IAEE in Mexico City in October.

By itself, “Energy Picture” may be just a blip in the development of the broadest regional energy market in the history of the world – which in recent years has already amounted to more than \$50 billion a year. But the publication points up the special role that governments can play, even in a relatively free international market. Even though the NAEWG has no “authority” on its own<sup>3</sup>, it also is proving the value of good-faith international dialogue – once mutual confidence can be established.

Joint projects are being developed trilaterally through the NAEWG in such areas as the modeling of large-scale transportation networks – a capability that can ultimately be a factor not only in trade but also in the protection of critical energy infrastructure. A workshop has been scheduled this spring to discuss specific problems of electricity exchange across the southern U.S. border. The U.S. and Canada already have extensive capacity for power exchange (although both could take fuller advantage of *north-south* ties if they strengthened their *east-west* connections). The main trade push for the future up north will be for more natural gas pipelines rather than powerlines; and a subgroup of the North American Working Group is beginning to focus on regulation of gas movements.

By the time this article reaches most readers the full NAEWG should be meeting for the fifth time – this time in Canada (after two sessions in Washington, one in Mexico City and another earlier one in Ottawa). It has already published a side-by-side comparative summary of regulations within the three countries affecting international electricity trade<sup>4</sup>; and dialogue on energy efficiency standards and labeling has helped produce analogs to the U.S. Environmental Protection Agency’s successful “Energy Star” program in both Canada and Mexico.<sup>5</sup> Minimum energy performance standards (and test procedures) are now identical or very similar in all three countries for refrigerators, freezers, and both central and room air conditioners; and commonality is anticipated in the near future for dishwashers, clothes washers, and both fluo-

rescent and incandescent lamps. The Science and Technology subgroup has held a series of useful teleconferences and has brought together research directors from the three countries repeatedly. These meetings (one of which I attended in Washington) have been remarkably businesslike and down-to-earth. For instance, one area being emphasized is equipment used to convert AC flows of electricity to direct current and then back to alternating current. This is critical at border interfaces where adjoining grids are not synchronized; and improvements might thus be helpful in beefing up east-west connections (e.g., between Quebec and Ontario, or the Eastern and Western Interconnections in the United States) as well as in north-south international trade.

Given the nationalistic traditions on energy in all three countries, virtually no one could have predicted 15 years ago that their respective federal governments would agree to look at the continent as a potential energy *unit*. That’s what “Energy Picture” purports to do; and – although it doesn’t fully succeed – it establishes a platform from which to do so. At the same time, states and provinces are well on their way to exploring and bolstering means of energy cooperation in both national and regional contexts.<sup>6</sup> The North American Electricity Reliability Council has taken a more vigorous continental stance, and this has led to a variety of contacts between NERC and NAEWG. The Federal Energy Regulatory Commission (FERC) – besieged by state complaints about its efforts to introduce the concept of a Standard Market Design (SMD) – is nevertheless dedicated to Regional Transmission Organizations that somehow accommodate national borders while recognizing that power can flow fruitfully across them in both directions.

While the situation holds enormous potential, it should not be hyped. In only a few years there has been surprising progress, an *interruption* to progress, and now a *resumption* of progress toward an integrated North American energy market – a sequence that will be discussed later in this article. This has huge economic, environmental, and geopolitical implications for the long run that deserve objective analysis; and “Energy Picture” (which generally brings together data for the Year 2000) establishes an officially agreed-upon benchmark from which to measure future assessments.

An energy analyst or policymaker should not expect to find conclusions and recommendations in the document. Those are left to the reader, who in many cases must search out unexpressed relationships between data in different sections . . . or even use the information there to draw thoughtful comparisons with other sources. Nevertheless, the value of the publication – especially as background for the Mexico City IAEE Conference – can hardly be exaggerated.

North American energy trade is (and will always remain, in part) a series of common-sense regional markets – some of which overlap international borders. A truly continental market built upon them can optimize benefits. But envisioning the *best* future courses of action (for the private sector as well as government) requires that we know “who has what”, “how much”, and “what kind”. Unfortunately, this has been hard to pin down . . . because national statistics are often incompatible. Although projections by the three partners in “Energy Picture” of their respective energy supply and demand between 2000 and 2010 proceed from somewhat different sets of assumptions, at least these are stated. Equally important is the fact that common units of measurement are used throughout.

One unfortunate shortcoming in this “first edition” is that

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<sup>1</sup> See footnotes at end of text.

only two pages of text are devoted to energy *demand* and there is no breakdown of fuel preference or demand volume by consumption sector. That will apparently be remedied next year. If we hope to continue improving energy efficiency, we should also know “what *sorts* of energy we consume”, “how much”, and “how” – now and (in so far as we can anticipate) over the next decade or two. Even a simplistic comparison, based on EIA’s “Country Analysis Briefs”, shows that differences in gross energy use by sector raise interesting questions.

**Percentage of Energy Consumption by Sector  
(NAFTA Countries, 1998E)<sup>7</sup>**

Country	Residential	Commercial	Industrial	Transportation
Canada	17.7	15.5	48.0	18.9
Mexico	15.9	04.6	54.7	24.8
United States	19.4	15.8	38.2	26.6

Why does such a geographically spread-out country as Canada (with population nevertheless highly urbanized and concentrated pretty much in a narrow east-west line) devote such a relatively small share of the energy it expends to moving goods and people around? If Mexico’s residential and commercial sectors are as scanty in energy use as they seem to be, should energy policy (and assistance) focus as much on increasing popular availability as almost anything else? With the United States expending about three-fifths of its energy on the transport and combined residential/commercial sectors, does this add impetus to energy efficiency standards for buildings and vehicles?

A five-year-old comparison such as this is obviously less than ideal, but this only highlights the need for up-to-date official statistics from all three countries, using common definitions for sectoral breakdowns. The office of Mexico’s Undersecretary for Energy Policy and Development publishes detailed data on an annual basis (see *Balance nacional de energía 2001*); but it cannot be compared directly with the four consumption sectors shown here (and used generally by U.S. DOE). The Mexican figures separate Farming (*Agropecuaria*) from Industrial, and they lump Residential and Commercial use.

The United States is a giant in the North American trio – in population, in wealth, and both as an energy producer and an energy consumer (see table). We (as the major customer) have doubled our net imports of all forms of energy in barely a dozen years – from less than 12 quads to more than 25 quads. In 2000, 36 percent of those imports came from our NAFTA partners. They account for about 15 percent of all the oil and natural gas consumed by the United States.<sup>8</sup>

**Major Forms of Primary Energy Consumption  
(NAFTA Countries, 2000)<sup>9</sup>**

Country	(Quadrillion Btu)				
	Petroleum	Natural Gas	Coal	Hydro	Nuclear
Canada	4.05	3.37	1.49	3.17	0.78
Mexico	3.90	1.46	0.25	0.34	0.08
United States	38.40	23.11	22.5	3.09	8.01

U.S. gas imports from Canada have grown every year since 1986, more than quintupling. Canada sends us half of its total production of natural gas (now exporting nearly 4 tcf and importing about 175 bcf annually) and perhaps as much as

two-thirds of its crude oil production (more than 1.4 mmbd out of 2.1 mmbd in 2002, according to preliminary estimates).<sup>10</sup> In addition, Canada provides roughly 500,000 bbl/day of refined petroleum products – a volume that seems destined to grow in the future because of U.S. difficulties in adding to its own refining capacity.

Still, the story isn’t *just* U.S. imports. Mexico has long been one of our leading oil suppliers; but it depends increasingly on U.S. and Canadian natural gas, not to mention gasoline and some electricity from Texas. Last year, total U.S.-Mexican gas trade was the highest in history (although still only about 250 bcf), of which almost all goes south. In respect to electricity, Alberta and Saskatchewan are consistently *net importers* from the Lower 48,<sup>11</sup> and virtually all Canadian provinces count on U.S. electricity at times during each year. Although “Energy Picture” doesn’t mention the fact, National Energy Board statistics<sup>12</sup> show that in recent years Canada has traded more electricity with the United States than across its own domestic provincial boundaries.

“Energy Picture” should have noted that much energy trade *fluctuates* in either direction across these borders. Map callouts on page 32 reveal that in 1999 the overwhelming flow of electricity was southward from British Columbia, Manitoba, Quebec, and the Maritime Provinces; but Alberta, Saskatchewan, and Ontario all received substantially more electricity from the Lower 48 than they sent south. Interprovincial electricity trade in Canada is relatively undeveloped, and recurrent variations in demand, plant readiness, and precipitation make two-way, north-south commerce not only economical, but at times essential to maintain reliable supply.

Maps constitute a vital part of the NAEWG document, complementing the energy production and trade data. They show the location and estimated size of oil, gas and coal reserves, as well as interconnections for both gas and electricity. They also display the impressive potential of Canada’s Maritime Provinces. Reserves of conventional oil in Newfoundland and Nova Scotia rival the light oil still in Alberta (the country’s energy leader). As for Canadian natural gas, the New England market beckons; and the text describes current and planned projects (some subsea) to deliver that fuel. It takes only a bit of imagination to envision an “in-and-out” hub in central Pennsylvania that could tap widespread and distinct sources – western Canada, eastern Canada, the Gulf Coast of the U.S., and perhaps even the Burgos Basin of northeast Mexico – to satisfy complementary demand in all three countries.

U.S. reserves of natural gas are large (167 trillion cubic feet, compared with Canada’s 92 tcf); but Mexico’s are fairly limited, based on exploration to-date (only 30 tcf). By contrast, Mexico leads in *conventional* oil reserves (24 billion barrels, followed by 22 billion bbl in the United States and only 4.4 billion bbl in Canada). Canada’s wild card is its “vast reserves of oil sands, of which about 308 billion barrels are economically recoverable”.<sup>13</sup> Discussions with U.S. government and corporate geologists have convinced me that this whopping estimate is credible. We ought to weigh its ramifications in long-range energy policy planning.

Canada’s oil sands appear to contain 2.5 trillion barrels of oil, of which about one-eighth is considered recoverable with today’s technology and economics. With development costs ranging now between \$9 and \$13 per barrel, oil sands production has already reached 658,000 bbl/day, with about 60

percent being exported to the United States in 2000. But environmental implications need to be evaluated, and the upfront costs are steep. With more than \$20 billion (U.S.) in new projects announced for the next few years, Canada's National Energy Board has projected a production rise to 1.6 mmbd from oil sands by 2015.<sup>14</sup> Yet Deutsche Bank's analysts go well beyond that. Its *Oil and Gas Abacus* publication of May 27, 2002, cited \$86 billion of planned industry spending and forecast as much as 4 mmbd from Alberta oil sands by 2010. It remains to be seen how much Canada's ratification of the Kyoto Protocol will dampen investor enthusiasm.

*Could* Canada some day be as dominant in continental oil as the United States is in coal? Is "energy independence" a prospect on a North American basis? The NAEWG document reaffirms that we are essentially independent as a continent now in gas, coal, and electricity. But the problem is still *oil!*

"Energy Picture" never touches this politically sensitive matter; but (as is frequently the case) a determined reader can pull together supply and demand figures from different sections of the report. They indicate that continental oil independence is certainly *not* realistic within this decade or probably the next, or the one after that. In fact, if the projected shortfalls between oil production and oil consumption for all three countries are combined, the total rises – from 8.7 mmbd in 2000 to 11.1 mmbd by 2010.

The situation with natural gas is less clear in "Energy Picture" – which oddly omits any demand projections at all for that fuel. The overall outlook is bright if one accepts EIA's reference case projection of 33.9 tcf in annual North American consumption by 2010.<sup>15</sup> But there are grounds for caution: 1) "Energy Picture" projects U.S. gas production as rising between 18.6 and 23.7 percent over 10 years – which will take lots of capital investment, despite today's risk-averse atmosphere. 2) Canada's gas production (and exports) are seen growing at almost the same speed. Yet this assumes that the scattered recent cries for "Canada First" in energy supply won't be allowed to violate the "proportionality" pledge of the Canada-U.S. Free Trade Agreement. 3) Mexico's official projection in the trilateral document (nearly doubling by 2010, to 3.2 tcf)<sup>16</sup> surely reflects the confidence of President Vicente Fox that foreign multi-service contracts for the development of Mexico's Burgos Basin will be approved by the national legislature and upheld by the Supreme Court.<sup>17</sup> Neither is a certainty.

Statistics in this report reveal (but don't draw attention to) the significant disparity among the three countries in both generation capacity and electricity production. The U.S. figures are almost 7 times as large as Canada's and more than 20 times those in Mexico. Perhaps the "Energy Picture" should also have explained that power generation consumes more than one-third of all primary energy expended on the continent. Because of U.S. predominance in the combined statistics, more than 45 percent of all North American electricity is coal-based – although, relatively speaking, Canada's smaller output depends even *more* heavily on hydroelectricity.

Mexico's government monopoly in electricity has been shifting from heavy oil to natural gas, for environmental and other reasons – both through unit conversions and the addition of capacity (largely via private investment and long-term supply contracts, rather than direct government construction). The report fails to note this . . . or a similar trend toward gas-fired generation in the United States. It does mention in

another section Canada's "plans to expand hydropower generation in Quebec and Newfoundland"; but it says nothing about plans in the province of Alberta to increase its coal capacity by 30 percent (implying more coal generation). Ontario is Canada's other largest coal-burning province; and it has announced a goal of switching from coal to natural gas at some plants, although the commitment is somewhat vague and no switching has yet taken place at its largest coal plant (Nanticoke).

Early last year, Mexico's Under Secretary of Energy for Policy and Technology predicted that Mexican requirements for natural gas would grow at an annual rate of more than 8 percent for the next decade . . . and that domestic gas production would supply only 80 percent of this requirement by 2010.<sup>18</sup> This sets the stage for more new pipelines, tech transfer, and additional investment. It might even encourage agreement among Mexican legislators about the advantages to their own country of certain energy reforms.

The lack of any reference in "Energy Picture" to the environmental effects of energy production and use is understandable, since it was undoubtedly a challenge to win trilateral acceptance of the "hard" data that *are* included. Nevertheless, planners and analysts ought to complement this basic document on their own. Water use is endemic to oil sand development. Land rights play a role in most regulatory hearings. Emissions are a factor that must be considered in every form of fossil-fueled generation, as well as transportation.

*Some* useful data on energy and environment have been developed by the trilateral Commission for Environmental Cooperation, which was established in a side agreement to NAFTA. By painstakingly analyzing each generating location in North America, the Secretariat of the CEC managed to draw credible comparisons among Canada, Mexico and the United States in plant emissions for a single year (1998); and these add a thought-provoking dimension to "the Energy Picture". They showed Mexico's electricity sector at that time<sup>19</sup> releasing nearly as much NO<sub>x</sub>, CO<sub>2</sub> and mercury as Canada – and more than two and one-half times as much SO<sub>2</sub> – despite the fact that Canada produced three times as much power as Mexico.<sup>20</sup> This year, Environment Canada has announced it will begin to publish up-to-date records of emissions of SO<sub>x</sub> and NO<sub>x</sub> by individual plants,<sup>21</sup> and this will undoubtedly facilitate such "scorekeeping" in the future.

As noted earlier, Canada depends largely on large-scale hydroelectricity (which may have other environmental drawbacks, but emits no pollutants), while boiler plants (many using high-sulfur, heavy domestic oil) predominated in Mexico up to the late 1990s. Of course, emissions from U.S. units dwarfed both those countries because their electricity production is so much greater. Fortunately, the CEC was briefed by the NAEWG last summer; and there is now at least a vague commitment to "pursue . . . efforts in a complementary fashion."<sup>22</sup> There has even been some talk recently of inviting CEC representation at a future NAEWG meeting.

For all the publicity accorded to wind, solar, and biomass energy, non-hydro renewables have played a minor role in North American energy balances; and they aren't projected to do much more between now and 2010. Even if the U.S. Congress passes a Renewable Portfolio Standard with a target-date of 2020, the nearer-term effects would probably be modest. On the other hand, much might be said for an all-out

effort in tech transfer to develop “appropriate technology” in Mexico – which would have spinoff value for all three NAFTA partners.

Taken together, the sections of “Energy Picture” devoted to “Infrastructure” and “Legal and Policy Frameworks” provide a quick survey of where the continental market stands, where it might head, and some of the barriers that remain. For instance, “North America’s oil industry operates within an array of different national, state and provincial laws.”<sup>23</sup> The same could be said about natural gas, electricity, and even renewable energy. If anything, the influence of public utility commissions and other *sub-national* bodies over the production, delivery, and use of energy in this country is somewhat underplayed in this document. But it does show that Canadian provinces have even *more* say about how energy is to be produced and consumed than U.S. states – which, in turn, are far more powerful in this respect than the states of Mexico.

Originally, the major moves toward North American energy integration came through *private-sector* initiatives – although they had to be facilitated by government. There has never been a “master plan”, and none was needed for relatively free market forces to begin to work. That’s good, because a fully homogenized approach may never be feasible politically. Pemex is not going to be privatized, the Canadian provinces will continue to buck Ottawa in energy matters, and U.S. Governors and Senators are not likely to surrender their very real influence on national energy policy. Still, the North American energy market as it stands now is living proof that mutual benefits can come from a thoughtfully cooperative approach.

BUT there have also been *problems*, especially over the past couple of years, as hinted above: 1) the California energy debacle (which splintered public faith across all three countries in market pricing), 2) the disintegration of Enron (which disgraced electronic trading in the eyes of many), 3) the serious economic troubles of the “new” merchant energy enterprises that had blossomed (which forced them to shed complementary assets and closed the window on badly needed risk capital); 4) the new threats of terrorism and war (which diverted the attention of both the public *and* private sectors from this experiment in regional cooperation), and, finally, 5) the legislative logjams in all three countries in respect to “logical next steps” to strengthen and expand the market.

These aren’t the only problems either; yet the fact that the giant North American energy market has been treading water for the past couple of years instead of displaying as much fresh expansion as it did earlier does not mean that gas pipelines and power lines built and undertaken prior to 2000-2001 are going to be abandoned and overgrown. The NAEWG’s willingness to show initiative instead of bureaucratic torpor is a welcome sign of renewed life . . . in that the three governments themselves are now treating the vision of trilateral energy cooperation as real rather than rhetorical.

*Oil* trade among the three NAFTA neighbors grabs most of the headlines – particularly during periods of unrest in the Middle East and Venezuela; and that is largely one-way, in the direction of the United States. But well over \$20 billion a year of North American energy trade is commerce in natural gas and electricity, moving back and forth. In fact, it has been the *convergence* of the gas and electricity industries that always offered the most potential for future growth. This has been augmented . . . 1) by electronic trading, 2) by treatment of both

electricity and gas as *commodities* under NAFTA and in the derivatives market, and 3) by a general move in all three countries toward market pricing and the “unbundling” of production, delivery, and end-use distribution. The unsettling retreats on some fronts have been cause for concern; but this should only heighten interest in two plenary sessions at our October North American Conference. One is entitled “Continental Trade and Transportation: Forward or Reverse?” A second will address the question “Gas and Power – Convergence or Divergence?”

The NAEWG mechanism is far from perfect. It is probably still too much of an inward-looking body in each country, although there are increasing contacts with governors, the private sector, and even the numerous departments and agencies at the federal levels that are concerned with energy policy. U.S. representation on the NAEWG may be strengthened especially by signs of closer liaison between DOE and higher echelons of the State Department<sup>24</sup>. It would also be immensely helpful, of course, if active cooperation developed between the NAEWG and the Council for Environmental Cooperation; but that may not be in the cards. Apart from disagreements over “turf”, the two bodies are at different hierarchical levels.

Furthermore, a *trilateral* approach is not always the most appropriate one. For example, Mexico will have to work out *its own* way to encourage more investment where needed – whether by reforms in the fiscal condition of Pemex and its national electricity entity, implementation of contractual devices that can attract private risk capital, or both. The U.S. Congress must be more serious and imaginative in drafting comprehensive new energy legislation. Canada will have to wrestle *by itself* (I almost wrote “*with itself*”) over how it can address the commitments Prime Minister Chretien has made through ratification of the Kyoto Protocol.

Governmental action (joint *or* unilateral) is only part of the unfolding story. Resumption of rapid progress in successful energy interdependency depends largely on strong economic recovery. Yet the new form of focused governmental cooperation in a traditionally sensitive area through the mechanism of the NAEWG can accomplish a great deal – say, over the next 8 to 10 years. Ultimately, this serves basic energy policy goals of all three countries – more reliable, efficient, affordable, environmentally acceptable means of producing, delivering and applying energy in all forms.

#### Footnotes

<sup>1</sup> This article is an update and extension of a paper presented by the author at the 2002 IAEE North American Conference in Vancouver. He welcomes comment at dukert@erols.com.

<sup>2</sup> *North America – The Energy Picture*, prepared by the North American Energy Working Group, June 2002. A limited number of printed copies of the trilateral document have been issued; but it was made available quickly on the internet at <http://www.nrcan.gc/es/energypicture/index.html> and later at <http://www.eia.doe.gov/emeu/northamerica>. The document index at the Mexican Energy Ministry’s site is at <http://www.energia.gob.mx/sener/docs>. Some discrepancies that appeared in the printed version have been corrected on the Internet. In the rest of this paper, the document will be cited simply as “Energy Picture” – with pagination based on the printed version.

<sup>3</sup> NAEWG derives *some* bureaucratic clout within the three countries from the fact that each of the national units is acting under presidential or prime ministerial directive.